ACM TM INTEGRATION

Project report submitted in partial fulfillment of the requirement for the degree of
Bachelor of Technology

in

Computer Science and Engineering/Information Technology

By

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Under the supervision of

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to

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CERTIFICATE

I hereby declare that the work presented in this report entitled **"ACM TM Integration"** in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering/Information Technology** submitted in the department of Computer Science & Engineering and Information Technology**,** Jaypee University of Information Technology Waknaghat is an authentic record of my own work carried out over a period from February 2019 to May 2019 under the supervision of **Abhishek Garg** Development Manager, SAP Innovative Business Solutions, **SAP Labs India Pvt. Ltd. Delhi**.
The matter embodied in the report has not been submitted for the award of any other degree or diploma.

(Student Signature)
Danish Wadhwa, 151347.

This is to certify that the above statement made by the candidate is true to the best of my knowledge.

Abhishek Garg
Development Manager
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Dated: 21/5/2019

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I perceive this opportunity as a big milestone in my career development. I will strive to use gained skills and knowledge in the best possible way, and I will continue to work on their improvement, in order to attain desired career objectives.

Sincerely,
Danish Wadhwa

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

This document describes the basic architecture for SAP Focused Business Solution "ACMTM Integration" (working title, OneVoice tbd). The FBS will provide an integration between SAP S/4 components Agricultural Contract Management (ACM), Trader's and Scheduler's Workbench (TSW) and Transportation Management (TM) for specific business processes. ACM and TSW are part of the S/4 industry layer (IS-OIL) whereas TM is part of S/4 Core. The FBS will only support system internal integration, a side-by-side deployment with a separate TM installation is not supported.

Technically, the FBS will be delivered as a modification free ABAP AddOn to SAP S/4 1809 FP2. The main architectural challenges are

- Provision of enhancements to underlying components ACM, TSW and TM without introducing technical dept: No modifications, minimal use of implicit enhancements.
- No reduction of customer enhancement options after AddOn installation (e.g. do not implement single use BAdIs, no not use WebDynpro customizing layer).
- Integration architecture: Synchronous integration within the S/4 system is preferred. Fallback to asynchronous integration / queueing is required in case of technical locks or when processing high data volumes.
- No impact on existing standard processes after AddOn installation.

Designs and requests for additional enhancement options (e.g. internal BAdIs) will be aligned with the underlying standard components and the use of implicit enhancements will be strictly controlled. All enhancements to the standard components will be reviewed to ensure that there is no negative impact on existing functionality.

Chapter-1 INTRODUCTION

1.1 Introduction

The ACM TM integration project is all about creating a Focused Business Solution by integrating SAP Modules Agricultural Commodity Management, Trader's and Scheduler's Workbench and Transport Management.

1.1.1 Enterprise Resource Planning

Enterprise Resource Planning (ERP) is an integrated management of key business processes, usually in real time and through software package and technology.
ERP typically is sometimes known as a class of enterprise management software package - usually, a package of integrated applications - that a corporation will use to gather, store, manage and interpret knowledge from several business activities.

ERP provides an integrated and up-to-date show of basic business processes victimization common databases supported by the management system. ERP systems track business resources - money, commodities, production capability - and standing of business commitments: orders, purchase orders and wages. The applications that form up the system deliver knowledge between completely different departments (production, purchase, sale, accounting, etc.) that deliver knowledge. ERP facilitates the flow of knowledge between all business functions and manages relationships with external stakeholders.

Enterprise system software package may be a multi-billion greenback business that produces elements that support varied business functions. investment in it's become the biggest class of investment payment in North American country firms over the last decade. though early ERP systems have centered on massive businesses, smaller businesses square measure more and more victimization ERP systems.

The ERP system integrates completely different structure systems and facilitates perfect transactions and production, increasing the organization's potency. However, the event of the

ERP system differs from the normal development of the system. ERP systems care for completely different configurations of element and networks, typically victimization the information as a storage register.

ERP systems are on paper supported business best practices, and their manufacturers intend that organizations deploy them "as is". ERP vendors do provide customers configuration choices that allow organizations to incorporate their own business rules, however, gaps in options typically stay even once the configuration is complete.

ERP customers have many choices to reconcile feature gaps, every with their own pros/cons. Technical solutions embody editing a part of the delivered software system, writing a native module to figure at intervals the ERP system, or interfacing to Associate in Nursing external system. These 3 choices represent varying degrees of system customization—with the primary being the foremost invasive and dear to keep up as an alternative, there are non-technical choices like ever-changing business practices or structure policies to raised match the delivered ERP feature set. Key variations between customization and configuration include:

Customization is often nonobligatory, whereas the software system should always be organized before use (e.g., fixing cost/profit center structures, structure trees, purchase approval rules, etc.).

The software system is intended to handle numerous configurations and behaves predictably in any allowed configuration.

The result of configuration changes on system behavior and performance is predictable and is that the responsibility of the ERP vendor. The result of customization is a smaller amount predictable. it's the customer's responsibility and will increase testing activities.

Configuration changes survive upgrades to new software system versions. Some customizations (e.g., code that uses predefined "hooks" that are known as before/after displaying information screens) survive upgrades, though' they need retesting. different

customizations (e.g., those involving changes to elementary information structures) are overwritten throughout upgrades and should be re-implemented.

Customization blessings embody that it:

- Improves user acceptance
- Offers the potential to get competitive advantage vis-à-vis firm's victimization solely commonplace options

Customization disadvantages embody that it may:

- Increase the time and resources needed to implement and maintain
- Hinder seamless interfacing/integration between suppliers and customers because of the variations between systems
- Limit the company's ability to upgrade the ERP software system within the future
- Create over-reliance on customization, undermining the principles of ERP as a standardizing software system platform

1.1.2 SAP IS- OIL and GAS

1.1.2.1 SAP ACM

1.1.2.1.1 Product

Product	SAP Agricultural Contract Management
Release	2.0
Based On	SAP enhancement package 7 for SAP ERP 6.0
Last Documentation Update	May 2015 (Support Package 01)

Table No.1: SAP ACM information

1.1.2.1.2 Use

The commerce of agricultural commodities, like wheat, corn, soybeans, and coffee, maybe a niche business that has extremely specific necessities. artifact traders will have relationships with several counterparties and maintain many contracts with everyone. The terms Associate in Nursing evaluation knowledge in an agricultural artifact contract will be extremely complicated and embrace evaluation changes supported quality factors. additionally, the contract execution will involve each planned and unplanned deliveries, that should be

recorded and assigned to at least one or additional contracts. Finally, the contract settlement method should handle prepayments, reassignments, quality-based evaluation, tolerances, and optionality. SAP Agricultural Contract Management permits artifact traders to capture and manage these complicated artifact contracts. it's Associate in Nursing end-to-end resolution that supports the complete contract life-cycle, as well as the capture of the contract terms, the logistics process, and therefore the final settlement and closure.

SAP Agricultural Contract Management supports the following commodity contract scenarios:

- Third Party Purchase
- Third Party Sale
- Intercompany
- Intracompany
- Back-to-Back
- Spot Purchase
- Commingled Stock
- Washout (including the Circle variation)

1.1.2.1.3 Integration

SAP Agricultural Contract Management is an add-on for SAP ERP. A minimum unharness of SAP ERP 6.0 sweetening package half-dozen is needed. SAP international Trade Management and SAP Trader's and Scheduler's worktable should move. SAP Agricultural Contract Management is additionally totally integrated with SAP monetary Accounting.

Optionally, SAP Agricultural Contract Management is often integrated with a 3rd party commercialism system via AN SAP NetWeaver method Integration (SAP PI) system. during this implementation state of affairs, contract information is captured through the third party commercialism system so flows into SAP Agricultural Contract Management. Then, any changes created to the contract information or contract master information in SAP Agricultural Contract Management square measure communicated back to the third party commercialism system.

The following figure illustrates the technical design of SAP Agricultural Contract Management:
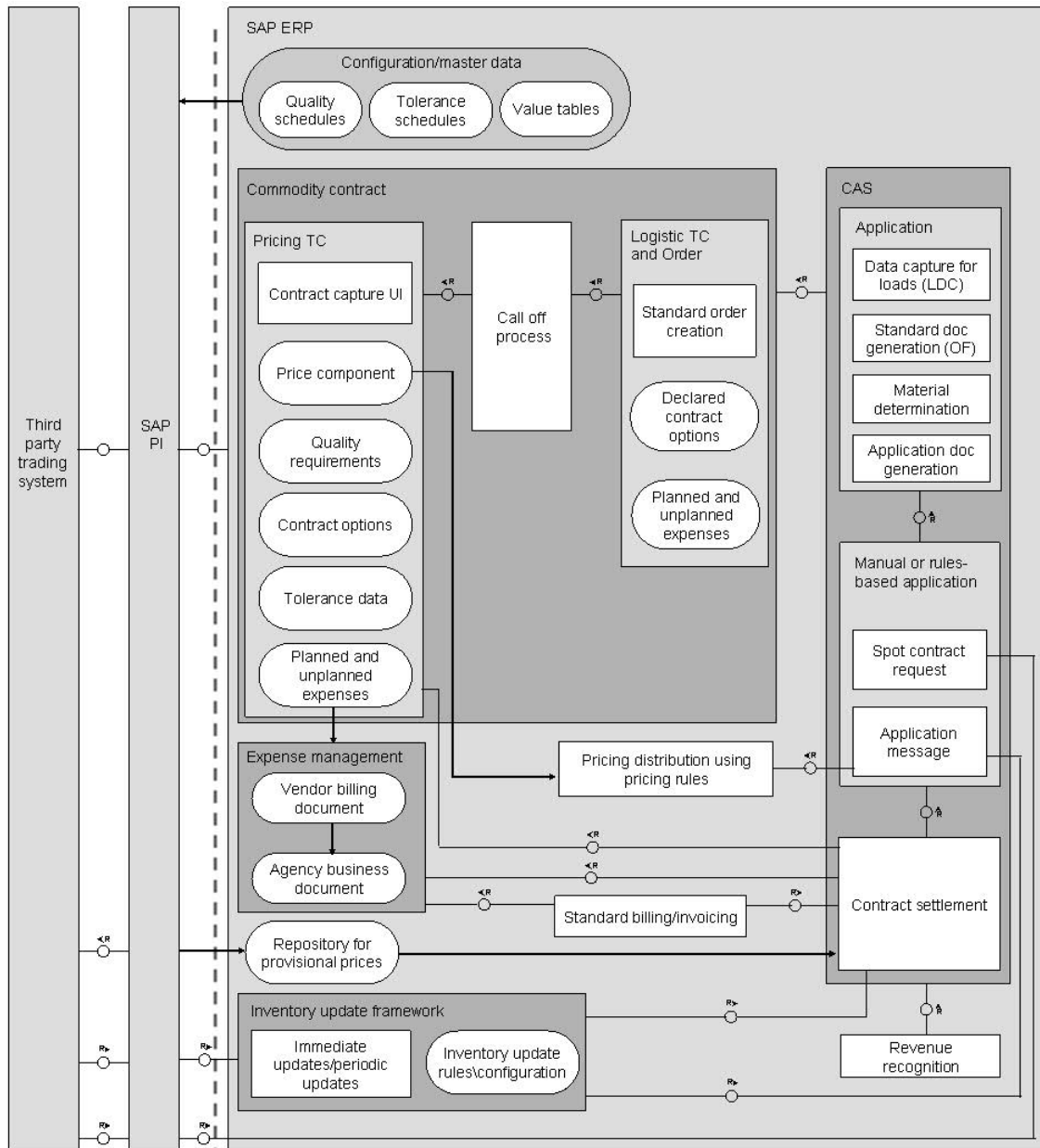

Fig 1 : Technical Architecture Model for SAP Agricultural Contract Management

1.1.2.1.4 Features

1.1.2.1.4.1 Contract Capture and Maintenance

You can capture all of the complicated terms and conditions that govern the fulfillment of a goods contract directly in SAP Agricultural Contract Management.However, before you'll be able to begin to capture goods contracts, you want to tack together sure contract master information.

1.1.2.1.4.2 Commodity Pricing Engine

You can use this feature to retrieve valuation formulas in business documents and valuate them to calculate final costs for commodities.The ensuing worth is then transferred to the condition varieties that ar employed in goods valuation.You can use the system to capture basis and futures worth parts.

You can conjointly enter further valuation information at goods item level and at CPE level. The system conjointly permits you to enter provisionary costs that may later be overridden once the contract is finally settled.

1.1.2.1.4.3 Expense Management

You can use the system to manage the costs associated with a commodity contract.

1.1.2.1.4.4 Call-Off

During the execution of a contract, you can call-off a quantity of the contract by raising a purchase order or a sales order to link the delivery to a specific contract.

1.1.2.1.4.5 Load Data Capture

You can use the system to capture the details of delivered loads, including weights, volumes, and quality characteristics. The system then uses these details during the contract application and contract settlement processes.

1.1.2.1.4.6 Contract Application

You'll use the contract application options to validate a delivered load and assign it to the acceptable trade goods contract.

1.1.2.1.4.7 Contract Settlement

Throughout the execution of a contract, you'll financially settle numerous quantities with the contract counterparty, as an example, rapt quantities, washout quantities, and canceled quantities

1.1.2.1.4.8 Inventory True-Up

You can use the system to calculate the value of the firm's inventory. The inventory true-up method takes account of each contract connected inventory changes and non-contract connected inventory changes like shrinkage.

1.1.2.1.4.9 Exposure Management

You can use the system to manage the risks and exposures that the assorted merchandise could face thanks to many unforeseen circumstances.

1.1.2.1.4.10 Possible Third Party Integration

Agricultural artifact management could need subtle risk analytics, portfolio management, and granular relationships with money instruments.To support these further necessities, SAP Agricultural Contract Management are often integrated with a 3rd party mercantilism system.

1.1.2.1.4.11 Country-Specific Features

The solution provides further options that ar designed to satisfy country-specific necessities for agricultural artifact contracts.

1.1.2.2 SAP Trader's and Scheduler's Workbench

1.1.2.2.1 Purpose

Trader's and Scheduler's bench (TSW) provides functions for stock projection and for designing and programming shipments mistreatment nominations. TSW provides the relevant master information to model the provision chain.

The stock projection, planning, and nomination processes modify the computer hardware to schedule shipments whereas taking under consideration provide, demand, and out there transportation.

1.1.2.2.2 Features

1.1.2.2.2.1 Master Data

You use the following master data objects in TSW:

- Transport unit
- Vehicle
- Transport system (TS)
- Location (business location) and material
- Partner role
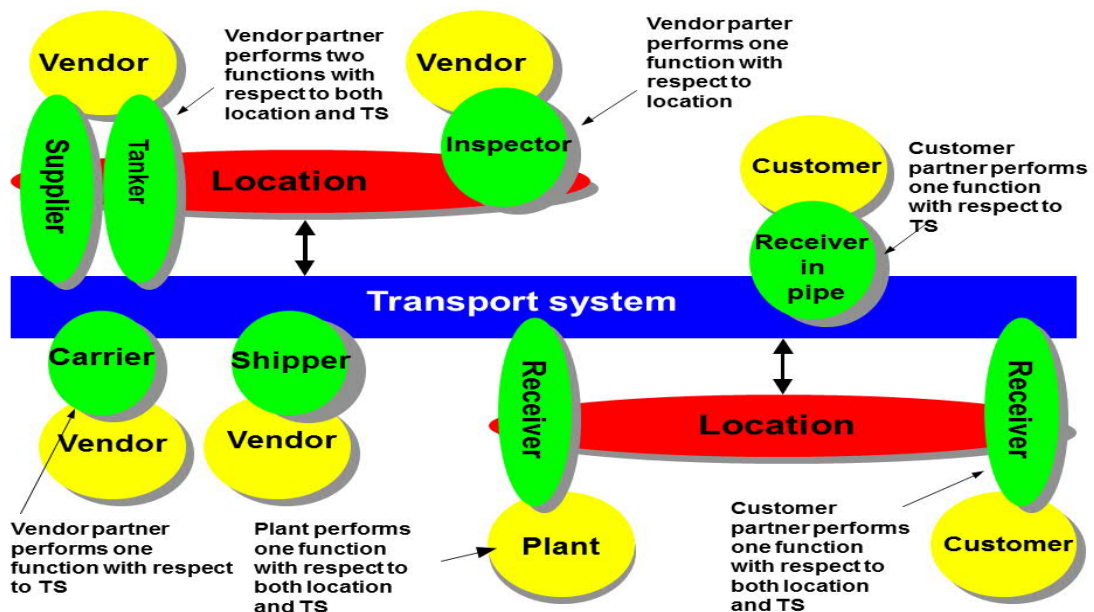
Fig 2: TSW Functioning

The graphic depicts a single transport system with two locations. The location in the upper left of the diagram is effectively an origin (supply) location, while the location in the lower right is effectively a destination (receiving) location. However, every location are often outlined to act as each AN origin and destination.

Master information objects within the SAP system, like client, vendor, or plant ar connected to the locations and transport system mistreatment TSW partner roles.

1.1.2.2.2.2 Processes and Functions

The following planning tools are provided by the TSW application:

- Planning (Replenishment Proposals and Safety/Target Stock Calculation)
- Stock Projection Worksheet (SPW)
- Location Balancing
- Worklist

The following scheduling tools are provided by the TSW application:

- Three-Way Pegging (3WP)
- Berth Planning Board (BPB)
- Nomination
- Ticketing
- Worklist

1.1.2.2.2.3 Process Flow
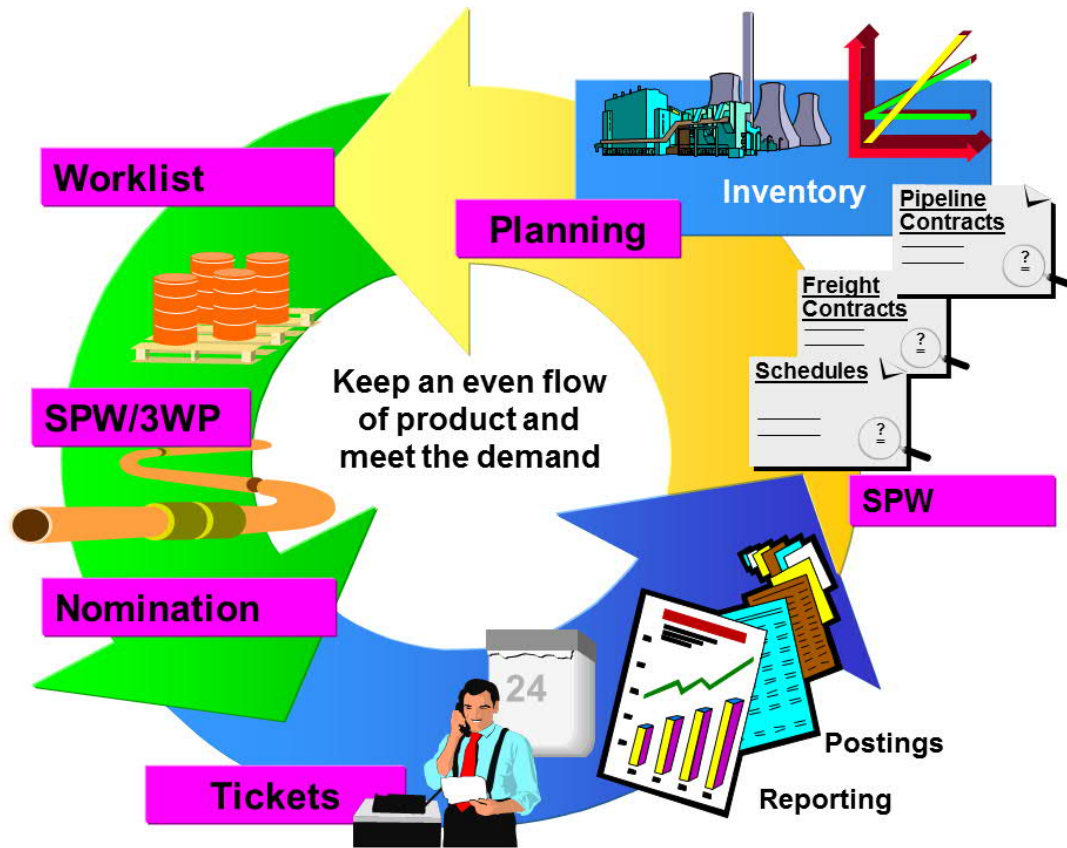
Fig 3: TSW Process Flow

The following sequence is recommended to properly model the supply chain using TSW master data objects:

1. You create a transport unit.
2. You create a vehicle.
3. You assign a transport unit to a vehicle.
4. You define your transport system in the TSW master data transaction.
5. You define locations or business locations in the TSW master data transaction.
6. You assign materials to locations.
7. You assign locations to the transport system.
8. You create partner roles for the transport system and/or locations.

The following sequence is recommended to properly set up planning data:

1. You generate the stock projection worksheet.

2. You use the Stock Projection Worksheet to perform stock projection.
3. Caution
4. Generating the Stock Projection Worksheet is required, before using the Planning functions or Worklist for the first time.
5. You generate the replenishment proposals based on the demand information from the Stock Projection Worksheet.
6. You generate the Worklist.

The following sequence is an example of a scheduling scenario:
1. You create a nomination and assign documents to nomination line items.
2. You send the nomination to your partner, such as a carrier.
3. You confirm or reject nomination line items, based on information from the carrier.
4. You enter the ticket details based on the carrier ticket and physical goods movements.
5. You validate the ticket against the nomination line items.
6. The system automatically creates the underlying shipment documents and posts documents

1.1.2.3 SAP Transportation Management

SAP Transportation Management (SAP TM) supports you all told activities connected with the physical transportation of products from one location to a different.

You can use SAP metal to perform the subsequent activities, for example:

- Create forwarding orders for your ordering parties
- Transfer orders and deliveries from an ERP system
- Create freight bookings
- Plan the transportation and select carriers
- Tender transportation services
- Dispatch and monitor the transportation
- Calculate the transportation charges for both the ordering party and the supplier side
- Consider foreign trade and dangerous goods regulations

You can use SAP metal to make and monitor an economical transportation arrange that fulfills the relevant constraints (for example, service level, costs, and resource availability). You can verify choices to save lots of prices and to optimize the utilization of obtainable resources.

You can react to transportation events and notice solutions to doable deviations from the first transportation arrange.

1.1.2.3.1 Integration

SAP TM is integrated with the following applications:

Application	Integration Type
SAP ERP (or another ERP system)	In SAP TM, you can perform transportation planning and execution for your ERP orders and deliveries; in ERP, you can also perform invoicing and invoice verification for your TM settlement documents. The data is transferred using enterprise services. You can also integrate SAP TM with ERP shipment processing. In this case, data is transferred using enterprise services and IDocs.
SAP Event Management (SAP EM)	You can use event tracking to monitor the execution status of your transportation.
SAP BusinessObjects Global Trade Services	You can perform customs processing for your SAP TM business documents in a connected global trade services (GTS) system. For example, you'll be able to request export declarations for freight orders or freight bookings. The data is transferred using enterprise services.

Table No. 2 : SAP TM Integration Information

Note also the following:

- You use EH&S Services in SAP TM to ensure the safe transportation of dangerous goods in accordance with legal regulations (see Considering Dangerous Goods).

- You can integrate SAP TM with external systems by using enterprise services. For example, you'll be able to mechanically produce and ensure forwarding orders supported information received from your ordering parties.

1.1.2.3.2 Features

SAP TM covers the following subcomponents with the following functions, for example:

1.1.2.3.2.1 Forwarding Order Management

You can use forwarding order management to form, edit, and ensure the forwarding orders from your ordering parties. Furthermore, you'll be able to produce forwarding quotations and send them to your ordering parties. While the orders and quotations area unit being created, you'll be able to even have the system confirm the transportation route, and you'll be able to check the transportation charges.

1.1.2.3.2.2 ERP Logistics Integration

The ERP supplying integration supports the transfer of orders and deliveries from SAP ERP to SAP metallic element likewise because the coming up with and execution processes supported the ERP information.

1.1.2.3.2.3 Freight Order Management

You can use freight order management kind} and edit freight orders and freight bookings that then form the premise of transportation coming up with.
You can then perform carrier choice, and either subcontract the freight orders on to a carrier otherwise you will perform tendering.

1.1.2.3.2.4 Planning

In coming up with, a transportation set up is formed on the premise of the orders that were either entered in forwarding order management or transferred via associate degree ERP system. You can perform planning either manually or automatically. Here the system uses advanced planning algorithms (optimization).

1.1.2.3.2.5 Forwarding Settlement and Freight Settlement

From SAP TM, you can trigger invoicing and invoice verification that takes place in the ERP system.

1.1.2.3.2.6 Master Data and Transportation Network

You can se these SAP TM components to create and administer all the master data that you need for the activities in SAP TM, for example, business partners, locations, and products.

1.1.2.3.2.7 Considering Dangerous Goods

You use EH&S Services in SAP TM to ensure the safe transportation of dangerous goods in accordance with legal regulations.

1.1.2.3.2.8 Business Context Viewer in SAP TM

You can display content for SAP TM content in Business Context Viewer (BCV). Enterprise Services and ESR Content for SAP TM Enterprise services enable you to exchange data with SAP ERP and SAP BusinessObjects Global Trade Services, as well as with external systems that belong to your business partners. Communication can be realized using either SAP NetWeaver Process Integration or point-to-point communication (Web Services Reliable Messaging).

1.1.2.3.2.9 Business Intelligence Content of SAP TM

The business intelligence content (BI Content) of SAP TM optionally provides you with BI queries and analytic tools for evaluating, analyzing, and interpreting business data.

1.2 Problem Statement

In the agricultural business, customers work with Commodity Contracts to buy and sell commodities (e.g. soybeans or grain) and that are imperative for their business. This industry-specific functionality is provided by SAP with the SAP ACM (Agricultural Contract Management). In the agricultural business, the call-offs of products (for sales and purchase)

are outlined within the commodity contracts based on linked objects called nominations. These nomination documents are transportation relevant demand element that is not transferred to SAP TM for transportation planning. Therefore, it is not possible to plan transportation activities in advance. Furthermore, it is also not possible to benefit from other processes provided by standard SAP TM to collaborate with carriers by tendering, execute the advanced functionality in TM in charge calculation and so on.

1.3 Objectives

To benefit at the same time from ACM functionality and likewise from the advanced functionality provided by SAP TM agricultural customers asked SAP to provide an integration package between those two solutions.

It was requested to get the functionality based on a standard product. Therefore, it was decided to develop an FBS to close the gap between SAP ACM and SAP TM.
This FBS will address all customers in the agricultural business that work or plan to use the SAP ACM functionality.

The ACM/TM integration FBS will mainly integrate two objects between ACM and SAP TM. The first object on ACM side is the nomination, that is the demand element (like a sales order or a purchase order) for SAP TM. The nomination and the related items will be integrated with the freight unit (or transportation unit) in SAP TM. In SAP TM planning processes can be executed based on the freight unit.

The result of based on the freight units are in SAP TM freight orders. All standard processes like carrier selection, tendering, charge calculation and settlement can be done using the freight orders.

The second object that will be integrated from SAP ACM is the LDC (Load data capture) object. This object records actual ACM loading and unloading data like weights, resources,

seals and other data. By integrating the LDC to the SAP TM freight unit actual data will be sent to SAP TM. This is important for follow-up processes in TM like execution and freight costing based on actual data.

1.4 Methodologies

In this project, we are following the Agile Methodology keeping in mind ABAP OO concepts of modularization, forward and backward compatibility. Agile code development is Associate in Nursing approach to code development underneath that necessities and solutions evolve through the cooperative effort of self-organizing and cross-functional groups and their customer(s)/end user(s). It advocates adaptive coming up with, biological process development, early delivery, and continual improvement, and it encourages speedy and versatile response to vary. The term agile was popularized, during this context, by the pronunciamento for Agile code Development. The values and principles espoused during this pronunciamento were derived from and underpin a broad vary of code development frameworks, together with start and Kanban.

There is significant anecdotal evidence that adopting agile practices and values improves the agility of software professionals, teams and organizations; however, some empirical studies have found no scientific evidence.

1.4.1 Agile software development principles

The Manifesto for Agile Software Development is based on twelve principles:
- Customer satisfaction by early and continuous delivery of valuable software.
- Welcome changing requirements, even in late development.
- Deliver working software frequently (weeks rather than months)
- Close, daily cooperation between business people and developers
- Projects are built around motivated individuals, who should be trusted
- A face-to-face conversation is the best form of communication (co-location)
- Working software is the primary measure of progress
- Sustainable development, able to maintain a constant pace

- Continuous attention to technical excellence and good design

- Simplicity—the art of maximizing the amount of work not done—is essential

- Best architectures, requirements, and designs emerge from self-organizing teams

- Regularly, the team reflects on how to become more effective and adjusts accordingly

1.4.2 Overview

Pair programming, an agile development technique used by XP.

1.4.2.1 Iterative, incremental and evolutionary

Most agile development ways break development work into little increments that minimize the quantity of up-front coming up with and style. Iterations, or sprints, are short time frames (timeboxes) that typically last from one to four weeks. Each iteration involves a cross-functional team operating all told functions: coming up with, analysis, design, coding, unit testing, and acceptance testing. At the tip of the iteration, a operating product is incontestable to stakeholders. This minimizes the overall risk and allows the product to adapt to changes quickly. An iteration might not add enough functionality to warrant a market release, but the goal is to have an available release (with minimal bugs) at the end of each iteration. Multiple iterations might be required to release a product or new features. Working software is the primary measure of progress.

1.4.2.2 Efficient and face-to-face communication

The principle of co-location is that co-workers on the same team should be situated together to better establish the identity as a team and to improve communication. This enables face-to-face interaction, ideally in front of a whiteboard, that reduces the cycle time typically taken when questions and answers are mediated through phone, persistent chat, wiki, or email.

No matter that development methodology is followed, each team ought to embody a client representative ("Product Owner" in Scrum).This person is in agreement by stakeholders to act on their behalf and makes a private commitment to being offered for developers to answer queries throughout the iteration. At the tip of every iteration, stakeholders and also the client representative review progress and re-evaluate priorities with a read to optimizing the come

back on investment (ROI) and making certain alignment with customer needs and company goals.

In agile code development, Associate in Nursing data radiator may be a (normally large) physical show placed conspicuously close to the event team, wherever passers-by will see it.It presents an up-to-date summary of the product development status. A build light indicator may also be used to inform a team about the current status of their product development.

1.4.2.3 Very short feedback loop and adaptation cycle

A common characteristic in agile code development is that the daily stand-up (also referred to as the daily scrum). In a transient session, team members report back to one another what they did the previous day toward their team's iteration goal, what they will do these days toward the goal, and any roadblocks or impediments they'll see to the goal.

1.4.2.4 Quality focus

Specific tools and techniques, like continuous integration, machine-controlled unit testing, combine programming, test-driven development, style patterns, behavior-driven development, domain-driven style, code refactoring, and different techniques are usually wont to improve quality and enhance development nimbleness. this is often predicated on planning and building quality in from the start and having the ability to demonstrate code for patrons at any purpose, or a minimum of at the tip of each iteration.

1.4.3 Agile software development methods

1.4.3.1 Software development life-cycle support

Agile software system development ways support a broad vary of the software system development life cycle.Some concentrate on the practices (e.g., XP, pragmatic programming, agile modeling), whereas some concentrate on managing the flow of labor (e.g., Scrum, Kanban).Some support activities for necessities specification and development (e.g., FDD), whereas some request to hide the complete development life cycle (e.g., DSDM, RUP).

Popular agile software system development frameworks embrace (but don't seem to be restricted to):

- Adaptive software development (ASD)
- Agile modeling
- Agile unified process (AUP)
- Disciplined agile delivery
- Dynamic systems development method (DSDM)
- Extreme programming (XP)
- Feature-driven development (FDD)
- Lean software development
- Kanban
- Rapid application development (RAD)
- Scrum
- Scrumban

1.4.3.2 Agile software development practices

Agile software system development is supported by variety of concrete practices, covering areas like necessities, design, modeling, coding, testing, planning, risk management, process, quality, etc. Some notable agile software development practices include:

- Acceptance test-driven development (ATDD)
- Agile modeling
- Agile testing
- Backlogs (Product and Sprint)
- Behavior-driven development (BDD)
- Business analyst designer method (BADM)
- Continuous integration (CI)
- Cross-functional team
- Domain-driven design (DDD)
- Information radiators (scrum board, task board, visual management board, burndown chart)

- Iterative and incremental development (IID)

- Low-code development platforms

- Pair programming

- Planning Poker

- Refactoring

- Retrospective

- Scrum events (sprint planning, daily scrum, sprint review, and retrospective)

- Story-driven modeling

- Test-driven development (TDD)

- Timeboxing

- User story

- User story mapping

- Velocity tracking

The project has been divided into 6 sprints of 1 month each in which the whole development process is divided into user stories and have been assigned to the cross-functional teams of developers and there is a demo at the end of every month and a daily scrum to keep a check on the progress of the developers and to gain insight of any blocker to the development process.

1.4.4 Sprint

A sprint (or iteration) is that the basic unit of development in commencement. The sprint could be a timeboxed effort; that's, it's restricted to a selected length. The length is fastened before for every sprint and is generally between one week and one month, with period being the foremost common. Each sprint starts with a sprint designing event that aims to outline a sprint backlog, establish the work for the sprint, associate degreed build an calculable forecast for the sprint goal.

Each sprint ends with a sprint review and sprint retrospective, that reviews accomplish show to stakeholders and establish lessons and enhancements for subsequent sprints. Scrum

emphasizes operating product at the top of the sprint that's very done. In the case of software system, this probably includes that the software system has been absolutely integrated, tested and documented, and is doubtless releasable.

1.4.4.1 Sprint planning

At the start of a sprint, the commencement team holds a sprint designing event to:

- Mutually discuss and agree on the scope of labor that's supposed to be done throughout that sprint
- Select product backlog things that may be completed in one sprint
- Prepare a sprint backlog that features the work required to complete the chosen product backlog things

The suggested length is four hours for a two-week sprint (pro-rata for different sprint durations) During the primary half, the total commencement team (development team, commencement master, and products owner) selects the merchandise backlog things they believe may well be completed in this sprint During the last half, the event team identifies the elaborate work (tasks) needed to complete those product backlog items; leading to a confirmed sprint backlog As the elaborate work is detailed, some product backlog things could also be split or swap into the merchandise backlog if the team now not believes they'll complete the required work in a single sprint

Once the event team has ready their sprint backlog, they forecast (usually by voting) that tasks are delivered at intervals the sprint.

1.4.4.2 Daily scrum

A daily scrum in the computing room. This centralized location helps the team start on time. Each day throughout a sprint, the team holds a daily commencement (or stand-up) with specific guidelines:

All members of the development team come prepared. The daily scrum: starts exactly on time even though some development team members are missing ought to happen at identical time

and place daily is proscribed (timeboxed) to fifteen minutes. Anyone is welcome, though solely development team members ought to contribute.

During the daily commencement, every team member generally answers 3 questions:
- What did I complete yesterday that contributed to the team meeting our sprint goal?
- What do I plan to complete today to contribute to the team meeting our sprint goal?
- Do I see any impediment that could prevent me or the team from meeting our sprint goal?

Any impediment (e.g., obstacle, risk, issue, delayed dependency, assumption evidenced unfounded) known within the daily commencement ought to be captured by the commencement master and displayed on the team's commencement board or on a shared risk board, with an agreed person designated to working toward a resolution (outside of the daily scrum). No detailed discussions should happen during the daily scrum.

1.4.4.3 Sprint review

At the top of a sprint, the team holds 2 events: the sprint review and therefore the sprint retrospective.

At the sprint review, the team: reviews the work that was completed and therefore the planned work that wasn't completed presents the finished work to the stakeholders (a.k.a. the demo) collaborates with the stakeholders on what to figure on next Guidelines for sprint reviews: Incomplete work can't be incontestable. The suggested length is 2 hours for a two-week sprint (proportional for different sprint-durations).

1.4.4.4 Sprint retrospective

At the sprint retrospective, the team:
- Reflects on the past sprint
- Identifies and agrees on continuous process improvement actions
- Guidelines for sprint retrospectives:

- Three main questions are asked in the sprint retrospective: What went well during the sprint? What did not go well? What could be improved for better productivity in the next sprint?

The recommended duration is one-and-a-half hours for a two-week sprint (proportional for other sprint duration(s). This event is facilitated by the scrum master

1.5 Organization

Chapter 1: Includes a brief introduction to the project. A basic idea of what we are doing and what we are trying to accomplish with this Project has also been provided and technologies we are using in this project have also been listed.

Chapter 2: Includes literature survey. The key terms used in the project are all discussed in this section of the report, Consisting of various ABAP objects, agile terminologies, SAP Terminologies of TSW.

Chapter 3: Includes details on system development. Explanation about the project design, architecture implemented and the requirements that need to be accomplished in this FBS.

Chapter 4: This section provides the part of the project I have worked upon with my TSW Team and the detailed description of the user stories with the acceptance criteria and test cases' evidences authorized by the tester.

Chapter 5: Conclusion. Progress and the future scope of the project have been discussed briefly, along with the various testing methods used in SAP for further testing of the develops FBS.

Chapter-2   LITERATURE SURVEY

2.1 Introduction to Literature Review

In this project, various key terms related to agile development and ABAP workbench has been used which will be discussed under the key terms and as it is not an open source project so there is a little too less information available on all the open source information portals.

2.1.1 Key Terms

2.1.1.1 Nomination

A nomination is the scheduling document used to communicate between various scheduling partners, including the scheduler and the carrier. In the SAP Oil & Gas system nominations are used to schedule bulk material shipments and are the basis for subsequent R/3 documents, such as deliveries and shipping notifications.

2.1.1.2 Transport Unit

The smallest loadable unit of a vehicle that's accustomed transport merchandise. The transportation unit (TU) will be, however doesn't got to be, a part of a vehicle.

2.1.1.3 Vehicle

A vehicle will comprise one or additional transportation units You outline vehicles within the master information for transportation. You use vehicles to cluster TUs and to speak with invoicing and freight order management. It is not obligatory to use vehicles in shipping and receiving if the options out there at TU level are spare for your transportation processes.

If you assign TUs to a vehicle in an exceedingly fastened method, you can't assign these TUs to a different vehicle. In this case, information that you simply outline for the vehicle is additionally valid for the assigned TUs. The dimensions of the vehicle return from the means that of transport that you simply assign to the vehicle and are used because the planned size. You can print waybills for vehicles.

2.1.1.4 ALV Grid

The ALV Grid management (ALV = SAP List Viewer) may be a versatile tool for displaying lists. The tool provides common list operations as generic functions and may be increased by self-defined choices. This allows you to use the ALV Grid management in an exceedingly giant vary of application programs.

2.1.1.5 Product Owner

Product owner may be a scrummage development role for an individual United Nations agency represents the business or user community and is chargeable for operating with the user cluster to work out what options will be within the product unleash.

As the liaison between the event team and customers, the merchandise owner should collaborate closely with each teams to make sure there's a transparent understanding of what options are required in the product or application. Because there may be a variety of types of customers and users, the product owner must have a firm understanding of the business domain and the varying needs of different types of users.

Chapter-3 SYSTEM DEVELOPMENT

The system which we are developing is in accordance with the architecture designed by the system architect and the development is being done in an orderly way in the sprints by following some basic development rules being specified by the system architect.

3.1 Boundary Conditions

Quality Attribute Scenario "Nomination Integration"	
Who initiates activity (interactor)?	ACM Trade Execution Export
Addressed part of the system which executes initiated activity (executor)?	Runtime environment
How does the interaction between initiator and executor take place?	ACM Trade Execution Expert creates and updates nominations with up to 1.000 items.
Under which conditions / environment does the interaction take place?	Online transaction (nomination maintenance).
Result of activity	Nomination is processed and transportation demand created / updated in TM.
KPI	The performance of the online transaction must not be impacted significantly because of the integration to TM.

Table No 3: Quality Attribute Scenarios(Nomination Integration)

Quality Attribute Scenario "Extensibility"	
Who initiates activity (interactor)?	Customer Implementation Team
Addressed part of the system which executes initiated activity (executor)?	Design environment
How does the interaction between initiator and executor take place?	Customer Implementation Team already enhanced or wants to enhance standard processes.
Under which conditions / environment does the interaction take place?	System implementation / customer enhancement.
Result of activity	System is enhanced with customer specific logic.
KPI	Customers still have all options to enhance standard S/4 components. There are no conflicts when installing the AddOn or after AddOn installation.

Table No 4: Quality Attribute Scenarios (Extensibility)

Quality Attribute Scenario "Consistency"	
Who initiates activity (interactor)?	Business User
Addressed part of the system which executes initiated activity (executor)?	Runtime environment
How does the interaction between initiator and executor take place?	Business User executes standard S/4 business processes.
Under which conditions / environment does the interaction take place?	Online transactions, background processing, standard system usage.
Result of activity	Standard S/4 business process executed.
KPI	Standard business processes are not impacted after AddOn installation.

Table No 5: Quality Attribute Scenario (Consistency)

3.2 Technology Decisions for TSW

Architecture Area	Technologies to be Used
Clients	SAP GUI (ACM, TSW)
Presentation Layer / User Interface	SAP GUI (ACM, TSW)
Business Logic Layer	N/A
Analytics / Reporting	N/A (no developments planned)
Integration Middleware	N/A (S/4 internal integration between ACM/TSW and TM)
Business Process Management / Workflow	N/A (no developments planned)
Data Persistency	HANA
Development Environment	HANA Studio, ADT, ABAP Workbench
Software Lifecycle / Change Management	ABAP
tbd	

Table No 6: Technologies Used

3.3 Reuse

The FBS does not make use of any 3rd party or open source components. The FBS also does not introduce dependencies to any re-use components that are not already used by the underlying components ACM, TSW and TM (e.g. functional components like Business Partners and technical frameworks like BOPF). The installation of the FBS does not require the installation of additional systems or software components.

The AddOn is dependent on Business Function Set OIL_&_GAS (SAP Oil and Gas).

3.4 Cross-Release Compatibility

The FBS is developed as ABAP AddOn to S/4HANA 1809 FP2. The FBS only integrates system internally with other S/4HANA components and does not integrate with any external systems. A side-by-side deployment with a separate TM installation is not supported and was explicitly marked out of scope for the FBS (note that standard S/4HANA with embedded TM supports such side-by-side scenarios as of release 1809).

This ACD describes the first release of the FBS. The FBS will only be released on S/4HANA 1809 FP2 and subsequent Support Package Stacks.

Because of the afore mentioned points, there are currently no requirements regarding cross-release compatibility. Future releases of S/4HANA (e.g. S/4HANA 1909) might be supported with new releases of the FBS. However, no future release plan for the FBS is currently available.

3.5 SAP TM Collaboration Portal

Integration of the SAP TM Collaboration Portal (software component SAPTM UI 1.x) through ODATA services was initially in scope for the FBS. This was required because S/4HANA with embedded TM does not support integration any more (ref. SAP note 2663403, Version 6 from 20.11.2018, Section G).

After discussions with standard TM product owners, it was agreed that S/4HANA shall support the integration between the SAP TM Collaboration Portal and S/4HANA 1809. The decision from standard development was based on requirements from this FBS but also other TM customers who stated that they would only migrate from TM releases 9.x to S/4HANA with embedded TM if Collaboration Portal support is available with S/4HANA as well.

Providing integration between the TM Collaboration Portal and S/4HANA 1809 is therefore out of scope for the FBS.

3.6 Other External Forces / Constraints and Assumptions

The FBS shall be delivered as a modification-free ABAP AddOn to SAP S/4HANA 1809. Usage of implicit enhancements shall be avoided wherever possible and is subject to an approval procedure. Working models with standard ACM, TSW and TM development teams are established to request explicit enhancement options (e.g. internal BAdIs) to support FBS developments. Before requesting a new explicit enhancement option, all other available enhancement options (e.g. BOPF enhancement workbench) need to be considered in order to avoid technical debt and additional effort for standard development.

Standard TM product owners agreed to support the integration between the SAP TM Collaboration Portal and S/4HANA 1809 as backend system. This commitment is not officially communicated to customers at the time of writing this document (Feb. 2019). We assume that such a commitment will be formally communicated to customers before the release date of the FBS.

The architecture and business switch definitions for the first FBS release shall not prohibit a later separation of code that would support a standalone integration between TSW and TM without ACM. More specifically, it shall be ensured that a later release of the FBS could be installed on a S/4HANA system where ACM business functions are not activated. It is assumed that such a release would incur additional efforts for code separation and refactoring.

3.7 Architecture Definition

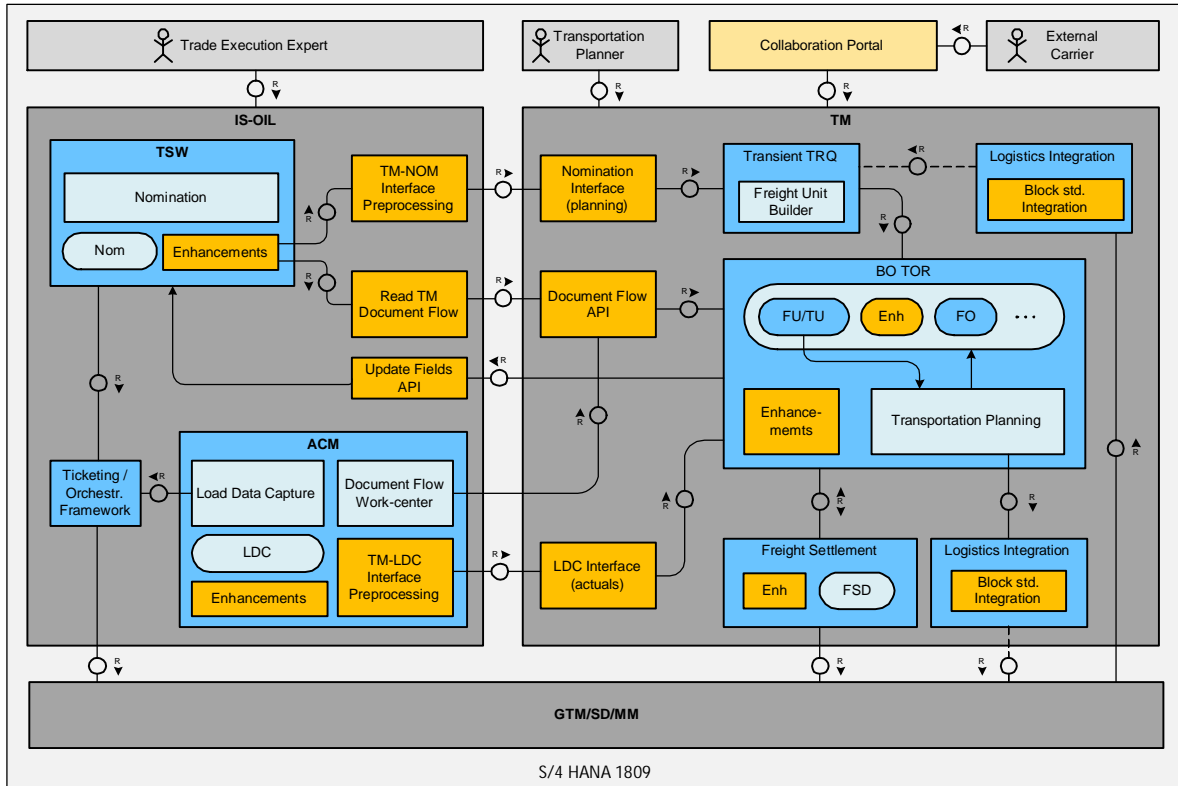### 3.7.1 Architecture Context and Overview

Fig 4: Overall Architecture

Blue boxes indicate existing standard functionality and golden boxes indicate new FBS developments. Figure 2 shows that the majority of FBS developments is related to integration and that enhancements in the areas of ACM, TSW, and TM are planned.

3.7.2 Business functions and switches

ACM and TSW are part of industry business functions in S/4HANA and are activated through settings in the switch framework. In contrast, TM is part of S/4HANA Core and does not make use of business functions. All TM functionality is available in S/4HANA by default. Typically, FBSs are delivered without any business functions and switches. The assumption is that customers who install a Focused Business Solution also want to use it because it

targets their specific industry segment. Apart from that, the functional scope of FBSs is typically limited and does not justify a separation by business functions.

A requirement towards the FBS ACMTM Integration is that it shall be possible to make parts of its functionality available for TSW customers that do not use ACM in a potential later release. In particular, the integration of TSW nominations and TM is of interest for these customers. In order to technically allow a later separation of code, it was decided to use one business function with one assigned switch in FBS release 1 and to assign all development packages of the FBS to this switch. This will later allow the technical installation of FBS release 1 on a sandbox system where ACM business functions are switched off. Analysis of ACM dependencies can then be done on this sandbox. According to ARES, technical installation of the FBS would fail in case there are DDIC dependencies in the AddOn sue to not activated DDIC objects that are hidden behind ACM business functions.

In release 1, the FBS business function will declare a static dependency on ACM business functions. This will ensure that only customers who have switched on ACM can also switch on the FBS business function.

3.7.3 Main Architecture Challenges and Decisions

3.7.3.1 Architecture Challenge: Consistency and Extensibility

Installation of the FBS shall not have a negative impact on any existing functionality in the underlying components ACM, TSW, and TM. All existing standard processes shall run as before.

The FBS shall not restrict customer enhancement options of the underlying components ACM, TSW, and TM. Customers must still be able to enhance the underlying components. The FBS shall minimize the introduction of technical debt for customers and underlying standard components.

The FBS will be delivered as an ABAP AddOn to S/4HANA 1809 FP2. Modifications to underlying software components are not allowed. Usage of implicit enhancements (pre-, post-, overwrite) must be minimal and subject to approval. Introduction of new explicit enhancement options in underlying components must be aligned with the responsible standard development teams.

The FBS must not implement single-use BAdIs or consume other enhancement options that are meant for customer usage (e.g. WebDynpro customizing for UI enhancements). Doing so would restrict customer usage of the underlying software, overwrite or conflict with existing customer enhancements and in the worst case prevent AddOn installation in systems where customers have already implemented enhancements.

The FBS ACMTM Integration will be deployed as an AddOn to SAP S/4 HANA 1809. The minimum support package level required for installation will be SAP S/4 HANA 1809 FP2. No other deployment option is planned for the FBS. All code of the FBS will be assigned to a single software component which is referred to as "SCV ACMTM 100".
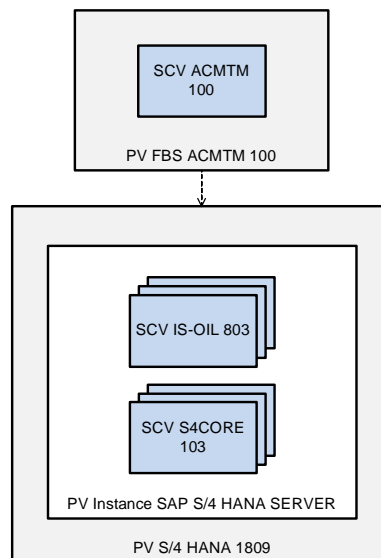
Fig 5: Software Component Structure

3.7.3.2 System Landscape

A typical productive system landscape including the FBS ACMTM Integration is depicted

.
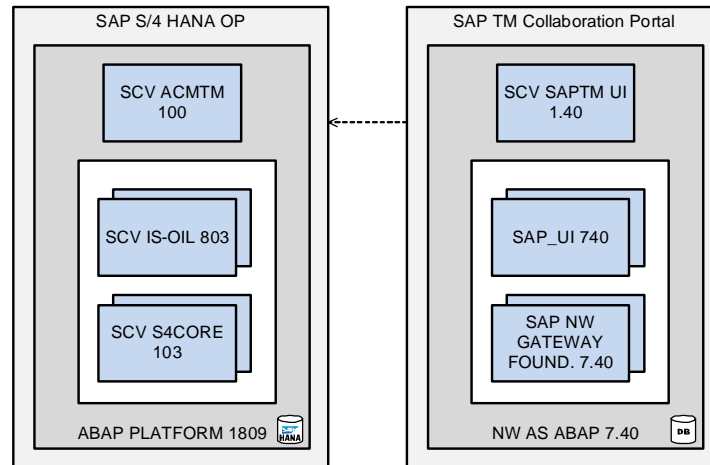
Fig 6: System Landscape

The FBS would be deployed as an ABAP AddOn on the customer's S/4 HANA 1809 installation (left-hand side of Figure 6). Customers who want to make use of the existing SAP TM Collaboration Portal functionality would run the Collaboration Portal User Interface on a separate server based on SAP NW AS ABAP 7.40. As pointed out in ??, SAP TM product owners committed to releasing the integration between an S/4 HANA 1809 backend and the existing TM Collaboration Portal for use by customers, including maintenance and support. This integration was previously not allowed with S/4 HANA (ref. SAP note 2663403, Version 6 from 20.11.2018, Section G).

A minimal production system landscape would only include the S/4 HANA 1809 AddOn deployment without Collaboration Portal for customers that do not use the Collaboration Portal functionality.

3.7.3.3 Architecture Details

3.7.3.3.1 Agricultural Contract Management (ACM)

The FBS would cover enhancements in the following areas of ACM

3.7.3.3.1.1 LDC (Load Data Capture) Enhancement

The LDC in ACM allows automatic creation of the logistic documents using reference document dependent on various business scenarios. The following changes will be done on LDC:

- LDC display screen will be enhanced to display TM relevant data by implementing ACM BAdI.
- LDC create screen will be enhanced to maintain TM relevant data by implementing ACM BAdI.
- LDC selection screen will be enhanced to accommodate new fields by implementing enhancement points.
- And subsequent data selection logic will be enhanced by implementing ACM BAdI to adapt to new selection criteria.
- An ACM BAdI will be implemented which will send the LDC data to TM at the time of LDC release.

3.7.3.3.1.2 ACM Document Flow Work Center Enhancement

ACM Document flow work center will be enhanced in order to display TM documents like FU (Fright Unit), FOR (Fright Order).

- Selection screen of document flow work center will be enhanced to add new selection criteria.
- Business logic to determine the documents will be enhanced to adapt new selection logic as well as determining related TM documents.
- Display screen of document flow will be enhanced to show new TM documents in the document flow
- The internal BADIs (SAP-use only), to be provided by ACM product team, will be implemented to enhance the document flow work center.

3.7.3.3.1.3 ACM Enhancement

Existing ACM solution will be enhanced to add new functionality as part of the FBS. It will be achieved by implementing several BADIs. It would be ensured that implementing any of the BADI(s) must not restrict the customer from using them for their customer-specific enhancements.

3.7.3.3.1.4 Freight Assignment Work Center

A new application 'Freight Assignment Work Center' will be built in SAP GUI to link/de-link FOR and LDC.

- A new selection screen and Freight Assignment work center screen will be developed in SAP GUI. SAP ALV will be used for displaying FOR (Fright Order) and LDC (Load Data Capture).
- SAP ACM LDC Update API and TM APIs will be used for the link/de-link LDC and FORs

3.7.3.3.2 Trader's and Scheduler's Workbench (TSW)

The FBS would broadly cover the following TSW functionalities as part of ACM TM Integration.

3.7.3.3.2.1 Nomination Enhancement

Following enhancements will be done on the nomination:

- Nomination item overview list will be enhanced to add new fields. Nomination item structure will be enhanced to add these new fields. A BAdI will be implemented to enhance the logic to populate new fields.

- A new tab will be added on nomination item details for TM relevant fields. TSW BAdI(s) will be implemented to add a new tab and populate fields.
- A BAdI will be implemented to send nomination data to TM on the nomination save.

3.7.3.3.2.2 Nomination change validations

Nomination change processing will be enhanced implementing TSW BADIs to add new validations based on TM document(s) status.

3.7.3.3.2.3 TM Documents Flow on Nomination Item

Existing ACM document flow on nomination item overview will be enhanced, by implementing ACM BAdI(s), to show the TM documents (FU/TU/FOR/FSD) with status (TM subcontracting and lifecycle).

3.7.3.3.2.4 Failed Nomination-TM Integrations

A new monitor will be developed in SAP GUI to display and re-process nomination items which have failed during TM integration process.

It will be ensured that implementing any of BADI(s) must not restrict the customer from using them for their customer-specific enhancements.

3.7.3.3.3 Transportation Management (TM)

3.7.3.3.3.1 TM enhancement approach

Development of FBS ACMTM based on SAP TM will be done using different enhancement possibilities following the principles of the SAP TM enhancement guide. Modifications of the standard SAP TM functionality is not allowed.

The following technologies and frameworks will mainly be utilized:

- BOPF Enhancement Workbench
- FPM/FBI enhancement possibilities
- BAdIs
- Implicit enhancements
- Process Controller Framework
- Direct Output Agent Framework

etc.

SAP TM enhancement guide contains a comprehensive overview of the above-mentioned implementation and configuration technologies. For more details please refer to the document.

This document will describe a general high-level approach and sequence of applying different enhancement features. Specific cases will be described in a more granular level for each backlog items in the corresponding design documents.

The main guiding principles shall be respected while building of FBS ACMTM:

- Enhancements of UI and backend functionality shall be done with the minimal impact

- Installation of multiple Add-on shall be possible with the minimal impact

- Customer enhancements must still be possible for standard and enhanced objects

3.7.3.3.3.2 BOPF Enhancements

The BOPF framework comes with a set of enhancement techniques that you can use to add the functionality using BOPF Enhancement Workbench. It is a powerful tool to be used for enhancements of the standard TM business objects. New enhancement objects shall be created for the standard BOs which require the creation of a new or adjustment of existing functionality. You can again enhance such enhancements with the same tool, that is, nested enhancements are also possible. The enhancement name should start with the FBS's namespace to ensure a clear separation between different enhancements, when, for example, two or more AddOn is installed.

It shall be possible to install multiple AddOn. In this case, all enhancement objects created for the same standard BO by different FBS will be relevant and will be executed one by one. Enhancement objects introduced as part of FBS ACMTM as well as the standard business objects can be enhanced further by customer implementations.

Some SAP TM BO nodes contain quite a big amount of the fields. Direct enhancement of the node structure with the new fields might cause performance issues or dumps due to too long record length. Depending on the number of fields in the standard BO node structure and a number of fields to be added to the node, different approaches for the structure extension might be used: usage of extension structure or creation of a new node with 1:1 relation.

Extension fields and append structure names shall follow naming conventions in order to avoid conflicts with the other Add-ons or customer implementations.

3.7.3.3.3.3 UI enhancements

In accordance with the TM Enhancement Guide, for enhancement of UI layout so-called Component Customizing could be used. However, this technique is mainly relevant for the single enhancements when it can be assured that no further nested/parallel enhancement will be created for the same component. Since FBS ACMTM shall provide a possibility for installation of other AddOn or creation of customer enhancement for both standard and FBS UIs, another approach shall be applied.

In order to enhance the standard UI, application configuration it will need to be copied to the FBS namespace. The blocks that require adjustment will be created/copied/adjusted, the others can be reused.

The created configuration will be inserted as one of the attributes of the BO type (e.g. Freight Order type).

3.7.3.3.3.4 Internal BAdIs

If there is no possibility to go with the BOPF enhancements or enhancement shall be created not for a BO-relevant object (e.g. class for the handling of UI actions), internal BAdIs might be requested from the standard.

In order to request a new internal BAdI the following info will be collected and provided to the TM standard:

BAdI interface is clearly defined and assured that it is sufficient for the enhancement logic.

Purpose of the BAdI, the reason why the coding cannot be enhanced by the other means is described

Assumed placement of the BAdI in the coding (development object, coding lines, etc.) is provided. Based on this information standard SAP TM team makes a decision about whether BAdI is to be provided.

3.7.3.3.3.5 Implicit enhancements

As the last option, implicit enhancements can be created. Deep analysis of the application code needs to be done for identifying the objects and places where enhancement shall be implemented.

The following aspects need to be kept in mind when making such an enhancement:
Installed update of the standard code can have an impact on the created pre, post or overwrite enhancements. Method's signature can potentially change that could lead to the problem with the used parameters: their types can change or the parameter can even be removed.

In the case of overwriting methods by copying the code of a standard method and adjusting it within an overwrite method implementation, you will not get the changes/corrections for the standard portion of your implementation.

Due to the listed reasons, this technique shall be used with care. The preferred solution is to create a post and pre enhancements, overwrites shall be avoided if possible.

Chapter-4 Development

This chapter gives details of the development done in TSW with some specific user stories I have worked on with my team. It contains the TSW architecture to do development using MVC design pattern in ABAP using various enhancement frameworks and ABAP objects.

4.1 TSW MVC Design

In this figure the classes are defined according to the MVC design Pattern consisting of Model(/acmtm/cl_nom_tm_db), view(/acmtm/cl_nom_enh_ui) and controller(/acmtm/cl_nom_tm_integrator).

The model class communicates with the database to send or retrieve data from the database whenever it is needed. The view class is the class responsible for showcasing all of the UI which is being developed and shown to the user. This class is solely responsible for the things being shown on the screen. The controller class comes into play when the view needs to exchange data with the model class for further exchange of data or the controller class needs to exchange the data with other components ACM or TM, they might be needing.

4.2 Agile Development

In this section the work done by me with a team member or individually will be explained, the problem statement, development, and the end result of every user story in chronological order of sprints.

4.2.1 Sprint 1

User story 88

Summary:

Purpose of this user story is that Trade execution expert make nomination item as transportation relevant so that on nomination save, nomination information is sent to SAP TM for transportation planning when SAP TM is designated transportation planning solution.

- He/she can see and check/uncheck a new flag 'TM relevant' on the nomination item overview list during nomination create and change.
- He/she can configure if SAP TM is the target solution for a nomination item(s) based on company code, plant, and storage location.
- He/she can make a nomination item(s) as TM relevant by checking a 'TM relevant' flag.

BADI's Implemented:

Badi Defination : OIJ_NOM_MAINTAIN

Badi Implementation : /ACMTM/EHI_NOM_TM_INTEGRATION

Testing Evidence:
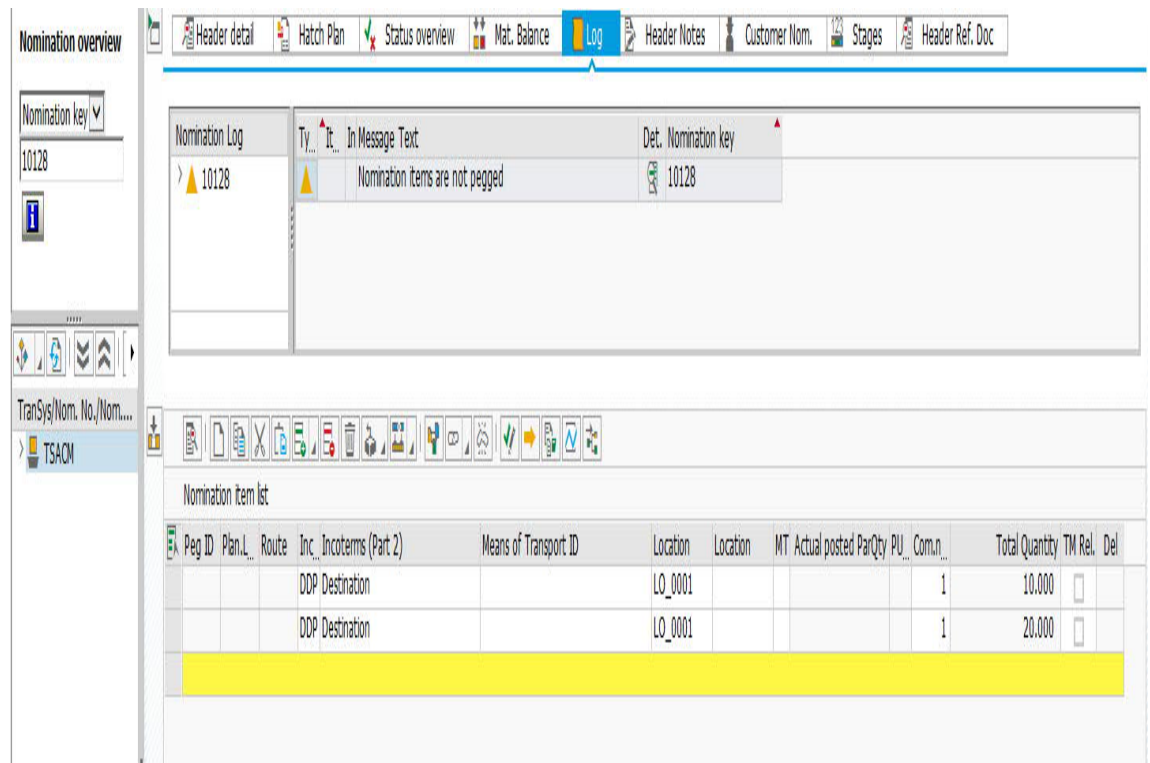
Fig 7: Editable checkbox is displayed in nomination list item.

Fig 8: TM Relevant items are checked and saved.

Fig 9: TM Relevant Checkbox data saved successfully in Nomination Item database table.

4.2.2 Sprint 2

User story 210

Summary:

Purpose of this user story is that it will give an idea to Trade execution expert about Subcontracting status or integration status of Freight Order for respective Nomination item on Nomination screen itself.

The value of subcontracting status and integration status will be shown in the form of traffic light & flag icon on the nomination screen.

Below are the icons which will be shown on the nomination screen:

Traffic Light Off: When Nomination item is not TM Relevant.

Red Traffic Light: When SAP TM is not the Target solution for TM relevant nomination item.

Yellow Traffic Light: When the subcontracting status is not defined.

Green Traffic Light: When the subcontracting status is "In Tendering".

Red Flag: Nomination –TM integration failed for TM Relevant item.

Checkered Flag: When the subcontracting status is equal to or more than 03 (Carrier Assign).

BADI's Implemented:

BAdI Definition: OIJ_NOM_UI_INT

BAdI Implementation: /ACMTM/OIJ_NOM_UI_INT

Method Name: IF_EX_OIJ_NOM_UI~NOM_ALV_REFRESH_DISPLAY

BAdI Definition : OIJ_NOM_MAINTAIN

BAdI Implementation: /ACMTM/NOM_TM_INTEGRATION

Method Name: IF_EX_OIJ_NOM_MAINTAIN~DATABASE_UPDATES

IF_EX_OIJ_NOM_MAINTAIN~UPDATE_DOCUMENTS

Flow Logic:

Whenever nomination is saved, TM API is called in IF_EX_OIJ_NOM_MAINTAIN~DATABASE_UPDATES method. This API will return the integration status of Nomination with the TM system. Below is the status code and its meaning:

- 01 – Nomination TM Integration done successfully.
- 02 – Nomination TM integration failed.
- 03 – Asynchronous processing

This status code is stored into OIJNOMI database table in field /ACMTM/TM_INTEGRATION_STATUS.

If SAP TM is not the target solution then this API will not return anything and blank value is stored in a table.

When a nomination is saved successfully, IF_EX_OIJ_NOM_UI~NOM_ALV_REFRESH_DISPLAY method is called. In this method, all the scenario for possible Traffic light or Flag is checked and Icons are displayed. Below is the flow logic for the respective scenario:

- When /ACMTM/TM_INTEGRATION_STATUS = '02', then display Red Flag
- When /ACMTM/TM_INTEGRATION_STATUS = '03', then display nothing.
- When /ACMTM/TM_INTEGRATION_STATUS = '01', then check subcontracting status for respective nomination item and if any one of the subcontracting statuses is in 01 status or if the subcontracting status is not assigned then display yellow traffic light. If the subcontracting status is 02, then show green traffic light and make every field in un-editable mode except confirming the checkbox. And if all subcontracting status is equal to greater than 03 then show the checkered flag and again make every field in un-editable mode except confirming the checkbox.
- When /ACMTM/TM_INTEGRATION_STATUS is blank and TM relevant is ticked, then check whether current nomination item is TM relevant or not and if it is not TM relevant then show red traffic light.
- When TM Relevant is not ticked, then show light out traffic icon.

- If we re-open the nomination, then again IF_EX_OIJ_NOM_UI~NOM_ALV_REFRESH_DISPLAY method is called and hence step 2 will repeat.
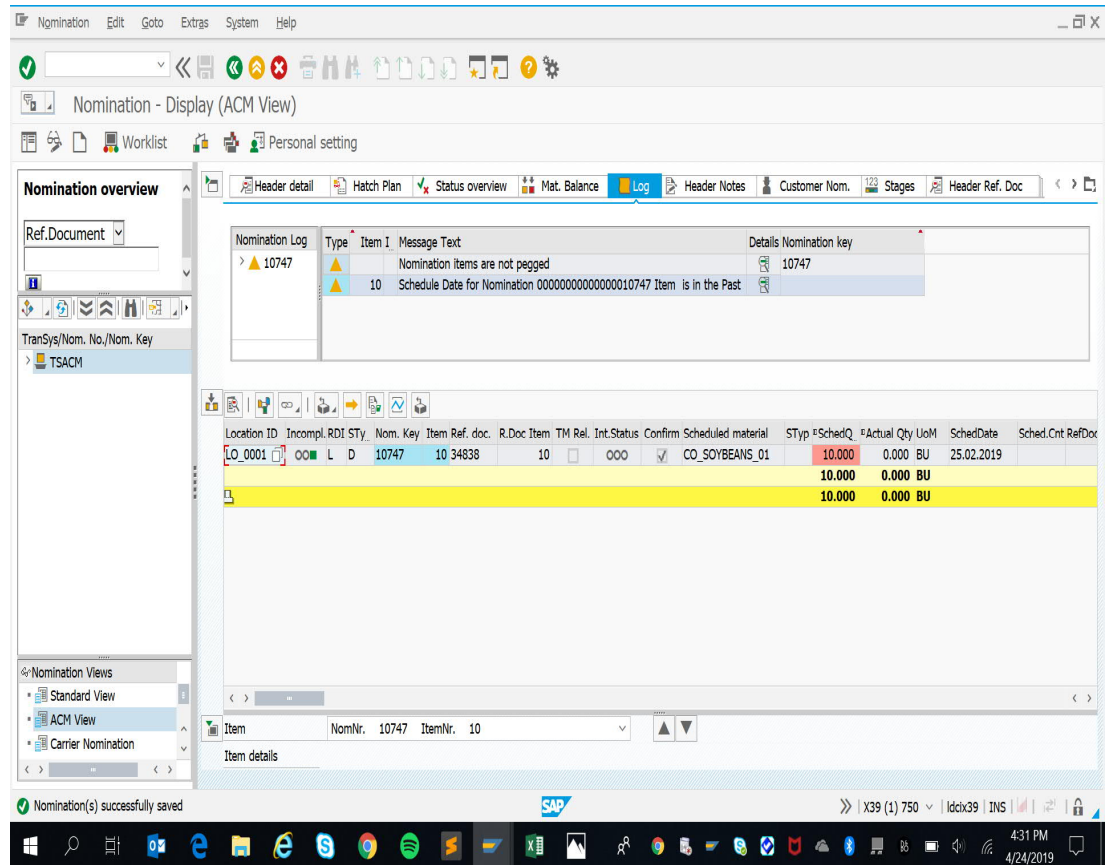
Testing Evidence:

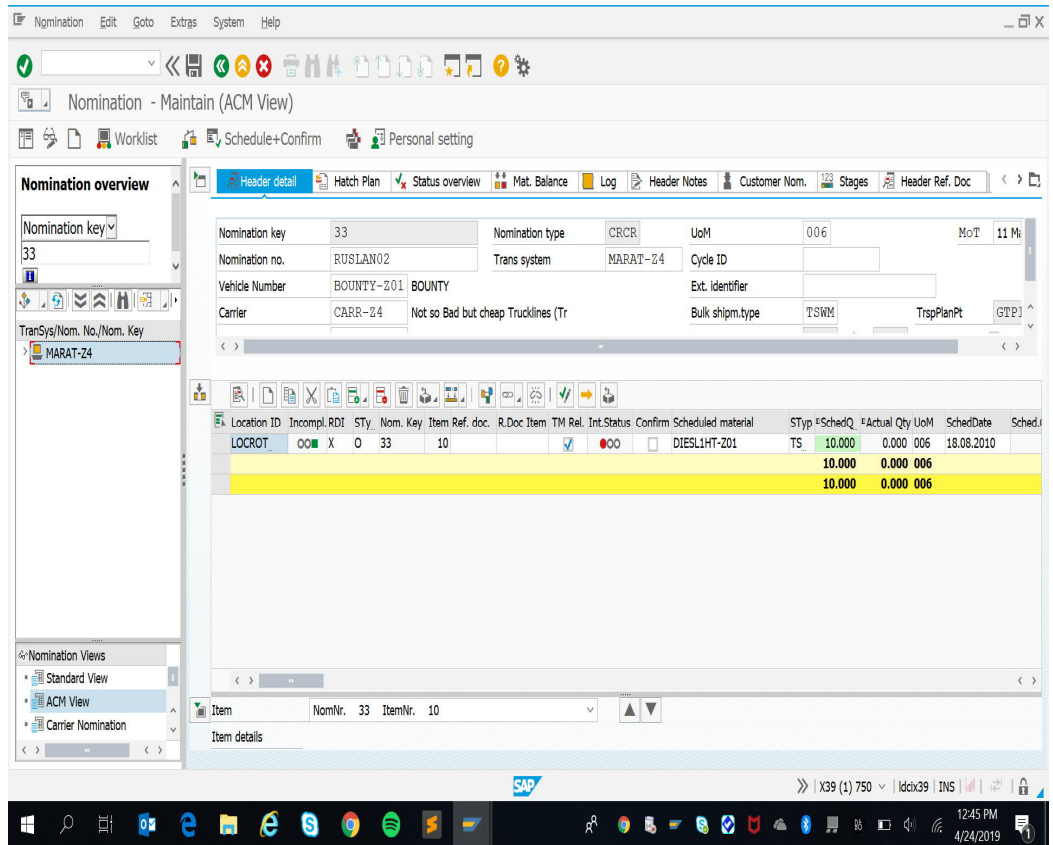**Fig 10:** Grey Traffic light is displayed in TM integration status column

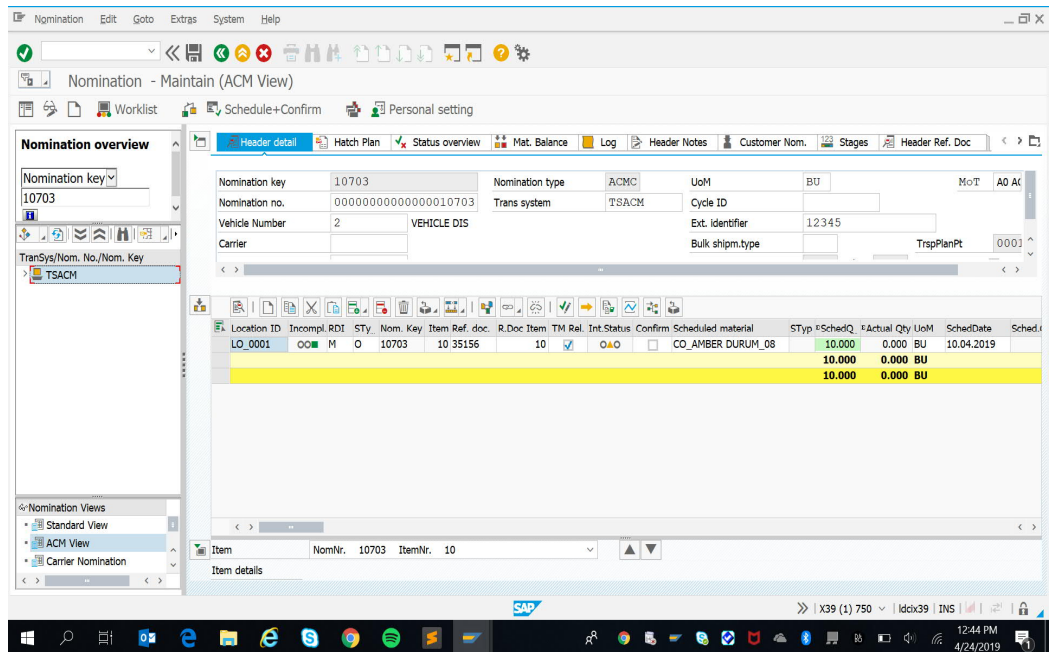**Fig 11 :** Red Traffic light is displayed in TM integration status column

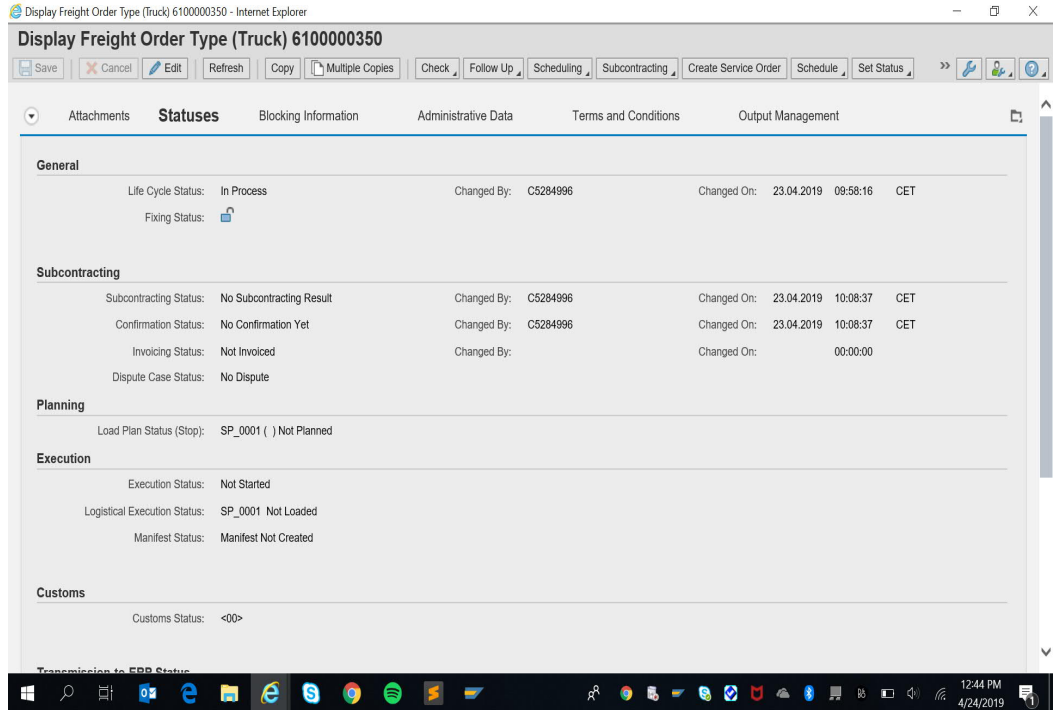**Fig 12a:** Yellow Traffic light is displayed in TM integration status column

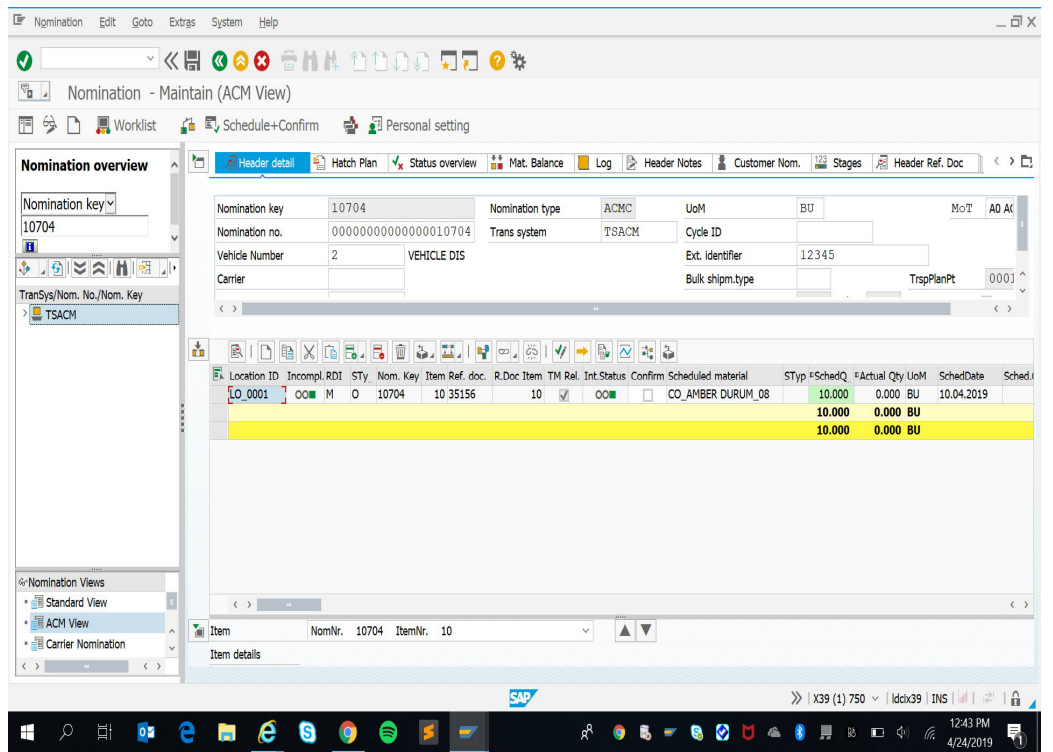**Fig 12b:** Sub Contracting status - "No subcontracting result"

Fig 13a: Green Traffic light is displayed in TM integration status column
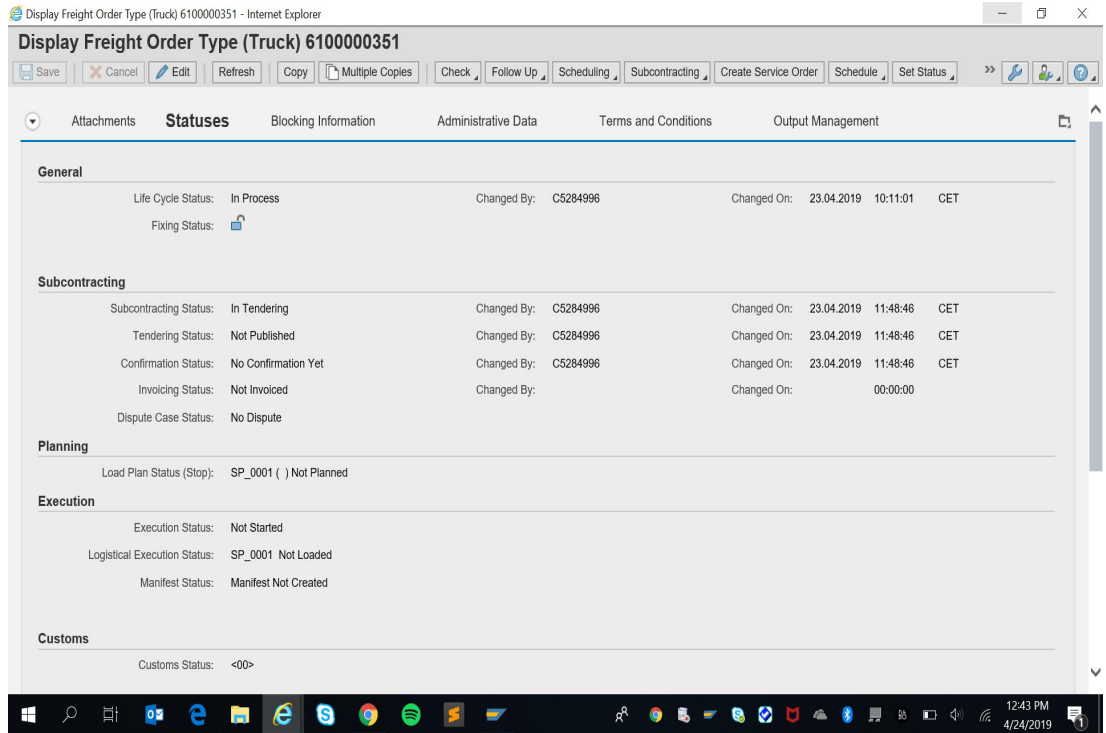
Fig 13b: Sub Contracting status - "in Tendering"
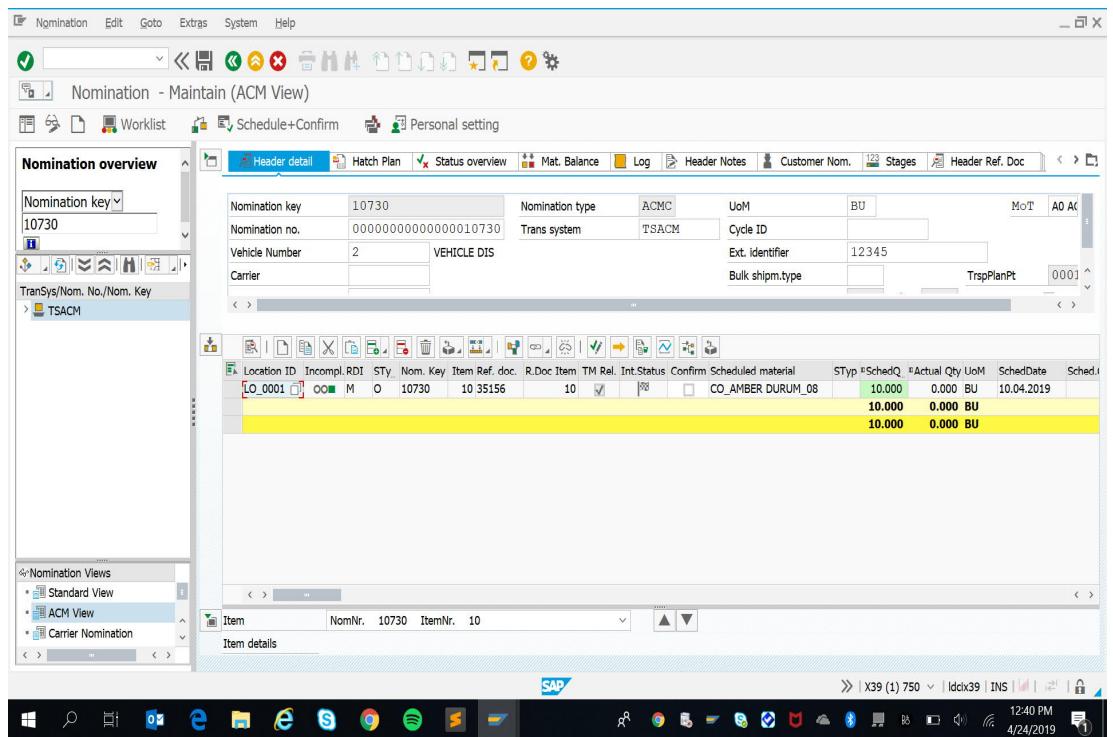
Fig 14a: Checkered Flag is displayed in TM integration status column
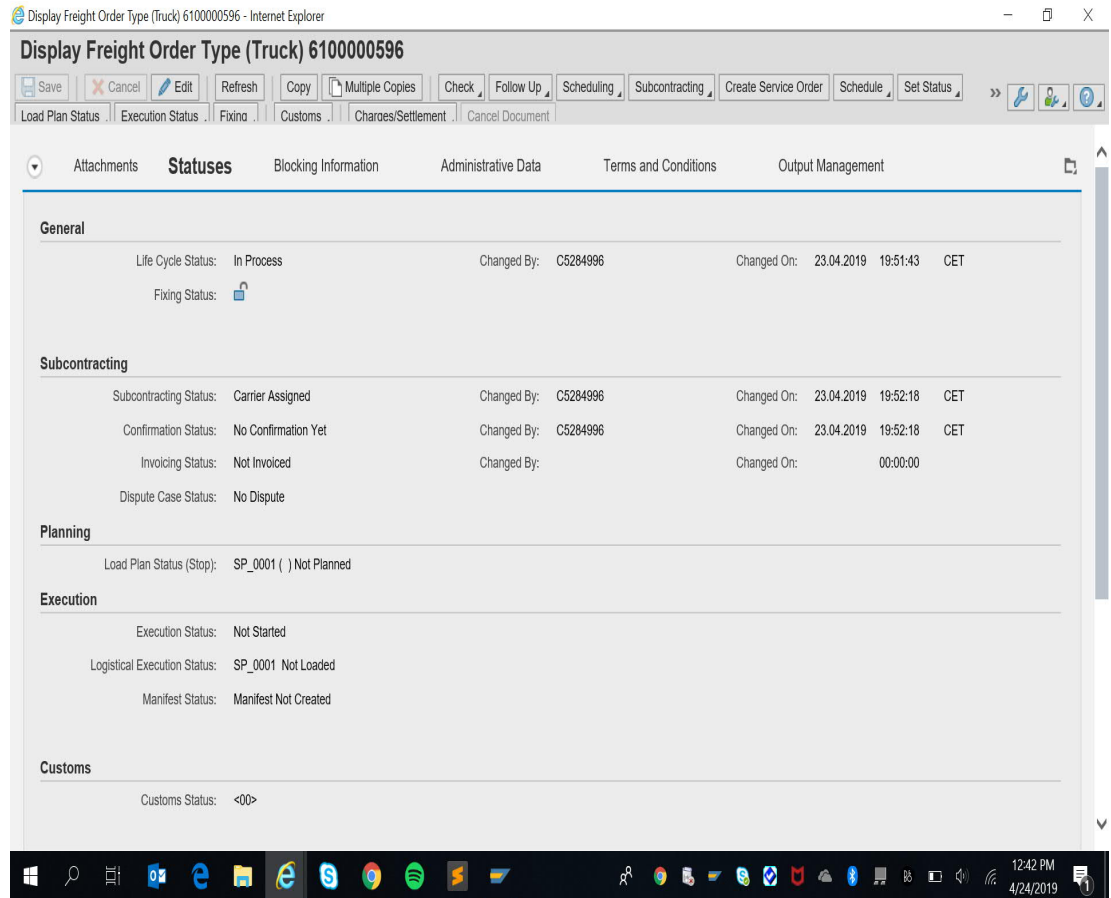
Fig 14b: Sub Contracting status - "Career assigned"

4.2.3 Sprint 3

User story 181

Summary:

Purpose of this user story is that it will create a new tab on the nomination screen under the nomination item section named TM information and the trade execution expert will be able to see FUs, FORs, LDC IDs, Net Weight, UoM, Railcar/Vehicle, planning location, planning location description, from and to dates (acceptable and requested), TM planning block, time zone, Carrier, carrier description, carrier Master BoL in ALV Grid.

Only 3 fields "requested from & to timestamps" and 'TM planning block' are editable. All remaining fields are displayed only.

BADI's Implemented:

BAdI Definition: OIJ_NOM_ITEM

BAdI Implementation: /ACMTM/NOM_TMINFO_TAB

Method Name: IF_EX_OIJ_NOM_ITEM~ACTIVATE_TAB

IF_EX_OIJ_NOM_ITEM~PROCESS_ITEM

Class Implemented:

Class Definition: /ACMTM/CL_NOM_ACM_ENH_UI

Method Name: CREATE_TM_INFO_ALV

DISPLAY_TM_INFORMATION

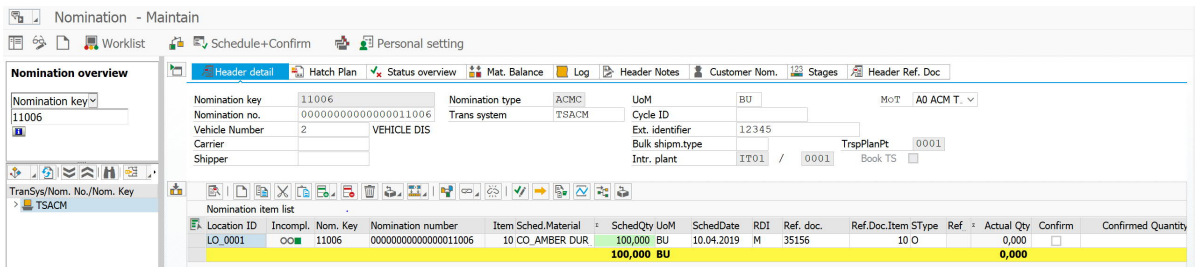PREPARE_FIELD_CATALOG_TMINFO

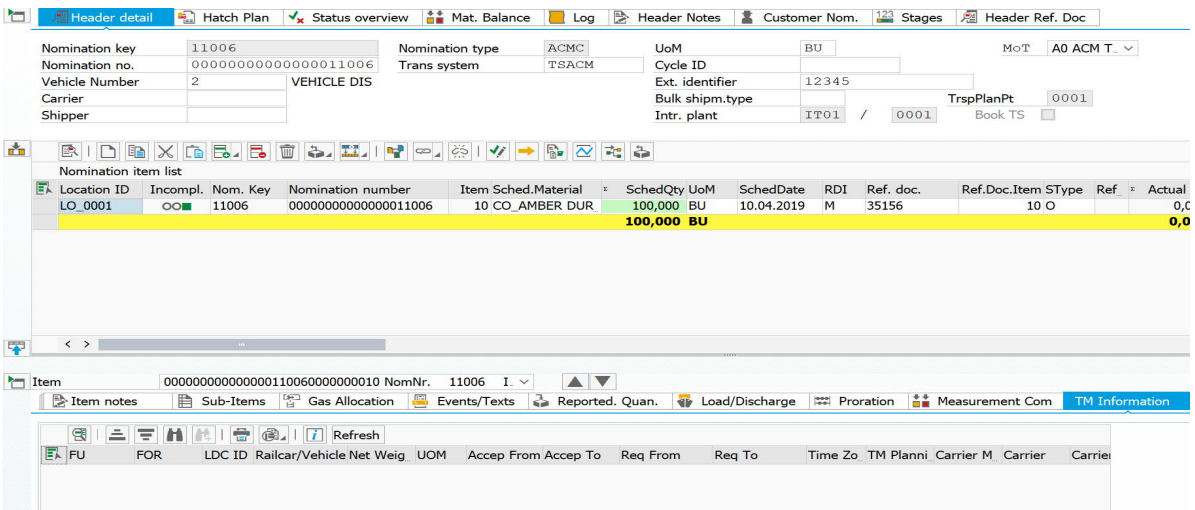**Testing Evidence:**

Fig 15: Nomination line item is added

Fig 16: New "TM Information" tab is displayed along with existing tabs

Fig 17: Required Column Header's are displayed

Fig 18: Nomination details are opened in display mode

Chapter-5 Conclusion and Future Plans

The project is currently in its 3rd Sprint of development after the development the FBS will be tested for the integration with the all the developed parts by the ACM, TM and TSW teams and then the customer will do the testing of the products and will check that the developed FBS is up to its business standards.

Along with the development phase the developed functionality is regularly tested unit tested at the end of each development phase a.k.a sprints and there is an internal demo of the working given to the product owner and if there is an update in the functionality or the user story it is discussed with whole of the team and the leading architects and if there is some dependency in between teams then some solution decides to develop the particular functionality.

For the upcoming sprints, there is a need to create ABAP Units test for the user stories which match the requirement to use ABAP unit tests others will be tested in the same way as they have been tested till now.

So, on a concluding note the user story being assigned to the TSW team of the previous sprint were all completed and the customer demo for those user stories went well and the customer accepted the work done. Also as the sprint 3 is ending there will be an internal demo first with the Prouct Owner and the TSW, ACM and TM teams to further progress into the development phase of the project.

In the future, the product that is being developed will be also be used by various customers dealing with agricultural contracts or are dealing with the movement of the stock from one place to another. There is a testing phase scheduled after the development phase will be completed. As there are different types of testing done in SAP, it depends on the User story to decide which testing will be done.

There are different types of testing methods available that can be used to perform SAP testing.

Unit Testing

Unit testing is employed to check the practicality of AN SAP system and its varied parts. It is performed by domain and configuration specialists United Nations agency recognize the practicality of every unit during a system.

Example

Suppose the task is to form a sales order and put it aside. To perform unit testing for this task, the tester ought to recognize that the sales order is saved mistreatment the SAP organization components like client master knowledge, partner functions, material master knowledge, company code, credit management space, sales organization, etc.

Example

In ABAP development, Unit testing is performed to ascertain if a report is created from developer-generated knowledge.

System Testing

System Testing involves the mixing of components of AN SAP system to confirm that connected SAP practicality ar coupled along within the development setting.

Example

If you say a cash flow for a quotation in an organization would show that a quote can be used to create a sales order, delivery can be created and processed from the order, the delivery is beaked, the request discharged to accounting, and a client payment applied against the accounting invoice. Each unit is take a located like this and so the test results are combined mistreatment system testing.

Scenario-based Testing

Scenario testing, because the name suggests, is performed as per specific business cases.

Example

Suppose there are a few tasks that are specific to a customer segment or a given product line or a set of services. For these specific lines of the target, you have different scenarios that you need to test. This testing is also performed in the development environment.

Integration Testing

In this testing, testing data comes from a real data extraction source. Data is known to business end-users. Integration testing is employed to gift that the business method, as designed and designed in SAP, runs mistreatment real-world knowledge. In addition, the testing shows that the interface triggers, reports, workflows are operating.

SAP Interface Testing

Interface testing ensures that a business method on the SAP system runs mechanically, the events ar triggered, and also the results ar transferred to the receiver system. Interface testing involves execution on the causation system followed by automatic generation of the interface output, and so the set intense that file and proving that a business process continues on the receiver.

Ideally, interface testing involves larger testing activities as a project progresses. Interface testing shows that triggering works, the info choice is correct and complete, knowledge transfer is booming, and also the receiver is ready to consume the sent knowledge.

SAP User Acceptance Testing

SAP UAT is used to ensure that the end-users are able to perform the assigned job functions with the new system. The important aspect of this testing is to understand the business requirement and to ensure that the expected features, functions and capabilities are available.

SAP System Performance Testing

Performance testing checks the following aspects −
Whether the system latent period is suitable as per the business demand Whether periodic processes ar running inside permissible time, Whether the expected synchronous user load is supported Performance testing identifies bottlenecks and cryptography inefficiencies within the SAP system. It is not going that system performance standardization is utterly came upon and also the program is running with optimized code.

SAP Load Testing

In Load Testing, the tester applies most load on a system, either on-line users or periodic execution, and identifies whether or not the system is capable enough to handle the load.
If not, it finds out the steps required to boost performance.

SAP Security and Authorizations Testing

Security and Authorizations Testing is employed to confirm that users are solely ready to execute transactions and access acceptable knowledge that's relevant to their project. As with the implementation of Security standards, this is really important to test if security and authorization are placed in a system. Test IDs for job roles are created and wont to each ensure what a user will do and what a user cannot do.

SAP Cutover Testing

Cutover testing is usually performed once in a project lifecycle. Here a full-scale execution is done of all the tasks involved to extract data from legacy systems. Then, to perform any reasonably conversion, load the results into the SAP system and totally validate the results, together with a user sign-off.

SAP Regression Testing

Regression testing is employed to search out new functionalities and to check previous functionalities during a system once it's upgraded or a brand new system is ready up.
The key role of regression testing is to check the prevailing practicality and fresh updated configuration and codebase.
When you upgrade your SAP system or apply a patch, it should not have an effect on the practicality that's expected to be performed by the users. In addition, it should not affect the new features that are supposed to be introduced in a new release.

So all these methods are there to fully test to be developed product before handing over to the customer to check that it is in accordance with the company standards and there is no further changes required by the customer or the stake holders to accept the product.

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