1. Introduction

Today's business enterprises must deal with global competition, reduce the cost of doing business, and rapidly develop new services and products. To address these requirements enterprises must constantly reconsider and optimize the way they do business and change their information systems and applications to support evolving business processes. Workflow technology facilitates these by providing methodologies and software to support

i. Business process modeling to capture business processes as workflow specifications,

ii. Business process reengineering to optimize specified processes

iii. Workflow automation to generate workflow implementations from workflow specifications.[1]

In today's ever-changing world, the only thing that doesn't change is 'change' itself. In a world increasingly driven by the three Cs:-

- Customer.
- Competition.
- Change.[2]

Companies are on the lookout for new solutions for their business problems. Recently, some of the more successful business corporations in the world seem to have hit upon an incredible solution: **Business Process Reengineering** (BPR). [2]

1.1 Objectives

The objectives of this study are:

- Study Bonita and to compare it with similar software (Bizagi).
- Implement it as an example in National College for Medical and Technical Studies in Human Resources.

1.2 Importance of the study

The Business Process Reengineering should actually precede any project of computerization and organization.

1.3 Methodology

- Bonitasoft is an open-source BPM and Workflow suite, created in 2001. It was started in French National Institute for Research in Computer Science, and then had incubated several years inside of the French computer science , can be applied for various projects requiring complex workflows like Supply Chain Management, e-Government, Human Resources, Contract management.

- Bizagi BPMS is an easy to use Process and Workflow Management (BPM) Software that allows organization to model, execute and improve business processes without programming.

1.4 Scope of Work

- **National College for Medical and Technical Studies in Human Resource Department.**

1.5 Organization of thesis

- ✓ **Chapter One:** Introduction.
- ✓ **Chapter Two:** Background.
- ✓ **Chapter Three:** Literature Survey.
- ✓ **Chapter Four:** Case Study.
- ✓ **Chapter Five:** Result, Comparison, Conclusion & Recommendation.

2.1 Business process:

Business process is a series of activities occurring within a company that lead to a specific end. It focuses on meeting the needs of the customer and delivering a good or service that will fulfill that need. Process is actually often a collection of interrelated processes that function in a logical sequence to achieve the final goal. [3]

2.2 Business Process Management (BPM):

Business process management (BPM) is a management approach focused on aligning all aspects of an organization with the requirements and needs of clients. It improves business effectiveness and efficiency while striving for innovation, flexibility, and integration with technology. BPM attempts to improve processes continuously. It can be described as a "process optimization task." It is argued that BPM enables organizations to be more efficient, more effective and more capable of change than a functionally focused, traditional hierarchical management approach. A business process comprises a "series or network of value-added activities, performed by their relevant roles or collaborators, to purposefully achieve the common business goal. These processes are critical to any organization, as they can generate revenue and often represent a significant proportion of costs. As a managerial approach, BPM considers processes to be strategic assets of an organization that must be understood, managed, and improved to deliver value added products and services to clients.BPM is an approach to integrate an organizational "change capability" that is both human and technological. Many BPM articles and pundits often discuss BPM from one of two viewpoints: people and/or technology.[4]

Business Process Management (BPM) is often referred to as 'Management by Business Processes'. The term business can be confusing as it is often linked with a hierarchical view (by function) of the company. It is therefore preferable to define BPM as Corporate Management through Processes .Management through processes is a management method based on two logical levels: process governance and process management:

- Process governance is all of the company's governance activities which, by way of allocating on the processes, work towards reaching its objectives, which are both operational and progress related.

- Process management is all the management activities of a given process which work towards reaching the objectives allocated for this process.[4]

Roughly speaking, the idea of business process is as traditional as concepts of tasks, department, production, outputs. The current management and improvement approach, with formal definitions and technical modeling, has been around since the early 1990s .Note that in the IT community, the term 'business process' is often used as synonymous of management of middleware processes; or integrating application software tasks. This viewpoint may be overly restrictive - a limitation to keep in mind when reading software engineering papers that refer to "business processes" or to "business process modeling". Although the initial focus of BPM was on the automation of business processes with the use of information technology, it has since been extended to integrate human-driven processes in which human interaction takes place in series or parallel with the use of technology. For example when individual steps in the business process require human intuition or judgment to be performed, these steps are assigned to appropriate members within the organization. More advanced forms such as human interaction management are in the complex interaction between human workers in performing a workgroup task. In this case, many people and systems interact in structured, and sometimes completely dynamic ways to complete one to many transactions. BPM can be used to understand organizations through expanded views that would not otherwise be available to organize and present, such as relationships between processes. When included in a process model, these relationships provide for advanced reporting and analysis. BPM is regarded by some as the backbone of enterprise content management. [4]

BPM allows organizations to abstract business process from technology infrastructure , it goes far beyond automating business processes (software) or solving business problems (suite). BPM enables business to respond to changing consumer, market, and regulatory demands faster than competitors- creating competitive advantage.[4]

As of 2010 technology has allowed the coupling of BPM to other methodologies, such as Six Sigma. BPM tools allow users to:

- Vision - strategize functions and processes.
- Define - baseline the process or the process improvement.
- Model - simulate the change to the process.
- Analyze - compare the various simulations to determine an optimal improvement.
- Improve - select and implement the improvement.
- Control - deploy this implementation and by use of User defined dashboards monitor the improvement in real time and feed the performance information back into the simulation model in preparation for the next improvement iteration.
- Re-engineer - revamp the processes from scratch for better results.[4]

This brings with it the benefit of being able to simulate changes to business processes based on real-life data. Also, the coupling of BPM to industry methodologies allows users to continually streamline and optimize the process to ensure that it is tuned to its market need.[4]

2.3 Change management:

Change management is the application of processes and tools to manage the people side of change from a current state to a new future state such that the desired results of the change.[5] Change management, which involves all human and social related changes and cultural adjustment techniques needed by management to facilitate the insertion of newly-designed processes and structures into working practice and to deal effectively with resistance is considered by many researchers to be a crucial component of any BPR effort .[6]

2.3.1 Change management is necessary because**:**

- Apply change management to realize the benefits and desired outcomes of change.
- To maximize the collective efforts of all people involved in the change.
- Reduce the costs.
- Reduce the risks by minimizing unintentional change impacts.[7]

2.4 Project management:

Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements.[8]

2.5 Effective Change Management:

Changes in people behavior and culture, processes, and technology. As a result, there are many factors that prevent the effective implementation of BPR and hence restrict innovation and continuous improvement.[9]

3.1 Re-engineering

Reengineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed. When the process becomes too noisy and optimization is not fetching the desired output, it is recommended to re-engineer the entire process cycle. BPR has become an integral part of organization to achieve efficiency and productivity at work. [10]

According to many in the BPR field reengineering should focus on processes and not be limited to thinking about the organizations. A business process is a series of steps designed to produce a product or a service. It includes all the activities that deliver particular results for a given customer (external or internal. Processes are currently invisible and unnamed because people think about the individual departments more often than the process with which all of them are involved. So companies that are talking in terms of departments such as marketing and manufacturing must switch to giving names to the processes that they do such that they express the beginning and end states. These names should imply all the work that gets done between the start and finish. For example, order fulfillment can be called order to payment process.[10]

Talking about the importance of processes just as companies have organization charts, they should also have what are called process maps to give a picture of how work flows through the company. Process mapping provides tools and a proven methodology for identifying current **As-Is** business processes and can be used to provide a **To-Be** roadmap for reengineering product and service business enterprise functions. It is the critical link that reengineering team can apply to better understand and significantly improve business processes and bottom-line performance. Having identified and mapped the processes, deciding which ones need to be reengineered and in what order is the most important critical question. Company cannot take up the unenviable task of reengineering all the processes simultaneously. Generally they make there choices based on three criteria:- dysfunction: which processes are functioning the worst?; importance: which are the most critical and influential in terms of customer satisfaction; feasibility: which processes that are most likely to be successfully reengineered.[10]

3.2 Map and Analyze As-Is Process

Before the reengineering team can proceed to redesign the process, they should understand the existing process .[10]

3.3 Design To-Be process

The objective of this phase is to produce one or more alternatives to the current situation, which satisfy the strategic goals of the enterprise.[10]

3.4 Business Process Re-engineering (BPR)

Business Process Re-engineering (BPR) is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and processes within an organization? BPR aimed to help organizations fundamentally rethink how to do work in order to improve customer service, cut operational costs, and become world-class competitors. In the mid-1990s, as many as 60% of the Fortune 500 companies claimed to either have initiated reengineering efforts, or to have plans to do so. BPR seeks to help companies radically restructure organizations by focusing on the ground-up design of business processes. Business process is a set of logically related tasks performed to achieve a defined business outcome. Re-engineering emphasized a holistic focus on business objectives and how processes related to them, encouraging full-scale recreation of processes rather than iterative optimization of sub processes. Business process Re-engineering is also known as business process redesign, business transformation, or business process change management.[11]

3.5 Business Process Modeling Notation 2.0 (BPMN)

Organizations are relying on teamwork and communication. Team members work together to get works done. Teams and even companies exchange expertise and insights to maximize their mutual benefits. To ensure good yield is achieved, organizations are striving to remove communication overheads among parties. Business process modeling has been receiving much attention because it help to improve business efficiency, productivity and reducing operating costs. Organizations start to use BPM to understand how business processes get done, how parties work together and how they maximize productivity. [10]

Business Process Modeling Notation (BPMN) is a tool help to perform business process management by providing a set of graphical notations specifically designed for visualizing business processes. It helps review business processes to identify ways in which it can be improved. BPMN speaks clear language for all companies, business analysts, business owners, enterprise stakeholders to understand, document and analyze business processes. BPMN primarily achieves the followings: [10]

1. Process visualization - Presents a business process in graphical form, which is much better than textual representation.
2. Documentation - Not only to describe business activities in detail, but also to specify process- specific properties.
3. Communication - BPMN provides a simple set of notations that is simple enough for any people to read and understand a business process. Ideas can easily be shared and discussed during meetings or telephone conversations. .[10]

Business Process Modeling Notation 2.0 (BPMN) Is a neutral modeling language capable in showing how a business process works. It does not give advice on how to improve processes. Business process modeling tools harness BPMN to achieve the followings: [10]

1. Process analysis – show how business operation gets done and analyze the collaboration between parties, see how to work together to reach a business outcome.
2. Process planning - Design process flow as a replacement for legacy, inefficient process flow.

3. Process improvement - Study the allocation of activities and routing of flows to identify bottlenecks and communication overheads, and look for improvement.
4. Process simulation - Simulate the execution of process to estimate the type and amount of resources needed to complete a process, with respect to different scenarios.
5. Process execution - Execute BPMN in workflow engine without any programming.[10]

3.5.1 Basic Constructs

There are five basic categories of BPMN elements. They have unique definition, presentations and properties. Readers of BPD can easily recognize them and understand a process.[10]

3.5.1.1 Swimlanes

Figure 1: Swimlane

Swimlanes are graphical containers that represent participants within a process. It contains flow objects. In a swimming pool, there are lanes designated for swimmers. Swimmers get their own lane to swim in, and they won't swim across another. Swimlane objects in BPMN are rectangular boxes that represent participants of a business process. A swimlane may contain flow objects that are performed by that lane (participant), except for black box that must have an empty body. Swimlanes may be arranged horizontally or vertically. They are semantically the same, just different in representation. For horizontal swimlanes, process flows from left to right, while vertical swimlanes flow from top to bottom.. There are two kinds of swimlanes:[11]

1. Pools.
2. Lanes.

3.5.1.1.1 Pools

Pools represent participants in a business process. It can be a specific entity (e.g. department) or a role (e.g. assistant manager, doctor, student, vendor). Inside a pool, there are flow elements. They represent the works that the pool needs to perform under the process being modeled. there is a kind of pool that has no content at all. It is known as the blackbox pool. Blackbox pool is often used when modeling entities external to the business process. As it is external, its internal flow does not have any impact on the process being modeled, hence can be skipped, producing a blackbox. The following BPD (business process diagram) gives you an example of a blackbox pool. Customer is a blackbox. Since the process focuses on how the chef prepares a meal, what the customer does is not of the process' interest. The use of blackbox depends on the perspective the process takes. to model the process of how a customer places an order, the flow of Customer will be modeled, making the Chef pool a blackbox.[11]

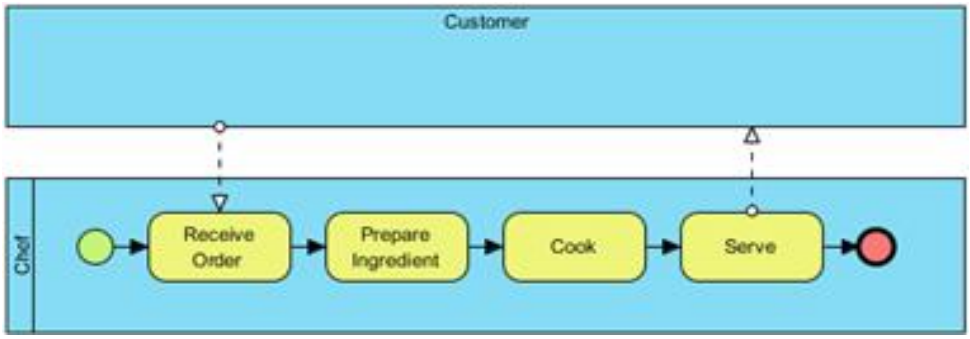

Figure 2: blackbox pool.

3.5.1.1.2 Lanes

Lanes are sub-partition of pools. Lanes can be used to represent specific entities or roles who are involved in the process. Lanes may contain lanes, to form a nested structure, when needed. BPMN helps to modeling business process. [11]

3.5.1.2 Flow Objects

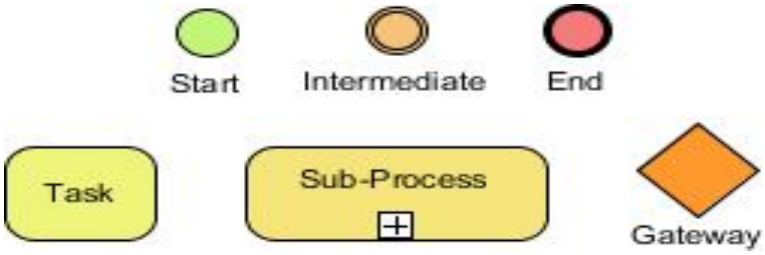

Figure 3: Flow Objects

Flow objects are elements that connect with each other to form business workflows. Flow objects are the primary elements to define the behavior of process. There are three kinds of flow objects: .[12]

1. Events
2. Activities
3. Gateways.[12]

3.5.1.2.1 Events

Events are something that happen and may have impacts on a business process. An event can be an external or internal one. As long as they can influence the process being modeled, they should be modeled. Events are shown as circles. In some, there are icons within the circles to represent the type of the event trigger. There are three types of events: Start Event, Intermediate Event and End Event. Every process should have a start event to show the beginning of business process. It allows readers to locate in BPD where the process begins, and under what condition. End event is used to indicate where a business process completes. Intermediate event is responsible for driving business flow based on the event it specifies. Intermediate event can be attached to an activity for modeling an event that may happen DURING the execution of that activity.[12] Intermediate event may also be connected by a connecting object for modeling an event that may happen AFTER the execution of the flow object before. the following example would give you some ideas on how events work. Basically, the diagram is saying when receive an order, begin to process it. If and only if there is no credit limit remained, check on the

problem. Process ends both when the order has been processed or the problem has been identified.[12]

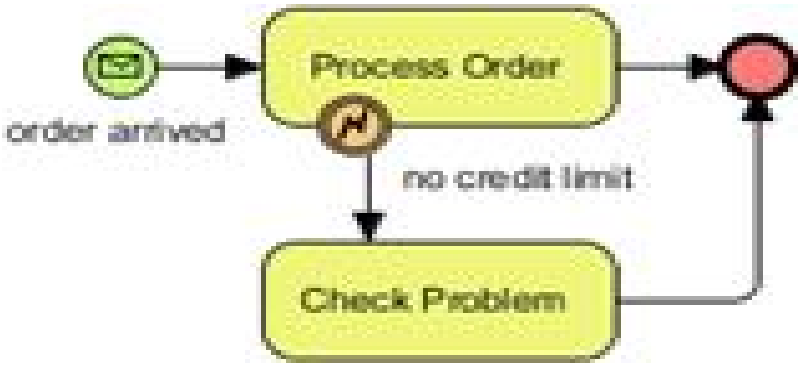

Figure 4: Event

3.5.1.2.2 Activities:

Activities are works that are performed within a business process. They are shown as rounded-rectangle, with names describing the works to perform. There are two types of activities: Task and Sub-Process. When we want to model an atomic work, which cannot be further broken down or makes no sense to do so, we use a task.[12]

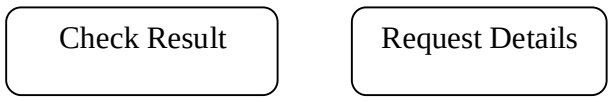

Figure 5: Activities

to model a non-atomic, complex work that can be elaborated into smaller works, use a sub-process. A sub-process can be broken down into another level of details. For this reason, a sub-process usually contains another BPD modeling its details.[12]

the selection of task or sub-process is not just about how complex a work can be, but also about how details need to know about the work. [12]

3.5.1.2.3 Gateways:

Gateways are responsible for controlling how a business process flows. They are shown as diamond shapes. In a process, the work to do and the output may vary under different external or internal conditions. For example, a discount will be offered to a VIP buyer, not to anyone else. Gateway is where conditions are evaluated and the decision is made. .[12]

Here are some of the typical types of gateways:

Data-Based Exclusive Gateway, also known as exclusive gateway, is used to control process flow base on given process data. Each outgoing flow connected from gateway corresponds to a condition. The flow with satisfied condition is traversed. Only one flow will be traversed.[12]

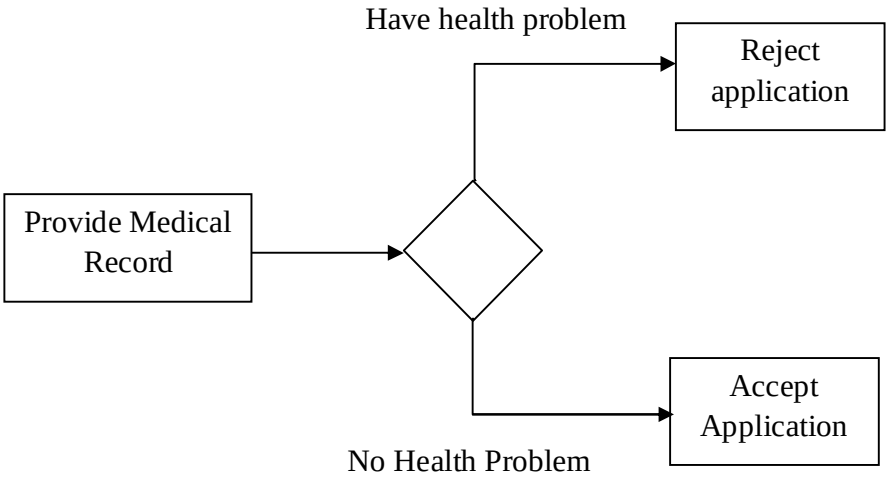

Figure 6:Execlusive Getway

Inclusive Gateway can be used to create parallel paths. The conditions of all outgoing flow are evaluated. All flows with positive result will be traversed. Therefore, it may result in executing multiple flows if multiple conditions are satisfied.[12]

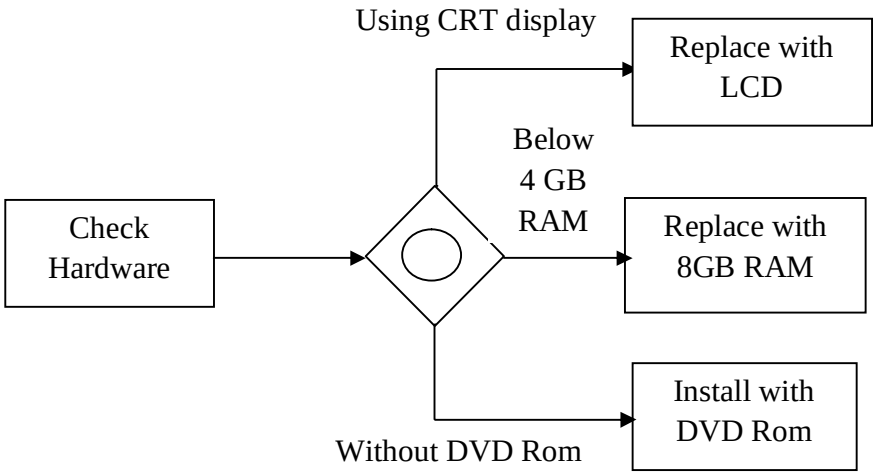

Figure7: Inclusive Getway

Parallel Gateway is used to model the execution of parallel flows without the need of checking any conditions. In other words, all outgoing flows must be executed at the same time. [12

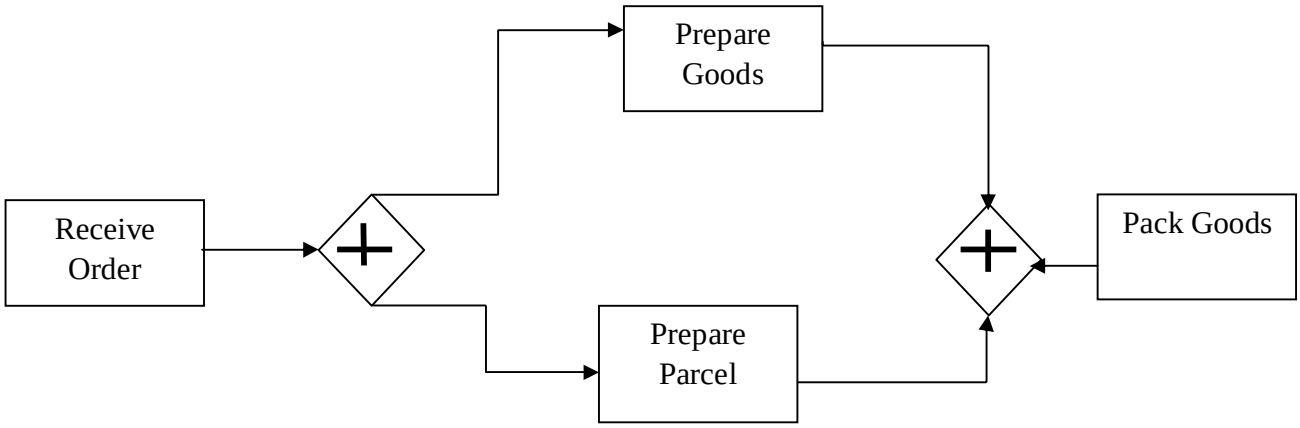

Figure 8: Parallel Gateway

Event-Based Gateway is used to model alternative paths that are based on events. For example, to wait for someone's reply, either Yes or No, to determine the path to traverse. The gateway is therefore followed by two connected intermediate events with message triggers, with one representing Yes message and another one for No. When any ONE of the events is triggered,

then the flow that follows that event will be taken. All the other events and their followed flows will no longer be valid. .[12]

3.5.1.3 Connecting Objects

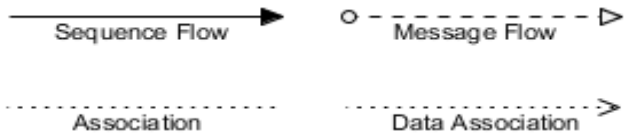

Figure 9: Connecting Objects

Flow objects are not isolated. They are connected in order to form a flow. The connectors that connect the flow objects are called connecting objects. There are four kinds of connecting objects:[12]

1. Sequence Flows
2. Message Flows
3. Associations
4. Data Associations

3.5.1.3.1 Sequence Flows

Sequence flow is used to connect flow elements. It is shown in solid line with an arrowhead. It shows the order of flow elements. [12]

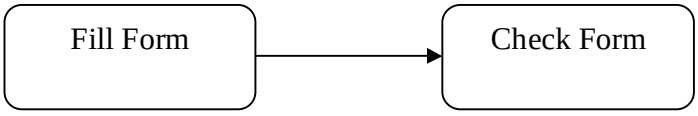

Figure 10: Sequence Flow

You can only use sequence flow to connect flow elements within the same pool, either within the same pool/lane, or across lanes in the same pool. If you want to connect elements across pools, you cannot use sequence flow. Instead, use message flow. [12]

3.5.1.3.2 Message Flows

In BPMN the communication between pools is achieved by use of message. Message flow is used to show the flow of messages between pools, or flow elements between pools. A message flow is shown in dotted line with an arrow head. Some examples of message that flows between pools: fax, telephone, email, letter, notice, command. [12]

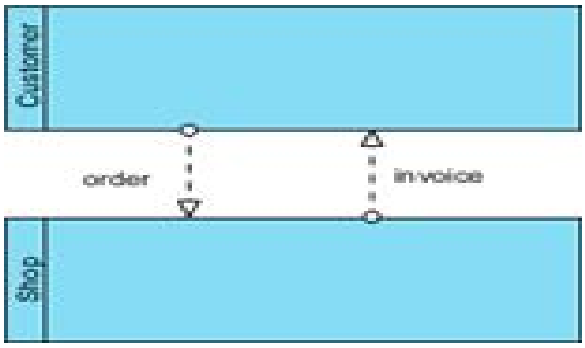

Figure 11: Message Flow

3.5.1.3.3 Data

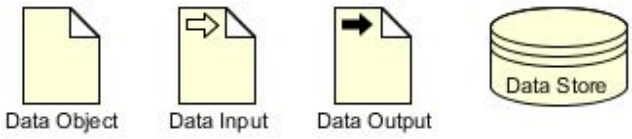

Figure 12: Data

Very often, when executing a business process there may be data produced, either during or after the end of the process. For example, a successful execution of the Place Order task will produce data like purchase order, invoice, receipt, etc. In BPMN, data can be modeled by several types of 'data' objects such as data objects, data inputs, data outputs and data stores. There is a well-defined way to manage the states of data, like instantiation, completed, deleted, etc. Data is mainly information needed or produced when executing a business process. There are four kinds of data: [13] Data Objects, Data Inputs, Data Outputs, Data Stores.

3.5.1.3.4 Artifacts

Figure 13: Artifacts

Artifacts provide additional information about a business process. There are two kinds of artifacts: [13]

1. Groups
2. Text Annotations

3.5.1.3.4.1 Groups

A group is a box with dotted line border, providing modelers a mechanism to group shapes by category. [13]

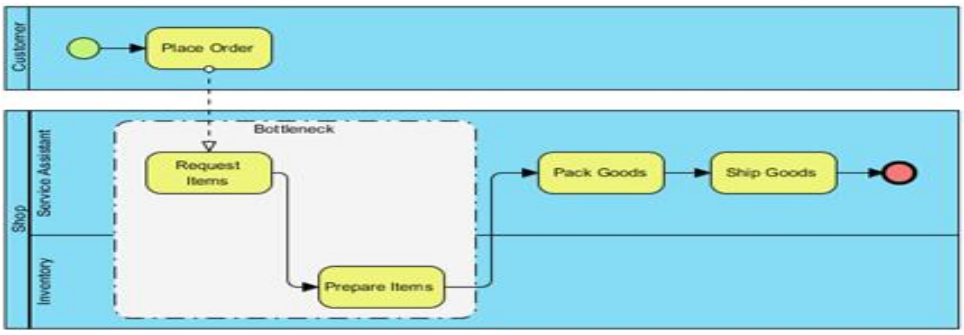

Figure 14: Groups

3.5.1.3.4.2 Text Annotations

A text annotation can be used to add extra detail to flow objects in a BPD. It does not affect the flow but gives details about objects within a flow. [13]

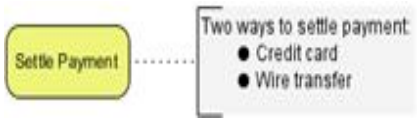

Figure (15)

3.6 workflow

Workflow is a term used to describe the tasks, procedural steps, organizations or people involved, required input and output information, and tools needed for each step in a business process. A workflow approach analyzing and managing a business process can be combined with an object-oriented programming approach, which tends to focus on documents and data. workflow management focuses on processes rather than documents.[14]

3.7 BPR Success & Failure Factors:

- BPR does not only mean change, but rather dramatic change. The constituents of this drastic change include the overhaul of organizational structures, management systems, employee responsibilities and performance measurements, incentive systems, skills development, and the use of IT. [15]
- BPR can impact every aspect of how business is conducted. Change on this scale can cause results ranging from enviable success to complete failure. [15]
- Successful BPR can result in enormous reductions in cost or cycle time. It can also create substantial improvements in quality, customer service, or other business objectives. It can produce revolutionary improvements for business operations. Reengineering can help an aggressive company to stay on top, or transform an organization on the verge of bankruptcy into an effective competitor. [15]
- BPR projects can fail to meet the inherently high expectations of reengineering. In 1998, it was reported that only 30 percent of reengineering projects were regarded as successful. The earlier promise of BPR has not been fulfilled as some organizations have put forth extensive BPR efforts only to achieve marginal, or even negligible, benefits. [15]
- Many unsuccessful BPR attempts may have been due to the confusion surrounding BPR, and how it should be performed. Organizations were well aware that changes needed to be made, but did not know which areas to change or how to change them. Process reengineering is a management concept that has been formed by trial and error or practical experience. [15]

- Business Needs Analysis: Is important factor in the success of any BPR effort is performing a thorough business needs analysis.BPR teams jump directly into the technology without first assessing the current processes of the organization and determining what exactly needs reengineering. [15]

In the analysis phase, a series of sessions should be held with process owners and stakeholders, regarding the need and strategy for BPR. These sessions build a consensus as to the vision of the ideal business process. They help identify essential goals for BPR within each department and collectively define objectives for how the project will impact each work group or department on individual basis and the business organization as a whole. [15]

The plan includes the following: identifying specific problem areas, solidifying particular goals, and defining business objectives. The business needs analysis contributes tremendously to the reengineering effort by helping the BPR team to prioritize and determine where it should focus its improvements efforts .[16]

3.8 The impact of BPR on organizational performance

The two cornerstones of any organization are the people and the processes. If individuals are motivated and working hard, yet the business processes are cumbersome and non-essential activities remain, organizational performance will be poor. Business Process Reengineering is the key to transforming how people work. What appear to be minor changes in processes can have dramatic effects on cash flow, service delivery and customer satisfaction. Even the act of documenting business processes alone will typically improve organizational efficiency by 10%. [17]

4. Introduction

Both Bonita Soft and BizAgi are tools used for Business Process Re-engineering. These two are Open Software, so we can download freely from the net.

4.1 Bonitasoft

- Is an open-source BPM and Workflow suite, created in 2001. It was started in French National Institute for Research in Computer Science, and then had incubated several years inside of the French computer science company. Since 2009, the development of Bonita is supported by a company dedicated to this activity.[21]
- BonitaSoft is a software created by the founders of the Bonita open source project. BonitaSoft aims at becoming the leading Open Source provider of agile Business Process Management Solutions for all types of organizations. [21]
- Bonita is an Open Source Business Process Management (BPM) software and Workflow software edited by the BPM Company BonitaSoft. Develop process based applications easily with Bonita Open Solution. [21]
- Bonita Open Solution combines three solutions in one: an innovative Studio for process modeling, a powerful BPM and workflow engine, and a breakthrough user interface. Create process-based applications in a single day with Bonita Open Solution. [21]

4.1.1 Features

Bonita is made of 3 major components:

- Bonita Studio: allows the user to graphically modify business processes following the BPMN standard. The user can also connect processes to other pieces of the Information System (such as messaging, ERP, ECM, databases...) in order to generate an autonomous business application accessible as a web form. Bonita Studio also allows the user to design graphically the forms that will be shown to the end user in order to interact with the process. Moreover, the Studio allows the user to get started with processes designed with other standards and technologies such as XPDL or JBPM. [21]

- Bonita BPM Engine: The BPM engine is a JAVA API that allows to interact programmatically with processes. It is available under LGPL. [21]
- Bonita User Experience: is a portal that allows each end-user to manage in a webmail-like interface all the tasks in which he or she is involved. The portal also allow the owner of a process to administrate and get reports about processes. [21]

4.1.2 Applications

- Bonita can be applied for various projects requiring complex workflows like Supply Chain Management, e-Government, Human Resources, Contract management etc.

4.1.3 Benefits of BPM with Bonita Open Solution

- BPM with Bonita Open Solution offers numerous advantages and benefits for organization as well as for key actors of BPM projects like Business Analysts, Developers and End users.

4.1.4 The first screen will be seen when launch Bonita soft

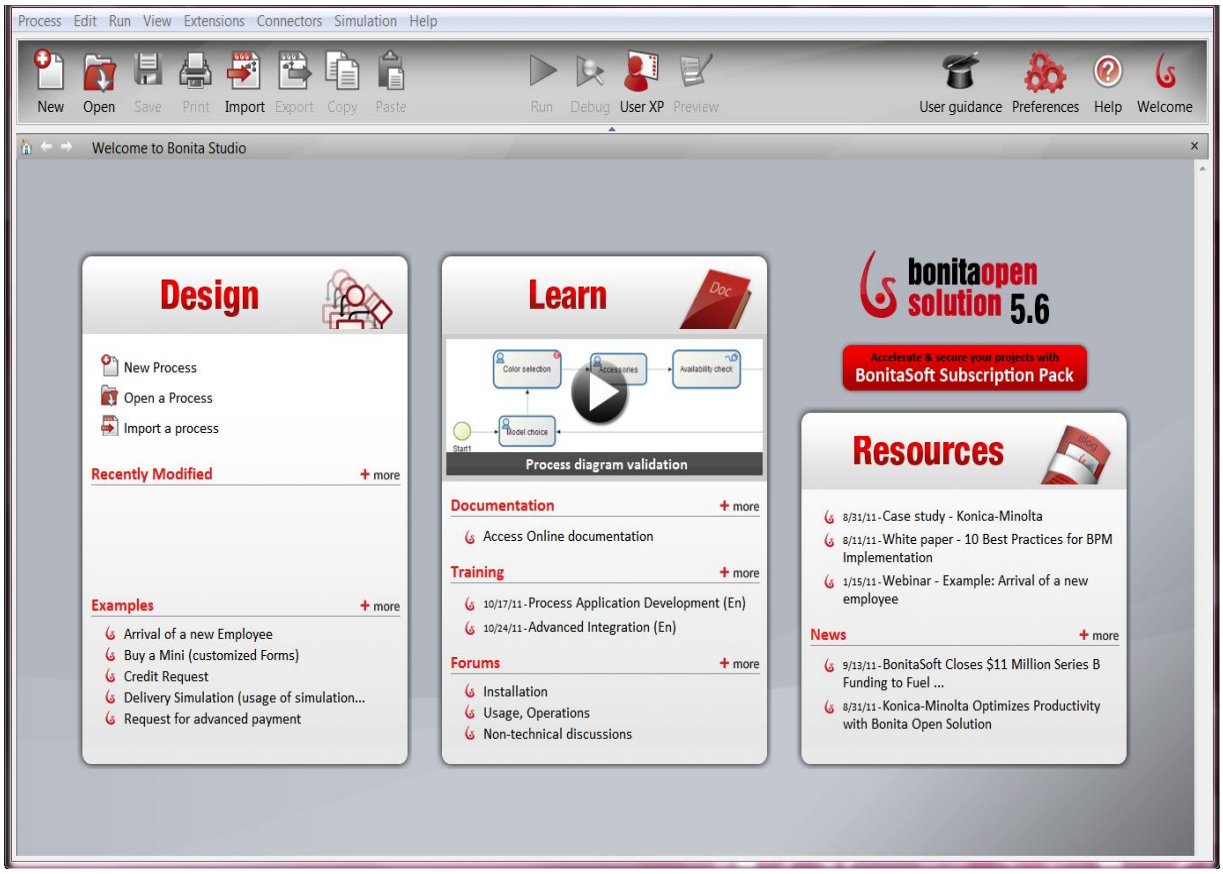

Figure 16 : first screen " Welcome to Bonita Studio "

4.1.5 How to define and execute a Process with Bonita

Click on New in the tool bar , or New Process on the Welcome screen, to enter Bonita Studio. The whiteboard is ready to begin with a pre-set Start1 and Step 1. The whiteboard is where you draw your processes**.**

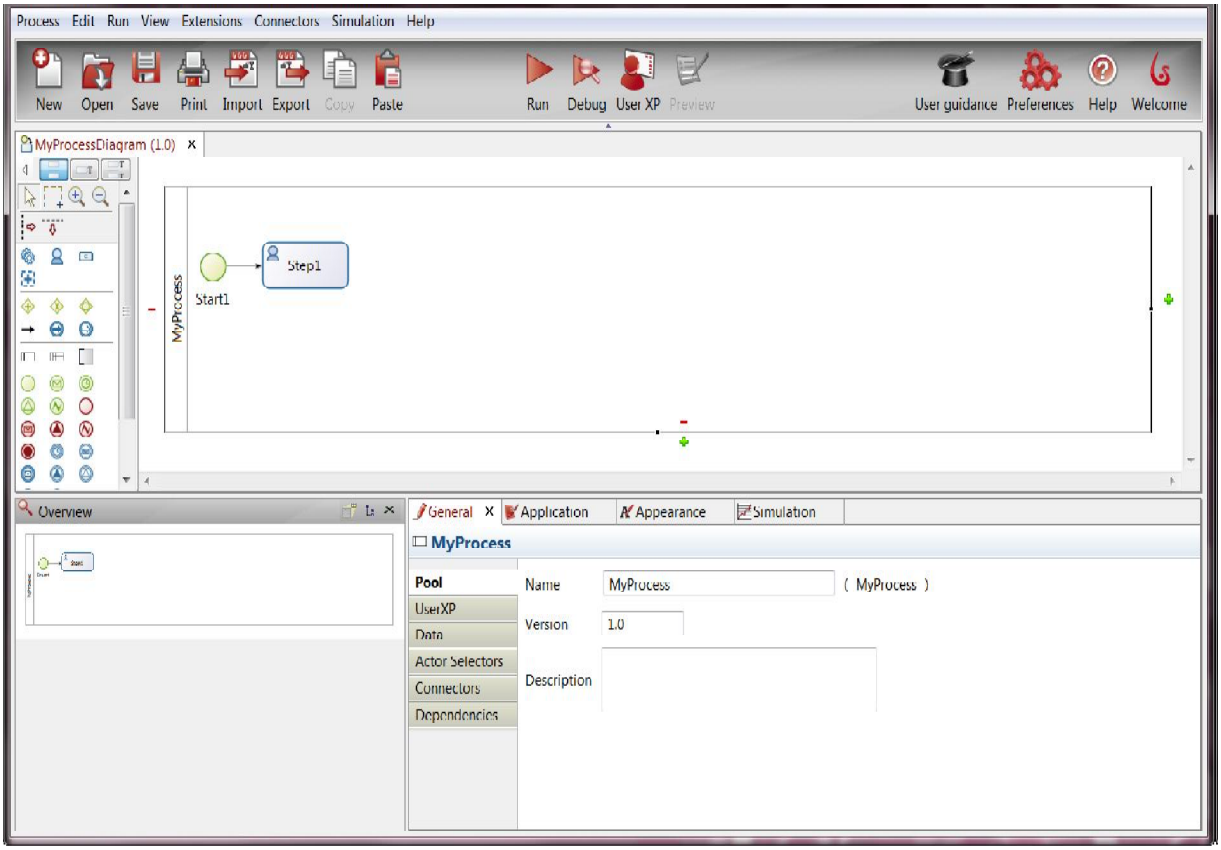

Figure 17: design a new process

4.1.6 Bonita Studio Form Builder

Use the Bonita Studio Form Builder to create the fields to go into forms for end users.

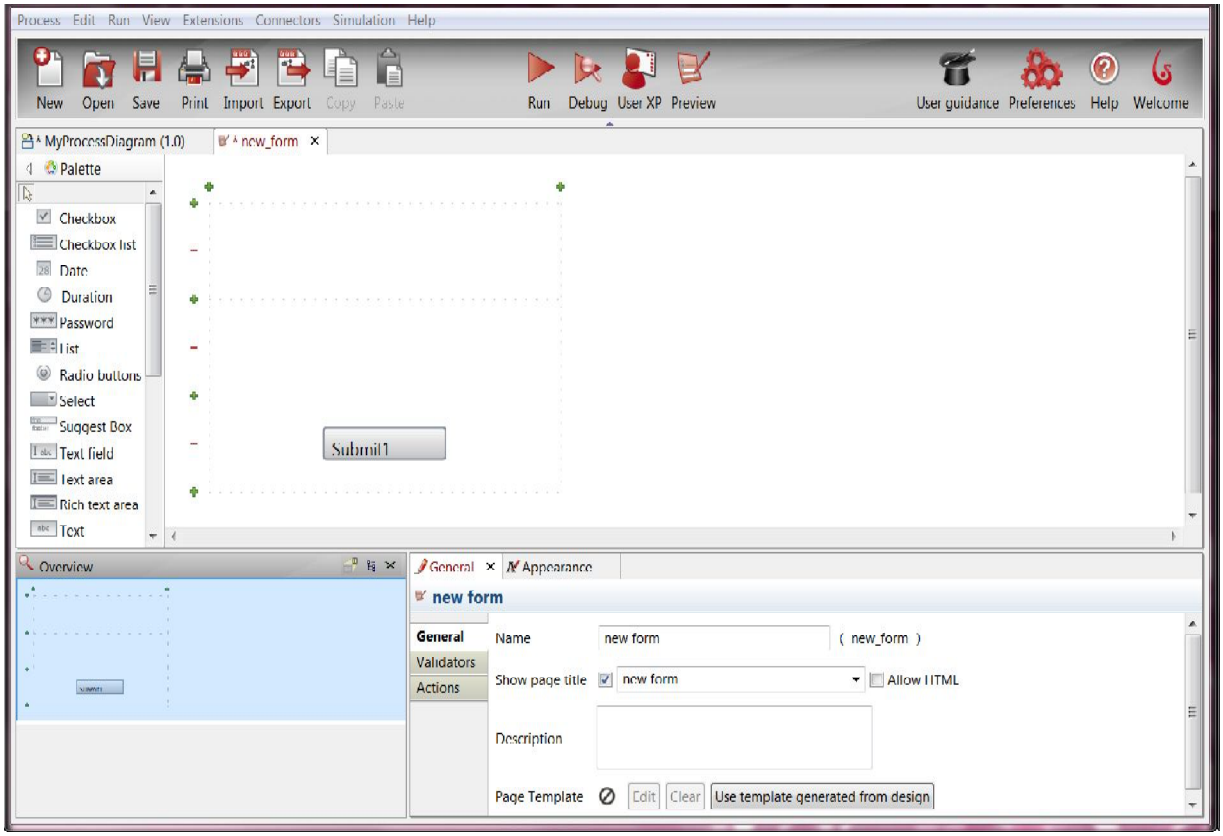

Figure 18: Bonita Studio Form Builder

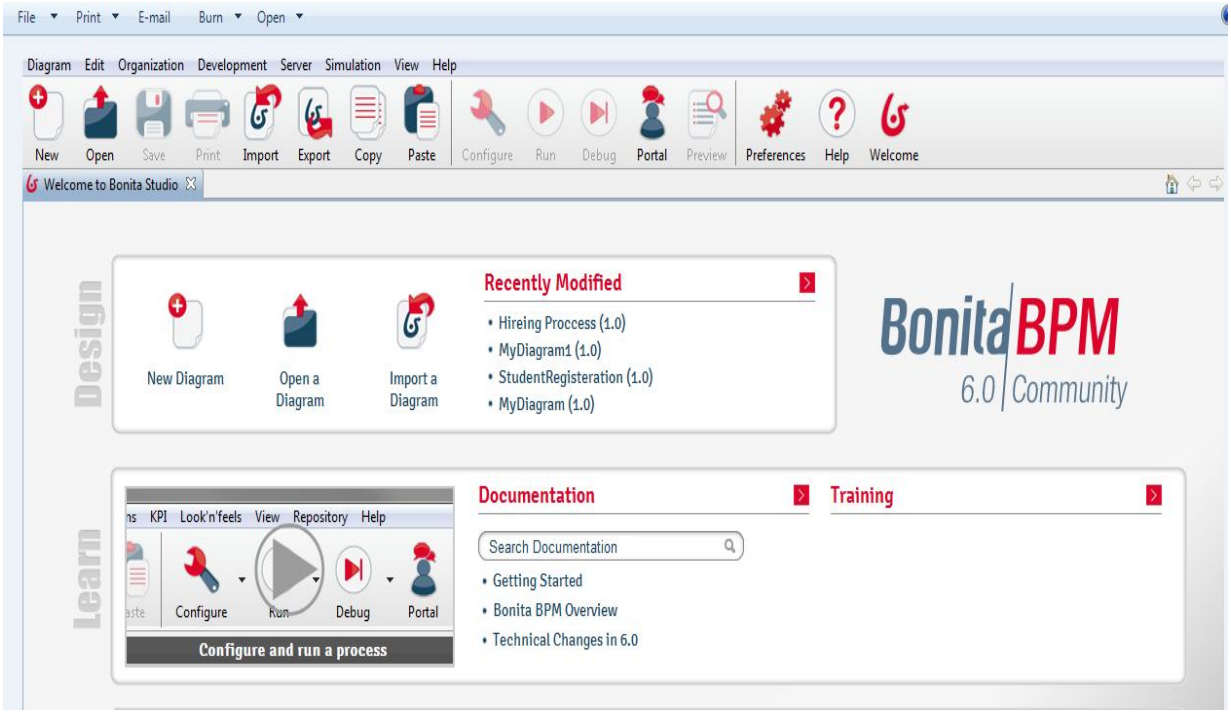

Figure 19: first screen in the system.

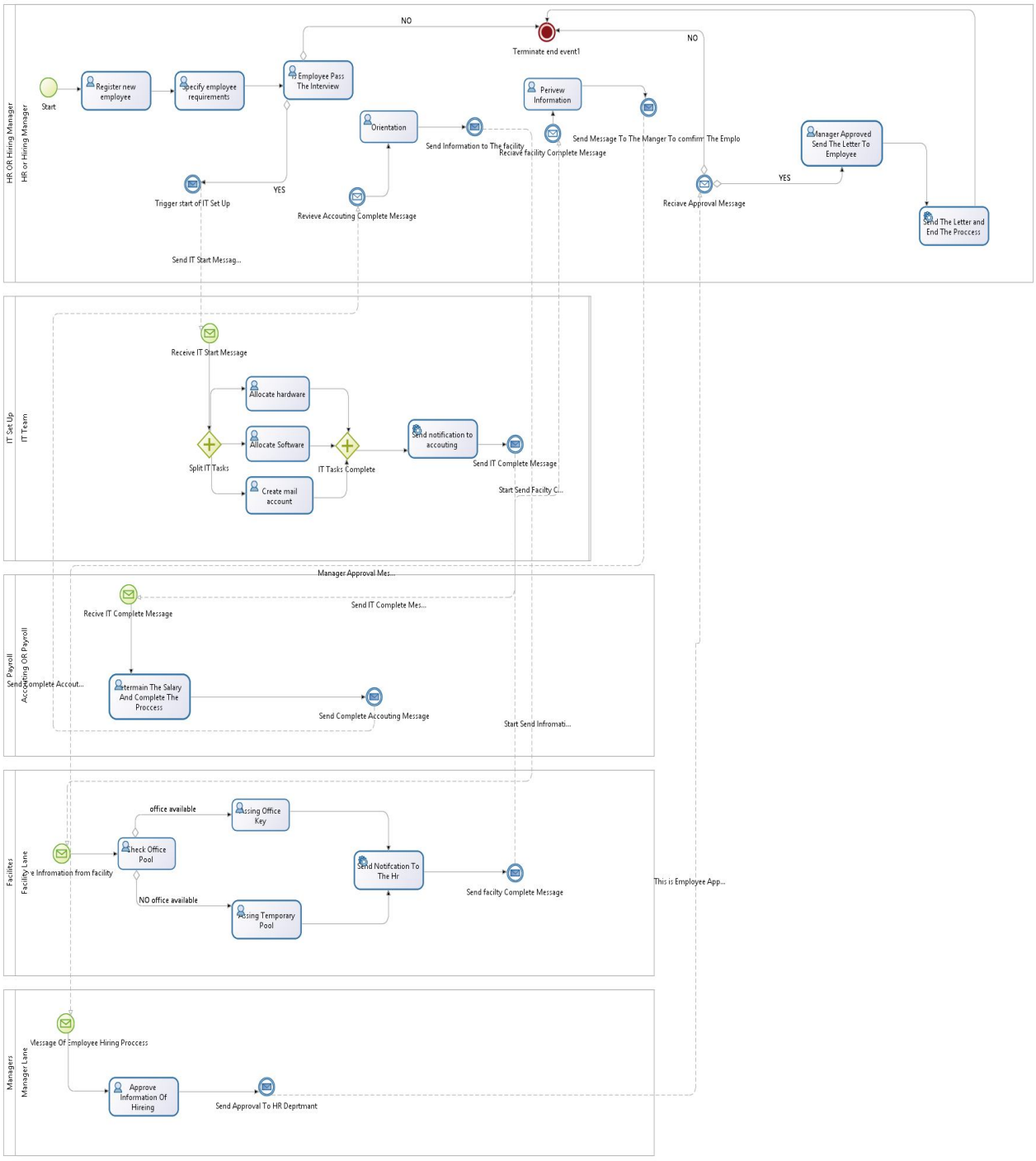

Figure 20: Hiring Process Diagram.

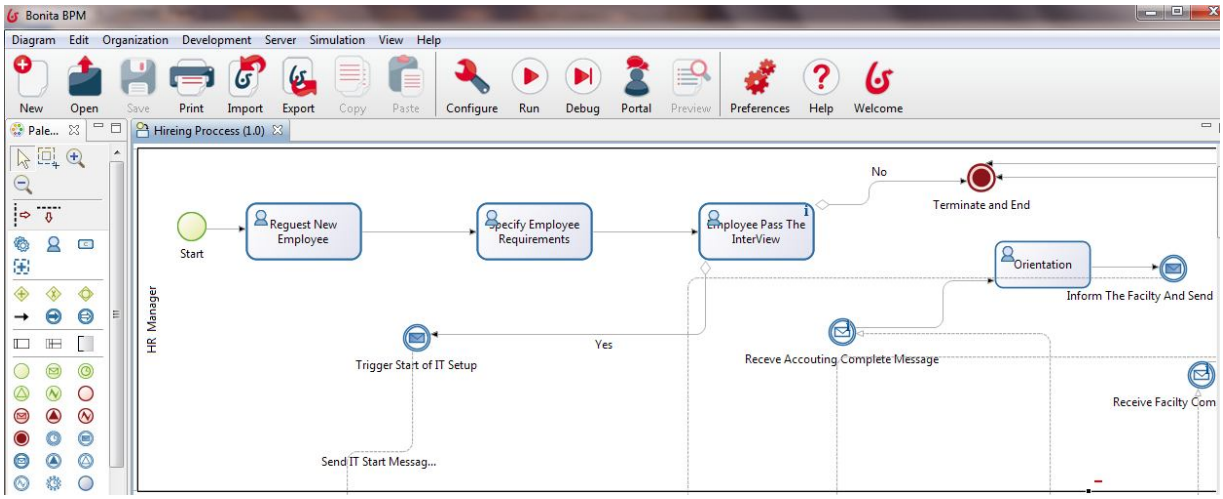

Figure 21: HR Lane

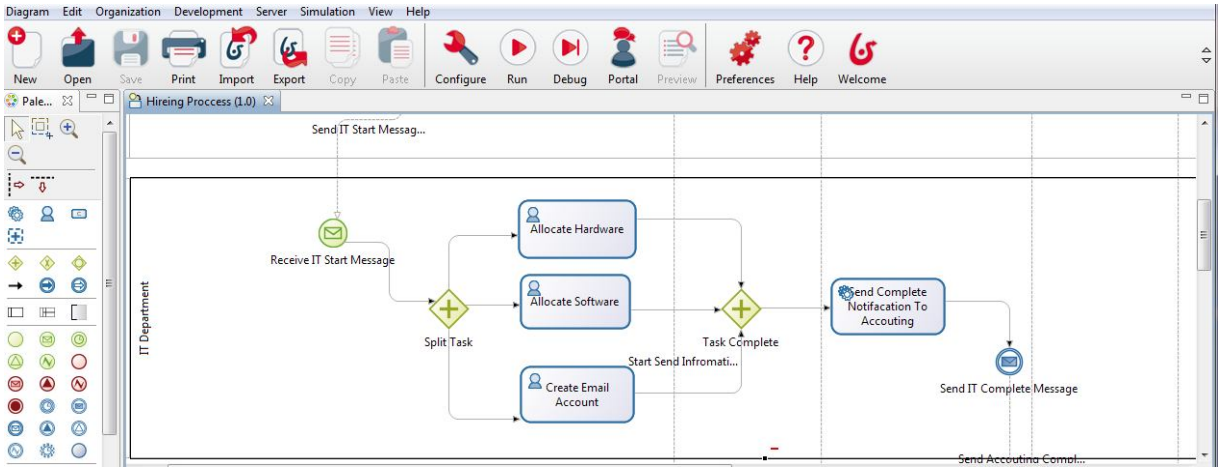

Figure 22: IT Lane

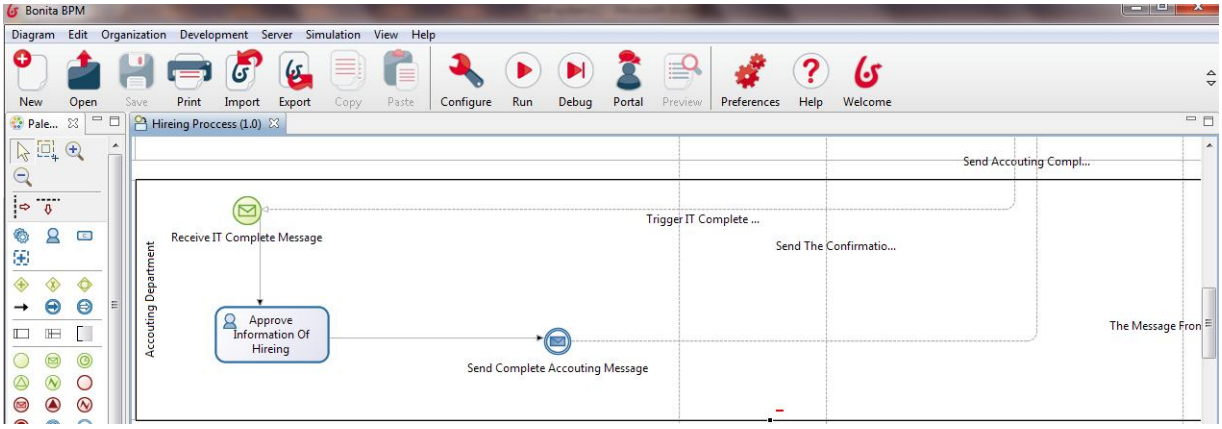

Figure 23: Acconuting Lane

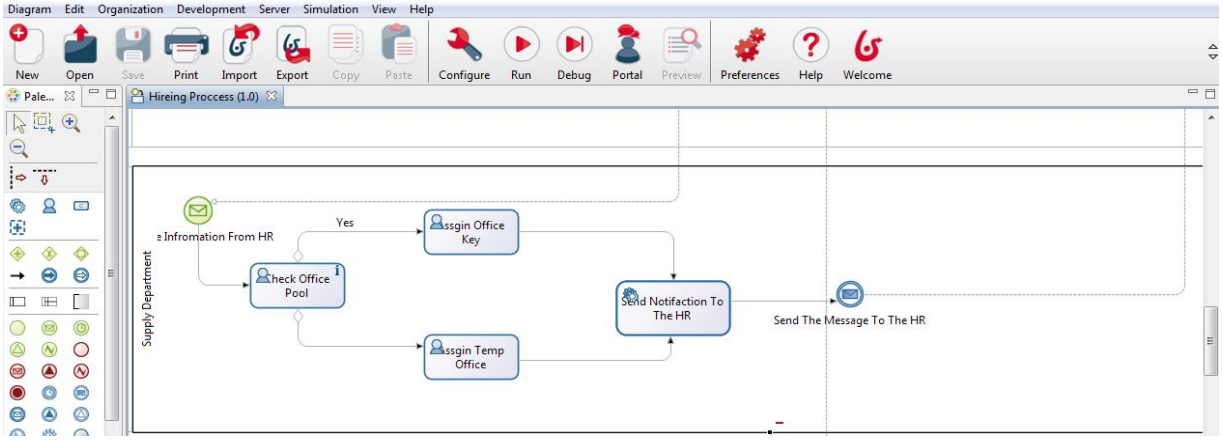

Figure 24: Facility Lane

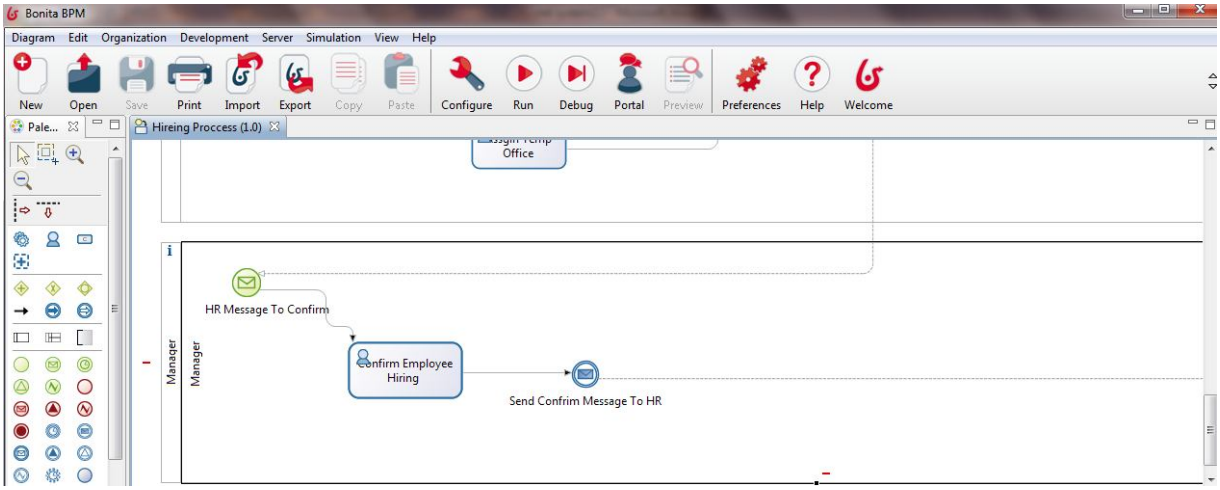

Figure 25: Manager Lane

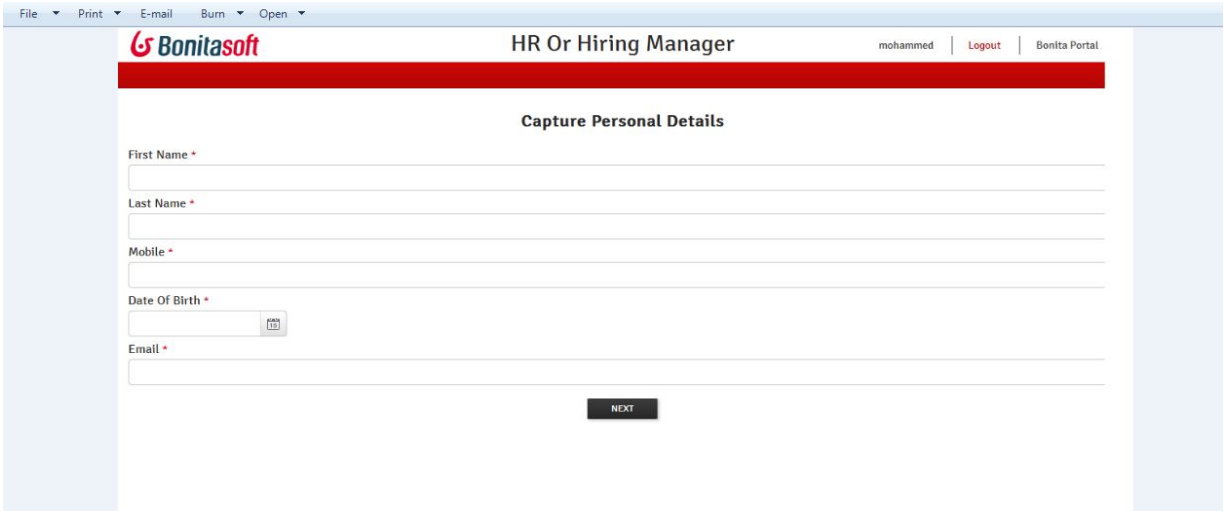

Figure 26: personal details screen.

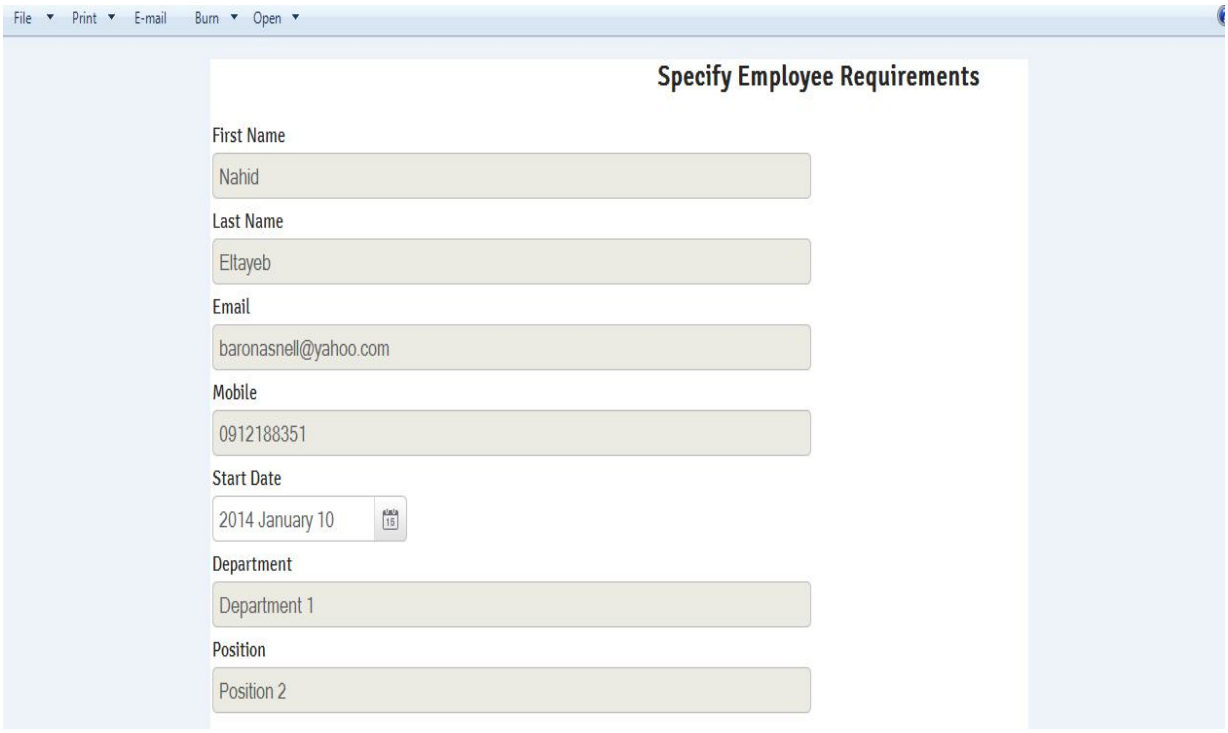

Figure 27: employee requirements screen.

4.2 Bizagi

Bizagi is a software suite with two complementary products, a Process Modeler and a BPM Suite. Bizagi BPMS is an easy to use Process and Workflow Management (BPM) Software that allows organization to model, execute and improve business processes without programming.

4.2.1 Model

The first step to create Bizagi solutions is to determine the processes. Bizagi BPM Suite has the Bizagi Process Modeler. This component is an application that can be download for free from the internet. Bizagi Process Modeler allow developer to diagram and document processes in an agile and simple way. It also present the business processes using a global accepted standard, which is better known as BPMN (Business Process Modeling Notation).[18]

4.2.2 Automate

After designing the process, the next step when building a Bizagi solution is to automate the process, it is to convert all the process activities into a technological application.
Bizagi Studio is the tool used to automate the processes that has been defined in the Bizagi Process Modeler without requiring any programming.
Bizagi offers a set of tools which graphically generates a model associated to a business process (flow diagram, business rules, user interface, etc.). This model is stored in a data base, and is interpreted and executed in production through a web application by Bizagi's BPM server without the need of any code. The resulting web application after the process automation with Bizagi has a very important characteristic: when the process is modified (any element of the model) the web application shows the change automatically. [18]

4.2.3 Execute

The Bizagi BPM Server is the engine that executes and controls the business processes built in Bizagi Studio. The server is based in a collection of components that offer all the necessary functionalities for an effective business process management in the organization (work portal, BAM, business rules, integration engine, etc.). Bizagi BPM server based on the model previously built, watches for the correctness and adequacy of the execution in the different tasks and activities that intervene in the business process; by controlling and

verifying that the tasks are done in the correct moment, by the correct person or resource, and according to company's guidelines, objectives, and other fundamental rules. [18]

4.2.4 Improve

Bizagi's BPM Server has a complete set of performance reports and indicators about the processes which will allow to analyze business, identify bottle necks and identify improvement opportunities in processes. Based on findings, processes and policies may be adjusted in real time using the web application. Improvements can also be done by using Bizagi Studio to generate a new version of the process. The new version of the process can be put into production without requiring any programming, in a short period of time, by just modifying the business model the application will adapt automatically, making it easier to do continuous improvement and to increase productivity in organization. [18]

Bizagi is available in multiple editions to support the varying needs of organizations:

- **Xpress Edition**, It is designed for departmental solutions or for small and medium sized businesses with a maximum of 50 users. Xpress Edition allow to experience the benefits of BPM without having to pay the high price tag attached to restricted and cumbersome competing systems.[19]
- **Enterprise Edition**, It allows to scale up to thousands of users delivering an enterprise-class platform for mission critical, high performance, complex business processes in organization. For the corporate edition can be choosen
- between Enterprise .NET and Enterprise JEE Edition depending on technological preferences. They are similar in functionality; the only difference is the platform where they execute.[19]

The following is an overview of features only available in the Enterprise Edition:

- **Support for Oracle databases**: Enterprise Edition supports both Oracle and MS SQL Server databases. Xpress Edition only supports MS SQL Server.[19]
- **Application Integration:** Very often in BPM projects processes need to be integrated with existing applications and legacy systems. In all editions Bizagi offers a very

powerful wizard to do this integration using web services and without programming. Enterprise Edition

- supports more types of integration: DLL´s, Remoting, EJB, JMS and classes. This is provided by a feature in Bizagi called Component Library. [19]
- **Clustering and Fault Tolerance:** use in large businesses with high volume, performance, reliability and availability requirements. Bizagi Enterprise Edition can set-up clusters consisting of multiple servers, and grow as business requires. it is guaranteed that any process will continue to operate properly in the event of a failure any of the components. Xpress Edition can only be installed on a single server.[19]
- **Virtualization:** Bizagi offers a very sophisticated technology to integrate Bizagi´s process data model with external data sources. With virtualization (shadowing) Bizagi makes data available to the process, but data only persists in the external database. Bizagi offers a wizard to handle virtualization with Oracle and SQL Server external databases. In addition to this, in the Enterprise .NET Edition the user can customize the virtualization classes to connect to any type of external data source (e.g.: MySQL, DB2, etc.) .[19]
- **Reusability:** Reusability provides a way to model things just once and re-use them anywhere in the same process or in other processes. Forms can be reused in any of editions. It must have Enterprise Edition to be able to reuse Vocabulary, Business Rules, Expressions or Functions. Reusability makes process modeling faster and more efficient.[19]
- **Custom Jobs:** Companies need to carry out tasks that should be executed at specific times. This is supported in any edition of Bizagi by means of Start Timer Events. sometimes tasks or processes need to be scheduled not based on time, but based on business events or information. This is only supported in the Enterprise Edition by means called Custom Jobs. This powerful functionality allows, for example, starting cases based on business rules or from a list of dates saved in a Parameter Entity.[19]

4.2.5 The benefits from implement Bizagi:

- Cost Reduction (with actual cases achieving savings of up to 50%).
- Improved customer service (consistent reduction in cycle and waiting times up to 80%), which lead to clear increases in market share.
- Better quality (with real life projects experiencing reduction of error rates of 90%).
- Increased Agility (for example, with three new versions of an improved core banking process released within a year).
- Increased Governance, Visibility and Control.
- Reduction in operational risk,
- Extension of the value chain to new partners.
- Greater resource mobility and flexibility.
- Better, more proactive decision making.
- Business and IT alignment.
- Optimization of the resources involved, reflected in the increase in productivity and profitability of the organization.
- Better Teamwork and collaborative development that allows multiple users to work simultaneously on the same project.[20]

4.3 Define and execute a Process with Bizagi

4.3.1 Process Modeling(First Step)

Modeling the Process is the first step in any Process automation. Modeling a Process is an iterative and straightforward task to represent business conditions in a flow diagram, using symbols and shapes. To create a diagram in Bizagi use the first step of the wizard. Simply click the *New Process* option and start diagramming.

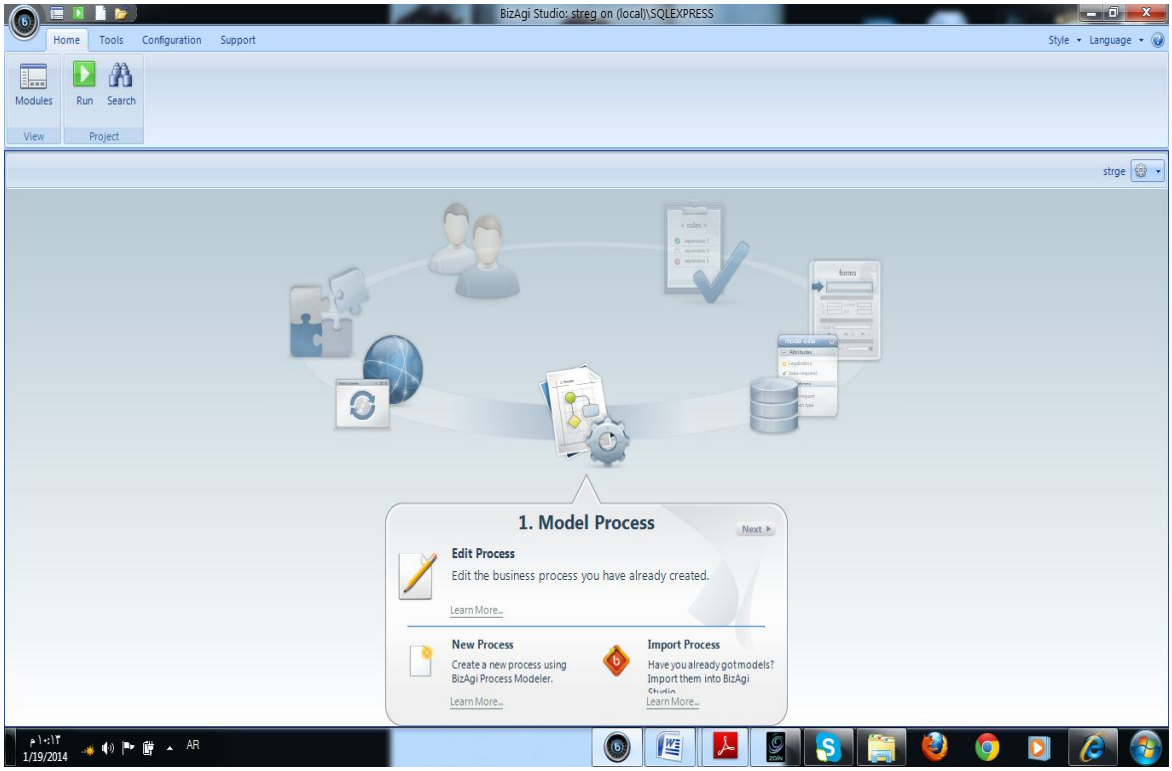

Figure 28 : Creating the process

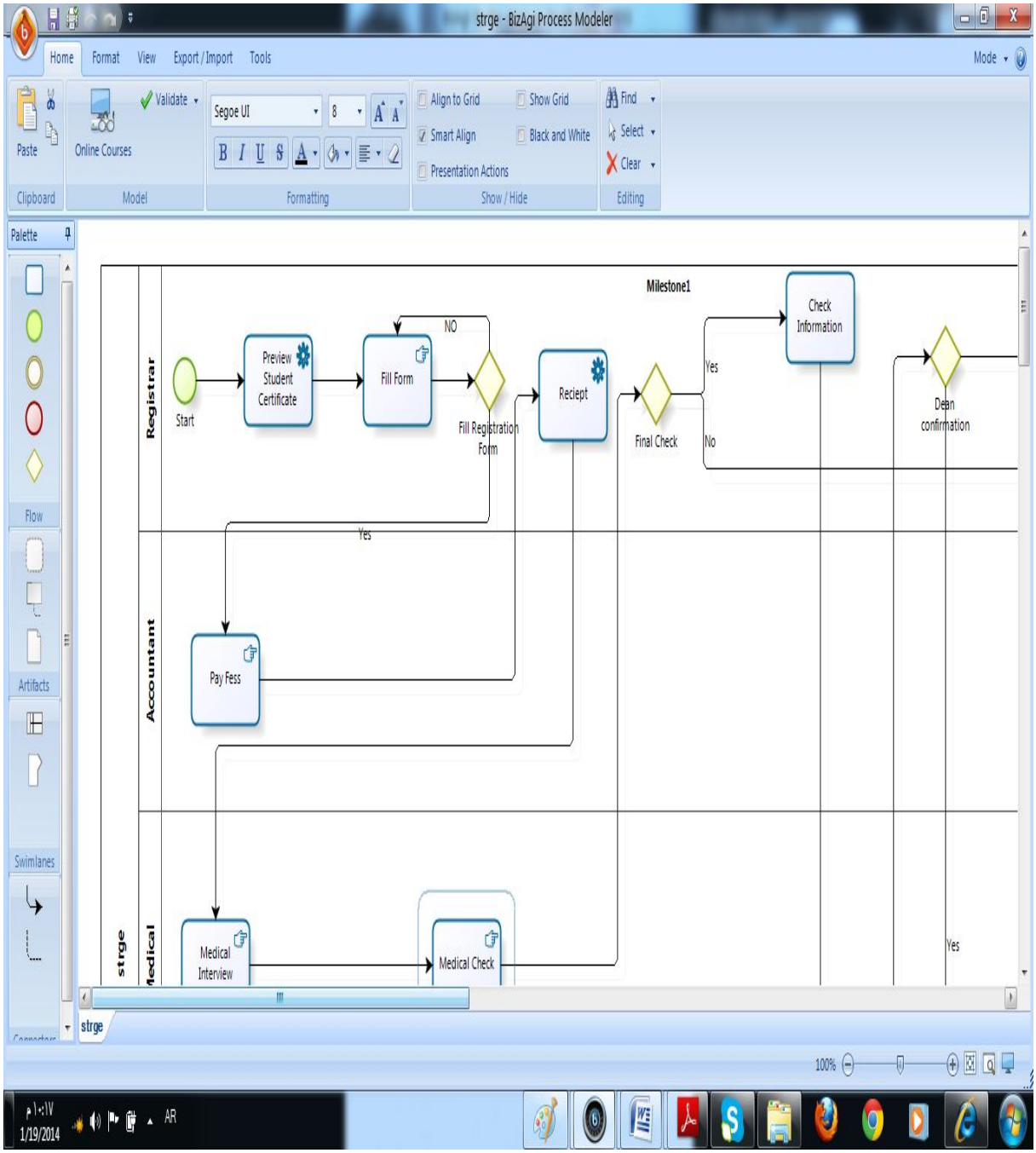

Figure 29 : Model process with Bizagi Process Modeler

4.3.2 Data Modeling (Second Step)

The second step of the Bizagi Process Wizard is to define the data that the Process requires for its execution.

Bizagi allows to structure business data in a graphical and logical way, resulting in an easy to understand Data Model.

The data model in Bizagi specifically defines how data is stored and accessed.

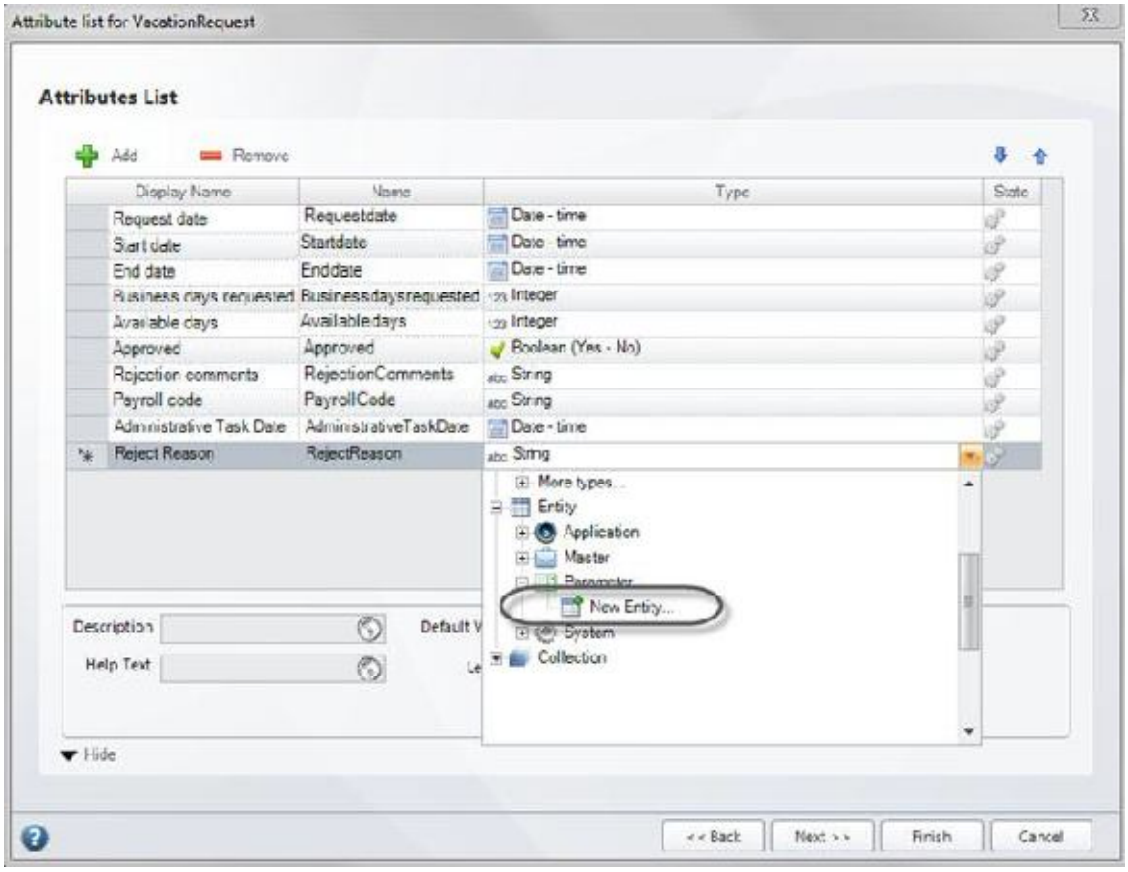

Figure 30 : Define the data

4.3.3 Creating the user Interface(Third Step)

The third step of the Process Wizard, *Define Forms*, manages all user interfaces for human activities

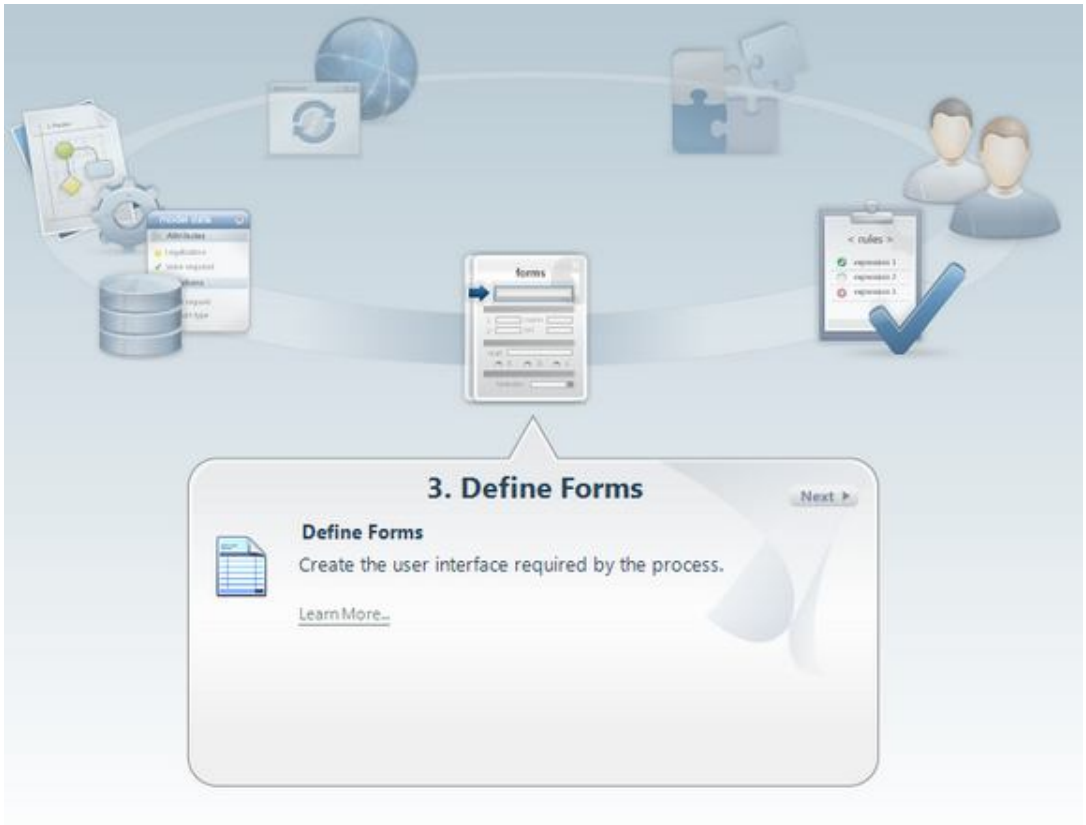

Figure 31: Creating User Interface

4.3.4 Define Business Roles :

Business rules are conditions, standards or rules that that must be complied with and controlled by the organization in the Process flow.

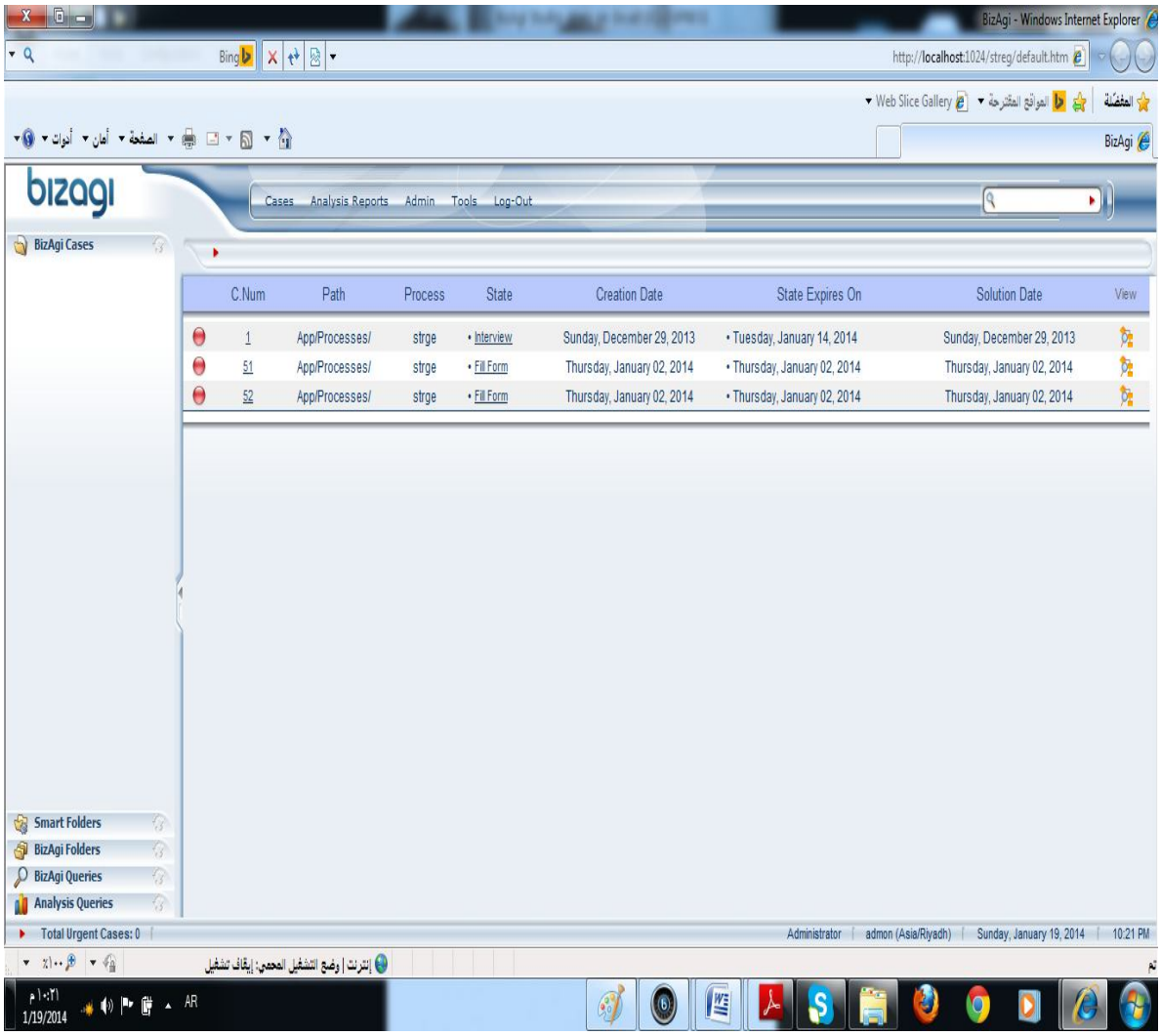

Figure 32: define business role

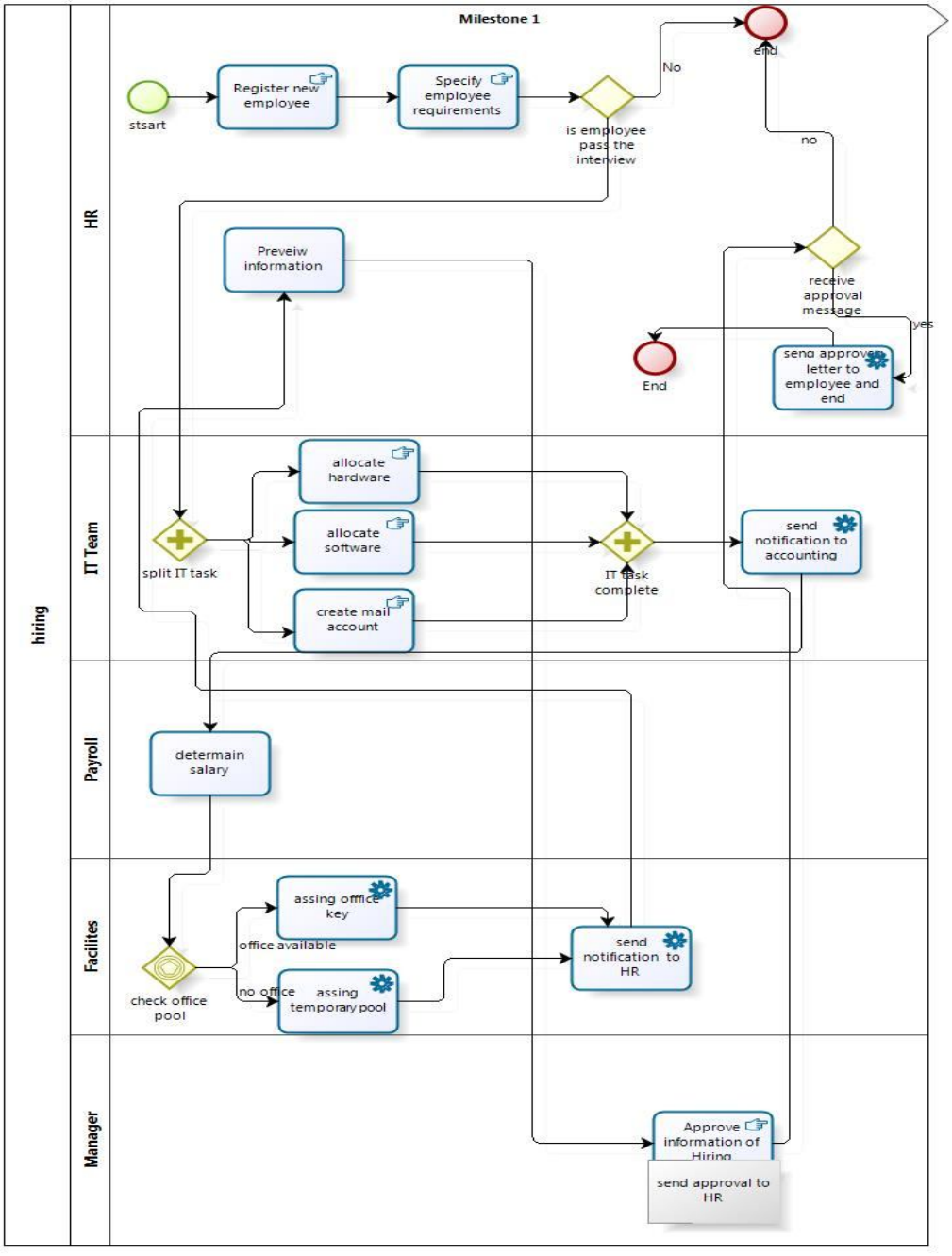

Figure 33: Hiring System

5.1Comparison between Bonitasoft and Bizagi

In this project I compared two of business process reengineering tools ,Bonitasoft (free open source version), and Bizagi (academic version). The project focused on the developing process. It showed that all of these two tools have satisfactory performance during development, as it was quite easy to conduct the case study through each tool. The project also showed that there are some differences between these tools in some aspect:

Form

The users interact with the system through the form and pass it to the next users.
Bonita Studio allows the user to design graphically the forms that will be shown to the end user in order to interact with the process. Moreover, the Bonita allows the user to get start with processes designed with other standards and technologies such as XPDL or jBPM. Bonita is very rich in form field types.
Bizagi allow creating forms and mapping form fields directly to data model. In other words when creating forms you select form fields from data model. Also you can copy many forms using copy form facility. Bizagi is not rich in form field types, as some fields like check box is absence.

Business Process Modeling

Process modeling is used to simulate a system using Business Process Modeling Notation (BPMN). The modeling enabling to understand the system logic and the
One in charge of every task in system easily
Bonita Studio: allows the user to graphically modify business processes following the BPMN standard. The user can also connect processes to other pieces of the Information System Bonita
Bonitasoft export and import process in many formats include XPDL, BPMN 2.0, JBPM 3.2
BizAgi Process Modeler rolling in the process in many formats includes: XPDL, Visio, and export PDF, Word, Image.

Platform

Bonita open solution is BPMN 2.0 tool is developed in java, is open source and runs under Windows, Linux and Mac. Bizagi process modeler is BPMN2.0 tool runs under windows.

Business Rules

A business rule is anything that captures and implements business policies and practices.
In both applications the administrator or a user who has access to monitoring page can view the distribution of cases of each of the system users. A list is displayed for each user, with all the pending activities. The case search can be carried out in accordance with the following criteria :(Area, Role, Location, Skill, and Position).

	Bonitasoft	**Bizagi**
Form	Bonita is very rich in form field types.	Bizagi is not rich in form field types.
Business Process Modeling	Use BPMN2.0 diagrams about 80% of standard	Use BPMN2.0 diagrams about 90% of standard
PlatForm	runs under Windows, Linux and Mac.	runs under windows.
Business Rules	A list of tasks displayed for each user.	A list of tasks displayed for each user.

Table1: Comparison between Bonitasoft and Bizagi

5.2 Conclusion

1. Appling Bonitasoft or Bizagi in National College for Medical and Technical Studies to automate the process.
2. Appling Bonita soft or Bizagi to create sessions for each department led to determine the tasks.
3. There will be administrator to flow and control the process and tasks.
4. Store Data in one database reduce the cost and time.
5. Retrieve data fast and get complete and right data.
6. To implement these tools I need to training the employees.
7. It proves to be efficient in cutting out the paperwork.
8. It provides constant attention to customer feedback and requests and thus identifying their needs and views.
9. It will be easy to get reports.
10. Re-engineering the process the more better than start new process.

5.3 Result

1. Automate the process reduce the cost and time.
2. Provide better service to the clients.
3. Reduce the number of employee which leading to reduce the cost.
4. Automate the process to get rid of routine and paper work.
5. Automate the process help employees to innovate and do their work efficiently.

5.4 Recommendation

1. Apply business process reengineering in all business in Sudan.
2. Reengineering is very important and it need more attention.
3. Bonita soft is very powerfull software, it must be taught in all computer colleges.
4. Appling automated system is very weak in Sudan and there must be a plan to change this during 1-3 years.
5. In Sudan there is a need for a well training employees and need to change work environment and automate process.
6. Also in Sudan there is a need for qualified managers who can take decision for apply reengineering concept among organizations.

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