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6. **Profile of Be Informed**
1 Introduction

Be Informed is an independent software supplier specializing in solutions for supporting business policies and processes in complex and dynamic environments. Using our software, organizations improve their interactions with customers and partners, streamline their working processes and achieve substantial gains in efficiency by delivering the appropriate knowledge in a direct and context-specific manner to business users and customers. Be Informed gives organizations the ability to quickly adapt to changes in legislation or their environment.

Be Informed offers a suite of products that enable organizations to:

- design, manage and analyze all aspects of their business;
- support straight through processing of complex cases;
- support manual handling of services (decision support and case management);
- support processes for registration and exchange of information;
- context-specific delivery of information and knowledge;
- apply knowledge in e-forms, case files and applications.

Be Informed is the result of many years of experience working for large government institutions. A common denominator for all these engagements is the observation that governments institutions, but also citizens, and businesses are subject to large amounts of rules they must apply in their daily practice and business.

1.1 Background

Laws and regulations are imposed on European, national, regional and local levels and are defined from a generic level to thoroughly detailed. They are aimed at protecting consumers, the environment, free trade, etcetera. These laws and regulations are drawn up from the government’s perspective, whereas citizens and companies initiate activities in which different government agencies and policies are involved. This leads to the situation where citizens and companies are confronted with a variety of laws and regulations from different organizations and policies. Complying with these rules then proves to be a complex matter, even with the simplest of activities.

This also applies for executive agencies. They are confronted with frequent adjustments in laws and regulations which are to be implemented in their processes, systems and their communication with clients. These adjustments occur faster and more frequent, because society expects policymakers to hedge risks with regulations.

Traditionally organizations have used a technology-driven approach to IT. Software is purchased based on features, rather than the role the software could play in the bigger picture. Not only does that lead to duplication of functionality (and license costs), IT departments also have to spend too much time configuring this functionality, building interfaces to existing systems and maintaining these increasingly complicated systems.

We have noticed that this leads to more and more problems in policy execution, rising IT-costs and failing projects. IT-complexity has become too high because rules are buried in software code and databases, hiding manageable policies behind vast amounts of software, processes, manuals and other systems. This frustrates the insight, transparency and manageableability of processes and the ability to swiftly adapt to changes.
1.2 Vision

Over the years Be Informed has developed a vision - Deciding for Excellence - to help government organizations cope with the complexity of ever changing legislation and policies, while simplifying processes, reducing operational costs and innovating customer service. This vision - materialized in the Be Informed Product Suite - has been successfully implemented with many large government agencies.

At the core of this vision lies the fundamental belief that organizations are defined by their policies and people and not by the IT components they have selected. Organizations should therefore focus on formulating, implementing and managing their policies and on enabling their professionals to excel in their work. By separating the know (policies) and the flow (process) from the function (IT) and the data it becomes possible to standardize business processes and the supporting IT components.

![Separation of concerns](image)

**Figure 1 - Separation of concerns**

This allows IT-departments to focus on operation and management of standardized, generic components. Reducing the number of components to be managed, licenses to be purchased, changes to be implemented and consequently reducing total cost of ownership (IT excellence).

Besides separation and standardization, organizations must get the governance of their policies right. Organizations today operate in an increasingly complex and dynamic environment where transparent and predictable behavior is required. The extent to which organizations are able to cope with unanticipated exceptions is crucial for their success in complex environments. They furthermore have to make sure that the appropriate policies are always applied correctly by their staff and automated processes.

The Be Informed Product Suite provides organizations with the means to formulate, analyze, implement, monitor, evaluate and adapt their policies independent of IT. Allowing government organizations to become very agile: enabling quick adaption to changes in legislation and changes in the market place (Management excellence).

Operational excellence is the final component of our vision. By using models to precisely describe the organization’s processes and decisions it becomes possible to automate operational processes and decisions to a high degree. The efficiency increases; less human effort is required to generate the same number or even more decisions than before. This
improves the potential for managing the organization and creates opportunities for improving business operations. Applying goal driven and event driven approaches to process management allows organizations to derive processes dynamically from the context of the case. The rules decide how cases will be processed: may a case be processed automatically or must the case pass the desk of an employee. Furthermore the rules dynamically decide which tasks must be executed to solve a case, thus avoiding unnecessary activities. Where possible decisions are taken automatically (straight through processing), when necessary - due to subjective criteria, high risks, missing information - human decision makers can manually handle the cases (case management combined with decision support).

Finally we see that organizations need to bring their knowledge from the traditional back-office applications to the front-office and to the internet (self-service). This delivers organizations huge cost savings (customers now do what normally is done by expensive personnel), improved customer satisfaction (faster response, better advise, more individual treatment), simpler registrations and therefore more flexibility.

1.3 A unique government platform

Based upon this vision an enterprise platform has been realized to support the primary processes of government organizations. One platform for both straight through processing and case management. This platform has already been used for supporting: taxes, benefits, permits, grants, registrations and enforcement.

Figure 2 - One platform for all primary processes

The building blocks of the platform are the generic business functions and standard process patterns for the administrative decisioning process in government. Standard process patterns already supported by Be Informed are:

- customer service process;
- administrative decisions process;
- registration process;
- complaints and appeal process;
- the supervision and enforcement process.
Generic business functions enable us to greatly reduce the number of necessary business functions. The specific laws which have to be executed are implemented as policy models (rules). When a case is presented for assessment, Be Informed selects - based upon the context -, the right set of business functions. Each business function in its turn will select the right policy model(s) and apply it to the details (data) of a citizen or entrepreneur. Processes are build by dynamically assembling generic business functions in the right order, based upon the specific context of the case involved.

Some examples of business functions in the context of a Land Register are: ‘deed processing’, ‘order processing’, ‘signaling’, ‘providing information’, etc.

Figure 3 - Process patterns for customer service and administrative decisioning

These policy models are managed separately and centrally, so that you only have to make changes to the rules at one single point. That makes it very quick and efficient to change the rules. The platform adheres to the principles of Service Oriented Architecture and Event Driven Architectures. The business functions are made available as self contained services. A self-contained component is a software component that contains everything to deliver the full functionality of a specific part of a government solution (the data of that component, the rules, the functional services and the service contract interfaces).

These components can be combined in a very flexible way to model and configure a specific e-government solution for permits, taxes, benefits, etc.
As the business functions are generic and reusable over different organizations, we can say that the model is the application. This means that the application can be deployed and used immediately from the Policy models in Be Informed. It also means that no programming is needed to come to an actual government solution.
2 Positioning Be Informed

Be Informed is a business process platform that supports the correct execution of business policies and business processes in complex and dynamic environments. Using Be Informed software, organizations improve their service to customers and partners, streamline their working processes and achieve substantial gains in efficiency by delivering the appropriate knowledge in a direct and context-specific manner to business users and customers. Be Informed gives organizations the ability to quickly to adapt changes in legislation or their surroundings.

Be Informed provides an integrated platform for all required services, processes and tasks. This enables customers to implement one platform for all their primary processes. Large government agencies use Be Informed to build multi-product, multi-tenant and multilingual knowledge intensive applications.

To address the challenges of a modern organization that runs business processes in complex and policy-driven businesses today, a knowledge infrastructure is required.

Using Be Informed, organizations can

- model all aspects of their business (business knowledge),
- run these models directly as an application and
- analyze the decisions and improve the models

"Can you describe everything you need?"
"Can you get everything executed?"
"Will it give you the expected effect?"

Figure 6 - Model, Run & Analyze

The business knowledge modelled in Be Informed can be used in many different scenarios:

- Context-specific delivery of information and knowledge;
- Customer portals to treat customers on an individual basis;
- Smart e-forms and customer self service;
- Straight through processing of large amounts of cases;
- Supporting knowledge worker with case management and decision support;
- Detection of fraud or risk in large amounts of events;
- Providing knowledge services to non Be Informed applications;
- Supporting policy makers in defining and implementing effective policies;
- Simulating and analyzing the effects of proposed policy changes;
- Combinations of the above.
All these scenario’s use a case based decision approach with knowledge functions as classification, assessment and diagnosis. In all cases we see that organizations bring their knowledge from the traditional back-office applications to the front-office and to the internet (self-service and self-assessment). This delivers huge cost savings (customers now do what normally is done by expensive personnel), improved customer satisfaction (faster response, better advise, more individual treatment), simpler registrations and therefore more flexibility and agility.

Figure 7 - Be Informed usage scenario’s

Making decisions is the primary activity of most administrative organizations. By focusing upon the outcome and not upon the route / process, organizations ensure that they only do what is necessary to fulfill the request. Nothing more, nothing less. For organizations to stay in control and to improve their operations, we believe organizations should:

- Focus on decisions;
- Automate decisions were possible;
- Support the decision makers.

Of course there are good reasons not to make all decisions automatically. If a decision cannot or may not be made automatically a process is necessary. Examples of this are: too high risk, incomplete requests, subjective / human interpretation of the case is required.

One of the key aspects of Be Informed is that organizations do not have to choose between straight through processing (STP) or manual handling, but Be Informed supports both the scenarios at the same time. Organizations can implement a mixture of STP and manual handling. The Be Informed processing engine determines for every case based on the rules dynamically how this case will be processed: may this case be processed automatically or must the case pass the desk of an employee and selects the tasks that must be executed.

As processes are derived dynamically and the rules decide at runtime the order of the activities, Be Informed enables organisations to handle complexity (versatility, anticipated and unanticipated exceptions and change) efficiently.

The next sections describe the various aspects of a Be Informed knowledge infrastructure.
2.1 Separate, Standardize and Govern

Effective utilization of knowledge requires not only that the knowledge is provided in an applicable and productive manner, but also that the knowledge is considered as a production factor and therefore managed independently throughout the entire knowledge life cycle.

With Be Informed organizations are capable of separating the process and the know from the functions and the data. This allows the business to model the business knowledge and express how they will run their business and the IT department can provide the functions and manage the data that, together with the models, become the supportive applications.

As a result of the separation between the process/know and the function/data, the functions and data can be highly standardized. In fact, the Be Informed product has implemented a lot of the functions required in a policy-intensive application environment.

Separation and standardization itself is not enough. Organizations operate today in an increasingly complex and dynamic environment where more and more predictable and transparent behavior is demanded. It is crucial that organizations can guarantee that the appropriate knowledge is available to their staff and automated processes and that they apply it correctly. They are obliged from a compliance perspective to take responsibility for the decisions and the knowledge they should be based on. In other words, organizations must get the governance of their business knowledge right.

![Figure 8 - Consistent, precise and communicable knowledge](image)

An important aspect of the governance of knowledge is about ambiguity or better the absence of ambiguity. To guarantee that people apply the knowledge correctly, the knowledge has to be consistent, precise and communicable. The best way to prevent misinterpretation is to prevent translation of the knowledge into applications and instead directly run the models.

As the dependency on knowledge in the primary process increases, organizations must take the necessary measures to ensure the quality, availability, usability and validity of the knowledge used. The necessity for these measures is even stronger because the pace of changes increases all the time. In other words, they must implement a good policy management process that supports the full knowledge lifecycle.
2.2 Support the Full Knowledge Lifecycle

The possibility to run the knowledge models directly has an huge effect on the agility of organizations. To benefit from this capability it’s necessary to implement an efficient policy management process. This process must deal with feedback from the runtime environment as well as new initiatives, for instance new legislation or organizational policies.

“How well and how fast you predict, foresee, adjust, adapt and exploit opportunities in this ever changing environment defines your strategic agility quotient. With that, strategic agility is not just a nice to have. It should be embedded into your culture, your business processes and organization, and you should make it a key core competency and capability to enable continuous value creation for your company.”

Binnur Al-Kazily

The knowledge lifecycle can be divided in three parts:

- the management of knowledge (model),
- the use of knowledge as services in the primary process (run), and
- the handling of runtime feedback as well as triggers coming from new initiatives (analyze, improve and simulate). Used to monitor the outcome, measure if the results are as good as expected and to simulate the effects of new changes.

![Policy Management Process](image)

Figure 9 - Policy Management Process

To support the lifecycle we support the following knowledge infrastructure functions:

- **Model**
  - edit, capture and express
  - verify and validate
  - manage and maintain

- **Run**
  - publish, apply and explain the use

- **Analyze**
  - analyze, simulate and learn
2.3 Support for all domains of Business Knowledge

Organizations have business knowledge in various domains. For example, organizations have rules about their products and the applicability for a specific customer group, but they also decide what level of service they provide to customers (“we always respond within 4 weeks to every question, but gold customers get next business day response”) and make choices how they offer their services to the various user groups.

Decision Domain
Making decisions is the primary activity of most administrative organizations. The rules underneath these decisions can be described in the decision domain. The decision domain provides the language to describe the rules and information about the products the organization offers. Examples of these are product definitions and the terms and conditions of the products. The main language elements of the decision meta model are:

- causal relation types (requires, implied by, excluded by)
- hierarchical relation types (subclass of, instance of, part of)
- numeric contribution types (depends on)

Based on decision models services can be configured for:

- classifications “What are the best products for me?”
- decisions “Do I need to have a permit?”
- calculations “How much allowance do I get when I retire?”

Case Management Domain
The Case management domain provides the language to describe the rules and information about the case-driven processes in an organization and the information that is part of it. As these type of processes require a high degree of flexibility and the ability to react in every circumstance appropriately, Be Informed has chosen the paradigm of event-driven case management to support and describe these processes.

The main language elements of the case management meta model are:

- Process: case types, states, events and case handling times
- Artifacts: records, documents, appointments and notes
- Collaboration: assignees and inbox

Based on case management models services can be configured for:

- Case handling (event registration, accessing case information)
- Term / deadline monitoring
- Document service (create new and access stored documents)
- Notification service

The Case Management domain provides a graphical process editor and a template to create an initial case model.
Interaction Domain

The Interaction domain provides the language to describe the rules about how organizations want to interact with the various user groups. For example: “Customers have web-access to their own case file and can modify the request details. Gold customers can also view …”.

The main language elements of the interaction meta model are:

- User groups, service contact points and skill level
- Accessible services and composite services
- Applications, tabs and page types

The interaction domain can be used to define the grouping and order in which certain questions are to be asked. This provides the possibility to form the dialogue more to the likings of the end users. The Interaction domain provides connectors (= external interfaces) for web, services and batch jobs.

Registration Domain

The Registration domain provides the language to describe internal and external data registrations and the ways to access them. Examples of this are customer and insurance policy registrations and (the interface to) a municipal registration.

The main language elements of the Registration meta model are:

- Entity and attribute
- Message (the notification of a change)
- Cardinality

Based on registration models services can be configured for:

- Creating, changing, correcting, deleting and viewing entities
- Without history, datahistory without eventhistory, datahistory with eventhistory
- in local and remote registrations.
2.4 Business users in control

To involve business users in the policy modelling process we provide business user friendly editors. The representation used to present the models has to be understandable to business users. Be Informed offers a number of alternative representations that are based on familiar metaphors to business users.

Figure 10 - Be Informed editors: graphical, definition, structured text and tabular

Every Be Informed model can be browsed as a catalogue. Via the catalogue users can browse through the knowledge stored in the knowledge repository, for example for always up-to-date documentation purposes. It is also possible to download policy models into spreadsheets and MS-Word or PDF documents.

Be Informed uses semantic models as the key building blocks for its policy models. In semantic models, knowledge is captured in terms of concepts and the relations that exist between these concepts. A concept has properties, labels, text fragments and annotations. Annotations are used to relate concepts to the documents in which they are defined, or to documents that contain related information such as examples, and explanations.

Figure 11 - A simple sentence is the key building block of a policy model

Concepts are defined in knowledge models. For every model, time versions can be defined to handle changes over time. A meta model defines a language to express the knowledge in that domain.

An important aspect of the knowledge infrastructure is that business knowledge should be maintained only once and can be used everywhere (“one ontology for all”). This means that knowledge stored in the Be Informed repository not only can be used by Be Informed applications, but also by a wide variety of other systems. Directly by incorporating Be Informed services into other systems or via an export of knowledge in a standard format (like RDF/s, OWL, etc.) or via (custom) transformations in any other format.
3 Solutions by Be Informed

Be Informed has - in numerous assignments for government agencies developed the Citizen Centric Government Framework. On top of this generic framework Be Informed is developing specific Vertical Solutions. Be Informed has already developed solutions for: Permits, Taxes, Benefits, Grants, Contributions, Pensions, Public security, Policy making, Registrations.

In this chapter we will briefly describe a number of Be Informed solutions, after which we will turn to the Be Informed Tax Solution for a more detailed description of the solution.

3.1 Permits

Be Informed’s e-Permit solution allows public institutions to improve their services to the public and cut costs at the same time. The essence of Be Informed’s Permit Solution is that it does not focus on the process that leads to a decision, but on the decision itself and what is needed to make legally correct decisions. Our Permit Solutions enable automated decision making where possible and involves your professionals when necessary. As a result, citizens are better able to manage their own interests and professionals gain more time to focus on exceptional cases. Error rates go down, customer satisfaction and efficiency increase.

3.2 Benefits

Governments need to support the weakest in society. Yet welfare, healthcare and social security systems are becoming very expensive. Society demands transparent decision making, responsible management of resources en funds and minimization of any costs involved in executing the arrangements. Yet customers and organizations providing care to them should not be hampered by administrative burden and bureaucracy. Government agencies organization need to support society with user friendly services, while applying ever changing rules and allowing for efficient public benefits at the same time. Be Informed’s Benefit Solution allows public institutions to improve the quality of their service, while cutting costs at the same time.
3.3 Pensions

Pension fund administrators are responsible for administering large numbers of collective pension funds. These funds are their customers, with each fund having thousands or hundreds of thousands of participants. Each fund has its own way it wants to treat its participants, covering everything from the procedures to be used to the language to be spoken. Frequent changes to Pension laws as well as strict compliance rules such as SAS 70 add an additional layer of complexity.

In this environment exceptions have become the rule. The wide range of variation between funds creates complexity in the interactions with participants. This will lead to mistakes, degrades effectiveness, IT systems are too expensive to manage, and customers are dissatisfied. Be Informed’s Pension Solution helps pension fund administrators deal with this complexity and in this way improve customer services, while cutting costs and reducing error rates.

3.4 Public Security

When it comes to upholding the law, cooperation between partners in the justice chain is crucial. The Police uses its investigative powers to obtain evidence. On the basis of this evidence the defendant is prosecuted by the Public Prosecutor. If all goes well, the prosecution results in a criminal conviction in court and a sentence. Society demands that criminals are brought to justice: effectively and efficiently. This requires effective process support for the different parties in the justice chain and facilities for cooperation between these parties. Be Informed has worked with each of these organizations to provide solid solutions.
3.5 **Point of Single Contact**

Aiming to reduce administrative burden and improve customer service, governments introduce Point of Single Contact for citizens and corporations. A Point of Single Contact enables anyone wishing to undertake an activity, e.g., start a business in a new building, to handle all the necessary government business through an integrated procedure: one licence from one procedure, one set of rules to follow and one system of remedies.

Be Informed has delivered a Point of Single Contact to the Dutch government which provides citizens with answers from all government organisations. www.overheid.nl provides access to more than 1,600 government websites and to all laws and regulations at central and decentralized levels, all official publications, products and service catalogues by the government and a rapidly growing number of daily permits and notices.

3.6 **Registrations**

Be Informed has been working with the Dutch Land Registry Office (Kadaster) to develop a generic solution for government registrations (Land, People, Vehicles, Buildings, etc.). The Kadaster is currently replacing all its legacy systems with Be Informed. A screenshot of the application is added below.
Figure 12 - Architecture for Dutch Land Registry Office
4 Example: Be Informed Tax Solution

Be Informed offers a standard software suite, that can be tailored to the specific requirements for a specific Tax Administration. This chapter describes a more detailed decomposition and description of the Be Informed tax solution. The fundament is the generic Government Framework of Be Informed. We have implemented specific business patterns for taxes to form the Be Informed Tax Solution.

Please note that the model that is used in this section is not a layered architecture model. Be Informed makes use of self-contained components that contain everything to deliver the full functionality of that specific part of the tax solution (the data of that component, the rules, the functional services and the service contract interfaces).

This means that the components interact with each other as described in the meta model in the figure 3. The specific components will be described in further detail in the sub paragraphs of this chapter.

![Figure 13 - Be Informed Solution for a tax administration](image)

Be Informed delivers the core functionality of a tax solution including a separate payments component. The Be Informed tax solution can interface with third party solutions, like general ledger, scanning and business intelligence.

The following sections describe the tax solution components within each services category in more detail.
4.1 Portals and Other Channel Services

**Definition:**
Different parties will interact with the tax Administration through different channels.

- Citizens (physical persons that are liable to pay taxes of certain types)
- Companies (legal persons that are liable to pay taxes of certain types)
- Intermediaries (tax representatives for citizens and companies)
- Governmental partners (deliver and receive information from the Tax Administration)
- Employees (Tax Officials within the Tax Administration)
- Managers (Director, Deputy Directors and Managers within the Tax Administration)

A channel offers the parties that interact with the tax administration an external interface to the tax solution with the objective to:

- provide end users with a personalized set of functionality and data in such a way that it supports their business activities in an optimal way.
- provide external parties and systems with the mechanisms to deliver and receive data and information in a reliable and consistent way.

**Description:**
Depending on the specific communication requirements per party, one or more channels will be configured to cover these requirements.
This specific part of the solution also contains shared channel services that provide more generic functionality to more than one channel, like keeping the contact history of all contact moments over all channels and the generic archiving, routing, notification, bundling and completion functionality to support different workflows in the front end.

**Example(s):**
The channel components can be organized among the following channel categories:
- Portals (a citizens, employees, manager’s and service desk portal)
- Send (print and send letters, declarations, - also by banks for companies etc.)
- Receive (receive, scan and archive paper/electronic mail, returns, etc.)
- Electronic Data Exchange (e.g. file- and message-based)

The Be Informed tax solution can integrate with a call center solution in such a way that a call center can act as an additional channel in the entire solution architecture. This is a recurring pattern in many of our Be Informed implementations.
4.2 Business Services

Definition:
A business service is a self-contained component which contains part of the core functionality of the Be Informed tax solution.

Description:
These services are organized by tax type and by accompanying supporting services for tax types which share common important characteristics and only vary in non-essential characteristics. In the sections below this distinction into generic business services and tax types is described in further detail. Examples are given below in the two sub-sections.

4.2.1 Generic Business Services

Definition:
A generic business services component is a self-contained component that contains all the data, functional services, rules and service contract interfaces with the objective to provide more generic business functionality for the tax activities which can be (re)used in combination with the more specific tax rules which are defined in the tax type components.

Description:
This group of generic business services components is further decomposed into the following sub categories of components:

1) A levy component that contains all the generic functionality for the levy processes for the different tax types;
2) A payments component that contains all the generic functionality to support the collection and recovery processes for all tax types
3) Customer events driven components that contain all the generic functionality to support all customer services related processes and
4) More ongoing enforcement and supervision components that can be triggered at any time and for a particular reason (e.g. in fraud detection processes).

Examples:
As described above, the generic business services are grouped into three categories. The levies component supports a number of processes. It generates the list of tax payers that are liable to pay taxes, it requests to taxpayers to fill in their tax declaration (on paper or online) and submit it to the tax administration directly or via designated banks, it determines the tax amounts and payment terms for certain tax types, it sends declarations forms to tax payers (also via banks), it processes the returns (validate, store, follow up, etc.). This is really the core of the tax solution.

Once the levies component has finalized its initial processes that determine who must pay taxes and under what conditions, the payments component supports all the processes that must assure that the taxes are paid in time via the collection and recovery functionality in this component and that any offsets for over and under payments can be done.
Based upon flexible business rules that have been defined in the Be Informed tax solution the different states of these processes are supported via an online interface and batch processing that maximum compliance to the tax payment obligations can be met using: effective dates, the risk profile of tax payers and tax payer groups, the right sanction mechanisms for penalties and/or imposition of interest, the bank interfaces for incoming / outgoing payments and with Treasury plus the proper allocation and distribution rule that payments can be processed for the right periods and accounts.

The payments components also supports the processing of additional payment settlement agreements or discounts that have been defined in the levies component, the manual overriding of transactions, reversing of transactions, setting all types of flags and statuses the activation and de-activation of accounts. etc.

The customer services processes are customer event driven. There can be many types of life events related to this component like requests, complaints, appeals, status updates, etc. And also related to requests there can be a wide range of possible customer events, like more self-service alike functionality that can be checked by a taxpayer via a portal (e.g. checks on their own status) or events that requires a follow up by a tax official if a taxpayer requests for a payment settlement (e.g. delay and/or settlement).

The enforcement & supervision components also supports a number of processes. On top of the compliancy monitoring within the levies component, more specific risk management, audits, etc. can be supported by this component for e.g. certain companies within certain branches. This is more an ongoing process based upon and verified in conjunction with external signals.

All these containers of functionality have been implemented by Be Informed before for other tax offices. This means that also for this part we can make use of recurring patterns to implement the tax solution. The specific parts of the solution can be easily implemented on top of the more generic tax functionality.

4.2.2 Tax Types

Definition:
A tax type component is a self-contained component that contains all the specific rules and functionality for a certain tax type with the objective to maintain and use these rules in a central place, to minimize the amount of specific functionality and link these rules to their respective sources for reasons of traceability and maintainability.

Description:
The main advantage of this approach is that any future changes in rules and functionality of any of the defined tax types can easily be made. The way tax rules are modeled and defined in Be Informed makes it very easy to determine the impact of a change (e.g. via where used overviews). Working this way provides a better overview of an entire rules set and enables the maintenance of a consistent rules set.

Examples:
- Value Added Tax (VAT)
- Personal Income Tax
- Corporate Income Tax
- Housing Tax
The most specific business and process rules of the Be Informed tax solution are defined in these tax type components. This is the true strength of the Be Informed tax solution. What is specific for a specific situation can easily be modeled and configured on top of the more generic components.

4.3 Shared Registration Services

Definition:
A shared registration is a self-contained component that manages a certain part of the data with the objective of ensuring the quality of the data before it is used within a case context and of reuse in different stages in the tax processes.

Description:
This self-contained component contains all the elements a business service also has (data, functional services, rules and service contract interfaces) but the focus for a shared registration component is different. A shared registration component focuses upon the collection, quality control and administration of data in such a way that the quality of this data is assured before it is used within a business activity. In this way it acts as the single point of truth for the Tax Administration.

Examples:
The different kind of shared registration services can be organized in the following groups:
- Parties (citizens, companies, intermediaries),
- Subjects (tax types related to physical and legal persons)
- Objects related to tax types (wages, real estate, securities, etc.)
- Current Accounts
- Values (verification values)

For parties it is important that all kinds of relationships can be defined between parties (e.g. partnering, parent-child, hierarchical and historical relationships). These types of relationships can be defined and maintained in the Be Informed knowledge models.

A citizen (a physical person) or company (a legal entity) that is liable to pay taxes of a certain tax type becomes a subject. This registration defines for which tax types a physical or legal person is liable to pay taxes (this is an n:m relationship).

There can be a wide range of tax objects for which the different tax types apply. This can be anything, ranging from wages, income, different kinds of capital assets (real estate and securities). Be Informed is very flexible in handling the different tax objects, since it focuses on the rules of the different tax types. The relationship and the required functionality for the different tax objects for the Tax Administration can be easily modeled and configured within Be Informed.
A very important component in the tax solution is a current account component. This component contains all the functionality to support all incoming and outgoing financial transactions with companies that at any moment in time there is an accurate overview of the amounts due to be paid by a company or by the tax administration. This is well known component in many of the Be Informed customer implementations.

A last shared registration service component consists of the verification values. These values are collected from an independent, reliable external source and are used during the daily work of a tax official to verify if a tax payer has provided the Tax Administration with the right information (accurate, consistent and complete).

Be Informed can also link to external registration services where appropriate (e.g. for audits). We can make use of an external central citizens register. This is one of the recurring patterns that Be Informed has implemented for many Government customers.

4.4 Supporting Services

Definition:
The supporting service component is a self-contained component that either can play a role in the security of the Be Informed tax solution, in storing documents and/or content in Be Informed or in providing insight into the status and correctness of the Be Informed tax solution for Kosovo via operational reports and an audit trail.

Description:
There can be a wide collection of supporting service components given the requirements of a particular customer. These supporting components are fed by the business and shared registration services and the results of the supporting services are shown via a portal or via other channel services (as defined in the Be Informed meta model).

Examples:
- User & Authorization Administration
- Document Management
- Reporting
- Audit Trail

Users and role-based user permissions can be created in Be Informed within the User & Authorization Administration component. Via the LDAP protocol Be Informed can make use of user definitions and permissions that are defined in another user directory, like e.g. Windows Active Directory or a user directory on another platform (e.g. on a mainframe and AIX platform). Documents, like policy documents, legislative sources, and tax returns, can be stored within Be Informed for direct use within the Be Informed tax solution.

This means that all relevant tax sources are available within a single system and that laws and legislations can be viewed during the use of the Tax Solution when e.g. functionality is used in a business service for a certain tax type that is based on that particular legislation or law.
Working this way, all required information is available within one system, in such a way that it is more easy to keep the overview of all this information. The documents can be linked to certain parts of the tax functionality in the business services, which makes it much easier to implement any changes to the tax system when changes occur in tax laws and legislations. This feature makes the tax system extremely flexible and required changes can be implemented in a very short timeframe.

All transactions within Be Informed are logged (‘who has done what and when and which data and rules have been used during that transaction’). A complete audit trail is kept as proof and for analysis and correction purposes for all the transactions that have been executed. This means that an administrator can go back to any point in time in the past to check what has happened exactly within the tax solution.

Be Informed does not provide:

- General Ledger functionality
- Scanning and high end archiving functionality
- High end document management functionality
- Advanced business intelligence functionality

Be Informed can however easily interface with third party solutions for General Ledger. Be Informed can also easily interface with a scanning and archiving system using the metadata and the resource locator (URL) to access the scanned documents. And Be Informed can interface with an existing output subsystem to print and send e.g. bar coded declarations, letters, etc. to the parties that need to receive this paper output. If no such output subsystem is in place Be Informed can provide such a component. We have implemented such functionality for our customers.

Be Informed has standard features to create a large number of operational reports. Any type of report related to any of the case types within the tax solution can be created easily using Be Informed’s standard reporting facilities. E.g. a report that shows the number of outstanding cases for taxpayers that have not submitted their return in time given the first deadline date.

Additional and more advanced business intelligence reports can be done with Cognos based upon the data that is available within the Be Informed tax solution and within the other data sources that are used by the Tax Administration. Be Informed can feed Cognos directly through the standard Be Informed data services or via an ETL solution like IBM’s Datastage.

From an electronic interfacing point of view with the outside world Be Informed can easily interface with a gateway or Enterprise Service Bus (ESB). All these interfacing categories have been implemented for a large number of Be Informed customers. Be Informed has implemented these recurring patterns in many customer situations.
5 Technical characteristics of Be Informed

5.1 Supported platforms

Be Informed Product suite requires following platforms:

- Operating system
- Java Runtime
- Application Server
- RDBMS
- Webserver

Following standard platforms are supported in the current release:

Server OS:
- Windows 2003 server (32-/64-bits)
- Red Hat Linux Enterprise 4 and 5 server (32-/64-bits)
- SuSe Linux Enterprise Server version 10 (32-/64-bits)

For these operating systems the following sets of products are supported:

<table>
<thead>
<tr>
<th>Product</th>
<th>Version 1</th>
<th>Version 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>JBoss</td>
<td>4.0.5.GA</td>
<td>5.1.0.GA</td>
</tr>
<tr>
<td>WebSphere</td>
<td>6.0/7.0</td>
<td></td>
</tr>
<tr>
<td>JDK</td>
<td>1.5 update 14</td>
<td>1.6.0.20</td>
</tr>
<tr>
<td>MySQL</td>
<td>4.1.22</td>
<td>5.1.38</td>
</tr>
<tr>
<td>Oracle</td>
<td>10g/11g</td>
<td>10g/11g</td>
</tr>
<tr>
<td>DB2</td>
<td>9.X</td>
<td></td>
</tr>
</tbody>
</table>

Be Informed the server application can be used with browsers Internet Explorer 6, 7 and 8 and Mozilla Firefox 2 and 3.

5.2 Be Informed integration and interconnectivity.

Be Informed product suite is a modular application with flexible infrastructure. The core of the system is formed by Be Informed application server and contains knowledge engine, case management, registries and business rules. Other application components, either from Be Informed or third party, could be integrated with core system using industry-standard techniques and communication protocols.

The figure below shows an overall picture of the integration possibilities (application landscape) of the Be Informed product suite.
Figure 14 Be Informed integration possibilities.

Be Informed applies a mix of open source and vendor-specific solutions in the application infrastructure (Linux, MySQL, Hibernate, Cocoon, Hippo, Apache, Jboss as Open Source solutions). The IBM, Oracle and Microsoft products stacks are supported as vendor-specific solutions.

Be Informed distinguishes seven levels of integration for linking the components in such an application infrastructure, namely:

- Presentation
- Process
- Application
- Data
- Knowledge
- Content
- Infrastructure

Be Informed applies open standards for integration: (HTTP/1.1, XHTML 1.0 Strict, CSS 2.1, WSRP/JSR-168, SAML 2.0, XML 1.0, WSDL 1.1, SOAP 1.1, JDBC, RDF(s), OWL lite, JSR283, WebDAV);

Figure 15 Be Informed technology stacks
Be Informed is based on a fundament of open standards and the J2EE technology stack. The following connectivity techniques, based on the principle “who approached whom,” are available and have been used and validated in many projects:

![Be Informed connectivity techniques](image)

**Figure 16 Be Informed connectivity techniques**

Be Informed integrates in heterogeneous application landscapes (see the first figure at the beginning of this section: integration with portals, ESB, data warehousing, gateways, filing systems, encryption services, PKI services, scanning services, print services, order registration systems, financial systems, etc.) by applying standard technologies, such as soap / http, http / xml, sql / jdbc. The only logical requirement is that non-Be Informed components support these standard techniques. Extensions for vendor specific third-party solutions could easily be made if integration into the existing application landscape with legacy systems is required.

### 5.3 Solution scalability

**Application scalability**

Be Informed core applications are stateless by design and could run as isolated processes on a single or multiple CPU’s or on multiple servers. This makes it possible to use standard load-balancing techniques and allows for almost linear horizontal scalability.

Scalability test are integral part of product development process and assure that deployed solutions meet the high-load and high-throughput requirements of the large scale administrative systems. We have successfully tested solutions capable of processing 1.5 million knowledge-intensive processing requests per hour on commodity hardware (blade servers): no other COTS product was able to match that performance!
**Database Scalability**

Choosing the right scalability option for the RDBMS back-end depends on the situation at hand. Practice shows that high-end RDBMS systems, such as Oracle and DB2, are better suited for vertical scalability. That means putting more power in a single system (more CPU's, more memory, etc.) and using vendor-specific load-balancing and failover techniques. For large-scale administrative systems with high availability demands we advice to rely on Enterprise-class solutions from IBM.

### 5.4 Security and audit

**General info**

The security architecture of Be Informed solution is fundamentally based on services provided by infrastructure components: LDAP, Active Directory, JAAS SSO, authentication / authorization mechanisms of a database, etc.

Following figure represents a general overview of Be Informed security model, including few examples of integration with external infrastructure components.

![Figure 17 Be Informed security model](image)

**Role-/rulebased autorisation**

Besides integration with infrastructural components, Be Informed contains few standard out-of-the box extensions to infrastructure-based authorization. If needed, a specific role- & rule-based authorization infrastructure could be setup within Be-Informed solution. User accounts could be assigned specific roles related to execution of certain tasks and access to specific data objects that are protected by Be Informed internal authorization mechanisms.
Integration with Directory Server

Informed solution supports authentication based on a Directory Server (i.e., the LDAP protocol) out-of-the-box. The figure below shows in detail just how this is supported.

Figure 18 Be Informed LDAP integration

5.5 Testability

Be Informed Test Server

For support of validation and regression tests for decision tools and process flow, Be Informed Suite contains a facility called Be Informed Test Server. This facility supports testing of business rules, scenario execution and monitoring and reporting out-of-the-box. Figure below gives an impression of Be Informed Test Server:

Figure 19 Impression of Be Informed Test Server
6 Profile of Be Informed

Be Informed is an independent software supplier specialising in solutions for complex and knowledge-intensive business processes. Using Be Informed, organizations improve their interactions with customers and partners, streamline their working processes and achieve substantial gains in efficiency by delivering the appropriate knowledge in a direct and context-specific manner to business users and customers.

In a short time, Be Informed has built up a large client base among Dutch government agencies including the Dutch Immigration and Naturalization Service (IND), the Central Administration Office (CAK), the Centre for Vehicle Technology and Information (RDW), the Netherlands Tax Authority, the Ministry of Justice, the Ministry of the Interior and Kingdom Relations (BZK), the Ministry of Housing, Spatial Planning and the Environment (VROM), the Ministry of Education, Culture and Science (OCW), the Ministry of Transport, Public Works and Water Management (V&W), and municipalities, as well as within the profit sector at companies such as Achmea, Interpolis, Eureko, ABN AMRO Insurance and Syntrus. Be Informed works together with leading partners such as O&I and partners, Accenture, Cap Gemini, Ordina, Logica, IBM, Juris and the University of Amsterdam.

In 2009 International technology research and advisory firm Gartner named Be Informed as a Cool Vendor. Gartner argues that organizations that examine methods for managing, monitoring, improving and supporting complex and knowledge-intensive processes must take a serious look at the innovations that Be Informed brings to the BPM playing field.