TIBCO Staffware Process Suite

Version: 2

TIBCO Software Inc.
3307 Hillview Avenue, Palo Alto, CA 94304
Tel: (650) 846-5637 Fax: (650) 846-1005
Web: www.tibco.com Email: jkristic@tibco.com

1 Product Overview

TIBCO Staffware Process Suite (TSPS), Version 2, is largely based upon the Staffware Process Engine (iPE) along with a few additional areas of functionality from TIBCO (TIBCO acquired Staffware in June 2004) and third party vendors.

The product set provides a wide range of BPM functionality, ranging from the modeling environment, through a highly scalable process engine, into process monitoring. The various components can be mixed and matched, depending on client objectives.

Key observations include

- iPE supports dynamic binding of procedural fragments at runtime, enabling highly flexible process architectures.
- Enhanced scalability: Tests have demonstrated throughput as high as 7.9m steps per hour. Recent additions in this area include multi-threaded front-end components to extend transaction throughput even further.
- A wide range of integration options allows processes to leverage virtually any third party environment or application. Further options exist for embedding the process functionality in other applications.
- A Process Monitoring tool allows users to view workloads (total number of items in a queue, those with deadline conditions, etc.) A Drilldown displays graphical charts, etc.
- The Prediction Service, based on a patented technology, provides users (or supervisors) with a view of the workload expected on a given queue in a given time period. It does this by looking at the process definitions, and factoring historical performance data and existing work in the queue. This approach can facilitate what if scenario evaluation but is primarily used to support human resource decision-making.

2 BPM Engine

The TSPS engine supports a wide variety of client and server platforms, and databases, but when buying the product, it is useful to think about the suite as shown in Figure 1. Underneath it all, is the scalable iProcess Engine that manages the state of all process instances. It handles all inbound and outbound interaction whether systems or human oriented. Information associated with Cases, such as form fields and their values, is stored in the shared database (Oracle, SQL Server, DB2, etc.). TSPS also offers an optional Business Rules manager module.

The Process Monitor is the result of a joint development with IDS Scheer and is optional. (Staffware can also import models developed in the IDS Scheer ARIS toolset.) Depending on the goals that a
customer has, one or more of the Integration Layer options is normally used (Process Objects, EAI Plug-ins, or Enterprise Application Connectivity Adapters).

Customers might then use one of the Standard out-of-the-box process clients, develop their own client user interfaces, or integrate the process functionality into a third party application. At the highest level, TIBCO provides a selection of optional Process Frameworks (built upon the TSPS stack of products).

The core elements of the iPE are shown in Figure 2. Logically, one could think of the iPE as split into three areas – in the foreground are those components that deal with the user interaction, the list of queues and their contents. In the background are the Staffware Servers that perform the processing (working out the next step, etc.). In between them, is the messaging layer that provides an assured transport mechanism between the foreground and background components. This approach also provides a robust transactional management capability, currently supporting Oracle Advanced Queues on Unix, and an equivalent mechanism for SQL Server and DB2. The Sentinels operate in a hot standby fashion, controlling the start up and shut down of server components, and monitoring them to ensure they are running satisfactorily. These components might reside on separate machines or, at the other end of the scale, be grouped together in one machine. Our use of the word component here is for clarity: They are effectively software servers.

Interoperability with other workflow engines is achieved via support for the WFMC interoperability interface (WF-XML & MIME bindings). This type of support means that a process instance, which is started in a TSPS environment, can be handed off to a third party Business Process Management environment to complete elsewhere in the enterprise or across the value chain. iPE also supports both
inbound and outbound Web Service, using SOAP over http, XML over JMS, and, soon, SOAP over JMS(H1 05) with full support UDDI lookup.

Via a Web Services call, 3rd party applications, including 3rd party process engines that support Web Services call outs, can interact with iPE process instances. Through this mechanism, iPE provides support for Case Start/Suspend/Activate, Event Trigger, JumpTo, Delay Release, and Graft Step (allowing new subprocesses to be added dynamically from external applications).

2.1 Platforms

The main server is available on HP-UX, AIX, Solaris, Linux, and Windows 2000/2003 systems. The PC Client on Windows 95/98/2000/2003/XP, with the Web Client needs Internet Explorer 5.01 or above. All Shared Data Space information and process status data are stored in the iPE database (Oracle, SQL Server, and DB2).

2.2 User Interface

Most users contemplating using the product would probably use one of the Web-based approaches (ASP & JSP), although there is also a traditional thick client. The Process Client consists of a Work Queue Manager and a Procedure Manager. The Work Queue Manager displays all Work Queues for the user, customizing the fields displayed as well as how Work Items are filtered and sorted for display. The Procedure Manager controls user access to procedures, ensuring they only see those created for them. Where authorized, the Procedure Manager allows the creation and editing of procedures (launching the Process Definer).

![Diagram of Staffware Process Suite](image)

**Figure 3.** The standard user client is browser-based (either ASP or JSP based)

Depending on how Work Queues are configured, work is pushed to individual users (workers receive the next Work Item on the list automatically), or, alternatively, users may pull work from the Work Queue. The push model can dynamically assess priority of the Work Item and the skill level of the individual (defined in the user attributes set up by the administrator).
2.3 Scalability

iPE can exist on a single machine or spread across multiple servers in a cluster (sharing the same database instance). With a node cluster, it is possible to share the iPE across several servers to improve load balancing and performance. Applications see only one logical iProcess Server. Further, most of the components are replicable (multiple instances of each), which allows fine-tuning of the configuration. This architecture provides linear scalability with no inherent bottlenecks.

![Diagram of TSPS components and their distribution](image)

**Figure 4.** TSPS can also be distributed across server clusters over a number of sites and supports load balancing across all available resources.

3 Processing Modeling

![Diagram of TIBCO Process Definer](image)

**Figure 5.** The TIBCO Process Definer has recently had an overhaul, providing a more modern user interface.

The TSPS environment supports highly sophisticated process architectures. There are two levels of process – the main process and the subprocesses, both of which are developed using the Procedure Definer. The semantics of the product rely on different step types.
The Procedure Definer avoids the need to write code extending the graphical functionality to cover:

- Data design, including user and system-defined fields, attributes, lists, etc.
- Step design, including addressees, deadlines, priorities, etc.
- Integration design, including wizards, data mapping, etc.
- Flow design, including conditions, parallel routing, rendezvous, etc.
- Form design, including client/server and browser-based forms.

### 3.1 Subprocesses

Subprocesses can be either *Static* (i.e., fixed) or *Dynamic* (decided at runtime). It is also possible to nest sub-procedures. Three distinct Step types are used to support subprocesses – the Sub-Procedure Step, *Dynamic Sub-Procedure* Step, the *Graft* Step (which allows external applications to select and insert a Sub-Procedure at runtime). Along with the *Array* field type (capable of storing multiple data elements related to a Case) these Step types extend dramatically the process capabilities of the product. Combined, these Step types enable loosely coupled process architectures – i.e., the parent process need not know anything about a procedural fragment that is linked in at runtime. Subprocesses can then be changed without reference to the parent procedure (but keeping a common information set).

Depending on design choices made, the selection of process fragments to bind can be derived automatically based on the goal of the process or other details of the Case. Alternatively, the system could be set up to allow users to choose from a list of relevant Subprocess to reflect the needs of the case in hand. Depending on decisions taken at design time, the process definition could support multiple process fragments, all dynamically linked to the Case at runtime.

The Procedure Manager is used to support developers as they organize and manage their procedures libraries. The Procedure Manager also facilitates testing, version control, and *Sub-Procedure Parameter Templates*. These are used as a basis for new subprocesses (ensuring they will work properly with a given parent process). In most installations, it is likely that developers will have a few standard Sub-Procedure Parameter Templates.

Using the Dynamic Sub-Procedures mechanism, the system can be set to *goal-seek*; i.e., selecting the appropriate process fragment to instantiate, depending on the goal of the process and the data associated with the case in hand. It is only at runtime that the Sub-Procedures to instantiate are determined. Therefore, each possible Sub-Procedure must share the same Sub-Procedure Parameter Template.

### 3.2 Shared Data Space

Along with the usual variable types, TSPS supports arrays, which can contain multiple data items (e.g., a list of customer names, and/or a list of process fragments for a Dynamic Sub-Procedure step). Facilities are also provided to import the structure of an XML document and also transform that structure XSLT.

If needed, a bridge is available to import ARIS-based process models, bringing with them their defined data structure. We understand that TIBCO is working on a more generic version of this, which will allow different plug-ins for different modeling tools.

### 3.3 Forms

The general approach is for developers to create Staffware *Forms* incorporating data items (*Fields*) that are displayed to, or updated by, users. Support is also provided for third party forms applications such as Visual Basic, Oracle Forms, or Delphi.
With the Staffware Forms facility, developers can add any number of Fields to a Form (based on the data structure they have associated with the procedure). Fields are defined as Required, Optional, Display, Calculated, or Hidden. Options are also provided to specify Field level validation and help on the Form itself. Furthermore, it is possible to link individual Fields with third party applications, allowing the user to automatically launch applications such as an image viewer, word processor or other third party application. Scripts are used, if necessary, to execute multiple expressions. It is also possible to control which Fields are displayed depending upon the context.

3.4 Time

Deadlines are based on either an absolute time from the start of the task (e.g., 2 hours) or based upon case data (e.g., required time minus 2 hours, or when the case was received plus 6 hours). It may relate to a single Step, multiple Steps, a Sub-Procedure, or the entire Case, and is visible within the Work Queue where applicable. When a deadline expires, the system performs an escalation action, triggering notifications and alarms appropriately. The escalation could also withdraw the original item, decide whether to continue on original path, or launch a new process, etc.

Every Step, and, therefore, every Work Item, has a Priority attached to it. By default, Priority is used to sort a Work Queue. Of course escalation actions can modify the Priority, ensuring that the older the case (or the longer it remains at a particular step), the higher (or, possibly, lower) the Priority.

As mentioned earlier, Staffware now includes a patented feature known as Case Prediction. This enables users to accurately forecast the outstanding Work Items in a Queue and the expected Work Items. In order to make that prediction, the developer needs to define the expected duration of the Procedure or Sub-Procedure.

The default working week established for the server is taken into account when calculating deadlines. It is also possible to configure the iPE to adopt the same time zone as the clients. This solves the problem where the client is in a different time zone to that of the server. Further, if multiple iPE Engine installations are deployed on the same machine, each can be independently configured to run in a different time zone.

3.5 Process Optimization and Simulation

TSPS now incorporates a pre-production simulation capability based on the Prediction Service. This mechanism runs the process model using the engine, calculating completion time and other statistics. This information is then fed into the Staffware Process Monitor analytics tools for in-depth scrutiny and reporting. A key factor in the simulation service is that it uses the actual process model to evaluate process conditions and to determine addressees, deadlines, step completion times, and other dynamic aspects of the process flow. This tool is designed for Business Analysts and Developers, rather than end-user managers.

4 Business Rules

A relatively new component in the suite is the TIBCO Staffware Rules Manager (SRM) that allows developers to remove parametric business rules from process definitions, managing them separately. SRM is actually an OEM version of the Corticon product that provides a spreadsheet-oriented interface, allowing access and maintenance of rules by appropriate business users. Each SRM decision service is deployed as a Java or Web Service and is accessed via an EAI plug-in within the iPE.
5 Integration

While it is possible to achieve integration out-of-the-box with simple applications, integrating each application normally requires some programming effort. A logical representation of the fundamental approach to integration is shown in Figure 6.

EAI Steps use a plug-in adapter framework to allow integration with any number of external applications, as well as integration with TIBCO BusinessWorks. Technology adapters consist of two components, a runtime plug-in for the iProcess Engine and a design time plug-in for the Process Definer. Available EAI adapters include: SQL Server, DB2, and Oracle Databases; Java; Web Services; Scripting; COM; SMTP Email; XML over HTTP; and XML over JMS. The XML-based steps also provide facilities to run XSLT on the imported data to map it onto the defined SDS for the case.

TIBCO BusinessWorks is an integration platform that provides complete support for industry standards and Web services. TIBCO also provides a library of off the shelf enterprise application adapters (SAP, Siebel, Oracle, etc), as well as an SDK enabling additional adapters to be developed either by TIBCO, its customers, or its partners.

Staffware Process Objects (SPO) expose Staffware process functionality directly to third party applications. SPO objects are available as COM, Java, and C++ interfaces. Staffware Server Objects (SSO) expose the core Staffware functionality as a set of server-side objects, designed for use in server-side, application architectures (Native Java, RMI, EJB, and .NET).

![Figure 6. Integrating third party applications and clients](image)

In contrast to Normal Steps that are delivered to Work Queues by the iPE, EAI Steps are executed directly. Since the iPE can run multiple background server processes simultaneously, it is possible for them to be run both synchronously and asynchronously without causing a system bottleneck.

6 Organizational Structure

The organizational structure is reflected using shared and individual Work Queues. A given Role is normally associated with a Work Queue. The User Validation API enables the system to validate user access via an LDAP, X500 or other Directory Server environment. It is also possible to import role definitions and user data from such environments.

7 Process Adaptability

As described earlier, one of the core capabilities of the iPE is the ability to dynamically link process fragments to Case of work on the fly. This enables considerable flexibility in the way in which the process architecture is implemented and, to a certain extent, adaptability at runtime if required.
Secondly, suitably authorized users can change the current Step in the Case, bypassing steps in between, or even moving the Case back again (perhaps to a point where a number of sub-procedures must be redone). However, the process model that supports a given Case cannot be altered.

To maintain a certain degree of control over what can and cannot be done with this functionality, a separate XML document defines the Steps to which the user can move from the current Step. It also defines the Roles that have this capability and any Case data elements that should be overridden. This is saved along with the Procedure definition in the Procedure Manager.

8 Processes Lifecycle Management

Processes defined in TSPS follow a 5-stage lifecycle – from the development phase, to development and acceptance testing, to operational rollout, and, in the end, final withdrawal. TSPS implements version control functionality underpinning this lifecycle, enhancing the management and control of process assets. Apart from the expected functionality, administrators can also move live Cases from an older version to a newer version, explore a full audit trail of all process modifications, and schedule the rollout of new process version. Procedures may also be imported/exported.

9 Monitoring, Measurement, and Management Information

TIBCO provides three tools to track, report on, and analyze business processes, as well as interfaces for third party tools.

- TIBCO Staffware Process Monitor (TSPM)
- TIBCO Staffware Work in Progress (TSWIP)
- TIBCO BAM for iProcess

TSPM provides a sophisticated tool to monitor the effectiveness of entire business processes, based on historical analysis of audit data and case data (TSPM can also act against simulation data). It is designed to allow management to establish and continuously measure Key Performance Indicators (KPIs) for ongoing process performance and improvement. Comparison of task/process execution time can be
performed on an enterprise wide basis, and drilled down and filtered by any factor (process, task, group, user, data within the case, etc) and compared against enterprise, department, or individual KPIs.

The TSPM front end is browser-based and presents designated users with a list of pre-defined Favorites reports. Users with the ability to define their own reports are also presented with a list of available KPIs and dimensions. Users simply drag and drop the required KPIs and/or dimensions and then select the chart type they wish to use. Management dashboards can also be created incorporating several views and delivered via the Web or PDF.

TSPM can also import data from external systems, such as data warehouses, to provide even broader views with integrated employee, financial, or even supply chain information. KPIs and SLAs can be set up with defined ranges, values, and warning/alarm settings – KPIs falling outside alarm values can trigger exception reports via email.

The combination of the audit trail data, combined with comprehensive case data for each process instance, provides an enriched management reporting capability, supporting the achievement of organizational KPIs. It also supports users as they drill down and filter by any factor.

The TSWIP reporting tool is complementary to TSPM and allows a team leader to monitor in real-time the work distributed across the various user and group queues. Information monitored typically covers the number, type, and age of work throughout the system, but can be configured to report on summary case information. TSWIP is available both as a management dashboard and as an API.

TIBCO’s offering for BAM solutions is TIBCO BusinessFactor. The TIBCO BusinessFactor solution monitors process metrics and KPIs from a business perspective. TIBCO BusinessFactor can leverage events from standard system sources via JMS, J2EE, Web services, Queues, etc. In the first half of 2005, TIBCO plans to release an iPE specific version of this BAM product, based upon the BusinessFactor technology. Through the BusinessFactor dashboard, users will be able to monitor in real time key steps within a TSPS business process, setting alerts, and automatically invoking escalation procedures.

TSPS (TIBCO Staffware Process Suite) also includes capabilities for Case Prediction, allowing users to see a consolidated, color coded view of current audit trail and predicted workload. This facility is designed to enable improved resource handling, helping supervisors ensure that sufficient resources are available to perform the work. Using parts of the API set delivered with SPO, developers can build elaborate views based on the prediction data that are continuously generated (that is, assuming the procedures are configured with their default duration information).

10 Templates and Frameworks

TIBCO provides two vertical industry frameworks containing domain specific knowledge in the form of processes, rules, and pre-built reports. These frameworks utilize the iProcess Engine and the other components of the Suite.

- The TIBCO Claims Management Framework is targeted at the Insurance Industry. It enables the end-to-end design, automation, integration, management, and tracking of the claims process from the customer interface to the claims back-office.

- TIBCO Fulfillment Framework offers out-of-the-box definitions for the major processes required by a Telecoms Operator, linking the core administrative functions with the Business Support Systems (BSS) and Operational Support Systems (OSS).

11 Vendor

The TIBCO BPM Group was formerly Staffware plc, which was acquired on the 7th June 2004 by TIBCO Software Inc. Staffware began researching process support in 1984, culminating in the release of
the first working version of Staffware in 1987. TIBCO is the successor to a portion of a business founded in 1985, known as Teknekrorn Software. In 1997 TIBCO was established as a separate entity, and went public on NASDAQ (TIBX) in 1999. TIBCO products are licensed by approximately 2,100 companies worldwide in diverse industries such as telecommunications, retail, healthcare, manufacturing, energy, transportation, logistics, financial services, government, and insurance. TIBCO Software Inc. directly employees some 1,400 staff, of which, approximately 500 are in the BPM arena. The combined business has offices in over 23 countries.

12 Cost

The pricing model for TSPS is based around two parameters – Case starts per day and number of users. One or both of these parameters will tend to drive a given customer requirement – larger user base or high throughput. Initial TSPS projects are in the order of $250,000-300,000, with an average sale price of around $400,000. Standard support and maintenance includes major upgrades and is charged at 18%.
## TIBCO Staffware Process Suite, Version 2

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overview</strong></td>
<td>Highly scalable engine; dynamic binding of procedural fragments at runtime; goal seeking processes; enabling flexible process architectures; Case Prediction facility; broad range of integration options;</td>
</tr>
<tr>
<td><strong>BPM Engine</strong></td>
<td>Client-Server, message queuing, dynamic linking process fragments at runtime, server distributed across several machines</td>
</tr>
<tr>
<td><strong>Platforms</strong></td>
<td>OS environments HP-UX, AIX, Solaris, Linux, Windows 2000/2003; Databases: Oracle, SQL Server &amp; DB2</td>
</tr>
<tr>
<td><strong>User Interface</strong></td>
<td>Browser-based Work Queue &amp; Procedure Manager; Staffware Forms facility as well as any third party forms packages</td>
</tr>
<tr>
<td><strong>Scalability</strong></td>
<td>Multiple server installations; single logical server distributed across multiple physical servers; Multi-threaded front-end</td>
</tr>
<tr>
<td><strong>Processing Modeling</strong></td>
<td>Process Definer avoids coding, using graphical functionality to cover all aspects: Data Design, Step Design, Integration &amp; Forms</td>
</tr>
<tr>
<td><strong>Subprocesses</strong></td>
<td>Dynamic binding of process fragments at runtime; both synchronously &amp; asynchronously; goal seeking possible</td>
</tr>
<tr>
<td><strong>Shared Data Space</strong></td>
<td>Arrays; XML import with XSLT tools for translation; ARIS import</td>
</tr>
<tr>
<td><strong>Forms</strong></td>
<td>Staffware Forms, 3rd Party forms applications</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>Deadlines based on task or via variables; Multiple time zones</td>
</tr>
<tr>
<td><strong>Optimization &amp; Simulation</strong></td>
<td>Case Prediction facility; Uses actual process model; leverages Analytics functionality for optimization</td>
</tr>
<tr>
<td><strong>Business Rules</strong></td>
<td>OEM relationship with Corticon to provide a BRE. Tightly embedded within framework applications</td>
</tr>
<tr>
<td><strong>Integration</strong></td>
<td>Broad range of options; wide range of Adapters and Plug-Ins, developer framework for plug-ins; Full API &amp; server-side object model; Integrated with TIBCO BusinessWorks</td>
</tr>
<tr>
<td><strong>Organizational Structure</strong></td>
<td>Shared Work Queues used to represent organization; import facilities from LDAP and other Directory Servers</td>
</tr>
<tr>
<td><strong>Process Adaptability</strong></td>
<td>Dynamic binding of process fragments at runtime; authorized users move the work onto selected steps bypass</td>
</tr>
<tr>
<td><strong>Process Lifecycle</strong></td>
<td>5-phase lifecycle supported by sophisticated repository with integrated version control</td>
</tr>
<tr>
<td><strong>Monitoring &amp; Measurement</strong></td>
<td>TIBCO Staffware Process Monitor, Staffware Work in Progress &amp; BAM for iPprocess</td>
</tr>
<tr>
<td><strong>Templates &amp; Frameworks</strong></td>
<td>Insurance Claims Management &amp; Telco Fulfillment Frameworks</td>
</tr>
<tr>
<td><strong>Vendor</strong></td>
<td>TIBCO Software Inc.; (650) 846-5637; <a href="http://www.tibco.com">www.tibco.com</a></td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>Initial TSPS projects are in the order of $250k-300k with an average sale price of around $400k</td>
</tr>
</tbody>
</table>