Integrated Modular Production & Reserves Reporting System

General Information

The **IMPRESS** system is a powerful integrated management information tool used for planning, monitoring and reporting on the development and production of oil and gas fields. The application is designed to validate, store, manipulate and report on a combination of data types from Wells, Reserves, Production, CAPEX, OPEX, Life of Field and Well Scheduling data. The IMPRESS program focuses on reliable, efficient and effective maintenance and use of valuable corporate data. IMPRESS features include:

- ➢ Monitors data from the producing formation through to corporate long range planning
- ➢ Reports from various levels including, wells, platforms, reservoirs, fields, area/block and countries
- ➢ Saves and reports production data in oilfield and metric units
- ➢ Reports discovered resources by ultimate recovery, in-place and reserves or contingent resources
- ➢ Simultaneously stores and uses daily, monthly and yearly data in various categories, e.g. actual, preliminary, forecast, budget, temporary and long-range planning
- ➢ Converts between unreconciled/reconciled production and entitlement/sales using automatically updated algorithms
- ➢ Stores individual 'business rules' for each customer secured in the Controller module
- ➢ Produces reports including; Well, Pipeline, Facility, Daily, Weekly, Monthly, Short Term Forecast, End of Year, Budget, Life of Field, Resources and the DTI's PPRS report.
- ➢ Full MDI functionality (Multiple Document Interface)
- ➢ Fast responsive screens using the latest Active X controls
- ➢ Provides immediate access to multiple preformatted reports and graphs through the Manager reporting module
- ➢ Stores data on the industry standard Oracle database system
- ➢ Operates in a client server environment
- ➢ Imports and exports raw and calculated data to/from numerous database and spreadsheet types
- ➢ Short learning curve for management, engineering and admin staff
- ➢ Accesses the databases through an interactive visual 'tree-view'
- ➢ Very fast database search engine

IMPRESS Module Overview

IMPRESS Version 7.0 has been modularized to meet the various end user requirements. This change to the program design now makes it applicable to both operating and non-operating companies, plus allows each customer to purchase only the required modules. For example, the basic version of IMPRESS 7.0 will include only the input interface, the Oracle database and the export module.

Companies wishing to make the program more specific to their requirements can purchase additional modules (the Manager and Planner), which can be customized with preformatted reports, graphs and business rules, etc.

The IMPRESS modules include:

> ➢ **IMPRESS** *Version 7.0* **– this module is used strictly for setting up the files, inputting and validating all the various data types before being deposited into the database. Data can be entered on a daily basis or by volume through the import functions.**

> ➢ **IMPRESS** *Controller* **– this module is an integral part of the input interface and is designed to store and operate the various 'business rules' and user preferences used to manipulate the data before it goes to the database.**

> ➢ **IMPRESS Oracle Database – all the raw, calculated and manipulated data is stored here in the IMPRESS specific data storage structure.**

> ➢ **IMPRESS** *Manager* **– this module stores a large range of predefined/preformatted reports and graphs, plus it exports raw and calculated data to other applications.**

> ➢ **IMPRESS** *Planner* **– this is the input module for entering data used in the Business Plans, Well Scheduling and Life of Field projects (not currently available).**

Version 7.0 Structure

Version 7.0 has been designed using **n-tier** architecture, which facilitates better data processing and reduces scalability problems over a network. The structure of the architecture is as follows:
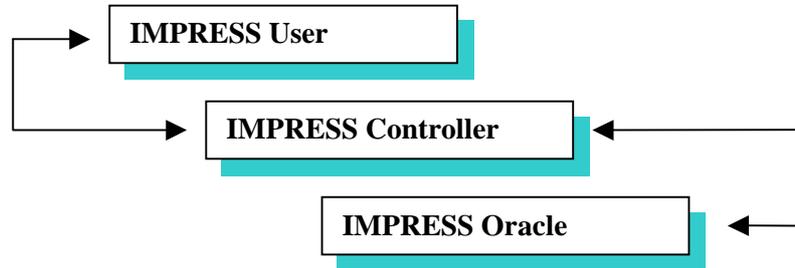

Fig. 1 – IMPRESS n-tier Structure

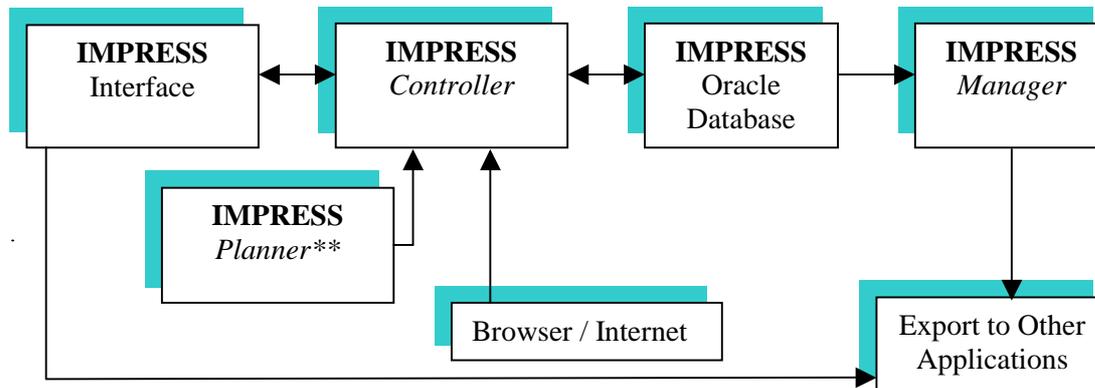Version 7.0 has a new and flexible modular configuration as displayed below:

Fig 2 – IMPRESS Module Structure (** IMPRESS Planner will be available in late 2002)

IMPRESS Interface

The new interface has been written in Visual Basic 6.0, primarily for its feature rich environment, popularity, ease-of-use, fast performance and its use of the latest Active X controls. This interface has a variety of new features, which makes the use of IMPRESS much easier and less time consuming.

In V7.0 there is an interactive 'tree view' of the database, which allows easy access to any type of data from wells to consolidated world levels. Right clicking on any parts of the tree will give the users multiple functionality including, new records, cut, paste and delete, etc. etc. Also, the MDI functionality enables multiple files and/or documents to be opened and worked on at the same time. This will be beneficial when comparing or cross-referencing files and running other application on the same client.

A significant new improvement is the import and export functionality, which has been designed to move data to and from the database easily and securely. Data can be imported in bulk from a variety of formats, plus the software can be setup to automatically import 'snapshots' of real time data from a live production system. The export function will be of particular benefit to engineers wanting to analyze portions of the database in other

applications. Also from the export mode, data can be transferred to other reporting applications such as Crystal Reports and Business Objects.

Included in the interface is the 'Administrator', which is a multi functional tool for freezing, archiving, auditing and general management of the data. The Administrator will be helpful in safeguarding the data integrity, as it has the ability to track all the database functions over time.

The application is now fully Internet compatible. This is significant improvement, as it will allow users to operate the application from anywhere in the world, using a centralized database at the head office.

Some features of the new V7.0 interface are:

> **Access to all databases through an interactive 'tree view'**
> **The addition of Reservoirs, Wells, Pipelines and Facilities to the old 'field only' structure**
> **Cut, copy and paste all items within the tree**
> **Fast search engine and 'favorites' function**
> **Full MDI functionality (Multiple Document Interface)**
> **Fast responsive screens using the latest Active X controls**
> **Short cuts – mouse/keyboard – Microsoft Standard**
> **User defined start up preferences**
> **Easy access to the 'business rules' via the Controller**
> **View, edit and export data sets via the Data Sheet View**
> **Data sets can be imported into IMPRESS individually or in bulk format**
> **Short learning curve for both management and administrative personnel**
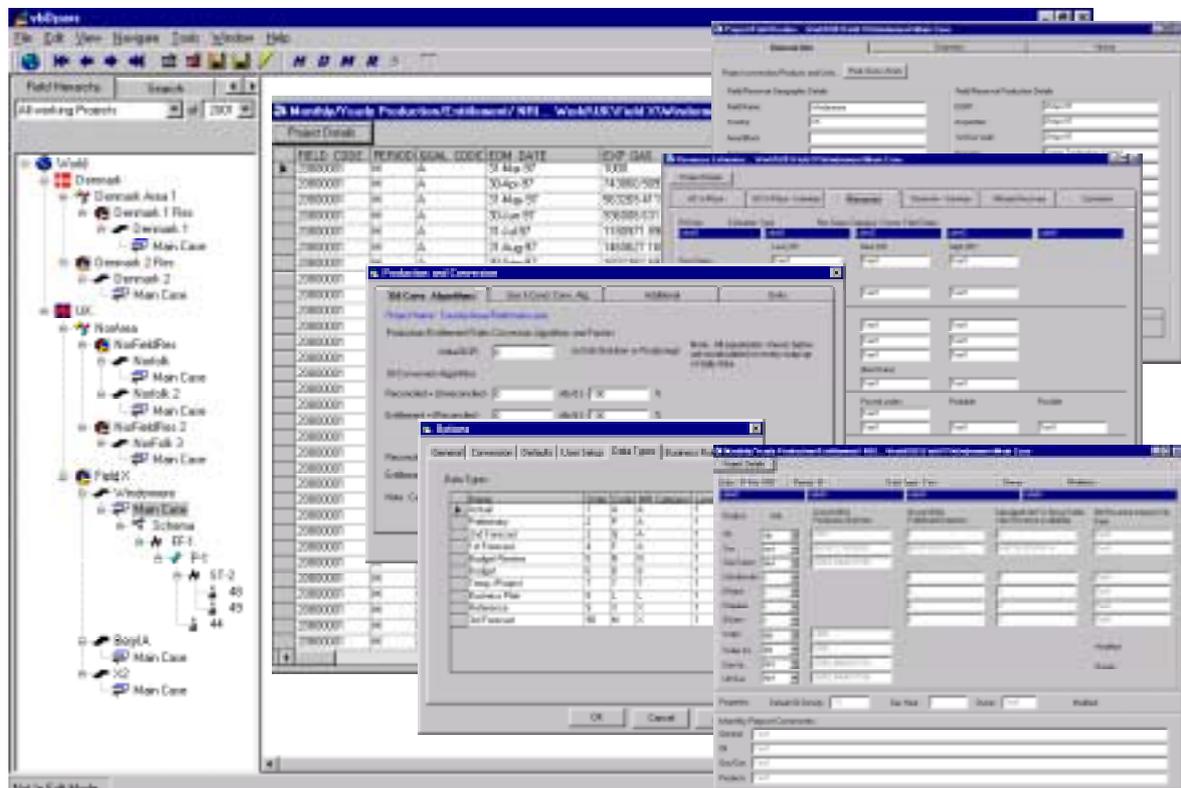> **Internet compatibility**

Figure 3 – IMPRESS 'tree' hierarchy and MDI functionality
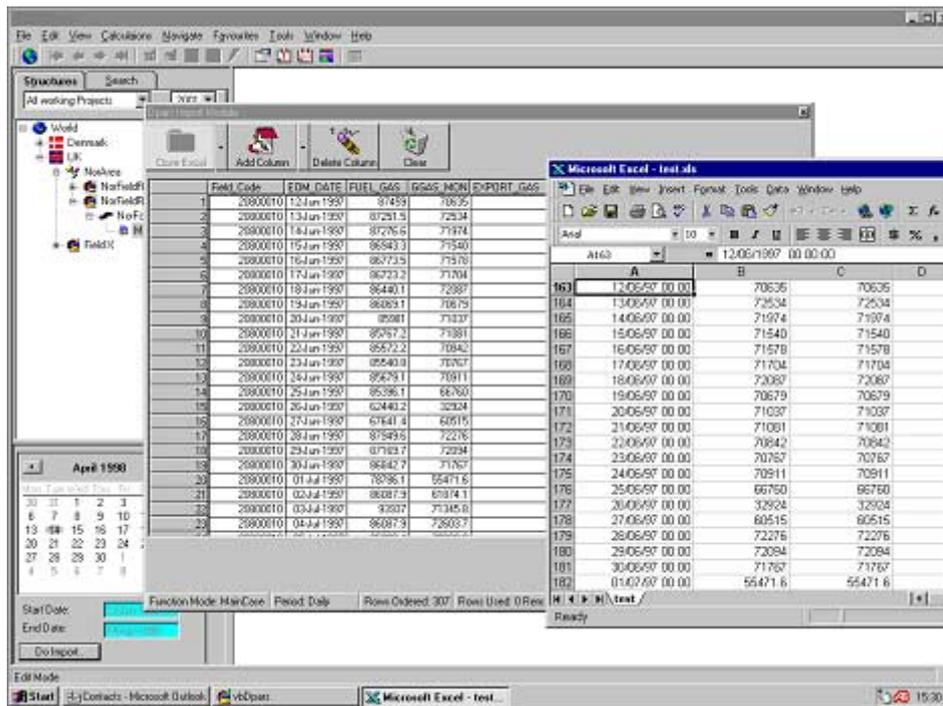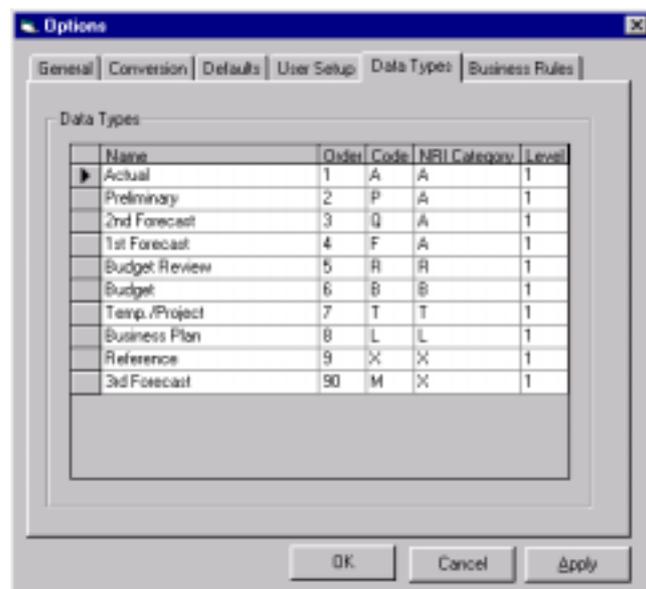
Figure 4 – Drag and Drop facility of Data Import/Export

IMPRESS *Controller*

The IMPRESS *Controller* is one of the most important features of Version 7.0, as it will enable instant access to the business rules that control the data manipulation.

The *Controller* has a 'smart interface' that utilizes '*application server methodology'*, which separates the user interface from the business rules and program interface. This interface is composed of 'smart objects' that know how to save, add and delete themselves to and from the database. By writing a smart interface that sits between the database and the user interface, we are able to create different 'front ends' to the database base for individual users.

Figure 5 - The picture opposite highlights how a user can redefine the data types within the database through the Controller module.

Within the *Controller*, authorized users will have the ability add, delete and edit certain functions, whereas, more complex functions will be hardwired, to protect the integrity of the database (hardwired functions can only be changed by our programmers). The ability to edit sections of the *Controller* will be controlled by the system administrator or an authorized user. The *Controller* has a number of built in safety features, including the ability rollback to previous rules. The *Controller* will optimize the whole

system by having all the rules located in one place, which will in turn, speed up the processing operation. Another significant task of the *Controller* is its logging function, which logs every single action made in the database. This information is stored for later use, i.e. to audit incorrect data input. One of the most important aspects of the *Controller* module is that it will significantly reduce the amount of customisation required by each customer.

Reserves & Resource Reporting in IMPRESS

The IMPRESS program includes a comprehensive reserves and resource reporting module. The module is two-fold in its application, firstly it works as a stand-alone report generator for annual reserves or partner reporting, etc. and secondly, in conjunction with the IMPRESS *Planner*, it assists in generating Business Plans for field development and Life of Field scenarios.

This system is based on the sub-division of the Resources into discovered/undiscovered and commercial/non-commercial categories. Reserves are defined as Discovered Commercial Reserves, and Non-Commercial Discovered Reserves are defined as Contingent Resources, while all Undiscovered Resources become part of the Global Prospect Inventory (GPI). Once a discovery has been made, the reserves associated with discovery are classified as a Field and are no longer part of the GPI. The field can then be subject to a commercial test in the IMPRESS *Planner* (which includes an economic evaluation), which will define whether a discovery constitutes a commercial field (with reserves) or a non-commercial field (with contingent reserves). Commercial Fields are further sub-divided into three additional categories, which include:

1. Field on Production
2. Field Under Development
3. Field Under Appraisal

These categories reflect the maturity of the asset and facilitate portfolio management. In the IMPRESS *Planner* all commercial fields are assigned to Business Plan - Category 1 based on the Proved plus Probable (2P) Reserves. Contingent Resources (in non-Commercial Fields) and the possible reserves from commercial fields provide the basis for target projects used in Category 2 of the IMPRESS *Planner*.

In addition to, but distinct from, the Resource Status Categories described above, Resource Uncertainty Categories are clearly defined. The reserve estimations are based on the industry standard Society of Petroleum Engineers definitions (see Figure 6 – Resource Reporting Classifications) of proved, probable and possible. These are linked to the Best Estimate philosophy of reserves estimation whereby *Proved plus Probable is equated to the Best Estimate*, while *Proved and Proved plus Probable plus Possible represent the Low and High* estimates and indicate the range off uncertainty in the estimate. Contingent Resources are classified as Low, Best and High estimates, using the technical criteria of the SPE definitions.

In addition to performance monitoring and business planning, the reserve and contingent resource volumes can be used to track the uncertainty estimate and provide a validity check on the technical procedures used in a project.

This part of the IMPRESS system works in conjunction with the production database, which guarantee's that the reports are based on the most current and up-to-date information. It also ensures that the company maintains a defined standard of definitions and classifications for resource reporting.
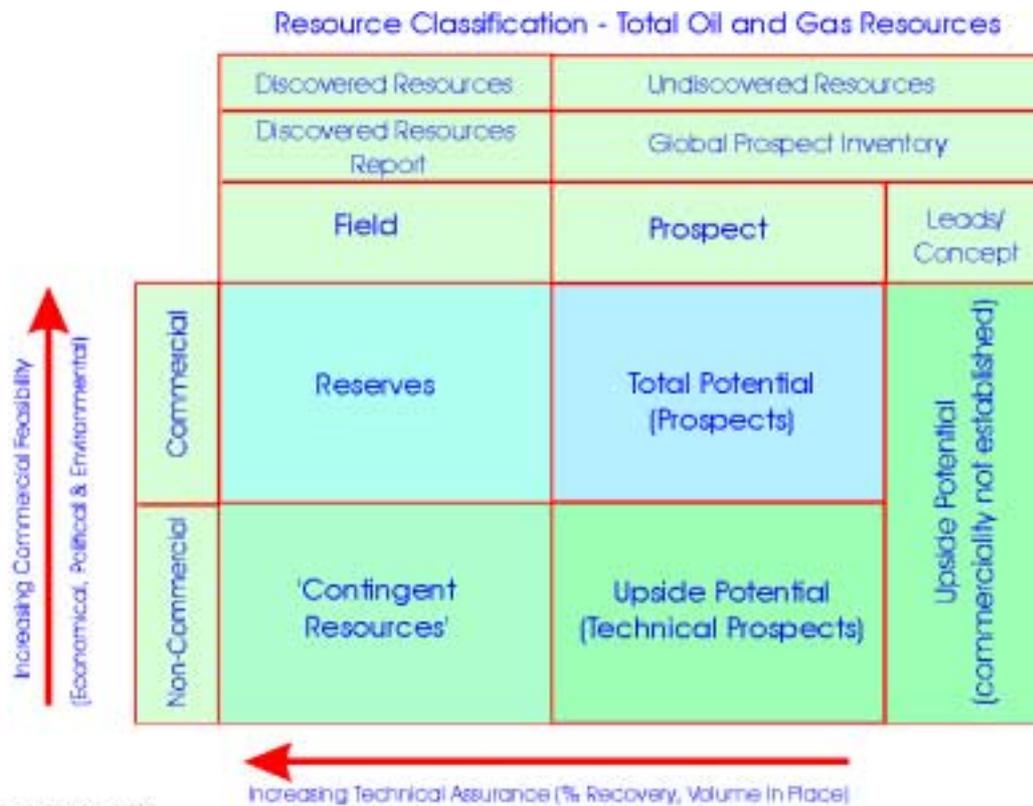
Resource Classification - Total Oil and Gas Resources

Discovered Resources		Undiscovered Resources	
Discovered Resources Report		Global Prospect Inventory	
Field		Prospect	Leads/Concept

Vertical axis (left): Increasing Commercial Feasibility (Economical, Political & Environmental)

| Commercial | Reserves | Total Potential (Prospects) | Upside Potential (commercially not established) |
| Non-Commercial | 'Contingent Resources' | Upside Potential (Technical Prospects) | |

Horizontal axis (bottom): Increasing Technical Assurance (% Recovery, Volume in Place)

Source: Based on McKelvey (1974)

Figure 6 – Resource Reporting Classifications

IMPRESS Oracle Database

Version 7.0 uses the latest Oracle 8i database, which significantly increases the power and flexibility of the application.

Highlights

- Implementation of Reservoirs, Platforms, Pipelines and Wells into the IMPRESS database structure
- Consolidation of complex table structures for easier querying
- Improved multi-user processing
- Storage of both metric and oil field units
- A common data storage facility for reserves
- Multiple currency options, e.g. currency conversions and escalation rates.
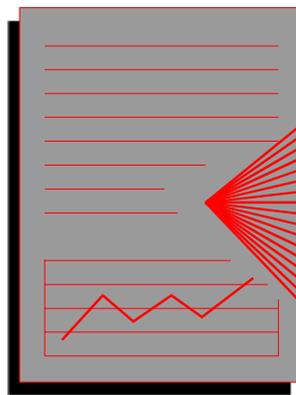- Optimization of all the database stored procedures/functions

IMPRESS *Manager*

The IMPRESS *Manager* module provides all the reporting output of the IMPRESS system. The *Manager* stores pre-formatted templates for the various report types and with the aid of a very fast querying engine, produces the reports to a '*management ready*' specification. In addition, this module can also produce quality graphical output, through the integration of the powerful MSGraph program. Users can also export any variation of data types to other applications.

In short, the *Manager* ensures standardization of all reporting procedures throughout a company.

Some reports are very complex in their structure and need to access large portions of the database to produce specific output. This querying can very often have an adverse effect on the time in which results are returned. To overcome this problem, the *Manager* has a special querying engine designed to extract only the required information from the database, in the fastest possible time. Most reports are ready for printing within a few seconds, whereas more complex reports like business plans can take a few minutes.

Country
Field
Area/Block
Field
Reservoir
Actual
Forecast
Budget
Oil
Entitlement
Preliminary
Products
Gas
Gross
Units
Condensate
LPG Sales

Each template type (e.g. monthly, reserves, etc.) has a number of different versions in which it can be produced. The monthly report is the most comprehensive and therefore has the most variations. For example and as the above picture shows, a monthly report can be produced using combinations of: locations, data types, product types, wells, reservoirs, and units, etc. etc. There are currently some 700 variations of reports contained in the *Manager*.

Graphical output is very important in any reporting procedure, so all the basic report types have default graphs associated to them. However, users can construct their own graphs using any combination of the stored data from the database. These graphs can be stored as templates or exported to other formats (e.g. Word, etc.). All reports can be produced in .pdf formats and saved to a central storage facility.

The *Manager* is used primarily by the production administration staff to produce all the necessary company reports in both hard copy and electronic formats. Additionally, its can also be used by the engineering staff, as it has a powerful and easy to use facility for exporting raw and calculated data to a variety of other applications.

As all the stored reports will not suit every company's requirements, a customisation facility is offered to bring the output to a company specific design. Also, there is a link facility within the *Manager* that allows data to be exported to other reporting applications, such as Crystal Reports and Business Objects.
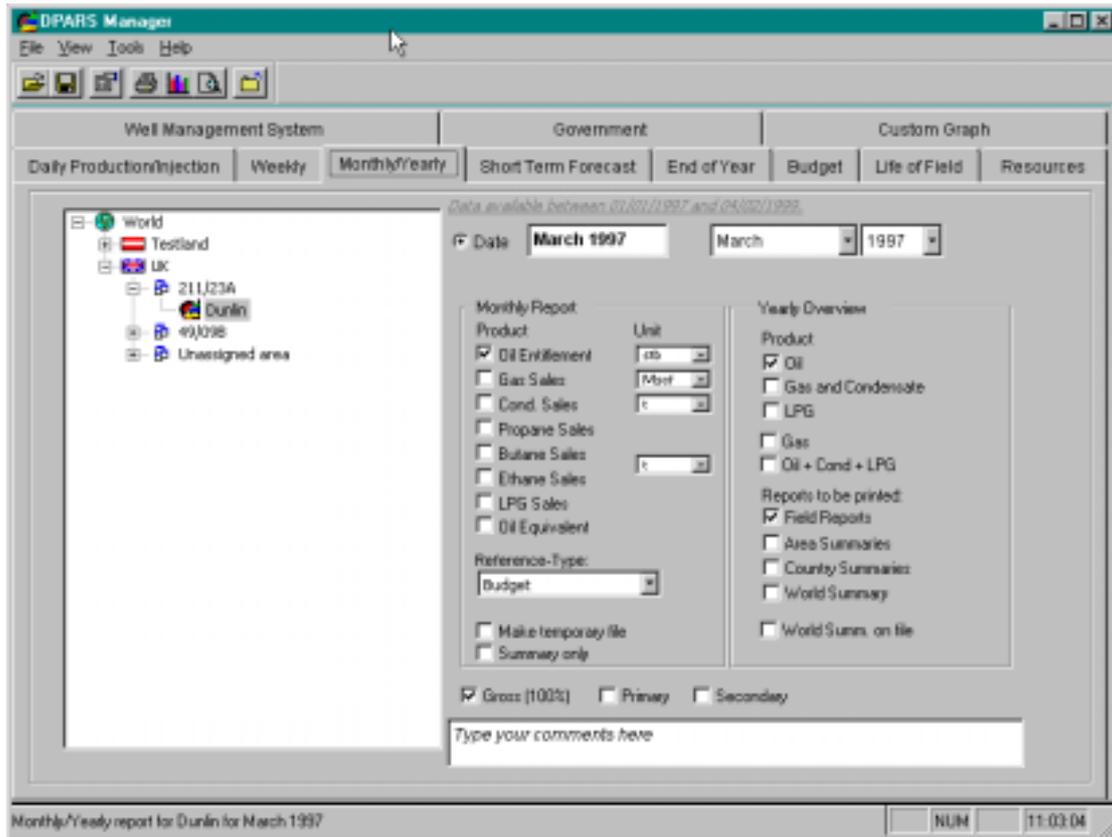
Figure 6 – IMPRESS Manager, Monthly/Yearly reporting section

IMPRESS *Planner*

The *Planner* module has been specifically designed for generating a variety of Business Plans, plus Life of Field and Well Scheduling scenarios.

The *Planner* assists the user in generating exploration and production cost profiles of new or existing fields. It can facilitate both onshore and offshore operations, and allows input of both CAPEX and OPEX for the project. The data input variations are considerable and include the costs for rigs, workovers, geophysical, processing facilities, pipelines and platforms, etc. etc.

The *Planner* works in conjunction with the resource reporting function to categorize the various plan types for commercial and non-commercial fields and projects. The *Planner* is the most complicated module of the IMPRESS application, as it requires data from most parts of the database in-order to generate answers and profiles. This complexity is illustrated in Figure 9, which shows the data interaction required in producing a Business Plan.

Due to the complex nature of the Business Plans, each company will require a small amount of customisation in this module, before it can be used successfully. A helpful addition to the *Planner* is the integration of the dTree Decision Analysis Program, which will further assist the user in analyzing the probabilities to be used in the Business Plan.
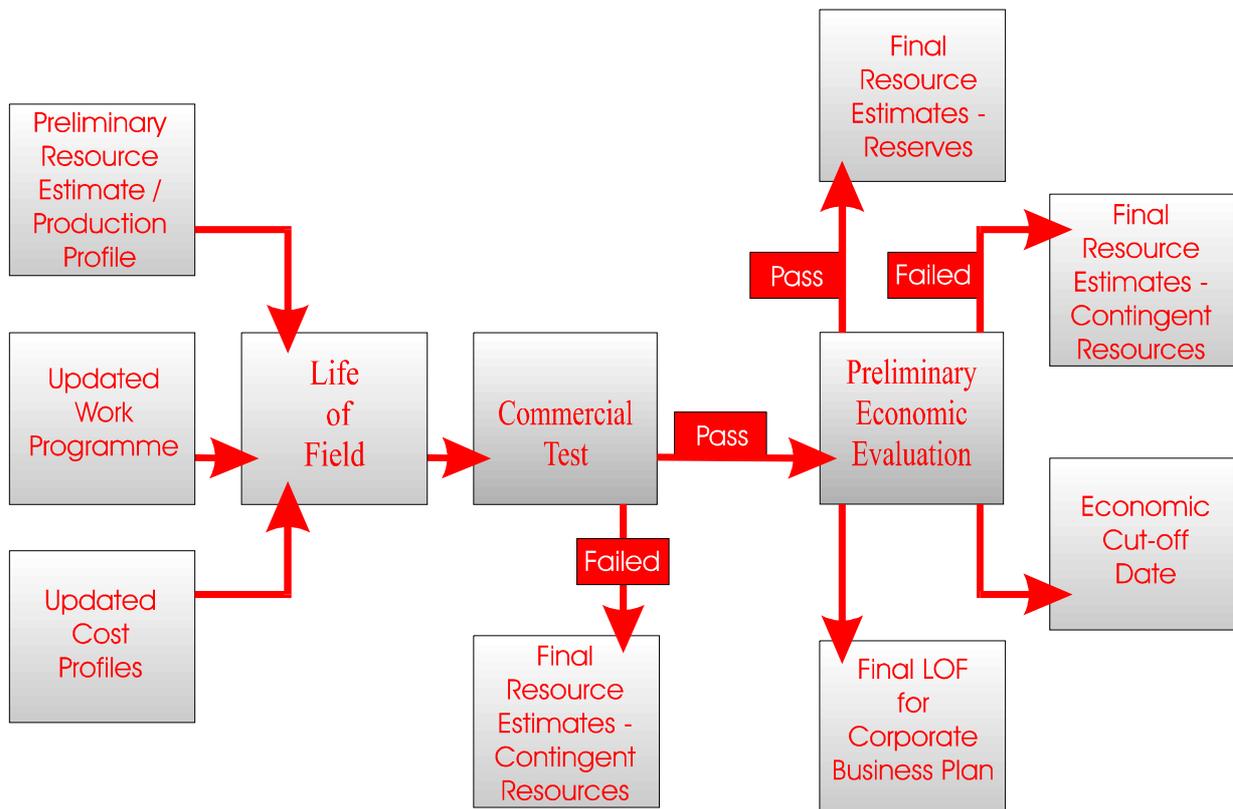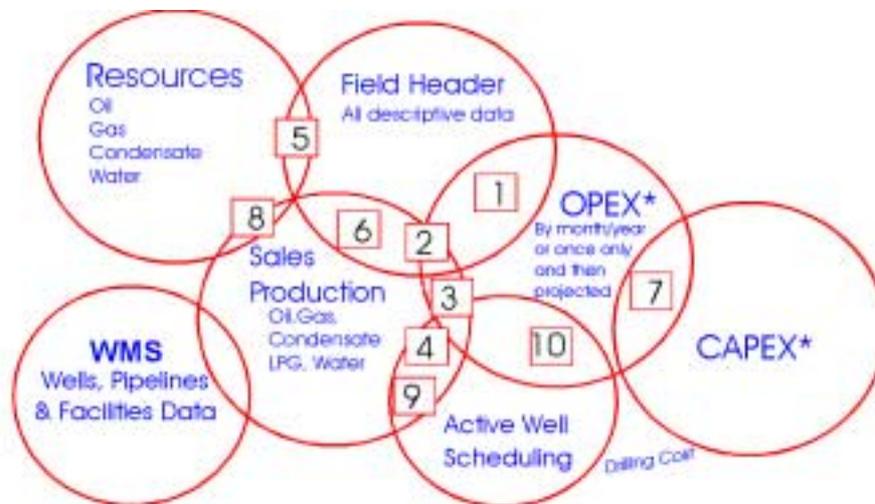
Figure 9 – Discovered Resource Reporting Process Flowchart

Figure 10 – Business Plan Data Interaction Diagram

The IMPRESS *Planner* module is currently only available in Version 6.3 and is not expected to be fully functional in Version 7.0 until the 4th quarter of 2002.

Company Specific Customisation

As most companies have different requirements in their data handling/storage and reporting process methods, the IMPRESS system can be fully customized to suit those individual needs. This customisation covers most aspects of the program and includes graphs, reports, resources, units, input data forms, menu choices, import and export facilities and company specific changes to the query engine. The user can perform certain customization tasks through the *Controller* module.

Hardware Requirements

IMPRESS has been designed to operate in a client/server environment however; it will work on a stand-alone system. The preferred operating systems are Windows NT, 2000 and XP (not available for Mac or Windows 3.1). To ensure maximum performance on a 3 User License, we recommend a high end Pentium processor (1500+) with a minimum of 128MB RAM on the client, plus a minimum of 128MB RAM on the server. These specifications will change depending on the number of consecutive users. In addition, Microsoft Office 97 is also required for the Excel and MS Graph functions. A full review of your system will be necessary before we can make any further hardware recommendations.

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