Information Builders

Best Practices
in Information Delivery

A Roadmap for Implementing Business Intelligence Solutions

A White Paper

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1 Introduction

This document offers guidelines for planning an enterprise-wide business intelligence (BI) implementation and related project-development efforts. It is intended for managers and systems professionals responsible for planning and designing BI systems. In many respects, the concepts discussed here apply to all BI implementations. However, specific concepts relating to Information Builders' WebFOCUS business intelligence suite are discussed in several sections.

After 27 years in the business intelligence arena, Information Builders has witnessed many successful implementations – as well as some that were not so successful. The purpose of this document is to steer customers down the right path. We provide this guidance through many avenues, including:

- An account manager responsible for client satisfaction
- Skilled system engineers to install and configure the BI environment for scalability and efficiency
- A consulting division capable of delivering complete solutions
- An education division with more than 40 formal courses, as well as customized courses for specific client environments
- An award-winning 24x7 help line
- An active user group that includes local chapters and an annual technical summit for all users

For a visual overview of our recommendation for implementing business intelligence solutions across the enterprise, please see Appendix A.

2 Enterprise Rollout Plan

Successful business intelligence solutions result from well-planned, carefully orchestrated implementations. The objective is to ensure that users receive the right information at the right time to fulfill their business requirements.

This section includes a high-level roadmap intended to guide customers through the major aspects of planning an implementation.

2.1 Enterprise Planning

Planning exercises begin with a committed support team that includes cross-functional representation from throughout the organization. Configuration planning ensures that the necessary data, security, application, and infrastructure components are in place. Project milestones should be agreed upon, and measurements should be established to gauge the ultimate success of the endeavor.

The key elements of a successful implementation include the following:

- An implementation support team to plan and guide the process
- A cross-functional program designed to educate key staff on the impact of enterprise reporting
- An incremental approach that identifies business needs in conjunction with an enterprise data architecture and standardization program
- A repeatable methodology for rolling out incremental BI components
- A data and application security structure that ensures the right information goes to the appropriate staff

The development effort for an enterprise-wide BI solution should occur within the standard development methodology. A client can utilize its own methodology or Information Builders' proprietary methodology, which is comprised of two components:

- Project Management Guidelines – a framework for managing projects from initiation through closure
- System Development Methodology – a management plan that describes the technical approach the project team will follow to meet the client's requirements

Information Builders' Consulting Division can support all phases of the implementation process, from short-term staff augmentation to full life-cycle application development. The team's extensive experience developing and deploying business intelligence solutions helps clients reduce costs, boost productivity, and accelerate time to market for BI applications. The consultants frequently work on-site at the client's location, with the directive not only to build the requisite solution, but also to train the client's in-house staff.

2.1.1 **Create an Implementation Support Team**

Most successful BI implementations are managed and overseen by a cross-functional group chartered with planning and supporting the rollout. This team should include representation from the following areas:

- Education and training
- Systems support
- IT management
- Business users and managers

2.1.2 **Educate the Organization**

One of the first steps in rolling out an enterprise-wide reporting tool is to make sure the key support staff understand their role in implementing and supporting the BI solution. These staff members typically include:

- System administrators
- DBAs
- Business analysts
- IT management

2.1.3 **Define an Incremental Approach and Strategy**

The implementation support team should begin by assessing the overall business reporting needs of the enterprise, identifying the information required to run the business and the data sources that can supply that information. Then, specific deliverables should be defined in an incremental fashion. Once the initial projects are identified, it may be feasible to execute them in parallel instead of successively to reduce time to market.

Identify Business Needs

It is essential that initial enterprise reporting projects meet critical business needs, so an important task for the implementation team is to identify those needs. The implementation support team needs to answer two important questions:

- What information is necessary to run the business, in terms of key processes and tasks?
- How does the enterprise measure success – in other words, what are the key performance indicators?

Business needs generally fall into two major categories: operational and managerial. Operational needs include information such as which offices failed to report specific data last night. Operational needs are generally time sensitive, with the latency requirements measured in seconds, minutes, or hours. Managerial needs include measures related to productivity or financial success. These needs are usually less time sensitive than operational needs, with latency requirements measured in days, weeks, or months.

After identifying high-level business needs, the implementation support team should determine how these needs will be supported – in short, how success will be measured. The team may go so far as to identify information or performance indicators that support these needs.

Identify Initial Projects

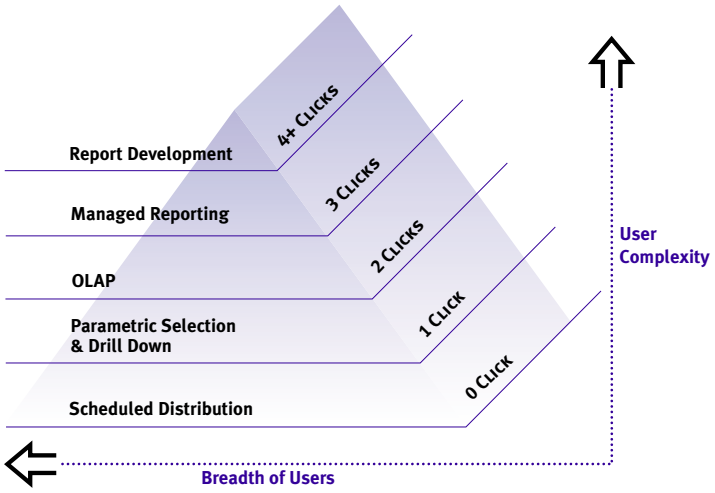
The client should select an initial project as a test-bed for future efforts. This first development exercise will help direct the evaluation of the required data, users, security, and configuration. Taking an incremental approach to the development and deployment of BI solutions is key to the success of the overall effort. Some of the benefits of an incremental approach include the following:

- A quick rollout of deliverables to the user community
- The ability to obtain user feedback in a short amount of time, which can be helpful in directing future development efforts
- The likelihood of building interest and obtaining buy-in to the BI solution (this can also generate additional demand)
- A quick ROI
- Avoidance of the “analysis paralysis” that plagues developers who attempt to achieve too much in the first increment

User Roles

In order for an organization to take complete advantage of an integrated business intelligence environment, stakeholders must consider their user community and determine which delivery methods are appropriate. Each user community has unique needs.

In most organizations, user roles can be categorized and associated with specific tiers, as illustrated below. Each tier addresses user abilities and needs at a progressively higher level. Higher tiers require greater aptitude and higher levels of training to take advantage of all the advanced reporting and data manipulation options.



The following profiles are useful in determining the appropriate reporting solutions for these different tiers or classes of users. Numbers of clicks refers to the approximate number of clicks of the mouse required to obtain reports and drill down into successive levels of information.

Zero-click users include a broad group of novice users, from senior managers to administrators. This group prefers to have information delivered to them, either on a scheduled basis via e-mail or in response to an alert, with minimal effort on their part. The underlying technology is invisible to the user. Upper managers often take advantage of the push technology associated with this tier.

One-click reports are requested from an intuitive user interface. They generally accommodate:

- Parameter-driven input, with the user supplying the values
- Selectable output formats such as PDF, Excel, HTML, and e-mail
- Provisions for drilling down into the data set

Two-click reports extend the analytical capabilities available to knowledge workers. This tier often includes business analysts interested in:

- Full power reporting
- OLAP panel analysis
- Drill-anywhere technology
- Complex output formats such as Excel pivot tables

Three-click reports include user-defined reports designed for ad hoc requirements. This tier often includes power users who create zero-, one-, and two-click reports for other users. WebFOCUS comes with report templates that speed up the development cycle, encouraging users to take over the work of high-end reporting specialists. Additionally, the WebFOCUS Managed Reporting Environment (MRE) can be used to create a user-friendly, menu-based reporting system, with controlled access to data. MRE can be used to create a secure, well-structured environment within which users can create their own reports.

Four-click reports are created by reporting experts who have complete access to the reporting environment. These developers are able to perform all the tasks necessary to support the strategic reporting needs of the enterprise. A report administrator often controls access to the development environment, coordinating support for the various user levels.

2.2 Architectural Considerations

During the planning stages, the project team conceptualizes the business reporting needs of the enterprise and defines all aspects of the underlying infrastructure. Developers work with managers to identify the pertinent data sources, specify and size the hardware, and install/configure the major software components. This lays a solid foundation for specific reporting deliverables or increments, as the team establishes a system-wide infrastructure that can be easily scaled and economically maintained in the future.

2.2.1 Data Considerations

At a high level, the implementation support team must identify the major data sources that support the business needs of the organization. In addition to identifying the data sources, developers must consider the optimum approach for scheduling and distribution of standard reports, periodic creation and refreshing of summary tables, enforcement of corporate security policies, and creation of data marts or multidimensional databases as necessary.

Specifically, the team will need to determine the following:

- Overall volume of data
- Data source for reporting purposes:
  - Accessing original operational data (if real-time reporting is a requirement)
  - Accessing an operational data store (ODS), which is extracted from the operational data; as a rule of thumb, 80 percent of frequently accessed data should reside in the ODS – users can drill into the operational data for the other 20 percent, such as when unique or highly detailed information is required
- CPU requirements to meet typical reporting needs
- Nature of the data (for example, is it a large volume of highly related data or a small volume of loosely related data)
- Update frequency and timing
- Latency requirements

Based on this information, the team can determine the overall reporting strategy and how it

pertains to the various reporting needs and data sources. Options might include live reporting from source data, scheduling and distribution of standard reports, periodic creation or refreshing of summary tables, and creation of data marts and multidimensional databases.

These options reflect various trade-offs in speed, processing time, and the ability to do ad hoc reporting. For example, if a query to compute a given indicator will take several hours to run, and the indicator need only be compiled once a week and reported to a known audience, then either a standard report should be run and distributed on a fixed schedule or an Operational Data Store (ODS) should be constructed to accommodate pre-processed data. At the other end of the spectrum, reports that only access a few records or need to reflect current information should be run directly against source data. This is referred to as native data access.

When an ODS is required, the WebFOCUS Resource Governor can be used to answer questions such as:

- What tables and files are most frequently accessed?
- What fields are most frequently requested?
- How often are these tables and files being used?
- Who is running queries and requesting reports?

With this information, an efficient and productive ODS can be constructed. The Resource Governor can be set to monitor queries against both the operational data and the ODS so the ODS can be fine-tuned as reporting needs change.

This type of data assessment does not need to be extremely detailed or comprehensive, but it should cover most expected reporting needs and be conducted in conjunction with an enterprise data architecture and standardization program.

2.2.2 **Software Component Configuration**

After examining the configuration options, the implementation support team will install and configure all software components, putting together an infrastructure that can be easily scaled and maintained. Important issues include the following:

- Current resources and proposed server activity
- Amount of data expected to be retrieved
- Which data, if any, is to be joined across platforms (possibly requiring a hub server)
- Current Web server activity
- Number and types of users accessing each platform (to determine if multiple data servers are required)

With this information in hand, the team can put together an implementation plan based on the agreed-upon configuration. The team should determine the database type, database versions, hardware platforms, operating systems, and Web server software that will be used. They should also identify the location of the data, whether it is centralized or distributed, and potential performance issues.

At this point, the team should identify developers and select the necessary development software. Information Builders will work with these individuals to identify the technical requirements and help determine whether all proposed products will work together successfully. Configuration planning is important at this stage, since the initial infrastructure that is identified will form the basis for ongoing growth and expansion.

Developers might target an initial set of data requirements that are expanded during subsequent iterations. Similarly, a small set of initial users might be identified, with the user population growing as the requirements progress.

During the analysis, design and planning processes documentation is available from Information Builders to guide the implementation team.

2.2.3 **Scalability and Availability**

When addressing the architectural aspects of enterprise reporting environments, developers need to consider scalability and availability. Scalability ensures adequate support for both current and future workloads. Availability ensures that a WebFOCUS application is online and available to users at all times.

WebFOCUS developers can ensure these requirements are met by utilizing the following technologies:

- Load balancing – A process that spreads demand over available resources.
- Random load balancing – A type of load balancing that uses an algorithm to randomly distribute demand over resources. When connection volume is high and transaction size is small, random load balancing is adequate, since a random allocation of demand yields a relatively equal distribution of load on the resources. When transaction size is large or unpredictable and processing times are long, random load balancing may be inadequate.
- Direct load balancing – A way to distribute the workload by relying on configured rules to direct different applications or users to different resources.
- Measured load balancing – A type of load balancing that factors the current resource load into its routing decisions. Although this offers a truer balancing of the load, it tends to be more expensive than its random counterpart and requires more expertise to implement.
- Session affinity – A capability of some load-balancing solutions that allows specific users to lock into specific resources
- Failover support – A capability that accommodates component failures without affecting overall application availability

For more detailed information, Information Builders provides customers with *WebFOCUS Reporting Best Practices: Enterprise Implementation Considerations, Volume 1, No.1.* (Available from local representatives, as noted in Appendix B.)

2.2.4 **Document the Installation and Configuration Plan**

Once these technical and organizational issues have been addressed, the intended configuration should be documented and distributed to all administrators involved in the BI rollout. Gaining their understanding of the requirements is essential to a smooth implementation. The implementation team should document both the business requirements and the technical requirements, with attention to data-access rights, network-access requirements, system administration, and personnel requirements.

Once the initial infrastructure is in place, developers may need to reconfigure the software as additional projects and users are added. If changes are made to the configuration, the associated documentation should be revised and redistributed to match. Information Builders refers to this document as the *Black Book Implementation Plan*, available to customers.

2.2.5 **Define the Security Strategy**

Security involves the protection of data against unauthorized access. However, even in the context of information systems, people have different ideas about what security means. To some, security centers on log-on IDs and how to make passwords inviolable. To others, security relates to file and directory permissions. These are all important aspects of information-systems security, and they must be combined to establish a comprehensive security strategy.

There are four primary elements of most security strategies:

Identification and Authentication

The most fundamental element of security involves identifying and authenticating each user's credentials, with attention to the following considerations:

- Define the importance of authentication – For some applications, authentication may not be critical. For example, it is probably not important to know who is accessing a company handbook from within the company. In this case, the users can be authenticated by providing a customized welcome message or logging user activity. Access to sales forecast data, on the other hand, would require a manager identity.
- Determine the method of authentication – There are two aspects to this issue; the technical aspect concerns what passwords and PINs to use and the policy aspect concerns the expiration of codes and how many characters and digits are allowed.

- Establish where the authentication should occur – Authentication may take place when logging into the network, while a further layer of authentication might be required when accessing an application.

Access Control and Authorization

Once a user is authenticated, the next step is to determine and enforce an appropriate level of access:

- Enforcing access control privileges – Access control is typically thought of in the context of file systems. Some file systems maintain user- and group-level permission schemes. Others support only read and read/write control, while some systems offer specific privileges such as the ability to modify an object's permissions.
- Group permissions – Group-level security enables organizations to move users in and out of groups without requiring a change to the individual user's permissions.
- Access control administration – A system administrator is generally assigned to manage access control privileges.

Confidentiality

Confidentiality ensures privacy. It is often achieved using various forms of encryption such as data encryption, network-session encryption, and file-based encryption.

Data Integrity

Data integrity is the assurance that the data will remain unchanged from its original condition. For traditional reporting applications, that concern may be quite low.

Security

Next, the team needs to consider how to implement security. WebFOCUS can be configured to work with an organization's existing security infrastructure. Based on the experiences of WebFOCUS customer sites, five layers of security have been identified.

- Physical security – Accidental and intentional security breaches can commonly be avoided by establishing physical barriers between users and network resources.

- System security – Security measures are provided at the operating-system level and enforced at one or both of the following locations:
  - The user's entry point into either local or shared computing resources
  - On a system where application services are being requested

System security can incorporate authentication, access control, confidentiality, and data integrity. How these elements are implemented depends on the specifics of each platform and operating system.

- Network-level security – Network-level security operates below the level of the application and operating system, segmenting the network and allowing only authorized users with the appropriate permissions to get through.

- Web server security – Web server security consists of:
  - Web server authentication schemes (HTTP); major authentication schemes include anonymous, basic, digest/challenge response, and secure sockets layer (SSL)
  - Web server environment variables
  - Web server integration with operating system security; most Web servers offer security that is maintained and administered within the Web server software, some companies augment this security with external security subsystems such as LDAP
  - Web server access control with aliases
  - Web server confidentiality and data integrity; after developers have decided what degree of confidentiality and data integrity they want for their applications, they can use either direct browsing or SSL schemes

- Data source security – Data source security is generally maintained within the data subsystem and may be integrated with the security mechanisms in the operating system. There are two major security schemes used by relational database systems (RDBMS):
  - Explicit authorization – The database will authenticate the user's credentials and decide what type of access to grant. The user must provide a valid RDBMS USERID and password with each connection to the database.

- Implicit authorization – The database is configured to respect operating system security and is not required to authenticate each user. This type of authorization is usually referred to as Already Verified Processing (AVP) or trusted connection, and is used when the remote authentication point is robust and secure.

Many RDBMS systems support both of these schemes, while some support only one or the other.

For more detailed information, Information Builders provides customers with the *WebFOCUS Security and Administration Manual*.

2.2.6 **Perform Initial Software Installation and Configuration**

During the documentation and approval of the installation and configuration plan, Information Builders will work with the client to schedule the appropriate resources to perform the installation of the software components. All pertinent administrative personnel should be aware of the installation dates and be available for access privileges and questions as they arise.

The software installation is considered completed when the following processes are accomplished:

- The pre-installation requirement document is sent to the customer to be completed
  - Collect hardware/software/RDBMS information
  - Collect information access requirements
- The implementation plan is submitted to Information Builders' Corporate Tech Team for approval
- Set up a pre-installation meeting to:
  - Review hardware/software/RDBMS information
  - Identify key contacts for the installation
  - Identify key contacts for the applications (business users)
  - Verify information-access requirements

- Installation
  - Install software; if the installation contains multiple platforms or multiple products, a modular approach is suggested
  - Verify connectivity to selected data
- Post-installation meeting
  - Review installed components
  - Review installed architecture
  - Deliver preliminary *Black Book* documenting the installed architecture, installed software components, key contacts (both within Information Builders and within the customer's organization), and customer support services instructions
  - Establish technical support infrastructure to manage ongoing success
  - Initiate knowledge-transfer to the customer's key technical contacts

2.3 Deployment Planning

Successful deployments anticipate and plan for standards, diverse user needs, training requirements, and support for 24 by 7 operations.

2.3.1 Development Standards

WebFOCUS applications are developed using standard Web tools and technologies. Typically, report output is provided in HTML, making it easy for developers to control report styling, navigation, and the placement of text and objects. If the enterprise does not already have Web design standards in place, they should develop standards for items such as:

- Standard colors and fonts
- Parameter selection screens (drop-down boxes)
- Use of frames
- Standard graphics
- Navigation and drill-downs

The company should also establish standards for the look and feel of printed documents, such as fonts, placement of text and graphics, and colors.

All business intelligence initiatives should conform to the client's standard development methodology, with careful consideration to development, staging, documentation, and version control in a controlled environment. Since each organization's goals and strategies are different, there is no single correct implementation approach.

2.3.2 **Define User Types**

Users can typically be classified by their access requirements (for example, whether they are internal or external). The general user configurations should be considered and documented. This is very important for the security strategy.

Information Builders defines business intelligence users according to the following terminology:

- End users – These individuals do not need to learn the WebFOCUS language in depth, but they do need to be able to navigate through the interface and learn its capabilities.
- Power users – These people need to learn the technology from a point-and-click perspective in order to run reports, modify reports, and save them as new reports.
- Report developers – Developers generally have an IT background and are expected to learn the complete functionality of the toolset.
- Report administrators – The people responsible for managing and deploying the Managed Reporting Environment and its associated components such as the ReportCaster information-delivery mechanism.
- System administrators – System administrators are responsible for the installation, configuration, and monitoring of the reporting environment. Where appropriate, this includes the iWay environment and the connectivity to all the required data sources. It also includes any user-group configuration.

2.3.3 **Training Requirements**

Information Builders has a full complement of training courses tailored to a variety of users. The complete course catalog is available on Information Builders' Web site. (Course descriptions and prerequisites are explained along with pricing information and a list of the current schedule of class offerings by location.) The classes can be conducted either at Information Builders' training facilities or at a client's site.

Education representatives are an important part of the Information Builders account team. These education specialists work with clients to design an ideal training curriculum. The objective is to ensure a successful deployment of BI assets that are optimized for use in each client's environment.

2.3.4 **Define User Support Staff**

The implementation support team needs to determine what type of in-house support will be provided once the BI applications enter production. They must also determine who within the organization will be given access to Information Builders' Help Line Support.

As part of the purchase of any Information Builders software, InfoResponse Standard Help Line Support is included. This support is detailed below. If the client requires a higher level of support, InfoResponse Silver and InfoResponse Gold provide additional support capabilities. Information Builders can also provide on-site consulting to bolster Help Desk efforts. The levels of InfoResponse are outlined below.

InfoResponse Standard – With Online Web Tools

The InfoResponse Standard plan delivers prompt, professional support – including Web-based resources and tools that are available 24 hours a day, including:

- Toll-free calls to Information Builders' award-winning support center
- Software updates and fixes to keep systems reliable and trouble-free
- Extended hours – Monday through Friday, 8:00 AM to 8:00 PM, Eastern Time, excluding major holidays
- Help prioritized by severity, assuring prompt assistance for critical issues
- 24-hour Web access to InfoResponse Online for entering new support cases, checking the status of existing cases, and obtaining information on known problems

InfoResponse Silver for the 24-Hour, 7-Day Enterprise

InfoResponse Silver includes all the features of InfoResponse Standard – including InfoResponse Online access – and enhances them with premium features for the round-the-clock enterprise, including:

- 24-hour telephone support for named, production applications – 365 days a year
- Professional evaluation of each customer's support needs for production applications and

systems using Information Builders' software products

- Management reports showing how InfoResponse resources are being utilized, so IT managers can identify systems, applications, departments, and users that are candidates for upgrades, enhancements, or user training

InfoResponse Gold – The Managed-Support Solution for All Client Sites

InfoResponse Gold enhances the 7-day, 24-hour availability of InfoResponse Silver with professionally managed, coordinated support for multiple sites and complex environments. InfoResponse Gold lets companies manage the demands on in-house IT and support staffs by identifying, prioritizing, and coordinating enterprise-wide support issues – including fixes, upgrades, and user training to make operations trouble-free.

InfoResponse Gold is intended for organizations with multiple sites or complex support needs. This service offers:

- An Account Support Manager assigned at Information Builders' corporate support headquarters, who manages support issues and solutions for all client locations
- Scheduled visits to client sites by Information Builders personnel, to help clients coordinate support issues
- Regular telephone conferences with Information Builders experts
- Enhanced management reports showing support activity at all client locations, which are used to identify and coordinate product upgrades, system tuning, and user training
- Automated system to bring immediate attention to resolve issues
- Ongoing performance and reliability enhancements

3 Project-by-Project Rollout

To be successful, the enterprise rollout plan must be supported by detailed project plans. This section of the paper provides detailed planning considerations.

3.1 Project Increments

Successful enterprise applications are typically rolled out incrementally. An increment can be defined as a complete reporting solution, a user environment or configuration, an application design, or an assessment of an organization's solution.

While considering the organization's overall roadmap for information delivery, each increment must be treated as an entire project, readdressing previous planning efforts. Each increment should have its own project plan and timeline (which may be just one component of an all-encompassing plan), and should include the same primary steps of identification, design, construction, and evaluation. This approach allows each aspect of the business intelligence environment to be tailored to the needs of the enterprise.

3.2 Project Planning

Project-level planning involves mapping the ideas and requirements that were identified during the enterprise planning phase to specific domains. In most cases, that means drilling down into user and departmental details. The general needs and requirements that were defined during the enterprise-level project planning stage are refined as each successive increment is rolled out.

Examples of project increments include:

- An information portal that allows customers to view their orders
- A graphical presentation of financial data compiled monthly
- Daily e-mail alerts pushed out to manufacturing managers to warn of production impediments
- A parameterized reporting environment to support the needs of a diverse sales force, delivered in Microsoft Excel Pivot Tables

In each of the examples above, the project increment redefines the enterprise requirements. Specific attention is given to the users it supports, the data that is delivered, and the method by which the data is received.

3.2.1 **Identification**

While general business needs were identified at the enterprise level, more detailed planning is required for individual projects. High-level processes, tasks, and performance indicators must be applied to specific users, departments, and domains. Additional analysis may be required to uncover each group's decision-making needs.

Each project can contain one or more user environments. For example, directors and senior managers might be identified as zero-click users, while systems analysts might be three-click users. Similarly, finance directors will have different interests from manufacturing directors, and each group will most likely generate reports from different data sources. Finance data might be stored in a summarized relational database while manufacturing data resides in VSAM files.

Project Support Team

Project support teams can be subsets of the implementation support team or a new team entirely. In either case, project support teams should include representation from the same areas required for the implementation support team:

- Education and training
- Systems support
- IT management
- Business users and managers

The project support team must have specific knowledge about the project increment, and it should involve users who have a direct role in supporting the architecture for the increment. Each project support team should work with the implementation support team to ensure that individual project goals are aligned with the enterprise goals.

Organizational Impact

The impact on the organization for a specific project should be tied to the organization impact study developed during the enterprise planning phase. For example, the enterprise planning phase might identify a certain DBA or system administrator who will be involved in the project. The project phase will further define how that individual needs to be involved. Will additional jobs need to be monitored? Will 24-hour support be required? Will system processes have to be created to support the report structure?

Architectural Considerations

The enterprise-level business intelligence architecture is concerned with the following components:

- Data requirements
- Software component configuration
- Scalability and availability
- Document installation and configuration plan
- Security strategy

Each of these items must be applied to the project at hand in order to identify the detailed components necessary to support the project increment. For example, while the enterprise planning exercises identify overall server, software, and data requirements, the project increment is concerned with the specific databases, file structures, and servers that will support this particular increment.

3.2.2 **Design**

Requirements Gathering

The project support team must produce detailed system requirements to drive the development process. Requirements can be gathered using the following techniques:

- Individual interviews
- Group interviews
- Workshops
- Formal JAD sessions

Requirements Documentation

Generally a subject matter expert (SME) will produce the requirements with feedback from a developer or technical consultant to ensure that the documentation is thorough enough to support developer needs. Project requirements documents should define the following items:

- Navigation screens
- System flow charts (screen hierarchy)
- Metadata
- Data diagrams and relationships
- User roles
- Reports
- Report name
- Business purpose
- Target users
- Inputs
- Parameters
- Data values or source of data values
- Tables and table relationships (joins)
- Calculations
- Selection criteria, including security restrictions
- Sort criteria
- Distribution frequency
- Distribution mechanism
- Self-service capabilities
- E-mail
- FTP
- Printer
- Output format
- Type of output (HTML, PDF, Excel, data extract, etc.)
- Fonts/colors
- Pagination
- Headings/footings
- OLAP dimensions, if necessary
- Drill-down functionality

The project support team should ensure that the above requirements follow enterprise standards and document any new standards.

Requirements documents are subject to change, so all documentation should prominently feature version numbers and dates. (Typically, the version or date is incorporated into a heading or footing that is displayed on every page.)

WebFOCUS Managed Reporting Environment

If WebFOCUS Managed Reporting Environment is part of the solution, the following additional items need to be defined.

- Domains – Domains are the highest organizational level in a reporting environment. Domains provide data on a particular topic (such as sales, inventory, or personnel). The data is stored in different forms in the following domain components: predefined reports (standard reports), data sources used to create reports (reporting objects), and reports created and saved by users (my reports or shared reports).
- Standard reports – A standard report is run by a predefined procedure created by the administrator. It is stored in a group folder or subgroup folder. Standard reports are used to retrieve data that changes on a regular basis, such as monthly inventory reports and weekly sales reports. Each time users run a standard report the output reflects the most current data, while the format of the reports remains constant.
- Reporting objects – A reporting object is a tailored view of a data set that the administrator creates and saves in a group folder. The data contained in a reporting object is used to create personal reports quickly and in compliance with overall reporting rules and guidelines.
- My reports – My reports are personal reports that users create and save while working in a domain. Once saved, users can run or edit these reports, which are protected from access by other users.
- Shared reports – A shared report is prepared and saved with the shared report capability. My reports can become shared reports. Users can run a shared report from the shared reports tab. They can also copy it to their own (my reports) tab and modify it without affecting the original report.
- Static reports – A static report is a type of standard report in which the output never changes. Unlike a regular standard report that always reflects current data, a static report delivers a snapshot of data from a specific time. For example, a static report might be a Web page that contains a report.
- Customized help – A reporting environment can also contain a customized help system that is accessed for specific information about a particular Managed Reporting Environment.

3.2.3 **Construction**

Architecture

The project support team must ensure that all appropriate hardware has been acquired, configured, and deployed before development begins.

Software Installation

The project support team must ensure that all appropriate software has been acquired and installed before development begins.

Environment Established

The project environment needs to have repositories for both the code and the requirements documents. A typical environment has three distinct areas: development, test, and production. Each of these areas should be referenced by a logical name to permit scalability and availability and to simplify disaster recovery.

WebFOCUS Developer Studio

The applications folder is where all local applications are developed, stored, maintained, and, if appropriate, deployed to the Web. An empty application named SESSION is available as a storage space for users to access. It contains three subfolders: Procedures, HTML Forms, and Master Files. Another folder contains Maintain procedures and launches the WebFOCUS Maintain Application Development Environment, where users can augment their reporting applications with data-update functions.

As individual applications are created, they will be added under the applications folder, with the same subfolders that are displayed for SESSION.

The WebFOCUS folder enables users to work with Web-based applications that have been deployed to a WebFOCUS Reporting Server and a Web server. Once users have connected to a WebFOCUS Reporting Server, they can drill down to an application on the server to see the deployed files on the WebFOCUS Reporting Server and the Web server. The WebFOCUS Reporting Server has folders for master files, procedures, HTML forms, and other files; the Web server has folders for HTML forms and other files.

In addition, using a subset of graphical tools that are available for local applications, users can edit and even develop application components directly on the appropriate server. The WebFOCUS folder also allows an administrator to create, view, and select WebFOCUS servers, repositories, domains, standard reports, and reporting objects directly from the browser.

The desktop folder is optional and can be activated through the Windows options dialog. The desktop folder provides direct access to each user's Windows desktop environment. It includes a user's local and network drives and behaves just like the Microsoft Windows Explorer. Objects can be dragged from the Windows desktop environment to the applications folder and the WebFOCUS folder.

In the develop-and-deploy scenario, the data being accessed resides on a platform with either the WebFOCUS Reporting Server or a subserver. A GUI tool called the Synonym Wizard gives developers a point-and-click environment to create the metadata.

Synonym Wizard – A synonym is an alias for a data source description (metadata) that resides on a remote platform. It describes the location and content of the data source. A synonym for that data source description must reside on the Developer Studio platform during the development phase to provide the graphical development tools with a list of available fields. The data source description or synonym consists of two files:

- A Master File, which contains field names and formats for the columns in the data source; the synonym also contains an alias for the data source
- An Access File, which contains additional information, including the real name and location of the data source

3.2.4 **Evaluation**

Reporting assets should be thoroughly tested under a variety of system loads and user conditions. All system components must be tuned, configured, and tested at this time. System usage should be carefully monitored to ensure the infrastructure is correctly sized and configured, and user queries don't tax system resources.

- System testing – Test and production activities are generally performed on different servers, making it easier and less risky to test new releases of WebFOCUS, as well as PTFs,

subsystems, and new Web server software. These changes cannot be tested on production machines.

- User-acceptance testing – Users should always have the opportunity to test an application before it is placed in production.
- Performance testing and tuning – Applications should always be tested for user-response time. The configuration of the application may need to be adjusted based on the network response, data volume, and data response.
- Post user-test changes and revisions.

Application Implementation

The actual implementation of a WebFOCUS application usually does not require workstation configuration other than to make sure users have the appropriate version of a Web browser. After that, the development team simply needs to publish the URL for self-service reporting activities.

Ongoing Tasks

Any application that is available to an end-user community should be maintained, with attention to:

- Performance management
- Version independence
- General maintenance

4 Training Plans

Once the system is in production, business-technology liaisons are solidified to support custom reporting activities. Training is conducted to help each constituency understand the capabilities and potential of the new business intelligence infrastructure. Report distribution strategies are refined, with attention to streamlining business processes and improving the corporate workflow. Users are polled to gauge satisfaction, and modifications are made in an iterative fashion to ensure the business intelligence environment continues to meet the needs of its users.

Information Builders' Education Division offers a full complement of formal, hands-on courses for the WebFOCUS user community. The types of users are generally categorized as follows:

- Report developers
- Power users
- End users
- Administrators

4.1 Courses

Each course description includes a comprehensive list of objectives, topics covered, and dates/locations of upcoming classes. This information is also available on the Information Builders Web site [http://education.informationbuilders.com/edu/toc.html].

4.2 Course Customization

Classes can be taught at an Information Builders facility or at a client site. By default, the courses use generic data files for the code examples and the student exercises. Some clients find that their training is more successful if the courses are customized to their own environments. Course customization is highly recommended for enterprise-wide implementations, particularly for the power users and the end users.

The Education Division can create training solutions tailored to each customers' needs, with several levels of course customization.

- Course exercise customization – The course material is generic for learning concepts and syntax; however, the student exercises are customized to reflect those users' own databases, views, and so forth.
- Complete course customization – The course books and exercises are customized to include client data and WebFOCUS features that are appropriate to their unique business needs.
- Application course creation – Education specialists can work with the client to create application-specific course material.
- Customized workshops – Information Builders can add training days to standard classes to address specific client issues, such as data-specific information and efficiency techniques; selected topics from other standard courses; client-specific requirements that students need to be aware of; and system-related information that users may need.

4.3 WebFOCUS Certified Professional Program

The WebFOCUS Certified Professional Program combines hands-on education and qualified testing procedures to ensure that individuals attain high levels of proficiency in WebFOCUS skills. Certification entails attendance at specified program courses, one Developer Studio license, and a certification exam.

All those who successfully pass the exam will receive a WebFOCUS Certified Professional certificate. A higher level is designated for the top achievers. This fee-based program consists of a series of instructor-led training courses. Instructors are drawn from Information Builders' staff of education specialists, all highly trained and experienced in WebFOCUS development techniques. Courses are held in 18 education centers conveniently located across the U.S. and in Canada. They can also be held at client sites. Brainbench, Inc., a leading provider of skills-based certification testing, administers the test online. This allows users to take the test at their convenience. Individuals who have already completed the required courses or have equivalent work experience may simply take the certification test for a nominal fee.

The WebFOCUS Certified Professional Program is designed for any developer involved in creating Web applications, including:

- Application developers
- Network administrators
- Systems analysts/programmers
- Database administrators
- Business analysts and power users

5

Information Builders' Consulting Services Overview

Information Builders' Consulting Division provides complete business solutions with comprehensive services, from business-model analysis through application development, deployment, and technology transfer. Its highly skilled professionals help customers transform information resources into a competitive advantage. Operating from its worldwide branches, the Consulting Division completed more than 1,000 projects in 2001, ranging from design and integration advice to full-scale systems development programs.

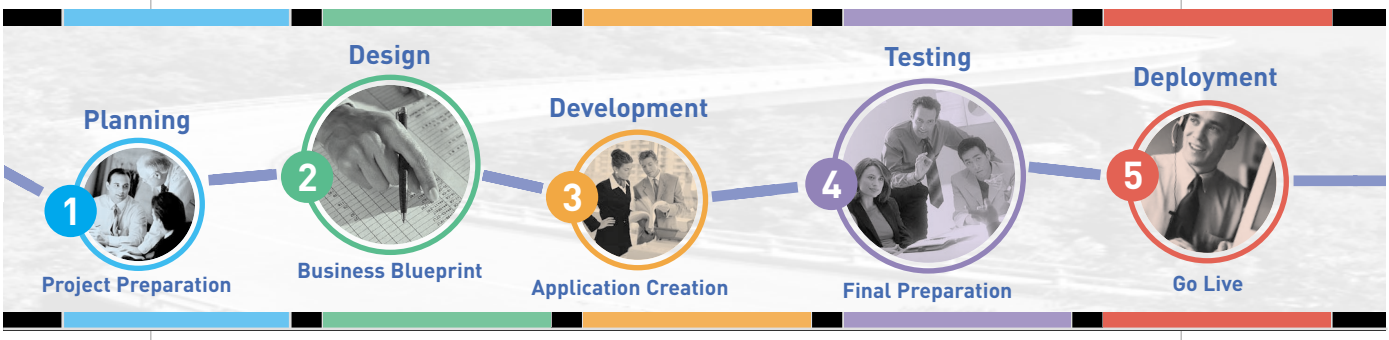
Information Builders has been developing and deploying mission-critical applications for customers since the inception of the company. Its Consulting Division has helped corporations and government agencies with all aspects of the development life, from requirements definition to deployment. Consulting employs more than 300 well-trained and skilled information technology professionals and has access to hundreds more through its consulting partnerships.

In addition to expertise in the Information Builders product suite, the consultants' skills cover a broad range of technology areas: database products such as DB2, SQL Server, Oracle, Sybase, and Informix; data warehousing and data modeling skills; systems architecture; JAD facilitation; RAD and wireless technology; quality assurance and testing; systems engineering responsibilities, including system architecture and design; and a host of other abilities to implement a successful solution.

Information Builders' project management and control mechanisms are prescribed in Information Builders' Project Management Guidelines (PMG), used to provide visibility, standardization, and quality in implementations of state-of-the-art information systems. The Project Management Guidelines meet and often exceed the Software Engineering Institute-Capability Maturity Model (SEI-CMM) Level 2 standard.

Appendix A: A Roadmap for Implementing Business Intelligence Solutions

Information Builders' Best Practices in Information Delivery



Phase 1: Planning

- Establish implementation support team
- Educate key staff members
- Define project milestones
- Create charter document

Successful business intelligence solutions result from well-planned, carefully orchestrated implementations. The objective is to ensure users receive the right information at the right time to fulfill their business requirements.

Planning exercises begin with a committed support team that includes cross-functional representation from throughout the organization.

Configuration planning ensures that the necessary data, security, application, and infrastructure components are in place. Then, project milestones are agreed upon, and measurements are established to gauge the ultimate success of the endeavor.

Phase 2: Design

- Review information-delivery requirements
- Design data access methods
- Define security infrastructure
- Establish technical architecture
- Specify and size servers

During the design phase, the project team conceptualizes the business reporting needs of the enterprise and defines all aspects of the underlying infrastructure. Developers work with managers to identify the pertinent data sources, specify and size the hard-ware, and install/configure the software components, creating a reporting infrastructure that can be easily scaled and economically maintained.

In addition to identifying the data sources, developers must consider the optimum approach for scheduling and distribution of standard reports, periodic creation and refreshing of summary tables, enforcement of corporate security policies, and creation of data marts or multi-dimensional databases as necessary.

Phase 3: Development

- Extract operational data
- Build data model and repository
- Create standard reports
- Enforce security, set up authorization procedures
- Construct user interface
- Train pilot users

All business intelligence initiatives should conform to the client's standard development methodology, with careful consideration of development, version control, and staging, in a controlled environment. Since each organization's goals and strategies are different, there is no single correct implementation approach.

Information Builders' Consulting provides complete business solutions with comprehensive services, from business-model analysis through application development, deployment, and technology transfer.

Phase 4: Testing

- Perform user and system testing
- Conduct system tuning and performance analysis
- Move reporting applications into production
- Document all systems and procedures
- Train the user population

Reporting assets should be thoroughly tested under a variety of system loads and user conditions. All system components are tuned, configured, and tested at this time. Reporting applications are moved into production, systems are thoroughly documented, and training is conducted to help each constituency understand the capabilities and potential of the new business intelligence infrastructure.

Phase 5: Deployment

- Support ad hoc reporting activities
- Ensure information delivery environment fulfills expectations
- Maintain data access and delivery infrastructure
- Make modifications and enhancements in response to user feedback

Once the system is in production, business-technology liaisons are established to support custom reporting activities. System usage is carefully monitored to ensure the infrastructure is correctly sized and configured, and user queries don't tax system resources. Data marts and other informational sources are refreshed as necessary. Report distribution strategies are refined, with attention to streamlining business processes and improving the corporate workflow. Users are polled to gauge satisfaction, and modifications are made in an iterative fashion to ensure the business intelligence environment continues to meet the needs of its users.

Appendix B: Best Practices Guidelines for WebFOCUS

Information Builders regularly provides customers with Best Practices Guidelines for WebFOCUS. For Volumes 1-3 of WebFOCUS Reporting Best Practices, please contact your local representative.

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