

## BIOGRAPHICAL INFORMATION

Judy Haas  
FLAME Project, I.S. Lead  
UGI Utilities, Inc., Reading, PA

### Specific Responsibilities

Judy brings over twenty years of technology related experience to the FLAME Project. Judy began her career at UGI Utilities as a Programmer Analyst in 1997. She played an active role in UGI's CICS Distribution Facility Information Systems, Computer Aided Dispatch and Geo-Facilities Information System. Recently, Judy was a Lead Analyst Programmer with the primary responsibility to implement and support GENS Smallworld. In her current position as FLAME I.S. Lead, her goal is to electronically place current and accurate information about UGI Utilities gas distribution facilities at the fingertips of field and office personnel to enhance decision making and place data collection at its source to reduce data redundancy.

### Past Experience

Prior to joining UGI, Judy was employed with the Commonwealth of Pennsylvania Department of Transportation, Harrisburg, Pennsylvania for 11 years (1986-1997) as Lead Analyst and Data Base Administrator for the Right-of Way and Contract Management systems.

During her work on the Contract Management system, Judy led the rewrite and redesign of the Work Order and Payment subsystem. This new state-of-the-art computerized system improved management of construction projects to help the Pennsylvania Department of Transportation complete highway and bridge projects faster and with fewer resources, giving Pennsylvania taxpayers more for their money.

Judy's DBA and lead role on the Right-of-Way project included writing data base conversion programs, rewriting the appraisal's subsystem and implementing data model changes using the Texas Instrument CASE tool.

Prior to that Judy served 4 years (1982-1986) in the United States Air Force at Luke Air Force Base, Phoenix, Arizona. By the end of her enlistment she had rose to the rank of a non-commissioned officer status as a Sergeant. During Judy's stay there Luke's ADP center was awarded:

- ❖ Best Data Processing Installation in Tactical Air Command 1982, 1983, 1984
- ❖ Best Information Processing Center in the Air Force 1984

As a Computer Shift Supervisor at Luke, Judy:

- ❖ Processed USAF standard and command unique programs on the Burroughs 4700 and UNIVAC 1050 computer systems
- ❖ Acted as liaison between all Operations shifts and Management
- ❖ Accomplished daily back-ups of Data Base systems
- ❖ Monitored on-line systems

As Resource Management Technician at Luke, Judy:

- ❖ Maintained utilization and downtime records for Burroughs and UNIVAC
- ❖ Reduced government expenses \$2000 a month by performing preliminary equipment maintenance.
- ❖ Updated \$3 million automated data processing equipment inventory
- ❖ Calculated computer equipment maintenance charges and credits and submitted to higher headquarters.

### Educational

B.S. Computer Science and Management/Computer Information Systems, Magna Cum Laude, Park College, 1985  
A.A.S. Computer Science, Pennsylvania College of Technology, 1981, Who's Who in American Jr. Colleges 1980

### Professional Memberships

GITA

Tom Helmer  
Solution Architect  
KEMA Inc

Joining KEMA in 2003 as a Solution Architect, Mr. Helmer provides clients with specialized expertise in all aspects of both system and software engineering, including a full range of utility engineering and operations applications, their underlying database design and development and the design and development of their integration architectures using EAI middleware technologies. He has over 12 years experience designing and integrating utility solutions around WMS, GWD, GIS, OMS, DPS, SCADA, CIS and ERP technologies.

**Selected Professional Experience:**

- Serves as the solution architect for the HECO outage management RFP specification generation and selection project.
- Serves as the solution architect for the UGI FLAME project. Responsible for developing the integration and system architecture for integrating their current GIS (GENS Smallworld) with a new graphical design system, a new mobile GIS system, a new content/document management system and their existing work management system (DOJM), mobile workforce management system (WorkUP), SCADA and engineering analysis (Stoner SynerGEE).
- Served as the solution architect for the Cinergy CAPEX strategic implementation plan. Was responsible for reviewing all of their operational systems and developing a strategic implementation plan that addressed enhancements to their planning, budgeting, scheduling and work management business processes and supporting business systems.
- Served as the solution architect for the New Jersey Natural Gas Strategic Implementation Plan (SIP). Put together strategic implementation roadmap including GIS vertical applications, useful business based integrations with CIS, their back office financial systems (JDEdwards), Engineering Analysis (Stoner), Graphic Job Design, Work Management, Mobile Workforce Management (MDSI), and Mobile GIS systems, data conversion, training and OCM tasks. The emphasis on this assignment is to develop a solid business case and a realistic GIS implementation plan
- Served as the solution architect for the Northeast Utilities Dynamic Operations Display Board (DODB) project. He is responsible for laying out the architecture to integrate the DSCADA and CONVEX systems with the OMS (CES) and to integrate the new schematic viewer module from CES.
- Served as the solution architect on the Progress Energy Strategic Implementation Roadmap (SIR). This project involved evaluating the two merged companies' (CP&L and FPC) complete EDRP solutions: MWM (MDSI, Intergraph), GIS (Intergraph), OMS (ABB, Intergraph), DPS (CYME), SCADA (Siemens), WMS (STS STORMS, In-house), GWD (Intergraph, Tellus) and their integrations including to MMIS (Indus Passport). The project developed their combined 'to-be' solution and an implementation roadmap on how to decommission current systems. The emphasis for this project was to develop a unified approach to common business systems and to include a new focus on enterprise asset management (EAM) technologies such as performance forecasting, load forecasting and asset investment decision-making tools.
- Served as a Technical Consultant for the Southern California Edison (SCE) Wires project in the deployment of a WMS (Indus PassPort) and its integration with SCE's ERP system consisting of in-house systems for CIS, material management, portable job design, corporate accounting, timekeeping, and human resources. Configured and customized the DOORS requirements management product to support the gathering of all business requirements, system functional requirements, and software designs. Supported the complete traceability between business requirements, the system functional requirements, and the software designs.
- Served as solution architect on the Rochester Gas and Electric (RG&E) PRIDE project. Their EDRP solution involves the integration of: GIS (ESRI ArcGIS/ArcSDE), OMS (CES Centricity), Mobile Workforce Management (MWM-MDSI Advantex), WMS (STS STORMS), GWD (CVG CWIM) and DPS (Stoner Associates SynerGee) with the clients' Customer Information System (SPL CISPlus), Enterprise Resource Planning (SAP R3), Interactive Voice Response System (IVR), and SCADA system (Siemens Spectrum). The major integration infrastructure related technologies being used are IBM's MQSI and MQSeries EAI products, Oracle's RDBMS, and IBM's Clustering and SAN technologies for disaster recovery.
- Served as Lead System Architect for the Cinergy EDSIP project that involved the design and integration of their EDRP systems: GIS (Smallworld), GWD (CVG), OMS (CES), DPS (ABB), MWM (UP) and WMS (Indus Passport) with their CIS and back-office ERP systems which included MMIS (Indus PassPort).
- Served as Lead System Architect for the IES Utilities (Alliant Energy) project in the system deployment to a merger partner, which integrated five technologies for their EDRP systems: GIS (Smallworld) OMS (CES), WMS (STS Storms), GWD (CVG), DPS (Stoner), and CAD/MDT (MDSI).

- Served as Lead System Architect, Program Manager, and Project Engineer for Kentucky Utilities over a four-year period, integrating and developing GIS (Smallworld), SCADA (Leeds&Northrup), OMS (CES), WMS (Logica WMIS), GWD (CVG), CIS, and call processing systems. This enterprise wide integration project used Oracle, DB2, Sybase Omni Server, and internally developed CICS transactions
- Served as Lead System Engineer for the Ohio Edison project, responsible for all phases of a pilot system implementation. This effort involved the designing and developing the data model and end user applications, training end users, developing data conversion QA/QC procedures and tools and performance monitoring and tuning of the system for pilot users. The technologies deployed were: GIS (GeoVision), GWD (GeoVision), OMS (DB2 based) and WMS (Logica WMIS).
- Served as solution architect on the City Utilities Strategic Implementation Roadmap (SIR). This project involved evaluating their current systems and developing their future state integrated business processes and system architecture. The project developed their 'future-state' solution and an implementation roadmap on how to deploy new technologies while decommissioning current systems. The emphasis for this project was to develop a sound business case for a five year implementation roadmap that would deploy at the future state an integrated system of: CIS, GIS, GWD, WMS, OMS, MWM, DPS, SCADA and their back office financial system (Peoplesoft). The assignment included an in-depth functionality review of the major GWD vendors: Miner&Miner ArcFM, GENS Smallworld Design Manager, Cook-Hurlbert Expert Designer and Itron LD-Pro.
- Served as solution architect on the Northeast Utilities (NU) Transmission strategic implementation plan. The project developed the high level implementation and budgetary estimates for their new suite of technologies to support getting new transmission projects approved by state boards quicker, to support transmission congestion analysis, to support transmission designs, to support transmission project management, to support transmission asset investment analysis and to support transmission maintenance and inspection work flow management.
- Served as solution architect for the Consolidated Edison corporate mapping strategy study. This project effort developed the business strategy for geographic record use and standards across the enterprise. The goal of the project was to leverage information technology to improve business processes, optimize the energy delivery assets of the company, and significantly reduce operating costs through the consolidation and standardization of GIS technology for all business units. A key task performed was the audit of their 16 currently deployed mapping and records systems.
- Served as Lead System Architect for the City of Portland project. A GIS Hub has been developed for citywide distribution of heterogeneous GIS/RDBMS data sources and is deployed to nine city bureaus.
- Served as Lead GIS Database Designer for the City of Riverside, California, in a multi-participant project that served the Department of Planning, the Department of Public Works, the Water Department, the Electrical Department, and Wastewater Management, integrating both ESRI and Oracle products.

## **Professional Experience:**

### **KEMA, Inc., Englewood, Colorado: 2003 to Present**

*Solutions Architect*

### **SchlumbergerSema (Convergent Group, UGC Consulting): 1992 to 2003**

*Solutions Architect*

As a Solutions Architect, Mr. Helmer provided clients with specialized expertise in all aspects of both system and software engineering, including a full range of engineering and operations applications, their underlying database design and development and the design and development of integration architectures using EAI middleware technologies.

Mr. Helmer has made significant contributions to company standards and professional service offerings, which were vital to growing the company from a consulting company to a consulting and system integration company, including developing the company's:

- Data modeling methodology, including the selection of supporting CASE tools and the development of productivity metrics.
- EDRP systems integration methodology to support multi-vendor operational systems for GIS, GWD, OMS, DPS, WMS, CAD/MDT, SCADA, CIS, and ERP based on technology-leading trends in the enterprise application integration (EAI) arena.
- Enterprise spatial data warehouse integration design for multi-vendor GIS and RDBMS.
- Automated GIS QA/QC tools and conversion methodology.

## **Hughes Aircraft Company: 1982 to 1992**

### *Laboratory Database Technologist*

Mr. Helmer served as Laboratory Database Technologist, specializing in the study of the integration of spatial and relational data structures. Mr. Helmer also worked on internal company engineering and IR&D projects related to adopting object-oriented principles to Hughes' standard software engineering and database design methodologies.

### *Software Engineer*

As a Software Engineer, Mr. Helmer's experience includes six years of developing real-time software following DoD standards. He also has practical experience using numerous CASE tools to support various structured software analysis, design, and test methodologies. His projects have included modifying a commercial operating system to support a multiprocessor real-time debugger; developing a task-to-task communication system for a multiprocessor environment; an automated quality control checking system for GIS data; and designing a distributed heterogeneous data access system. For four years, Mr. Helmer managed a team that designed, developed, and populated a database used to generate command and control applications. He also participated in company-funded pilot projects to verify that their software engineering methodology incorporated Object-Oriented Analysis, Object-Oriented Design, and rapid prototyping concepts.

### *Senior System Engineer*

As a Senior System Engineer, Mr. Helmer's experience included being the Lead System Engineer for proposal efforts involving the Alberta Land-Related Information System (LRIS) and the Bureau of Land Management ALMRS. He was also a key contributor to NASA's EOS/Dis Phase D RFP response. All of the proposals required an integrated solution for a wide range of heterogeneous data sources centered on distributed spatial data warehousing technology.

## **Education:**

M.S., Hughes Fellow, Computer Science, University of Southern California, 1984.

B.S., Phi Beta Kappa, Computer Science, University of Southern California, 1982.

## **Professional Affiliations:**

Association Computing Machinery (ACM)

Institute of Electrical and Electronics Engineering (IEEE)

GITA

# System Architecture Overview For The Field Level Asset Management Environment (FLAME) Project

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## ABSTRACT

This paper shows the types of integrations required to bring enterprise asset information to the field and office; the benefits of automating natural gas business processes, issues surrounding the posting of as-builts; the process modeling used to derive the solution; the integrated suite of commercial products used by FLAME; the tradeoffs made during the system architecture and integration design; and an assessment of challenges still on the FLAME project horizon.

## 1 INTRODUCTION

The gas field work force needs a variety of information available to them: facility maps, leak sketches, leak survey results, main inspection, work order instructions, work order sketches and bill of materials. We will start with an overview of all of the business processes that the FLAME architecture needs to support. The description of the FLAME system architecture will be presented in some detail using a set of architectural views.

The primary innovations that comprise the FLAME system are the introduction of a Mobile GIS application providing field crews editable access to the latest maps and records, a Graphical Work Design (GWD) application providing design engineers an electronic design and drafting application, and an intranet site through which others can access GIS maps and records.

Field crews will have local off-line access to the latest maps and records refreshed daily (by downloading incremental changes). As-built redlines and attribute changes will be uploaded for posting to the master database.

As part of the new intranet site, a new document management system will maintain digital renditions of UGI documents including service cards, as-built construction drawings, leak report sketches, and other document types. Another intranet site component will provide GIS map access and navigation by address or identifier, and will provide document access through associations to graphical objects in the GIS or by ad-hoc attribute searching.

### 1.1 Overview of Business Processes

This table describes the business processes that will be enabled by FLAME technology suite at UGI Utilities. The UGI FLAME project team identified these major business processes that will benefit from FLAME technology. These business processes are as follows.

|              |  |
|--------------|--|
| New Business | <p>The New Business process covers customer ownership from initial contact to meter turn-on. The goal is to meet the needs of the customer and to stay in constant contact with the customer. A key goal is to optimize profitability of delivering the service.</p> <p>This process covers both commercial and residential business. The process also covers both mains and services work.</p> <p>The following results come from this business process:</p> <ul style="list-style-type: none"> <li>• <b>Construction Complete</b> - The work order is complete and construction complete in the field. All related systems have been updated.</li> <li>• <b>Corporate Availability</b> - Corporate availability of facility records include map plots on request, current data in GIS, data for spatial analysis and data warehouse functionality</li> </ul> |
| PA One-Call  | <p>A process required by law whereby a utility decides whether it has facilities in a location where a caller (contractor, home owner or designer) plans to dig. The process also includes marking/identifying facilities in the field. A response (none, marked, send plan) back to the one-call system is required.</p> <p>The following Results come from this business process</p> <ul style="list-style-type: none"> <li>• KARL Notified - Conflict</li> <li>• KARL Notified - Locate Completed</li> </ul>  |

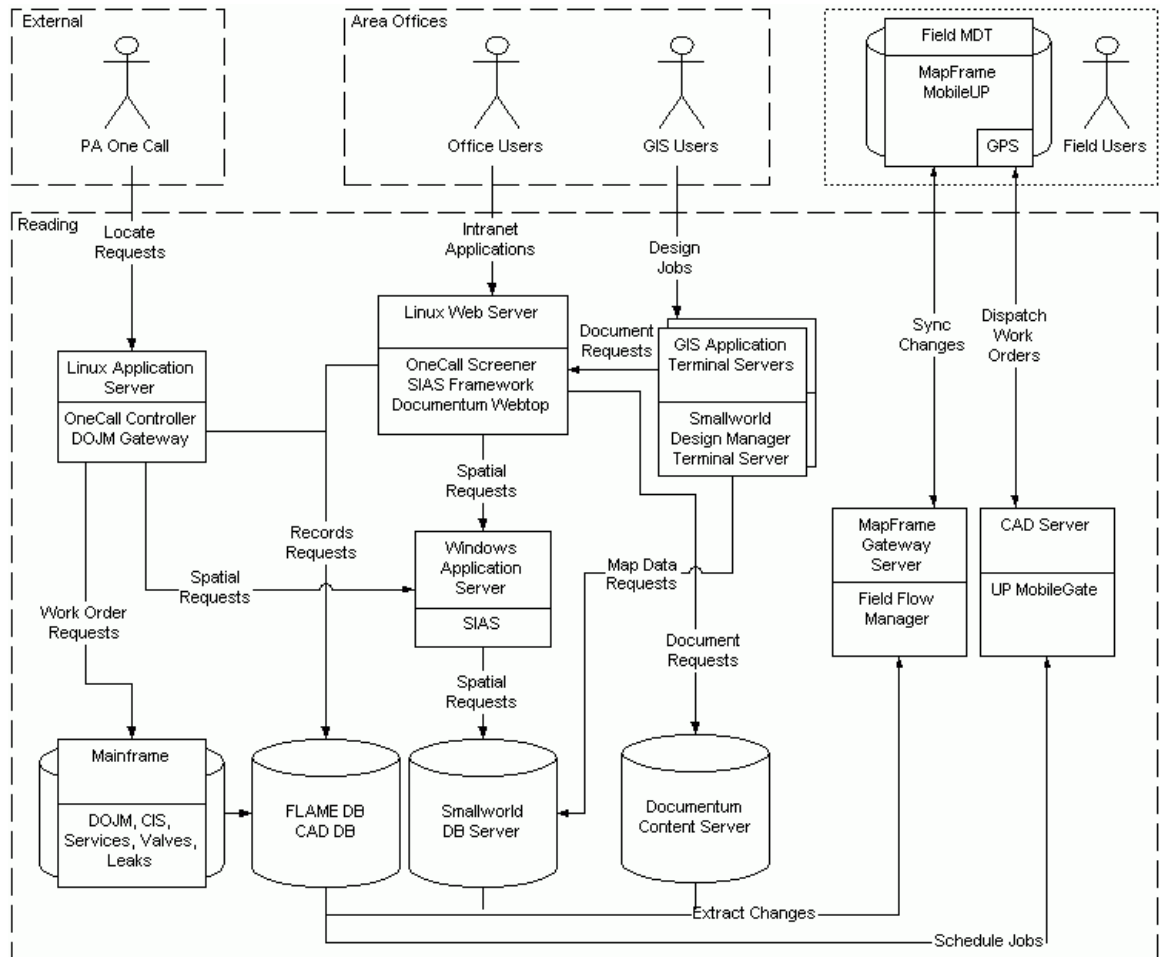
|                       |   |
|-----------------------|---|
|                       | <ul style="list-style-type: none"> <li>• KARL Notified - No Locate Required</li> <li>• KARL Notified - Partial Complete</li> </ul>  |
| CP Periodic Survey    | <p>The process of measuring and documenting the current CP values to assure they meet UGI criteria and Federal regulations for cathodic protection.</p> <p>The following Results come from this business process</p> <ul style="list-style-type: none"> <li>• <b>CP Survey Complete</b> - The CP point has been surveyed and all related facility information systems have been updated.</li> <li>• <b>CP trouble-shooting work performed</b> - It troubleshooting was required to fix a CP system, then that work is performed and a work order was created and completed for that troubleshooting work.</li> <li>• <b>Maintenance order created</b> - A DOJM order is created to either repair the facility or to perform a CP function to correct a problem.</li> </ul>  |
| CP Design             | <p>The process of designing the facilities needed in order to provide cathodic protection to all steel facilities.</p> <p>Capital budget controls amount of CP work to be done.</p> <p>The following Results come from this business process</p> <ul style="list-style-type: none"> <li>• <b>Approved CP Design</b> - The CP design is approved and ready to be passed on to construction.</li> <li>• <b>Work Order for Insertion</b> - It has been determined that it would be more cost effective to insert the pipe rather than do cathodic protection.</li> <li>• <b>Continue to Monitor</b> - In some cases it is more cost effective to monitor the pipe for leakage than to install cathodic protection.</li> </ul>  |
| Leak Survey Mains     | <p>Performing the scheduled survey of mains to search for new leaks and documenting the classification of the leak. Existing leaks may be reclassified.</p> <p>Leaks are classified into 3 categories. A C leak is the most severe and requires immediate repair. A B leak is less severe but gets further review. An A leak is noted but not reviewed.</p> <p>From 1000 - 1200 man-days per year are spent doing main leak surveys.</p> <p>The survey is performed by a consultant (currently Heath). The consultant currently receives a hard copy of all map pages for the planned surveys at the beginning of the cycle. Each work area has a Heath consultant.</p> <p>The following Results come from this business process</p> <ul style="list-style-type: none"> <li>• <b>Corporate Availability</b> - Corporate availability of facility records include map plots on request, current data in GIS, data for spatial analysis and data warehouse functionality.</li> <li>• <b>Repair Order Created</b> - The order has been created for the leak and it has been passed off to the operations staff.</li> </ul> |
| Leak Survey SLIP      | <p>Performing the scheduled survey of services to search for new leaks and documenting the classification of the leak. Existing leaks may be reclassified.</p> <p>SLIP = Service Line Inspection Program</p> <p>The following Results come from this business process</p> <ul style="list-style-type: none"> <li>• <b>Corporate Availability</b> - Corporate availability of facility records include map plots on request, current data in GIS, data for spatial analysis and data warehouse functionality.</li> </ul>   |
| Leak Survey (MR SLIP) | <p>This process encompasses performing the survey of and recording the results of the Meter Reader Service Leak Inspection Program. The program inspects inside meter sets for leaks and inspects all meter sets for atmospheric corrosion.</p> <p>The following Results come from this business process</p> <ul style="list-style-type: none"> <li>• <b>MR SLIP Leak Survey Complete</b> - The MR SLIP process has been completed for the service.</li> <li>• <b>Maintenance Work Order</b> - A maintenance order is generated to have someone rectify the atmospheric corrosion problem.</li> </ul>   |
| Valve Maintenance     | <p>Regulatory mandated periodic inspection, maintenance and repair of system valves.</p> <p>The following Results come from this business process</p> <ul style="list-style-type: none"> <li>• Follow-up Work Order Created</li> <li>• Work Order Complete</li> <li>• Valve Inspection Record Update Complete</li> <li>• GIS Update</li> <li>• Area Supervisors notified</li> </ul>   |
| Record Construction   | <p>Recording the results of the replacement into the appropriate systems and closing of the work order.</p> <p>The following Results come from this business process</p> <ul style="list-style-type: none"> <li>• <b>Closed order</b> - The work order is closed and all construction activity is recorded in the appropriate systems.</li> <li>• <b>Corporate Availability</b> - Corporate availability of facility records include map plots on request, current data in GIS, data for spatial analysis and data warehouse functionality.</li> </ul>  |

|                    |   |
|--------------------|---|
|                    | <ul style="list-style-type: none"> <li>• <b>Financial records</b> - Property accounting unit information has been updated.</li> <li>• <b>GIS Updated</b> - Includes update of Service records, CP, valves, drips, mains, leaks</li> <li>• <b>Restoration Work Orders</b> - Work orders such as paving, sidewalk, top-soil and seeding are needed to restore the construction site.</li> <li>• <b>Revise Authorization</b> - Form needed to explain major differences in planned and actual costs.</li> </ul>  |
| Repair/Replacement | <p>The process needed to determine the appropriate repair or replacement of facilities and the planning, design, construction, and reporting of the facility changes.</p> <p>The following Results come from this business process</p> <ul style="list-style-type: none"> <li>• <b>Capital Property Records Updated</b> - Maintenance work associated with the job has been recorded as capital in CPR</li> <li>• <b>Corporate Availability</b> - Corporate availability of facility records include map plots on request, current data in GIS, data for spatial analysis and data warehouse functionality.</li> <li>• <b>No Action Required</b> - Decision was made to not perform work on the facility at this time.</li> </ul> |
| Leak Management    | <p>The recording, prioritization, and trend analysis of leaks found within the system.</p> <p>The following Results come from this business process</p> <ul style="list-style-type: none"> <li>• <b>Held Leaks</b> - Unchanged work orders for all leaks, which will not be worked on at this time.</li> <li>• <b>Leak Management Information</b> - User specified reports, which assist in the leak management process.</li> <li>• <b>Leaks to be worked on</b> - Updated work orders for grade B leaks indicating that the area manager has decided they need to be repaired</li> </ul>   |

**Table 1-1 Business Process Summary**

**1.2 System Overview**

The system supports users through three main interfaces, as shown in the following diagram.



**Figure 1.1: System Diagram**

- **Field Users** will access maps and documents using MapFrame. Daily changes from Smallworld and Documentum data stores will be synchronized so that all required information is available on the mobile computer. Work Orders will be dispatched using MobileUP. Attribute and redline changes made in the field will be synchronized back to master data stores, and made available for records posting and updates.
- **Designers and Engineers (GIS Users)** will access Smallworld native interface through a terminal server allowing remote operation of the application running in the Reading data center. Design Manager will be installed on top of base Smallworld to provide drafting tools and integration with DOJM and WLKR for compatible units and the ability to dispatch designs directly to the field.
- **Maps & Records and other power GIS users (not shown)** requiring special configurations or additional processing power will access Smallworld using the native Smallworld client interface running locally on their computer. These users should be located in Reading since the only data server will be located there.
- **Office Users** will access maps, records, and documents through base and custom enhancements to the framework Smallworld Internet Application Server (SIAS).

### 1.3 Architectural Views

The FLAME field workforce integration architecture is defined in this document using a set of architectural views: high level system view, software component view, deployment view and a hardware view.

#### **High Level System View:**

The first section of this report shows the High Level System Component diagram. The intent of the system component diagram is to denote the major functional components required for the system. The diagram uses the FLAME project integration framework by making use of the Integration Gateway component for all integrations required with all mainframe applications and all databases that may need to have their information correlated and accessible by the field user.

#### **Software Component View:**

The software component diagram attempts to show the various products' software stacks and how they are layered when deployed together. The main objective of the software component view is to see which components from which of the software vendor products will be used to comprise the FLAME architecture and to get a breakdown of how much new development from an integration point of view will be required to enable the business functionality required by the FLAME project.

#### **Hardware / Deployment View:**

This view maps the software components to their hardware components, and shows the recommended hardware specifications for the hardware components required by FLAME.

## 2 Architecture

The FLAME Architecture will consist of the following components as depicted in Figure 2.1: High Level System View.

This Architecture includes the new field GIS (MapFrame), content server (Documentum), Intranet Applications including One Call (using SIAS), GIS / FLAME data servers (Smallworld and Oracle RDBMS), Work Management (DOJM) and customer information (CIS).

### 2.1 High Level System View

At the centralized office center site  
(Reading):

**Smallworld GIS DBMS** – (Smallworld Geographic Information System Database Management System, Smallworld Master File Server). This component provides the following basic functions to the architecture:

#### **GENS (GE Network Services) SWMFS**

– A process that manages the transfer of data blocks to/from GIS client applications. A versioned managed concurrency environment to support the workflow process of gas construction work orders: design, scheduled, as-built, retired, abandoned. A caching service that provides high-speed interactive access to web users (via SIAS –

Smallworld Internet Application Server) of a cache server copy of the versioned managed data store (VMDS). It will contain the active job designs in their Design Manager alternative structures as well as supporting multiple field users updating leak and CP surveys and valve inspections, and multiple office workers creating new landbase features for designers to put gas facilities on top of.

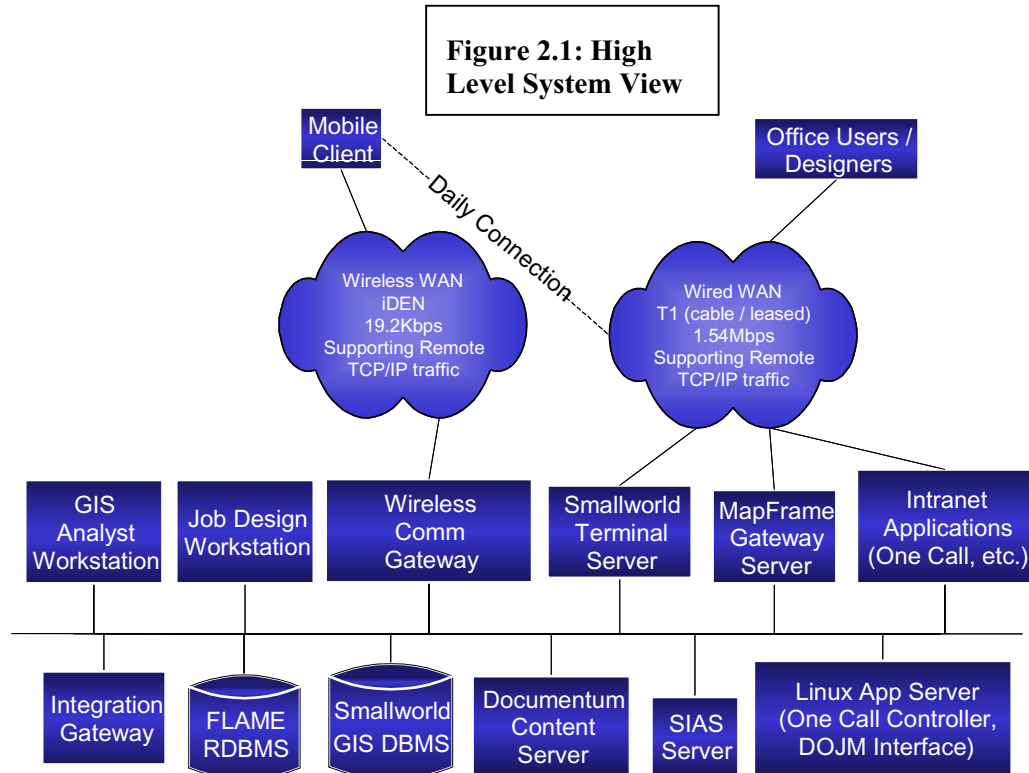
**RDBMS** – A relational database that manages the attributes of facilities that do not need to be versioned and that may be updated by both GIS users and other UGI systems such as the new maintenance and inspection system and the new CP system.

**MapFrame Gateway Server** – This Windows Server provides the following functions to the architecture:

**Field Gateway Server** – This is MapFrame’s Field Flow Manager (FFM) application. It runs daily, creating a delta file storing the changes since the previous execution to be synchronized on the mobile clients.

The data marshalling of daily changes to all documents that are related to the facilities in the GIS that are managed by the Content Server. Initially these will include the following categories of document types:

- **Service Cards** – one or more service cards associated with the service location.
- **PILR** – pipe inspection and leak report associated with either a section of main or service.
- **As-Built drawings** – one or more drawings associated with a set of facilities and pipe sections based on work order authorization number.
- **Other document types** – detail sketches, one-call tickets, etc.



The data marshalling of interactive field edits of critical information to other field users. This functionality is required to support the business process flows required to handle 'C' leaks.

**Documentum Gateway Server** – This component performs incremental update delta file creation processing for the Field Gateway Server process (above) for Documentum content.

**Design Manager Job Server** – This component is a Smallworld Server used to run conflict detection and data state advancement processes (merge and posts) when promoting private designs into public master alternatives (top) at the request of design manager users. This allows users to continue working while jobs are processed, or for jobs to be run at night for reconciliation the next day. The data marshalling of daily changes to all data managed by the GIS Data Server that has been targeted to be sent to the field.

**Documentum Content Server** – This component will provide a repository and a meta-data catalog of documents and their histories to be accessible directly by both end-users and other applications.

**Documentum Docbase** – This is an Oracle RDBMS storing document metadata and required for operation of Documentum Server. It will run on an existing Oracle Database (RDBMS) Server at UGI.

**Linux Application Server** – This server provides an Internet / intranet (http) application server environment within which to run applications which serve dynamic web pages. Components on this server are listed below.

One Call Controller, providing periodic processing of one call request e-mails, and pre-filtering using SIAS method calls.

Scheduled jobs (such as DOJM interface, One Call Controller) will be configured in JBoss and will run periodically without user but writing to log files allowing administration (optionally) through enterprise monitoring tools (BMC Patrol, other network status collection applications)

**Linux Intranet Web Server (Intranet Applications)** – This server provides an Internet / intranet (http) application server environment within which to run applications that serve dynamic web pages. Applications will access and present Oracle data using JDBC, Java, and JSP. Access to documents will be provided using links to Documentum files using identifier lists embedded in the http requests, and will be presented to the user in the Trinity customized Documentum Webtop interface (below). Interactive applications will use LDAP to authenticate and manage user permissions to applications. Components on this server are listed below.

**Documentum Webtop Application Interface Server** – Provides access to the Documentum content server documents through web browser http requests.

Intranet SIAS map viewer base framework application, providing access to maps via Smallworld Internet Application Server (SIAS).

Additional applications built on the base framework such as One Call Screener.

One Call Screener will allow users to access a list of pending one call locate requests, navigate to the area of the locate on a map, and specify whether a locate ticket is required through a Jboss application. Users will access service cards and other associated documents through geographical links into the Documentum Webtop application.

**SIAS Server** – This server provides a Windows based environment within which to run applications that serve periodic and interactive functionality to other applications and components. Components slated to be deployed on this server or group of servers are listed below.

**SIAS Server 4.0** – This component provides access to Smallworld maps and functionality to intranet applications. It is a stateless server, so the application server must track the context of the user's sessions in order to retain settings such as view scale, layers visible, etc.

**Smallworld Terminal Server** – This server provides a Windows based environment within which to run Smallworld / Design Manager clients accessed from remote locations.

**Smallworld / Design Manager Full Client** – This component provides access to Smallworld maps and functionality through the native Smallworld Client.

**Integration Gateway** – (DB2 II) This component shall provide the logical independence and loose coupling to the various existing mainframe application data stores and databases. From a FLAME application point of view, it will provide a declarative (SQL) access mechanism that gives FLAME applications access to a federated set of systems. It shall allow the FLAME application to perform traditional RDBMS correlations and aggregations on its configured set of data sources.

**Wireless Communications Gateway** – (Utility Partners MobileDispatch / MobileUp) This component provides communication between the office servers and the mobile data terminals in the field user's trucks. It also supports the compression and transmittal of dispatched work orders to the field users and the posting of their job status and work order completion details.

Office Clients

**GIS Analyst Workstation** – (Smallworld, FME) This component will be a desktop application that provides a rich set of analysis functionality. This tool shall support ad-hoc querying and the ability for the analyst to generate custom thematic maps that pull together information from the GIS database. This component shall provide the data import functionality required to accept new development plats from the developers. This component shall provide the QA/QC tools so the office workers may review and correct the edits being made by field personnel.

**Job Design Workstation** – (Smallworld Design Manager) This component will be a desktop application accessed remotely through terminal servers that provides the gas designer a rich set of data entry, job estimating, job sketching, bill of material generation tools, work instruction generation tools, and as-built redline review and updating tools.

**Office User** – (Internet Explorer) Office users will have access to maps and records through an intranet site. Applications will be built on SIAS framework application and Documentum Webtop application.

**Designer User** – (Smallworld Design Manager Terminal Services Client) Drafting intensive users such as designers will access the full Smallworld client with Design Manager through Terminal Services. This allows minimal client configurations the best performance, since the Smallworld client is run in reading on a terminal server, with remote control operation from the client computer.

Mobile Client:

**Mobile Workforce Management** – (Utility Partners MobileField) - This component provides the user his current day's set of jobs to work on. It allows him to record and send back to the office the status of his jobs and as well as the required detailed job completion information.

**Field GIS** – (MapFrame) This component provides the user with a graphical (Map) based interface to access facility maps and work order designs and sketches. For each specific facility or a fenced set of facilities, it provides the user with a set of related documents, which he may then select, view and edit. It gives the user tools to provide as-built redline information on top of work job sketches and to update related attribution for construction work order facilities, for CP surveys, for leak surveys and valve inspections.

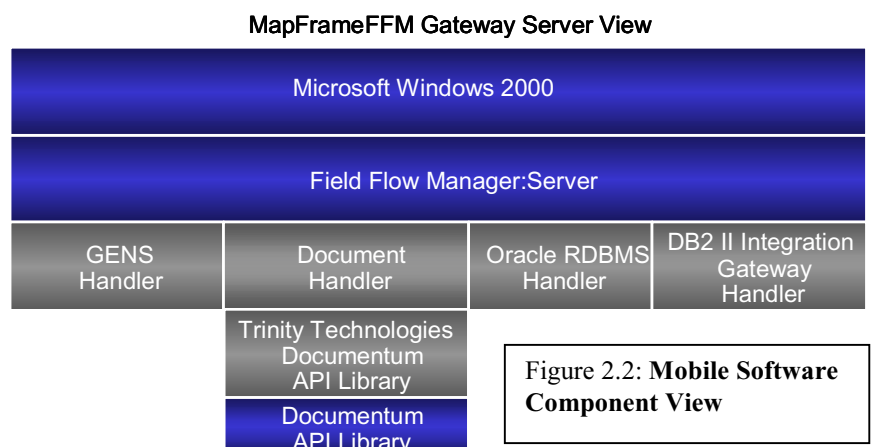
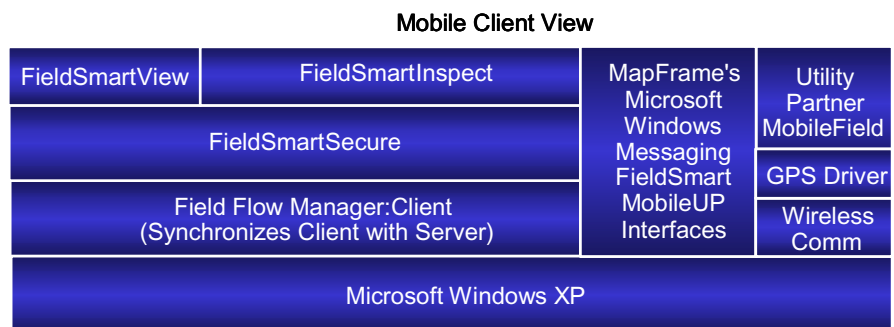
## 2.2 Mobile Software Component View

The next diagram, **Figure 2.2: Mobile Software Component View**, attempts to depict the individual software components that will be required from the mobile GIS vendor (MapFrame). Since MapFrame has both a mobile client set of components and a server set of components, the diagram includes two distinct software stacks.

### 2.2.1 Mobile Client View

**MapFrame's FieldSmart View** – This component provides the user access to all field maps, all related documents and all related attributes. The user will be able to navigate quickly to any facility or work order location. This component will also provide the user a map centered display based on the current location of the truck. This component will provide the user with a fixed set of queries.

**MapFrame's FieldSmart Inspect** – This component provides the user a set of data collection



**Figure 2.2: Mobile Software Component View**

forms to collect their survey and inspection results. This component provides the user a set of tools to redline on top of work order job sketches. This component provides the user a set of tools to create new leak sketches based on map features as well as to edit existing leak sketch documents.

**MapFrame's FieldSmart Secure** – This component provides the user access control to specific data collection forms and graphical map edits and redlining functionality.

**MapFrame's Field Flow Manager Client** – This component provides the stimuli for the client to synchronize with the Field Flow Manager Server. This component handles all changes coming from the server: incremental GIS data, incremental documents, incremental related attribute information, incremental field based updates (C leaks), incremental software upgrades, and incremental configuration upgrades. This component must also handle grouping all client edits and sending them back to the server. It must identify the high priority leak sketch updates and creations to ensure the FFM server caches these changes and makes them available immediately for the next field user who synchronizes with the FFM server over either a LAN or UGI's wireless iDEN network.

**Utility Partner's MobileField** – This component displays the set of work orders dispatched to the user and allows the user to update work order status information and to collect job completion details. It also monitors the device's GPS driver and reports the truck location to the dispatcher. It will need to use MapFrame's messaging component to indicate the current location of the truck or to zoom to the location of a work order. Another potential integration for this technology is to generate follow-up work orders.

**MapFrame's MobileUP Messaging Interface** – This component provides the Window's based messaging component for either Utility Partner components to pass messages to MapFrame's components or for MapFrame's components to pass messages to Utility Partner components.

**Microsoft Windows XP** – This component provides the operating system functionality including the standard TCP/IP driver to be used by the MapFrame FFM components to communicate to each other.

## 2.2.2 MapFrame Field Flow Manager (FFM) Gateway Server View

**Microsoft Windows 2000** – This component provides the operating system functionality including the standard TCP/IP driver to be used by the MapFrame FFM components to communicate to each other.

**MapFrame Field Flow Manager (FFM)** – This component provides the data marshalling of daily GIS changes made to the GENS Smallworld Data Server to the field. For the FLAME project, it has been identified it must be enhanced to provide the following five categories of integration functionality:

**FFM's Caching of Leak Sketches** – This component was identified by MapFrame as native functionality provided by FFM. The additional integration requirement is to ensure that all NEW leak sketches created in the field are associated with the correct GIS facilities so that other field users will be able to view them the next time they synch with the FFM server.

**FFM's GENS Handler** – The additional integration requirements are:

Retrieve GENS GIS data on a daily basis and generated the incremental updates for the vector map data required to send to the field devices the next time they synch with the FFM server.

Update GENS Smallworld GIS Data Server in a Design Manager intelligent alternative manner that places all field updates in an alternative directly below the current work order's scheduled/approved designed alternative. This allows the office engineer to approve/correct work order based changes that they own work order by work order without having to wait to approve all field related updates/changes.

Update GENS Smallworld GIS Data Server in an intelligent alternative manner based on field user ids. This allows the office staff the opportunity to automatically post all field changes on a user by user basis and allows the office to spot check users and to review the work of new employees without impeding the posting of leaks reported by the field, survey results and inspection results collected from the field.

Create an exception log and email it to the correct data steward for work orders, leaks, services, CP surveys when any error occurs when trying to post field updates to a GENS Smallworld alternative.

**FFM’s Document Handler** – This component was identified by MapFrame as new functionality to be provided by FFM. It was also agreed that Trinity would be providing a set of API’s for FFM to call to provide the required functionality identified below. The integration requirements are:

For each facility in the GIS, retrieve all associated PDF formatted documents from the content manager and generate the necessary relationships so that both the FieldSmart Viewer and FieldSmart Inspect modules can view related raster documents associated with a specific GIS facility. It needs to be configurable to retrieve just the latest version from the content manager as well as the complete history of a given document type. From a user’s point of view, they will need the latest version of a leak sketch, they will need all versions of a service card, and they will need the latest version (since each redline is its own document, so there should be only one version of the as-builts in the content manager for each authorization) of the as-built redlines.

For each field edit that updated a sketch or service card in the field, this component must insert the updated sketch or service card as a PDF formatted file and check it into the content manager as the newest revision and update all related meta-data accordingly.

For each field sketch originated in the field, the component must Create a PDF formatted file and all relevant meta-data for insertion into the content manager. If an insert error occurs, the Content Management Server will Create a exception in a log and email it to the leak sketches and service card data steward..

**FFM’s Oracle RDBMS Handler** – The integration requirements are:

For each facility in the GIS, retrieve all associated service records, leak records, inspection records and survey records. This data will need to be formatted for view only purposes, since the users will be creating new records in the field for this type of information base on the conditions they review in the field.

Create new records in the Oracle RDBMS based on the records created in the field.

Create an exception log and email it to the correct data steward for leak records, service records, valve inspection records and CP survey records when any error occurs when trying to insert records into the Oracle RDBMS.

**FFM’s DB2 II Integration Handler** – The integration requirements are:

For each facility or service point in the GIS, retrieve all associated work order records and customer information records. Note, at this time, no update to this information will go back through the gateway via FFM. Work order status and job completion updates will be done via Utility Partner’s WorkUP components and related integrations.

The software component view above clearly denotes the areas requiring development using a diagonal-hatch. Both MapFrame and Trinity will be supplying new development components for the FLAME field workforce integration architecture.

### 2.3 Intranet Mapping Software Component View

The next diagram, **Figure 2.3: Intranet Software Component**, includes components required to support users requiring access to maps, scanned records, and maintenance data within a UGI office.

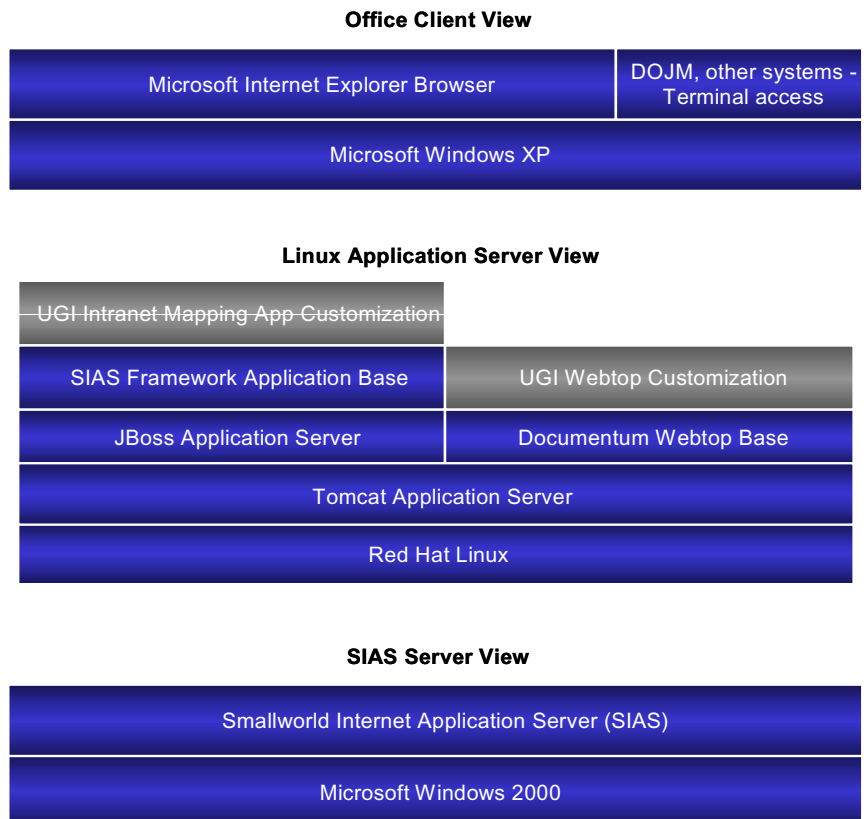


Figure 2.3: Intranet Software Component

### **2.3.1 Intranet Office Client View**

**Microsoft Windows XP** – This component provides the operating system functionality including network communication, and access to disk and other devices and peripherals.

**Internet Browser** – Internet Explorer provides the client presentation of HTML pages served by UGI intranet servers.

### **2.3.2 Linux Application Server View**

**Red Hat Linux** – This component provides the operating system functionality including network communication, and access to disk and other devices and peripherals.

**JBoss Application Server** – This component is a web application server, providing a Java environment inside which to develop and deliver dynamic web (http based) applications.

**SIAS Framework Applications** – These components provide the processing to respond to requests forwarded through JBoss resulting in dynamic application web pages. The One Call Screener application is one such application, as is the base SIAS map viewer on which One Call Screener is built.

Periodic (scheduled) processes will also be developed and deployed as JBoss applications, such as the One Call Server as well as the new DOJM gateway interface.

**Documentum Webtop Interface** – The Documentum web intranet browser interface application, customized and configured by Trinity for UGI.

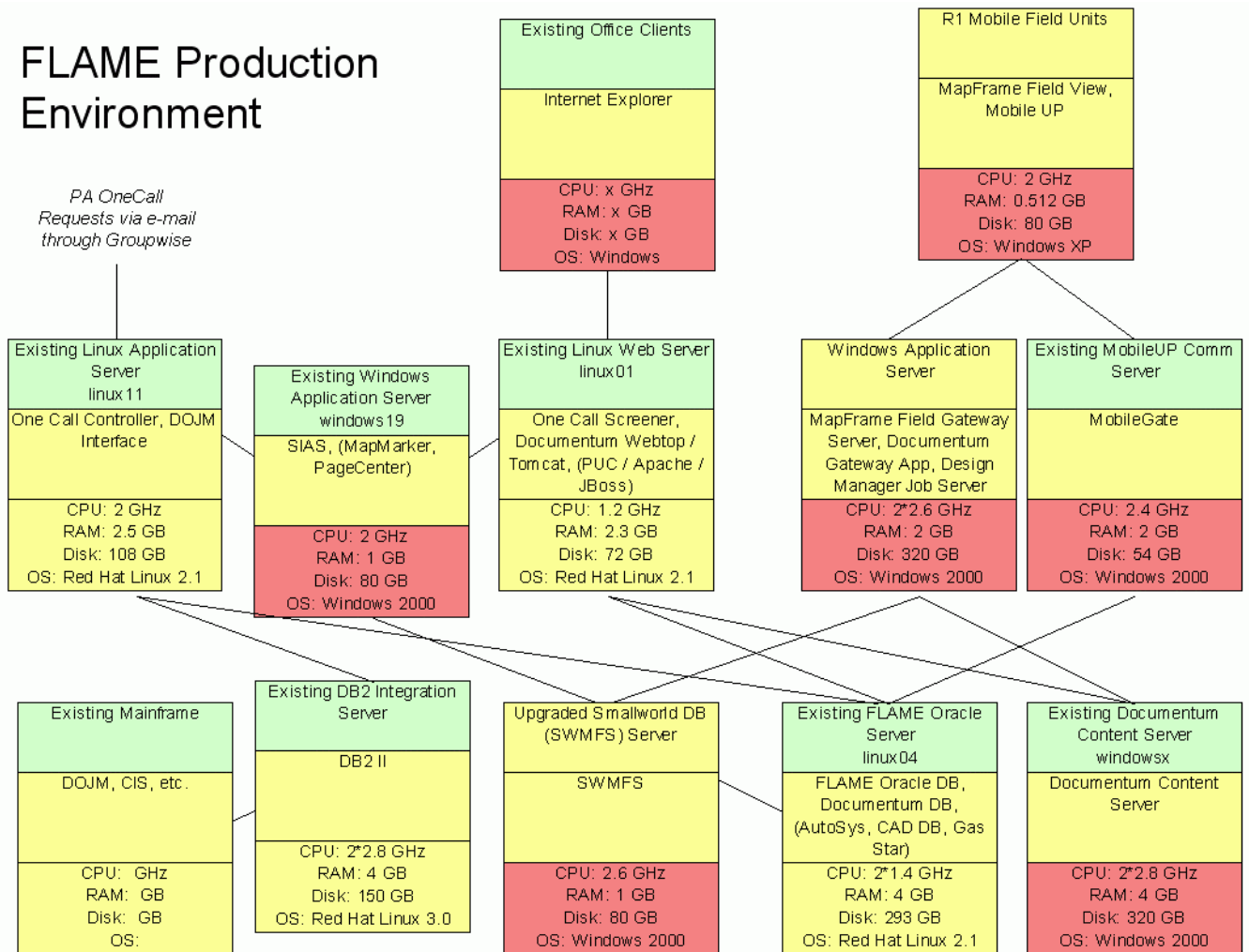
### **2.3.3 SIAS View (Windows SIAS Application Server)**

**Microsoft Windows 2000** – This component provides the operating system functionality.

**Smallworld Internet Application Server (SIAS)** – This component provides access to Smallworld GIS functionality through interfaces accessible within application server environments such as JBoss.

## 2.4 Hardware / Deployment View

Figure 2.4: Hardware / Deployment View shows the major software processes running on each of the functional components from the high level system component view, mapped to their hardware.



**Figure 2.4: Hardware / Deployment View**