

## **Some 'Assimilation' Required: Former Fort Ord's Data Integration System (FODIS)**

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### **Abstract**

Maintaining involvement of the local community in the cleanup of the former Fort Ord and providing scientists and engineers with a complete and integrated dataset is essential for an effective base realignment. With a large amount and wide array of data to analyze and disseminate, Army Corps personnel identified that a more robust data management and information dissemination solution was necessary.

Army Corps personnel devised an ArcIMS-based system that provides GIS and database query tools to the public, and advanced query tools to scientists, engineers and subcontractors. Data once inaccessible and difficult to analyze is now housed in one central ArcSDE-enabled SQL database. Administrative Record document retrieval, unexploded ordnance, groundwater chemistry, parcel transfer status, prescribed burn, and community relations data are now at the fingertips of the user.

### **Introduction**

Historically large but varied data sources were available to base personnel, agencies and to a certain extent, the public. It was not uncommon to have a numerous datasets managed at different locations by multiple contractors and/or agencies. It is a recent development that nearly all of the available data have been integrated into a web-based repository to support essential BRAC operations as well as provide the public with information regarding the ongoing closure activities.

The United States Army Corps of Engineers (USACE) established the Fort Ord Data Integration System (FODIS) in an effort to integrate the disparate sets of data of which GIS has significant role. The system includes several major databases including; a public information database and website ([www.fortordcleanup.com](http://www.fortordcleanup.com)), a Groundwater Chemistry database, a Military Munitions Response Program (MMRP) database, BRAC Reuse Parcel Information database, and an Administrative Record database. In addition to these

datasets, GIS layers are stored in SQL using ArcSDE and linked to tabular data via relationship classes. Layers include planimetric data, topographical data, transportation data, land use data, natural environment data and other spatially significant datasets.

This paper will describe the assembly and integration of the Former Fort Ord data components from a reconnaissance and historical perspective. The following sections will outline the process of integrating the data from the "pre-assembly stage" to the fully "assembled" and integrated system Former Fort Ord has today.

## **Pre-Assembly**

### **History (1917-1991)**

Fort Ord was established in 1917, originally as Camp Gigling, as a military training base for infantry troops. In 1917, the US Army bought the present day East Garrison and nearby lands on the east side of Fort Ord to use as a maneuver and training ground for field artillery and cavalry troops stationed at the Presidio of Monterey. Before the Army's use of the property, the area was agricultural, as is much of the surrounding land today. No permanent improvements were made until the late 1930s, when administrative buildings, barracks, mess halls, tent pads, and a sewage treatment plant were constructed.

This facility was designated as Camp Ord in 1939 and became Fort Ord in 1940. In 1938, additional agricultural property was purchased for the development of the Main Garrison. At the same time, the beachfront property was donated to the Army. The Main Garrison was constructed between 1940 and the 1960s, starting in the northwest corner of the base and expanding southward and eastward.

From 1947 to 1975, Fort Ord was a basic training center. After 1975, the 7th Infantry Division (Light) occupied Fort Ord. Light infantry troops operated without heavy tanks, armor, or artillery.

### **Historical Data**

As could be imagined, prior to the advent and use of modern technology, all of Former Fort Ord's tabular and spatial data existed in hardcopy format. Much of this historical data resided in filing cabinets and other storage areas

throughout the facility. Historical drafting documents as well as aerial photos have been digitized and archived... eventually they were added to the FODIS GIS application.

### **Base Realignment and Closure (1991)**

In 1991 Fort Ord was selected for decommissioning under BRAC, but troop reassignment was not completed until 1994 when the post formally closed. Although Army personnel still operate parts of the base, no active Army division is currently stationed at Fort Ord.

Fort Ord was identified by the U.S. Environmental Protections Agency (EPA) as a federal Superfund site on the basis of groundwater contamination discovered on the base in 1990. The 7th Infantry Division (light) was inactivated in September 1993 and the soldiers were reassigned elsewhere. The post officially closed on September 30, 1994.

With the closure of Fort Ord, responsibility for the remaining Army activities was transferred to the Commander, Presidio of Monterey. The Presidio of Monterey, Directorate of Environmental and Natural Resources, manages the cleanup of the former Fort Ord under contract with the U.S. Army Corps of Engineers.

### **The Primary Databases**

When the first environmental investigations were started in the mid 1980's, various datasets (excel, hardcopy tables) maintained by the various environmental contractors were created to house and report the analytical results of the soil and groundwater investigations. It wasn't until 2000 that all the different databases were converted and merged into a single database in Microsoft SQL Server.

As soon as the closure process started, property transfer became the number one driving force at the former base. Before any piece of property could be transferred, it had to be made safe for future use. In some cases, this was an easy task; in others, such as in areas where military munitions were used, the task was far more difficult. Initially an Excel spreadsheet was used to track what was happening with each property parcel. Later, when more complex queries were required, the information was moved into Microsoft Access.

The areas on the base that had been used for military munitions training had to be cleared by ordnance and explosives experts prior to property transfer. Again, this process began shortly after the base was closed. Clearance records were in the form of everything from hardcopy reports, spreadsheets, and small databases. In 2001 all these records were combined into a single SQL Server database.

When Fort Ord became a Superfund site in 1991, an Administrative Record was created to store the reports being written to document the cleanup activities at the base. Additionally, a database was established to track these reports. The first version of the Admin Record Database was in Paradox, where it remained until conversion to Access in 1999.

### **Data Reporting**

Early on, each of the individual databases had their own server- or workstation-based reporting tools. If a project team member wanted a specific piece of information from any of the databases, he or she would have to either sift through published (hardcopy) reports or run a query on the database using existing tools. Although the existing querying tools were powerful, they were not user friendly nor were they available to everybody. This relative inaccessibility tended to cause "data hoarding", where data users would keep their own copy of the data, usually in the form of a spreadsheet. Often these hoarded databases would not be updated when the master databases were updated, thus creating stale data. Obviously, reports and - perhaps more importantly - project decisions should be based on the master data and not the questionable stale data. Therefore, a great deal of time and energy had to be spent to make sure everyone was working from the same data.

Then along came the web.

In 2000 work was started on two web sites for Fort Ord. One would be for the project team members (primarily the U.S. Army, USACE, agencies, and various contractors) and the other for the public.

### **FODIS - Final Assembly**

The project site was named FODIS, an acronym for Fort Ord Data Integration System. Initially, FODIS had query tools for the four databases discussed above. Later, FODIS included other project management tools such as a calendar, an image database, project news, a contact database, and various areas for task-specific data sharing.

Eventually, GIS portions of the groundwater, MMRP, and Parcel tasks were added to FODIS using ArcIMS and ArcSDE. To ensure the ability to query spatially, x,y coordinates were mandatory during the data creation and data submission phases.

Ultimately, FODIS became the one-stop portal for nearly all the Fort Ord project data. The query tools were accessible and flexible, allowing users to view results in a tabular format or spatially using ArcIMS. The perceived need for data hoarding all but disappeared.

### **fortordcleanup.com**

When Fort Ord became a Superfund site, the community near Fort Ord became interested in knowing the progress of cleanup. Public outreach was accomplished through various means such as public meetings and, in about 2000, via the web, when fortordcleanup.com was launched.

Much of the content on fortordcleanup.com was static information about the background of the base and its cleanup. To make even more of the data available to the public, the Admin Record and Parcel databases were made available and searchable via the web site. Additionally, ArcIMS was used to present a spatial representation of the Parcel transfer status.

### **2006 - Assembly Complete**

We found three things to be vital in providing high quality data to the public and the decision makers on the Fort Ord project:

1. Single data repository,
2. Easy access, and
3. Multiple ways to query and view the data.

The single data repository was key in allowing all the players to see the same data at the same time.

Logistically, this required gathering up data from various sources and multiple contractors, but once these processes were in place, payoff was immediate. ArcSDE permitted the use of data in both tabular and spatial applications, removing the need for multiple copies of databases for different applications.

Robust and user-friendly query tools available via the web helped reduce (perhaps eliminate) the perceived need to hoard data. Also, a short feedback loop from the users to the tool developers allowed the addition of new features (or bug fixes) on short release cycles.

The integration of the online tools into a single site has allowed users to see the data represented in various ways, sometimes taking tabular data and showing them spatially or visa versa.

### **Conclusion**

A centralized data repository, made accessible via web-based tools, has increased project productivity and aided data interpretation. From the user's perspective, it's one-stop shopping for Fort Ord data. From the developer's perspective, utilizing such applications as ArcSDE and ArcIMS made the job of serving up data much easier.