Integration of GIS and SAP – Improves Business Processes

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Abstract: Technology is an important factor to improve business processes. In previous trend businesses have been striving to optimize their processes and improve efficiency by using SAP systems for workflow management and GIS for location based information management. Many advances have been observed in both fields but no direct integration was accomplished due to the complexity involved in handling each system. This resulted in loss of opportunities to leverage spatial analysis capabilities of GIS and business transaction management tools such as SAP. Here we discuss the integration techniques of SAP system with GIS. This paper also focuses on the advantages gained from the Integration of SAP and GIS framework.


I. INTRODUCTION

Making decisions based on geography is basic to human thinking. Where we go, what will it shall be like, and what we shall do when we get there are applied to the simple event of going to the store or to the major event of designing a global distribution network. By understanding geography and people's relationship to location, we can make informed decisions about how we conduct activities on our planet. [1]

Geographic concepts and techniques are used to create a common operation framework for different disciplines. With ability to combine a variety of datasets in an infinite number of ways, from routinely performing work-related tasks to scientifically exploring the complexities of our world, GIS gives businesses the geographic advantage to become more productive, more aware, and more responsive to daily business needs. SAP system become key tools in managing medium to mega size organizations in the past decade and continues to gain pace. This system enables businesses to manage workflows; monitors key business indicators, help manage resources and material procurements, and help manage people and information. It provides power
platform for integrating data from diverse resources and bring them into one concise environment where all activities are tracked, secured and managed properly in addition to allowing for paperless data exchange. [2]

II. OBJECTIVE
In this paper we study and discuss the possible integration methodologies between GIS and SAP systems. It also explains how this integration benefited to improve business processes. And finally analyze the benefit of this integration with the probable conclusion.

III. ABOUT GEOGRAPHIC INFORMATION SYSTEM (GIS)
A geographic information system (GIS) is a technological tool for comprehending geography and making intelligent decisions. GIS organizes geographic data so that a person reading a map can select data necessary for a specific project or task. A thematic map has a table of contents that allows the reader to add layers of information to a basemap of real-world locations. [1]

With an ability to combine a variety of datasets in an infinite number of ways, GIS is a useful tool for nearly every industry from agriculture to utilities. A good GIS program is able to process geographic data from a variety of sources and integrate it into a map project. Many countries have an abundance of geographic data for analysis, and governments often make GIS datasets publicly available. Map file databases often come included with GIS packages; others can be obtained from both commercial vendors and government agencies. Some data is gathered in the field by global positioning units that attach a location coordinate (latitude and longitude) to a feature such as a pump station. [3]

GIS maps are interactive. Some GIS programs are designed to perform sophisticated calculations for tracking storms or predicting buying patterns. GIS applications can be embedded into common activities such as verifying an address. From routinely performing work-related tasks to scientifically exploring the complexities of our world, GIS gives people the geographic advantage to become more productive, more aware, and more responsive citizens of planet Earth.

In following Fig. 1, GIS brings together graphical representation of natural objects (e.g. trees, houses, wells, roads, etc), attributes of objects and tools to manage behavior of the map objects. This makes, GIS goes far beyond the management of “background” mapping as it provides true positional awareness in support of conducting analysis across multiple sources of information.
IV. USING GIS AND SAP

SAP is a German software company. SAP users across a broad range of industries worldwide. Users can access and use SAP data through intuitive, user friendly map interfaces; see that data in context with other data from within SAP or other business systems; and perform a wide range of spatial analysis. This helps people make better decisions. Work orders, for example, can be assigned based on proximity to avoid unnecessary driving time for work crews. [3]

In recent years the level interest in integrating GIS with SAP and legacy systems has grown significantly. This was observed since most business data have a geographic or spatial component that can be geo-referenced on a GIS map to visualize, understand and interpret data in ways not possible through a spreadsheet or table. By visualizing relationships, connections and patterns in business data, GIS helps in making informed decisions and increase efficiency. The power of SAP systems in helping to adjust to market changes, sensing and responding to customer requirements and extending processes beyond the organization, could be further enhanced with the integration of GIS applications into business workflows. This makes GIS and SAP systems integral part of a powerful IT strategy. [4]

Advances in Internet technology and development of Service Oriented Architecture concept made it possible to embed GIS applications into common activities as well as integrating them with different systems such as SCADA and SAP. Introducing GIS into business process offers capabilities that fall into the following categories:

- Provision of geographic context to business decisions by integrating business data with geo-databases and feature tables.
- Linking business functions in ERP system with geo-processes combined functionality that is distributable across the software architecture.
- Fusion of business and geographic information and functionality into the common operational picture on both high and low levels.

With both systems integrated, a user can visualize SAP application data within the GIS and get direct access to the GIS within SAP applications. Moreover, relevant data can be altered from SAP.
applications as well as by using the graphical functionality of GIS software.

V. INTEGRATION BETWEEN GIS AND SAP

Following Fig. 2 shows the possible integration between GIS and SAP. This integration shows the different functionalities of SAP and GIS which form composite business processes and services. The below integrated view of the GIS and SAP systems supports operative personnel in processing and monitoring orders, reports and maintenance plans. In so doing, it creates automatic references between the map and the operating resources selected in SAP-ERP. Objects can be selected in the map and the maintenance plans added in SAP. The geographical reference makes it considerably easier for users to search for and determine selected objects and offers a completely new and intuitive way of accessing operations information in SAP-ERP.

Organizations that integrate GIS with SAP software today include
- Utilities (water, electric, gas, waste, recycling)
- Local government
- Oil and gas production
- Defense and public security
- Service providers (routing and logistics)
- Real estate
- Forestry and forest products
- Waterways, airports, ports

All of these organizations have several things in common:
- Assets and infrastructure distributed over a wide area
- Mobile field forces that need access to corporate data
- A need to better utilize assets, infrastructure, and people in the field through fast, accurate, and easy access to data and tools to efficiently and effectively execute business processes and optimize resource utilization [5]

VI. INTEGRATION BENEFITS

To implement operational GIS pervasively across the enterprise, project-based point-to-point

Fig. 2: Integration between SAP and GIS (Source: SAP, 2009)
integration approaches must be replaced by flexible, reusable integration components that merge SAP and GIS transactions into task-level enterprise services. Users and applications tap into these services to deliver information and insights on demand, transforming SAP and GIS applications from stand-alone products to reusable, shared enterprise services that make integrated applications easier to build and use.

Integrating GIS and SAP contributed following benefits to improve business processes:

- **Increase asset data integrity**: SAP and GIS databases reflect same data. It eliminates lost, duplicate and obsolete asset data. It also support reliable reporting and decision making.

- **Increase end-user productivity**: It find SAP asset data instantly from the map. It views equipment maintenance history from the map. It also Create/update SAP assets from the map and it dynamically link map features to SAP assets in real-time.

- **Increase SAP system acceptance and use**: GIS users interact with SAP data directly from ESRI map using simple interfaces.

- **Lower asset data maintenance costs**: Data maintained in one system. It updates and synchronizes data automatically and eliminates manual data entry errors. [6]

### VII. FINDINGS & RESULTS

The integration of SAP and GIS immensely helps staff identify work order locations and find related faults, thereby reducing the resolution time and increasing customer satisfaction. Decision makers rely on the GIS for a visual representation of the network, facility search options, and work order management.

Because of the GIS/SAP integration, SAP notifications and work orders can be retrieved through GIS along with technical data for equipment maintained in SAP. Customer data can be retrieved from SAP based on service points selected in the GIS. Notification of outages and work orders based on customer calls are also enabled through this integration.

The integration has given various parameters that, through a common window, help businesses to plan and analyze the network, leading to higher productivity and a reduction in the time required to execute a task. This allows more effective problem solving and faster, better service to our customers.

### VIII. CONCLUSION

After reviewing various literature and further recommendation given by business planners we came into the conclusion that today, more and
more non-GIS users want access to GIS capabilities. Rather than using stand-alone GIS applications that require setup and training, business users want to leverage embedded GIS functionality as an integral part of their SAP application without shifting application contexts when moving from SAP-centric views to GIS views or from operational processes to analytical ones. GIS becomes assimilated by the primary SAP applications that users employ to do their jobs, and they may not even realize that they're using distinct GIS tools. This operationalization of GIS is the next wave in enterprise GIS integration.

REFERENCES