

# A NEW GIS INNOVATION

From: Rightangle Technologies

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## 1 Key Concept

Pro-DOC™ – introducing a new technology for developing **Complex, Web-based, GIS-enabled, Enterprise Applications** in a fraction<sup>1</sup> of the time and cost compared to using conventional development methods.

The key innovation in Pro-DOC is not the GIS itself – in fact the GIS capabilities are same as what is available in other similar GIS solutions. The innovation is the ability to build GIS-enabled Web applications -

1. Quickly,
2. Easily,
3. Without requiring scarce and expensive GIS resources, and
4. With no dependency on third party GIS components.

## 2 How it works

Pro-DOC™ has four main components.

1. A unique data model that allows modeling of GIS, Business and Documentary data in a common integrated model.
2. A web application that implements the data repository, the web-interface, and the user applications and hosts the resulting solution.
3. A 4-GL designer that lets users design the application – GIS components and the Business components – from a common high-level interface.
4. A GIS designer, that lets users create GIS views, with feature and attribute data.

The Pro-DOC™ web application is required at run-time to run the application but the 4-GL designer and GIS designers are needed only to create or change the application or the GIS views. The application development process is as follows-

1. Develop the User application with Schema, forms, Business rules, Data analysis, and GIS View using the 4-GL designer (Minimal programming required).
2. Develop GIS queries, thematic maps and other OLAP queries (Core Java language skills required).
3. Create GIS data using standard GIS/CAD development tools.
4. Import GIS data (Shape files) into the GIS views using the GIS designer.
5. The application is ready to run.

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<sup>1</sup> A Case-study given later in this document has demonstrated a 10-fold gain in productivity.

### 3 Highlights

Pro<DOC/>™

- Platform is a J2EE based Enterprise class application platform,
- GIS viewer is developed using SVG, a de-facto web GIS technology available in all browsers,
- Is fully web-based,
- Does not require any third-party GIS components on client or server side.
- Supports, but does not require, Oracle Spatial GIS database,
- Is interfaced with Google Earth and Google Maps public services.

### 4 Comparison with Conventional Methods

Application Type	Development tools	Comments
Desktop, GIS data publishing	VB, MapObject	<ul style="list-style-type: none"> <li>• Simple applications,</li> <li>• Not web based,</li> <li>• No data sharing.</li> </ul>
Web based	Oracle, ArcGIS	<ul style="list-style-type: none"> <li>• Complex configuration,</li> <li>• Expensive deployment licenses,</li> <li>• More development effort</li> </ul>
Web based, Business Process enabled	ArcGIS, Oracle, Hyperion	<ul style="list-style-type: none"> <li>• Even more development effort</li> <li>• High skill requirement</li> </ul>
Web based, Business Process enabled, with integrated OLAP	Pro<DOC/>™	<ul style="list-style-type: none"> <li>• No third-party license dependency</li> <li>• No need to integrate different components in big projects</li> <li>• Enormously time and cost efficient</li> </ul>

### 5 Business proposition

Rightangle proposes to partner with established GIS players in Indian and International market to take this technology to its logical conclusion – as end user solutions for the GIS users community.

<b>Target Market</b>	<ul style="list-style-type: none"> <li>• Customers looking for turnkey implementation of mid – high end GIS based web solutions without being very keen on an ESRI based implementation.</li> </ul>
<b>Benefits to the customer</b>	<ul style="list-style-type: none"> <li>• Faster implementation,</li> <li>• Lesser risk,</li> <li>• No expensive license dependency,</li> <li>• Saving in implementation cost (We would pass on some of the cost savings to the customer)</li> </ul>
<b>Benefits to the partner</b>	<ul style="list-style-type: none"> <li>• More competitive in the marketplace because of a</li> </ul>

	<p>faster/cheaper solution</p> <ul style="list-style-type: none"> <li>Higher profitability (We would pass on only some of the cost savings to the customer, the remaining would add to the profit margin)</li> </ul>
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## 6 A Case Study

### 6.1 Property/Asset Management

A reference application for Property/Asset Management has been developed using Pro<DOC/><sup>TM</sup>. It is functionally very comprehensive, covering -

- Sale, Purchase,
- Rentals,
- Contracts,
- Payments,
- AMC,
- Maintenance, and
- Work-orders

It is web-based, fully GIS-enabled and has -

- Full asset Lifecycle Management
- Business Processes
- OLAP reports

### 6.2 Development Statistics

The entire application has been developed using the code and efforts as given below-

<b>Total development time</b>	2 months
<b>Development Effort</b>	6 person-months
<b>Java Code</b>	2035 lines
<b>Configuration, scripts and JSP code (generated)</b>	7100 lines
<b>Effort saving (Assuming 5 man-years effort otherwise)</b>	<b>90% approx</b>

## 7 GIS Feature Support

The following is a comparison of the GIS features of Pro<DOC/><sup>TM</sup> with other GIS Technologies. **Features with are not commonly available on other solutions are highlighted.**

<b>Feature</b>	<b>Pro&lt;DOC/&gt;<sup>TM</sup></b>	<b>Other GIS solutions</b>
GIS Data acquisition, Digitization	When using Pro<DOC/> <sup>TM</sup> , conventional data acquisition and digitization methods	Most GIS solutions either depend on other data acquisition and digitization

	are used and the final data is imported into the system.	software, or have separately licensed data creation tools.
GIS Viewer	<p>Pro&lt;DOC/&gt; has web based and desktop based GIS viewers with the following features-</p> <ol style="list-style-type: none"> <li>1. Zoom/Pan</li> <li>2. Raster/Vector layers</li> <li>3. Attribute data view/edit</li> <li>4. Geo-referencing</li> <li>5. Distance Calculator</li> <li>6. Area Calculation</li> <li>7. Buffering</li> <li>8. Selection in different modes</li> <li>9. Identification of Features</li> </ol>	<p>There are several GIS viewers in the market – commercial as well as open source. However, majority of them are desktop based, with very few Web based viewers.</p> <p>The GIS features of these viewers are same or similar to those of Pro&lt;DOC/&gt;™.</p>
GIS Search and Thematic maps	<p>Search and thematic maps are implemented in Pro&lt;DOC/&gt;™. The thematic maps can use of the following visual tools to display the map-</p> <ol style="list-style-type: none"> <li>1. Color segregation</li> <li>2. Pie charts (linked to features)</li> <li>3. Bar charts (linked to features)</li> </ol>	<p>Spatial queries and thematic maps are an essential part of any GIS application.</p>
<b>Data Analysis</b>	<b>Pro&lt;DOC/&gt;™ supports data analysis using OLAP, which is integrated into the GIS view (See sample in the end).</b>	
<b>GIS Editing</b>	<b>This is one of the USPs of Pro&lt;DOC/&gt;™ front-end. It allows editing of GIS features right from the web-browser.</b>	<b>Typical web-based GIS viewers do not allow editing of GIS features.</b>
Web based delivery	Pro<DOC/>™ is fully web based and both the desktop viewer and the web viewer store/fetch data on the Web server.	Most GIS solutions do not have web-based delivery. Some notable web based solutions are ArcGIS and MapGuide.
<b>Topology Support</b>	<b>Pro&lt;DOC/&gt;™ viewer supports network topology creation and analysis (route calculation etc.)</b>	<b>Support for Topology is not a standard feature in many GIS solutions.</b>
Interoperability with other GIS applications	Pro<DOC/>™ supports import and export of standard Shape files.	All GIS solutions support ESRI Shape file import capability.
Geo-Referencing	Pro<DOC/>™ supports data that is Geo-Referenced using either the Lat-Long or UTM coordinate systems.	Both coordinate systems are universally supported.
Integration with Google Maps/Google Earth	Pro<DOC/>™ fully supports Google Earth and Maps integration through generation of KML.	Google Earth/Maps integration is very common and most solutions support it in some way of the other.

<p><b>Map Server</b></p>	<p><b>Pro&lt;DOC/&gt;<sup>TM</sup> has the Map Server capability. Hi-Resolution (Including Satellite imagery of .5 M resolution) raster imagery can be handled by the Map Server. The installation has been tested with a raster image size of 150MB.</b></p>	<p><b>(Raster) Map server is a common feature in all GIS solutions. Some solutions have add-on components for advanced Map server features.</b></p>
<p>Handheld support</p>	<p>The GIS is not supported on handheld devices at this time.</p>	<p>The handheld support in not very common in generalized applications although there are several dedicated handheld applications available.</p>

## 8 Extended GIS Feature Support

The GIS feature set is very robust and complete – it can comfortably take on any demanding GIS application. It has already been deployed in projects with very heavy GIS views – A 10000 strong Road network and high-resolution raster imagery going up to 150MB.

However, it is always possible that future requirements may come up for GIS features not already present in Pro<DOC/><sup>TM</sup>. Rightangle is committed to enhancing support for other GIS features/requirements as per the needs of the specific projects/assignments.

### 8.1 GIS View

The screenshot displays a web-based GIS application. At the top, the browser address bar shows the URL: `http://192.168.106.128:8080/APPID-GNDA/docWebform.jsp?DISPOSITION=CREATE&DISPOSITION=READONLY&BIGVIEW=1&FULLKEY=GNDA0-GreaterNoida/g001`. The application interface includes a top toolbar with navigation icons and a status bar indicating 'Unit=Meters, X=9620, Y=455, Scale=65,65, 077°19'07",028°39'15"'. On the left, a 'Layers' panel lists various map features: Boundary, Land, Railway Line Corridor, Road, Villages, and Water (with sub-items Water body and Water Line). A 'Search' and 'Thematic Maps' section is also present. The central map area shows a geographical layout with a grid, roads, and water bodies. On the right, a 'BOUNDARY' data entry form contains fields for Village Id (119), Village Name (KHERI), and various agricultural and educational statistics. The form includes dropdown menus for 'Last Updated' and 'User Updated' (both set to 'dd mon yyyy'). At the bottom of the form, there are buttons for 'Validate', 'Print', 'Save', 'Close', and a 'Save & Close' button.

## 8.2 GIS OLAP View

