



**EXPLORATION &
MAPPING IN MINING**

17-19 July 2012, Duxton Hotel, Perth

CASE STUDY

**GULLEWA
LIMITED**

INTEGRATING GIS FOR DECISION SUPPORT

Garry Edser



INTRODUCTION

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Allegiance Coal Limited
Central Iron Ore Limited

■ Exploration (1980 – 1990)

■ Marathon Petroleum Australia Ltd (3 years)

- Coal , Minerals (uranium , gold)
- Exploration geology

■ Pancontinental Mining Ltd (7 years)

- Minerals (gold , base metals)
- Computer geologist

■ Business Intelligence (1991 – 2011)

- GIS and statistics
- Data Warehousing (Kimble method)
- Technologies – SPSS, Business Objects , Microsoft, MapInfo

■ Gullewa Limited (2011-)

- Systems Manager and Exploration Geology



AGENDA

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- Opportunities for GIS
 - Challenges for gaining acceptance of GIS
 - Integrating systems and data
-



OPPORTUNITIES FOR GIS

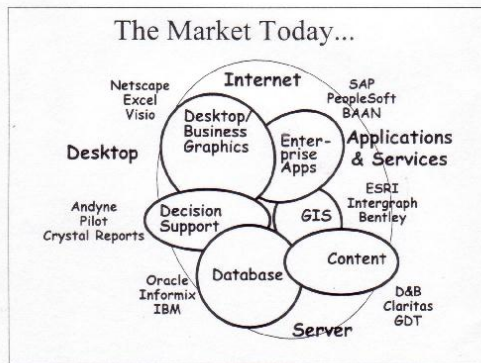
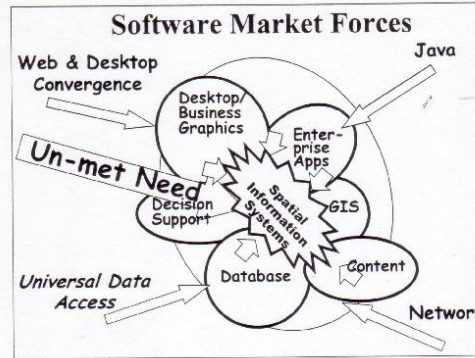
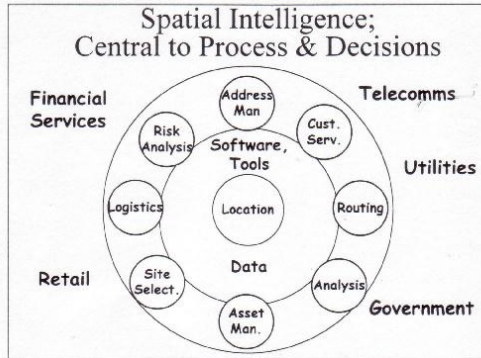
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- Where have we come from ?
 - Where were we 15 years ago ?
-

15 years ago

Exciting technologies lack of unifying standards

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COMPUTING EVOLUTION -
working in our favour

Phase I	Phase II	Phase III	Phase IV
Central	Distributed	Inter- Networked	Transparent Content
GIS Expert	Desktop Mapping	Client- Server Mapping	Free Mapping

Source: Richard Lindsay (1997) MapInfo Partner Conference

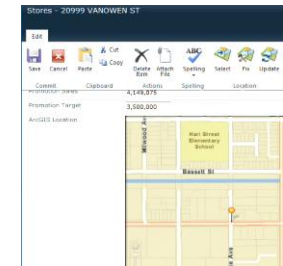
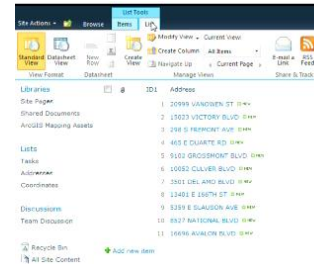
Evolving landscape



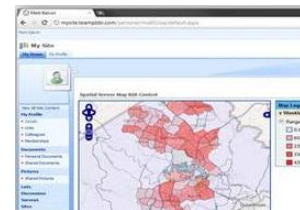
- Propelled by standards – based technologies like:
 - XML
 - Web services (SOA)
 - SOAP (“engine” behind xml based information exchange)
 - Rules based triggering of web services
 - Applications now are configured rather than customised
 - Build workflows in ERP / CRM using flowcharts e.g. MS Visio
 - Web part (edit web page design from a browser), GIS web parts (Silverlight web part)
 - ESRI ArcGIS for MS SharePoint
 - RDL (xml) revolutionised database reporting



Source: <http://www.fargeo.com/blog/gis-web-part-in-the-sharepoint-vernacular/>



Source: <http://www.esri.com/software/arcgis/mapping-sharepoint/demos>



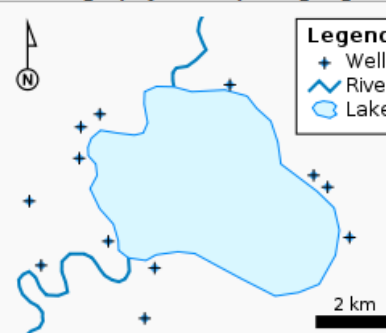
www.pb.com

Today's technology landscape and GIS

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- Spatial database – matured
- Web and web service – maturing
- Cloud – early stage, great potential (e.g. Tableau)
- Open source – mature elsewhere
- Mobile – becoming mature, app “world”
- Vendors – evolving
- Geography Markup Language (GML) and the Open Geospatial Consortium (OGC)

Geography Markup Language



Legend

- + Well
- ~ River
- Lake

A vector map, with points, polylines and polygons.

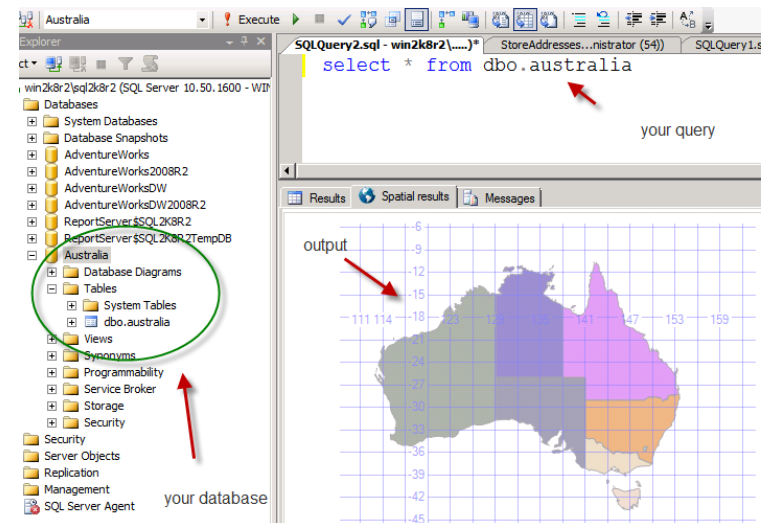
Filename extension	.gml or .xml
Internet media type	application/gml+xml ^[1]
Developed by	Open Geospatial Consortium
Initial release	2000
Latest release	3.2.1 ^[2] / 27 August 2007; 4 years ago
Type of format	Geographic Information System
Extended from	XML
Standard(s)	ISO 19136:2007 ↗

http://en.wikipedia.org/wiki/Geography_Markup_Language

Spatial database

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- SQL spatial – arrived fully with SQL 2008
- Geometry and geography data types
- Multi-level grid system index (4 levels)
- 2 column model faster but
 - “watch this space”
- SELECT * FROM t WHERE A.STIntersects(@B) = 1
- Fully OGC (Open geospatial consortium) compatible

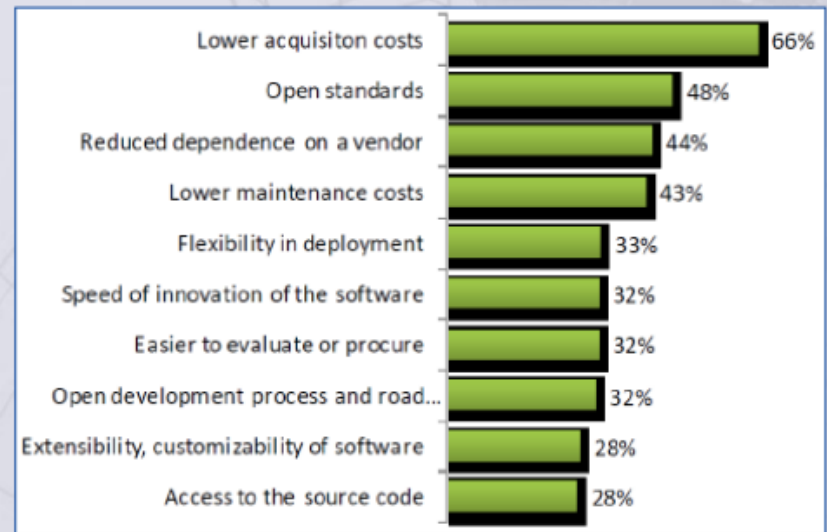


Open Source BI and GIS

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- Actuate
- Business Intelligence and Reporting Tools (BIRT)
- Gartner Group predicts open source BI to increase x5 through 2012
- JasperSoft
- Pentaho
- Weka
- Geobi
- Geoserver (server)
- Mapfish (client)
- Flashmaps and social media
 - Umapper (authoring tool)

Reasons for using open-source BI Source: Beyenetwork, 2009



<http://www.actuate.com/home/>




Flashmaps

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- What is Flashmaps ?
- “Mapping the world around you adds a whole new depth to social networking”.* (killerapps.com)
- Umapper.com

Home / Showcase / DB Mapper

Real Estate Sample



Filter listings

City: New York City

Category: Commercial

Type: All types

Price: Minimum to Maximum

Bedrooms: 2 to Maximum

Baths: Minimum to Maximum

Sq.Ft.: Minimum to Maximum

Show only new of 7 last days

Show additional info

pre-manufactured

Update map

Zip: 10001

Search address

Title*

Description*

Which map provider would you like to use?

 <input checked="" type="radio"/> Bing Maps	 <input type="radio"/> Google	 <input type="radio"/> OpenStreetMap	 <input type="radio"/> CloudMade
 <input type="radio"/> CloudMade Stamen	 <input type="radio"/> Yahoo		

U MAPPER Create Map Explore My Maps Welcome, garryae Logout

Garrys Map

Places: 1 Views: 0

Private Map

Map preview showing a satellite view of a river area with a marker labeled 'KL002'.

Share: Facebook, Twitter, Buzz e, GET KMIL

More From: garryae | View profile

Garrys Map Views: 0 | Places: 1

IMPLEMENTING GIS

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■ Strategic alignment +

■ Integration +

■ Governance =

■ ENTERPRISE ARCHITECTURE



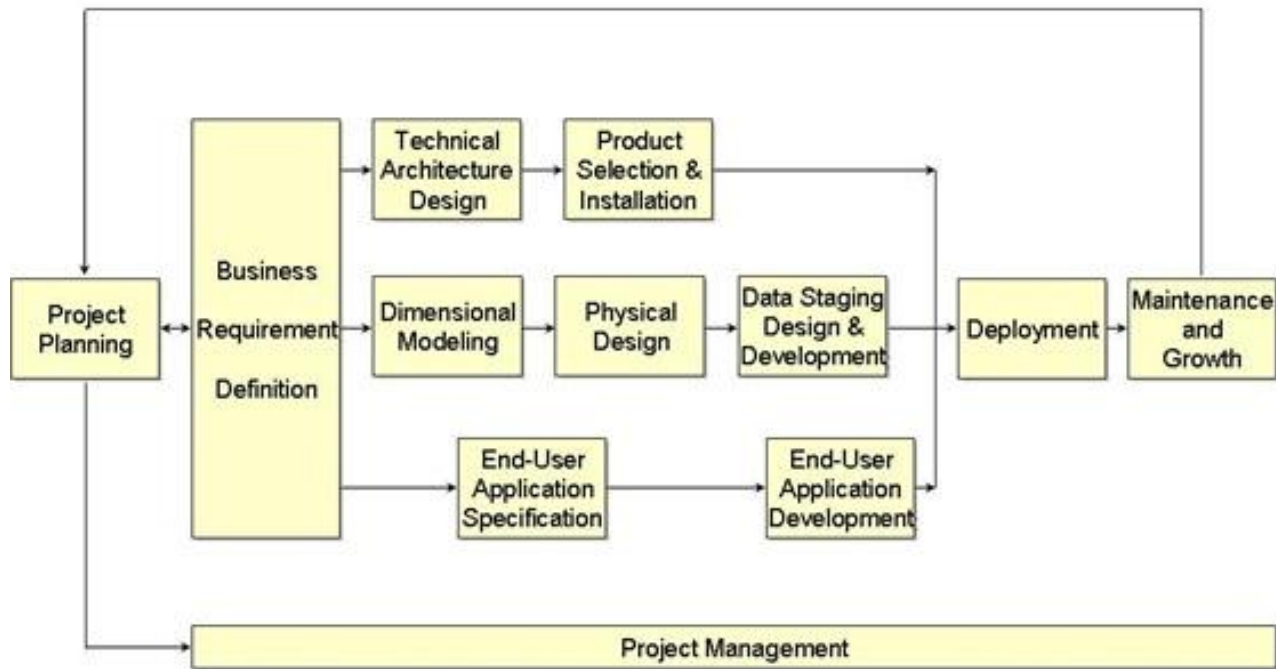
John Zachman



Dr. Clive Finkelstein

There must be a process

Business Dimensional Lifecycle Diagram



Source: Kimball Group series of “Toolkit” textbooks and www.kimballuniversity.com

You need a roadmap

An organising framework or classification

EWA
TED

The Zachman Framework for Enterprise Architecture™ *The Enterprise Ontology™*

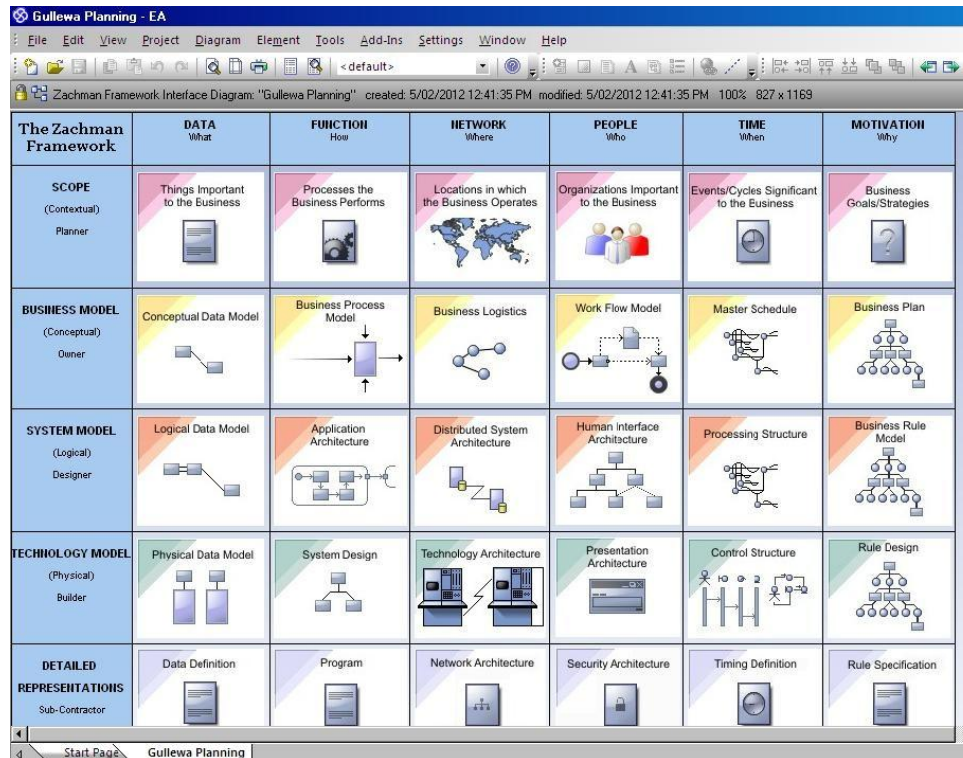
	What	How	Where
	Data	Function	Location
PLANNER	List of Things	List of Processes	List of Locations
Objectives / Scope			
OWNER	Enterprise	Activity	Business
Conceptual	Model	Model	Logistics
DESIGNER	Logical Data	Process	Distrib.
Logical	Model	Model	Architect.
BUILDER	Physical	System	Technol.
Physical	Data Model	Model	Architect.
SUBCONTRACTOR	Data	Program	Network
Out-of-context	Definition		Architect.

Source : John Zachman (www.zifa.com, www.zachman.com)

Tools to map your business

Sparx Systems application "Enterprise Architect"

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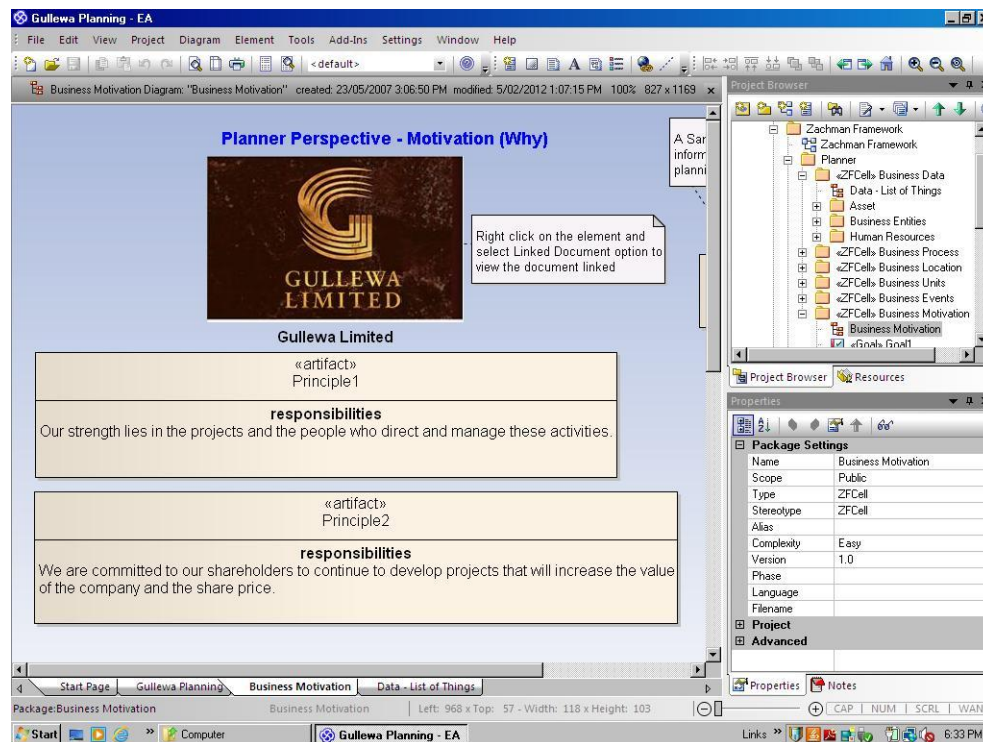


Source: www.sparxsystems.com

Strategic map of the business

Another example of a “back office” technology becoming mainstream e.g. UML (unified modelling language)

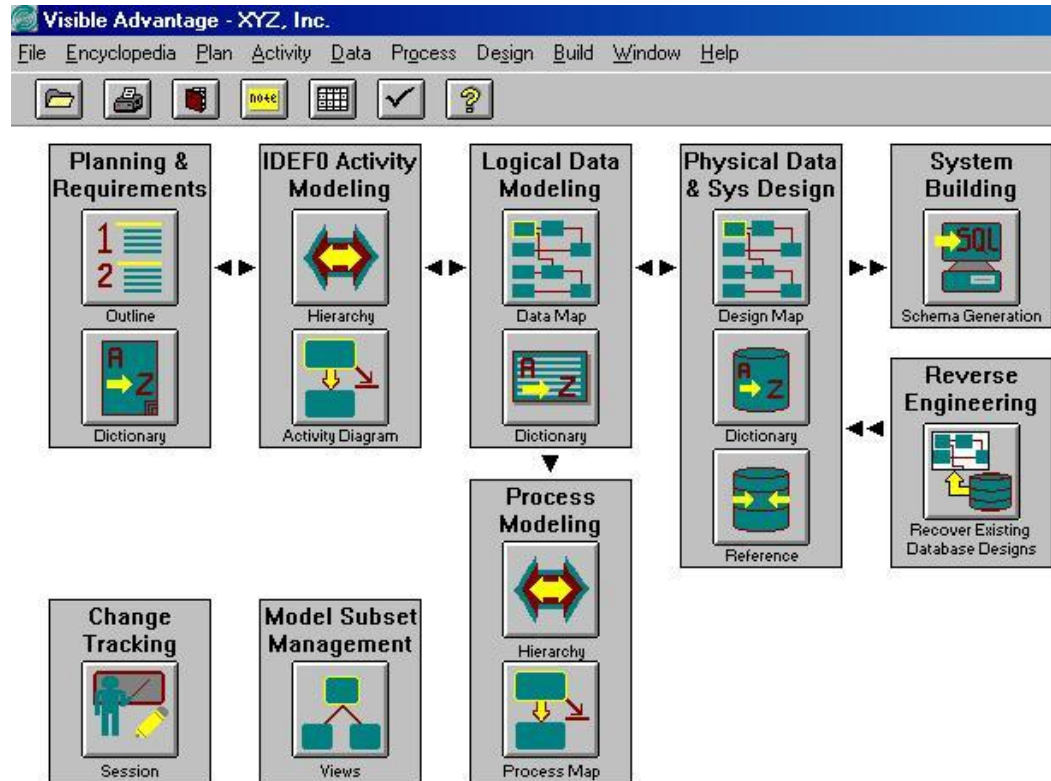
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- Top 5 things I can do with Sparx EA
- Needs Analysis
- Map of the business
- SOP storage
- Business Rules repository
- Data Model

Business model tool

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Source: www.visible.com

The original governance tool

“Drowning in a sea of compliance” solution

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The screenshot displays the Visible Advantage software interface for GULLEWA. The main window is titled "Statement-View Matrix: The Entire Model" and contains a table with the following data:

Model Views	F226 GIS	F230 Field Work	F240 Review Results
Statements			
P1 PROJECT OWNERSHIP	✓		✓
P2 PROJECT MANAGEMENT			
P3 PROJECT AUTHORISATION	✓	✓	

Overlaid on the right is a "View Hierarchy: Model Views" diagram showing a tree structure of views:

- F220 Plan Program (F) is the root node.
- F220 Plan Program (F) branches into F223 Land Access (F) and F226 GIS (F).
- F220 Plan Program (F) also branches into F100 Exploration (F).
- F100 Exploration (F) is highlighted with a dashed box.



People driven solutions

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- Business value (ROI, Nett Present Value)
 - Needs analysis
 - Change management
 - Dos and Don'ts
-

Return on investment

- Do your homework
- Software vendors are very capable
- BI/DW quote 120% DCFROR

Alan Leidner, former GIS director for New York City proposed that the Return on Investment (ROI) can reach \$4 for every \$1 invested in Enterprise GIS,

Source: <http://www.nascio.org/publications/documents/NASCIO-GovernanceGeospatialResources.pdf>

Source: www.nucleusresearch.com

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The screenshot shows the Nucleus Research website. At the top, there is a navigation bar with links for HOME, WHY USE NUCLEUS, PRODUCTS & SERVICES, RESEARCH, NEWS, ABOUT, and CONTACT US. A search bar is located on the right. Below the navigation, a main message states: "With more than 400 published ROI case studies, Nucleus Research is the leader in investigative research." To the right of this message is a graphic titled "Proving value Step 1: Show the value of your solution" showing a person in a hallway. Below the main message, there is a section for "LATEST RESEARCH" with links to "Microsoft acquires Yammer", "SilkRoad announces Point", "Del adds Pentaho to the Del Apache Hadoop solution", and "ROI Case Study: Microsoft Office 365". At the bottom, there are three columns: "TOPICS" (listing areas like E-Commerce, Application Development & Integration, etc.), "FUNCTIONS" (listing areas like Finance / Accounting, Executive Management, etc.), and "INDUSTRIES" (listing areas like Retail / Hospitality, Government, High-Tech, etc.). On the right side of the page, there are sections for "BECOME A CLIENT" (with a "want access?" link), "OF INTEREST" (with a "Who are the best Analytics vendors?" link), and "NEWSLETTER" (with an email input field and a "Subscribe" button).



ROI Calculation



XYZ Corporation is interested in implementing a BI application to serve as its enterprise-wide, ad hoc query and reporting tool. However, the project sponsor and senior management wants to know what the ROI would be on the BI project because it will be a tremendous undertaking. XYZ Corporation's current reporting environment requires 1,200 hours/month of support. Replacing the current reporting environment with a BI application will incur the following expenses:

<u>Expenses</u>	
Hardware	\$250,000
Software	\$400,000
Labor	<u>\$750,000</u>
Total	\$1,400,000

Assumptions

Proposed duration of the BI project is one year.

Ongoing support of the XYZ BI environment requires the following resources:

#	<u>Position</u>	<u>%Time</u>
2	BI operational support	100%
1	Database administrator	10%
1	System administrator	10%
1	Network administrator	5%
1	Trainer	25%

- BI software maintenance cost is 10 percent per year.
- The number of work hours per individual per year is 2,000.
- The average hourly labor rate is estimated at \$75.
- XYZ's investment yield is 9 percent.
- Three-year time horizon for ROI calculation.

XYZ with a BI application:

	Year 0	Year 1	Year 2	Year 3
Hardware	\$250,000			
Software	\$400,000	\$40,000	\$40,000	\$40,000
Labor	\$750,000	\$375,000	\$375,000	\$375,000
Total	\$1,400,000	\$415,000	\$415,000	\$415,000

XYZ without a BI application:

	Year 0	Year 1	Year 2	Year 3
Labor	\$1,080,000	\$1,080,000	\$1,080,000	\$1,080,000
Total	\$1,080,000	\$1,080,000	\$1,080,000	\$1,080,000

Net Savings n/a \$665,000 \$665,000 \$665,000

Discounted Net Savings at 9% \$1,683,311

Return on Investment

Discounted Net Savings at 9% \$1,683,311

BI Investment \$1,400,000

Return on Investment 120%

Source: <http://www.information-management.com/news/2487-1.html>



Requirements Analysis

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- There are good value tools to assist in collecting this vital information
 - Do not ask – What would you like ?
 - Ask – Why do you do what you do ?

 - Seek out the most influential stakeholder whose problem you can solve first

 - Show the business that you understand
-

Asian case study

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- The XYZ Ltd Pilot Data Warehouse Project is not “just another database”
- The ABC Project aims to align with and support the XYZ Ltd Shared Value Model

Shared Value Model



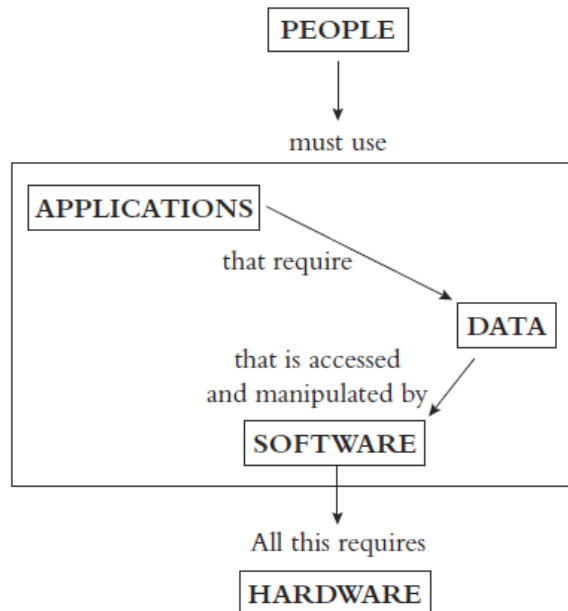
Source: www.dollmartin.com.au

Dos and Don'ts

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If the enterprise GIS project fails , it's most likely to be a people-related cause.

Components of an enterprise GIS



The worst mistakes in GIS Project History

- Not enough IT support
- Too much IT support
- Failed the 'bus' test
- No sponsor / champion
- Poor methodology or none
- Expectation management
- Unrealistic schedule
- Technology creep
- Ownership didn't "stick"
- Scope creep

Source:
Harmon 2003: The Design and Implementation of GIS Systems, Wiley

Source:
<http://www.miningsoftware.com/swmine/swarticles/esJun02GISArt.html>



Change Management

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- Can be the most challenging
 - Step by step
 - Management support is critical
 - Blow your trumpet
-



SYSTEMS INTEGRATION

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- Data architecture as a platform for spatial

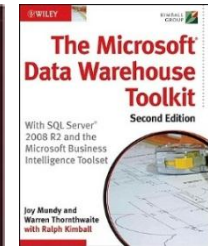
 - Enabling technologies
 - .Net and workflow
 - Web services
 - BI / DW becoming “commodities”
 - Metadata
-



Data warehouse and GIS

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Laura Reeves
Dr. Ralph Kimball
Margie Ross
Warren Thornthwaite



“Cubes” and star schemas have changed the way we store enormous amounts of data and serve it instantly to users

World expert consulting group has dominated for over 20 years. The Kimball Group.

The Kimball Group

The Kimball “diagram”

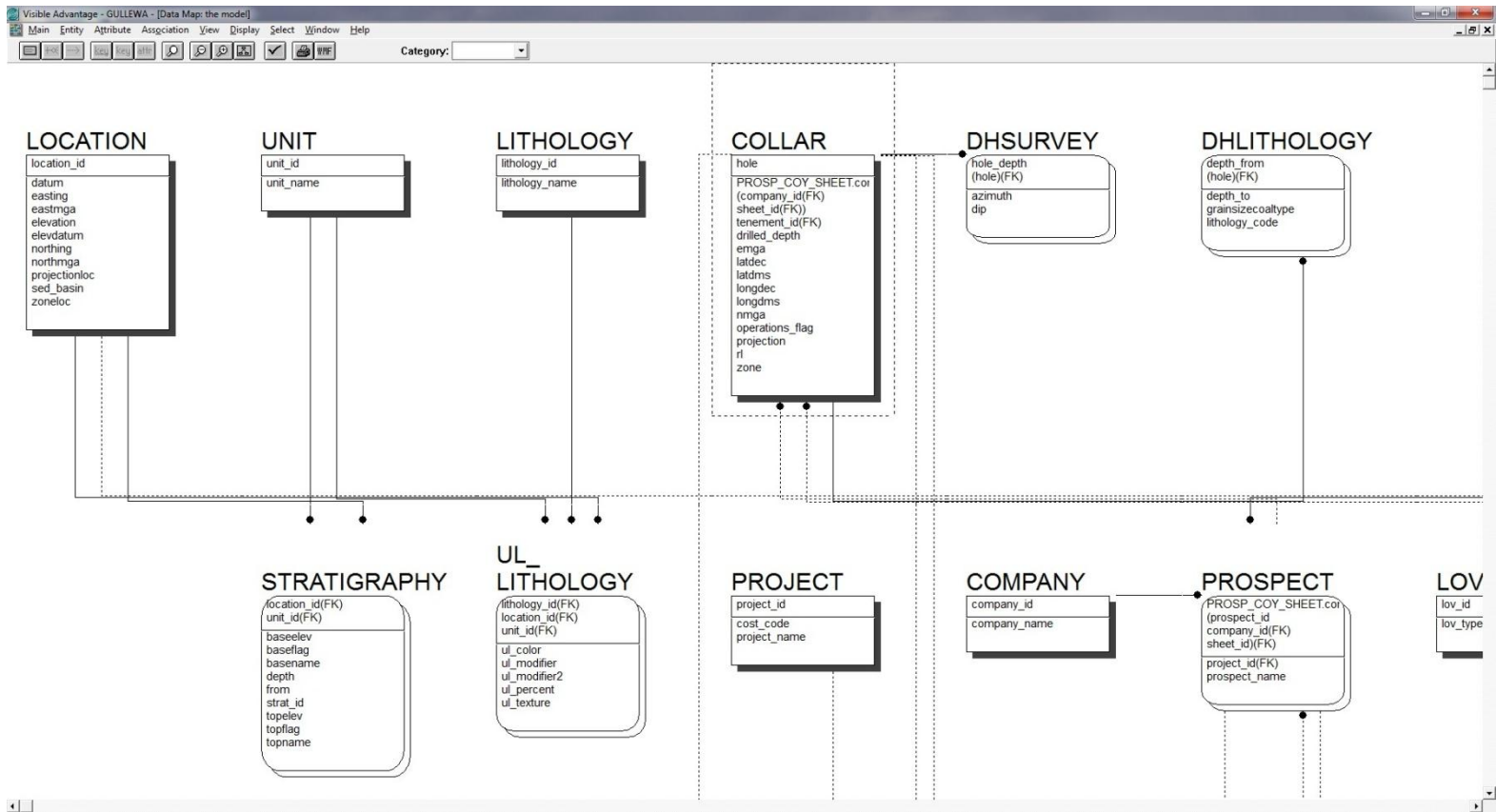
www.kimballuniversity.com



Data Model for source data

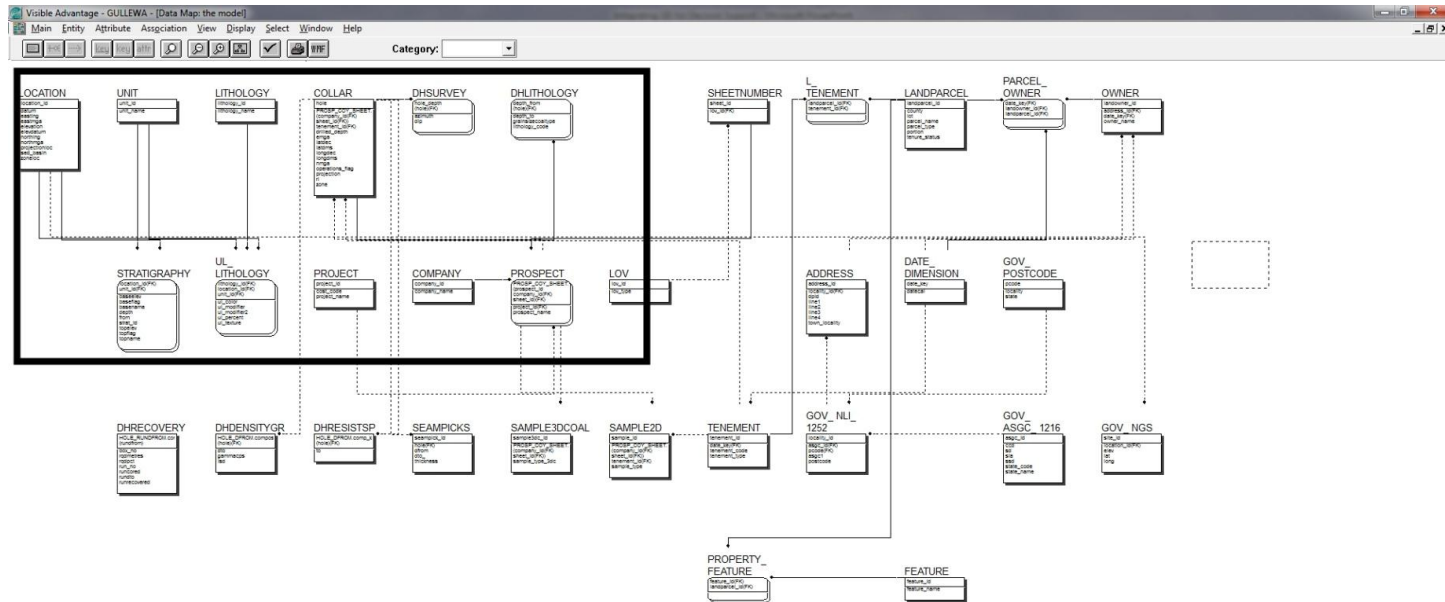
Great for storing data - lousy for analysing it !

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Typical exploration model

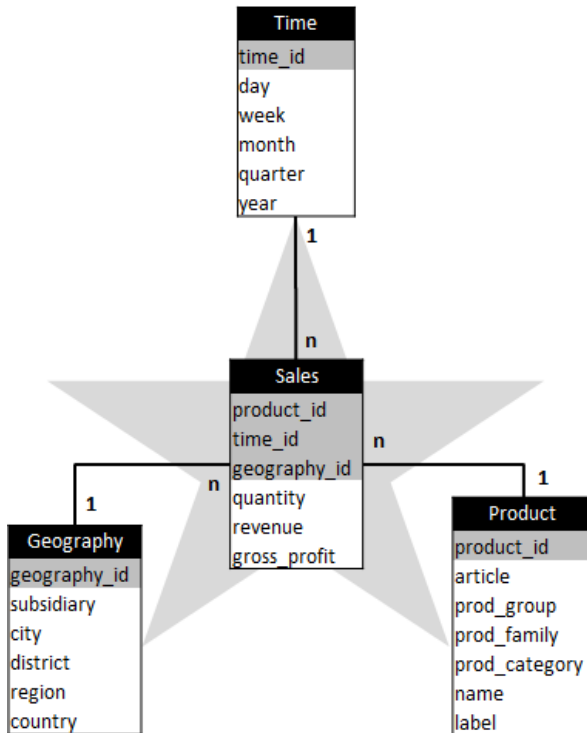
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Data Warehouse and spatial

Simple structure with few joins = fast drilldown in maps, reports

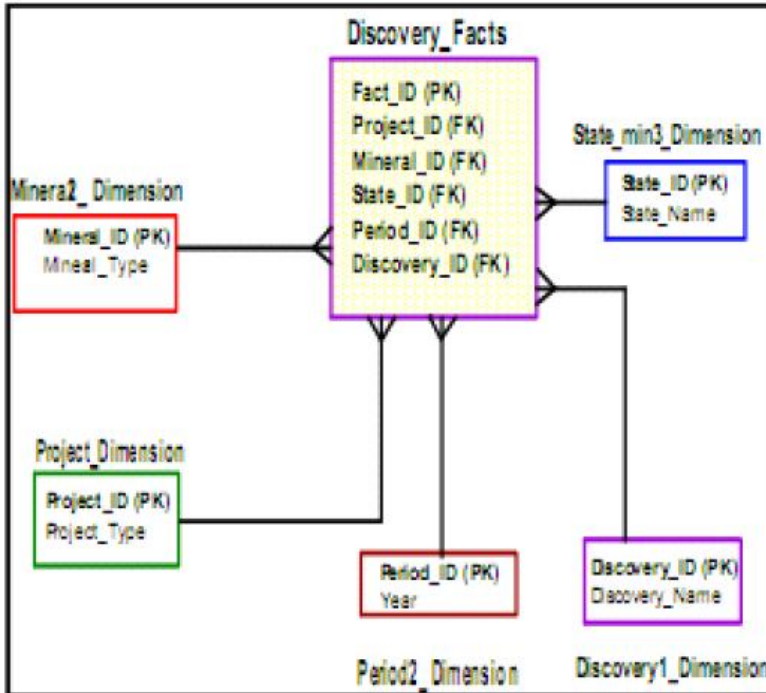
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Geography dimension

Country	State-Province	City	Internet Sales A...
Australia	(null)	(null)	9061000.5844
Canada	(null)	(null)	1977844.8621
France	(null)	(null)	2644017.7143
Germany	(null)	(null)	2894312.3382
United Kingdom	(null)	(null)	3391712.2109
United States	(null)	(null)	9389789.5108
Australia	New South Wales	(null)	3934485.7265
Australia	Queensland	(null)	1988415.0297
Australia	South Australia	(null)	618255.8616
Australia	Tasmania	(null)	239937.9033
Australia	Victoria	(null)	2279906.0633
Canada	Alberta	(null)	22467.8025
Canada	British Columbia	(null)	1955340.0996
Canada	Brunswick	(null)	(null)
Canada	Manitoba	(null)	(null)

Exploration “Cube”



3: Star schema of “mineral discovery” dimension – fact

Modeling Multidimensional Australian Resources Data for an effective Business Knowledge Management

Shastri L NIMMAGADDA and Heinz DREHER*
School of Information Systems, Curtin University of Technology, Perth, Western Australia

Business deliverable is a “dashboard”

Drake Exploration Inc.

December 2010 - February 2011

Chive Simons welcome to CampControl.

User Name	Latest Date	Task	Task Date
Jan Manning	21-Jan-2011	Flight to Accra	21-Jan-2011
Buddy Sapper	21-Jan-2011	Contact ALS re samples	21-Jan-2011
Melissa Nienaber	21-Jan-2011		
Rachelle Simmons	21-Jan-2011		

Flight Date	Location	Hours	Order ID	Order Date
19-Jan-2011	Banjo Base	0.9	2773 B1	21-Jan-2011
17-Jan-2011	Banjo Base	1.8	2773	21-Jan-2011
17-Jan-2011	Banjo Base	0.3	2772	21-Jan-2011
17-Jan-2011	Banjo Base	0.3	2771	21-Jan-2011

Borehole	Drill Date	Shift	Distance	PCS	Shipped	To Location
08-BB-013	20-Jan-2011	1	180	1123	21-Jan-2011	Great Camp
08-BB-013	19-Jan-2011	2	200	1118	21-Jan-2011	Banjo Base
08-BB-013	19-Jan-2011	1	210	1119	20-Jan-2011	Great Camp
08-BB-013	18-Jan-2011	2	40	1093	15-Jan-2011	Banjo Base

Batch ID	Shipped	Location	PCS	Received	Location
324	18-Jan-2011	Banjo Base	1081	08-Jan-2011	Great Camp
323	12-Jan-2011	Banjo Base	1071	05-Jan-2011	Great Camp
321	05-Jan-2011	Banjo Base	1072	05-Jan-2011	Banjo Base
322	05-Jan-2011	Banjo Base	1061	01-Jan-2011	Banjo Base

Passenger	Status	Departing	From	Name	Status	Arrives	Departs
Rob	Booked	22-Jan-2011	Edmonton	Rachelle	Booked	24-Jan-2011	25-Jan-2011
Rachelle	Booked	25-Jan-2011	Smithers				
Rachelle	Booked	05-Feb-2011	Edmonton				

Task	Task Date
Flight to Accra	21-Jan-2011
Contact ALS re samples	21-Jan-2011

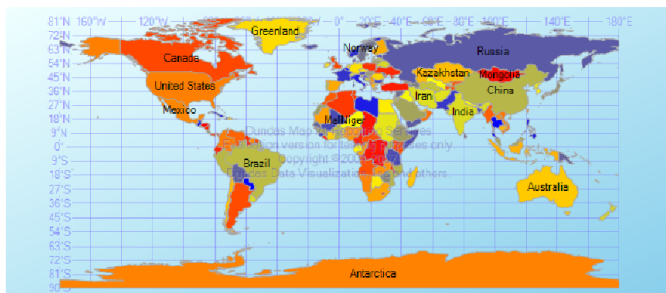
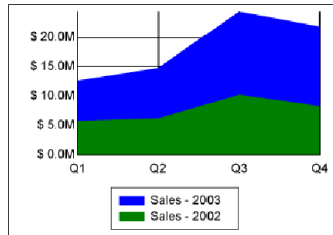
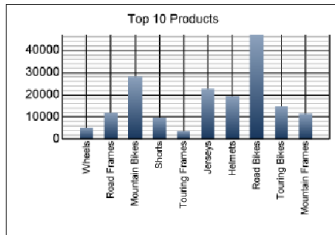
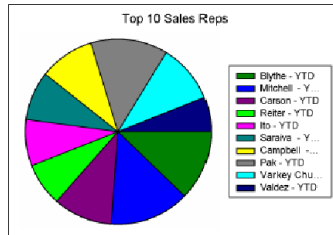
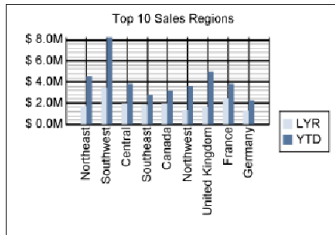
<http://www.campcontrol.com/features/FeatureTour.aspx?002-Dashboard>

Integrated GIS

AdventureWorks Corporate Dashboard
Report run on: 9/16/2008 9:42:50 AM



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- SSRS success story
- Roger Sanborn
- XML based 'Report Definition Language' (RDL) files
- .Net compatible maps
 - MapX
 - Dundas
 - Bing

Wrap Up

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- Spatial awareness is at an all time high
- Critical for Government and Business
- GIS now a mature technology
- New problems
 - Governance
 - Integration
 - Alignment

- Enterprise Architecture for Integration of GIS technology
 - At the Business Architecture level
 - At the Systems Architecture level

Thank you

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 gedser@gullewa.com