

# Thinking outside the (GIS) square

Simon Greener

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# Change of Speed

- Originally I was going to present the paper Eve Kleiman (International Products Manager, Oracle Multimedia and Spatial) and I are giving at the Melbourne SSI Conference
  - But, because this is Tasmania and the title of the presentation lends itself to a change...
    - I thought I would do something rather different to that which was advertised...
    - Though I will steal some material from that paper.
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# Sacred Cows?

- Are we (geospatial industry) taking ourselves too seriously?
  - Are we believing our own marketing hype?
  - Are we an industry with a serious case of myopia?
  
  - We are in danger of missing the bigger issues!
  - This is NOT about ME but it about the wider science and industry trends!
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# GIS Technology *IS* in Transition

- Factors causing transition:
    1. Open Systems
    2. “Commoditisation” of “GIS” technologies
    3. Vector graphics technologies
    4. Move from a 1960s model of data storage to mainstream data management through object (ADT) relational database technology.
    5. Data “democratisation”.
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# Business-centric “GIS”

- Before I move on to describe these, let’s express the transition another way...
  - Camp 1: “GIS is different”
    - The traditional view of GIS industry;
    - Special software is required to:
      - Store, manage, edit, access, analyse and display;
    - Result (data management):
      - Geospatial data described and managed via software that is external to an organisation’s enterprise data model(s) and information management infrastructure;
      - Inward looking, small, niche technology segment.
  - Camp 2: “Geospatial data and processing is NOT different“
    - An “enterprise geo-database” is not a product but, first and foremost, a *corporate data management philosophy* (“It’s about the model, stupid!”)
    - Trend is to horizontal market, commodity, open systems, fully IT integrated geospatial data and services.
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# Open Systems

(it ain't that special)

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# Open Systems

- Full “IT” integration (not just scripting *inside* a GIS client).
- GIS processing must be accessible within mainstream *programming* languages (not just scripting)
  - Java, VB, .NET etc
- GIS must work within mainstream frameworks and interoperability standards that matter to the *business community*:
  - .NET or J2EE (cf Corba)
  - Business Process Execution Language (BPEL), Web Services Definition Language (WSDL)
  - Service Oriented Architectures (SOA)
  - ASP, JSP, Servlets etc
  - SQL (and therefore JDBC, ODBC, OLEDB, ADO etc)
  - Note: Not just OpenGIS WFS/WMS/WCS standards!
- Fully integrated with mainstream databases (later)

# Open Systems: Portlets

- Java Community Process (JCP) helps control modifications or extensions to Java.
  - These extensions are JSRs (Java Specification Requests)
    - eg JSR 168: Portlet Specification
      - Interoperability between Portlets/Portals
      - Set of APIs addressing areas of aggregation, personalization, presentation and security
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Personnel portlet

### Personnel List

Mike Ross  
Tom Taylor  
John Smith  
Bruno Cotti  
James Black

All

Check availability

List Detail

Map

Jobs portlet

### Select to display the job list

Unassigned

Submit

Alarm portlet

### Alarms

Update Detail

DispatchMapping portlet

Map Width: 800 mi

wire Map Attributes

# Portal Reasons

- Single Point of Access for particular audience
  - Broad array of resources and services brought together from 1 source
  - Sense of community
  - Customisation, personalisation, integration
  - Portal Types - Subject Portals, User Community Portals, Institutional **Portals**...
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“Commoditisation”

(cost really is an issue)

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# “Commoditisation”

- “Commoditisation” of “GIS” technologies
    - Software competition (Globalisation?) is driving down cost.
      - Open Source (JTS, GeoTools, GeoServer, Deegree, Dig, PostGIS, MySQL)
      - Low cost Windows “GIS” (Manifold).
      - Low cost GPS (and mapping) tools.
      - OpenGIS.
      - Network centric (geospatial) technologies.
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# “Commoditisation”

- Manifold

$$\frac{\textit{Functionality}}{\textit{Price}} \equiv \text{No Brainer}$$

- But still even they think geospatial data and processing is so different it has to be done within a GIS package!
  - Google Earth (Keyhole)
    - Who can buy ArcGlobe at the Google Earth price?
  - World Wind (NASA)
  - Development kits
    - TatukGIS DK (\$0 deployment cost)
    - VS.NET and Avalon in Longhorn!
    - Java Topology Suite and GeoTools
-

# Aside: Home Grown?

- We are using:
    - Commercial and Open Source software
    - But lots of our public websites are powered by overseas technologies...
  - Why not Australian software?
    - Geometry (Exposure) / Social Change Online range of OpenGIS products.
    - IntraGIS Systems vs MapInfo Exponare
    - MapInfo 3+D Extension & Verdant SonarData
  - No “Buy Australian First” by any tier of Government!
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# Vector Graphics Technologies

(Kimmy, look at meee, look at  
meee)

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# Vector Graphics Technologies

- Graphics technologies have driven OS development
    - Need for multi-tasking in Apple OS by graphics industry saw move of primary development platform to Windows.
    - Games computing is most active of all software and hardware development arenas.
  - There is a need to move to vector graphics technologies in **general computing**.
    - CG (Computer Graphics) in movie industry!
    - CAD/CAM uses still outstrip GIS.
    - Bitmap OS User Interfaces are (almost) dead
      - Bitmap internet mapping too restrictive.
    - Scalability only achieve through vector objects
      - eg Font technologies (TrueType) replaced bitmap fonts.
      - Scalable Vector Graphics
      - Avalon
  - Result: You won't/don't need a GIS to draw a map!
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# Data Storage

(its about the model stupid!)

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# Data Storage

- Move from a 1960s model of data storage to mainstream data management through object (ADT) relational database technology.
  - Oracle Spatial
  - PostGIS
  - MySQL
  - Informix / IBM.
- Databases are not proprietary in the same sense that GIS-centric file formats are.
  - Most commercial relational DBMS are SQL99 standards compliant.
  - Standard of interest to GIS community is SQL3/MM (Oracle 10g is part way there; as is PostGIS)
- What will happen when SQL\*Server understands spatial?

# Data “Democratisation”

(let it go - it will come back to you)

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# Democratisation (2)

- Are we giving the customer what they want?
  - Let me try and illustrate ...
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# Case Study (1): GDA

- I put a lot of work into the conversion of FT's data and systems from AMG to MGA....
    - Unless otherwise convinced by attendees at this conference, my view is that, given today's GPS hardware and firmware, the conversion was not necessary.
    - The original decision might have made sense back 20 years ago, but the move in the year 2000 appears to me to be a classic “bureaucratic decision”.
  - But now we have moved are we taking advantage of the opportunities that arise from having converted our data?
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# Case Study (1): Map Production and the new economy

- Topo 25K Map Series
    - 455 map sheets
    - Conversion to MGA from AMG only for areas of state in which development is occurring (ie urban).
      - Existing paper stocks? **Tear them up!**
      - Do people really still want paper maps? **Yes but....**
      - Bush walking is “corner of 4 map sheets” activity to which new technology (GPS units, mobile phones, Epurbs) is being applied. **Ah - User choice?**
    - But we have just produced our first replacement topographic map sheet - Taroon!
    - Similarly for the Tasmanian Towns Street Atlas
  - Is a paper the best way to deliver the data?
-

# Case Study (1): “Outside the (Square) Map Sheet”

- User selectable area / scale
  - Live digital data
    - All topographic / cadastral datasets
    - All aerial/orthophotos / satellite imagery
    - Antique maps
  - Access via:
    - ATM Machines
      - On demand A4/A3 map products \$4
      - Lamination + \$1
      - Download to PDA / Flash Memory Stick \$2
      - Download to Mobile Phone (w, w/o GPS) \$2
    - Service Tasmania
      - “State of the art” Injet printers + laminators \$4 - \$20
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# Case Study (2): Data Costs

- Hardware, Software and Data
    - Your home stereo dies....
    - You decide to purchase a new one...
    - A visit to your local HiFi store is in order...
    - Bamboozled by options, the siren song of the salesman convinces you to buy the Rolls Royce...
    - You walk out with a new system....
  - But...
    - Lighter in the wallet, the new HiFi is installed...
    - But you discover that you can't afford the software (CD/DVD)....
  - Cut to GIS....
-

# Case Study (2): Data Costs

- US GIS software costs a lot of money
  - Capex and Opex.
  - Balance of Trade is affected (something we all have a responsibility to change).
- Often we purchase “Rolls Royce” GIS software
  - Functionality to burn!
  - Do we really need all that functionality?
- But once we have it installed, attended the training courses we discover that....

**We can't afford the data!**

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# Case Study (2): Statewide datasets

- These costs are affecting our (Tasmanian) economy?
- We can't afford (never mind coordinate) a set (ie various scales) of statewide orthorectified imagery.
- The uses for a navigable road network dataset have been known for over 10 years but Tasmania is only just starting out!
  - Data is not driving the state's economic efficiency
- At FT, a trial of Lidar has shown how beneficial it will be to the forest industry (inventory, cable logging, landscape etc).
  - A better DEM is one statewide benefit (fundamental infrastructure for a host of govt, business and private uses)
  - Flow on data quality effect for drainage, transportation etc.
  - City of Gothenberg. They have built an entire 3 D city!
  - The potential benefits noted by Verdant computer systems....

**Is exporting software license \$\$ to overseas companies stifling real economic efficiencies?**

# Data: What is holding us back?

- We don't seem to be able to leverage the good work done in creating The LIST.
    - Has The LIST lived up to what was expected?
    - Is it really a true data infrastructure on which a highway of information systems can be built?
    - Front ends are predominantly “GIS” oriented wrt functionality - target audience is poorly defined.
    - Have we thought about B2E, B2B and B2C uses?
    - Example: Every business in Tasmania should be able to execute sophisticated vehicular routing (logistics) as part of a G2B Portal (Government as ASP).
  - Tasmania 20/20 was anything but a vision of information technology in 20 years time!
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# Transition

(I think I can, I think I can...)

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# Transition Effects and Results

- The most immediate effect of these is that the binary divide between enterprise and “GIS” data management, visualisation and processing has gone.
    - It is no longer external to the core information model and architecture of an organisation!
  - **Result**
    - We are freed from the myriad issues that come with a duality of data management and processing systems;
    - We can concentrate on building systems that address real business and customer needs delivering better outcomes for all.
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Adjustment (?)



Education

(Can we do this?)

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# How can we adjust: Education?

- Geomatic education is broadly focussed on two groups:
  - Analysts
    - Realm of the science professional (eg ecologist, geologist, forester, zoologists etc.
  - Generalists
    - Mainly Geomaticians, Cartographers, Geographers;
    - A problem group for business-centric computing
      - How do they “add value”?
    - Neither fish or fowl:
      - Programmer? Analyst?
      - Systems Administration Helpdesk (Degree?)
      - Infrastructure (data) specialist End user?

# Education (2)

- But for us to grasp the new realities on offer we need to concentrate on creating a third group of experts:
    - Geospatially literate Computing Scientists
      - We need geomatics graduates that are **more** computing science and technology literate.
      - At least a *Minor* in computing science.
    - or
      - We need Computing Science majors with a geomatics minor.
  - Remember: **Scripting is NOT programming!**
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# Education (3)

- Giving of GIS technologies to Tertiary Education bodies by GIS companies may be good marketing but it is not helping the industry.
  - Graduates equate:
    - Skill with a vendor's technology **WITH** GIS.
    - Or, worse:
      - Vendor company **IS** GIS.
  - “Geography might bring us together”
    - Great marketing!
    - Results:
      - A narrowing of horizons;
      - Inability to think independently; (Think outside the square)!
      - FUD (What's happening to my career!);
      - No one ever sacked for buying IBM!
-

# Education (4)

- But what about the end user....
-

# A Change of Focus

Prejudices confirmed, Ego stroked  
(not about me, stupid!), Spleen  
vented... is this pig ready to fly?

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# Six Rules for Successful Web 2.0 / Where 2.0 Applications

(Stolen from) Tim O'Reilly

O'Reilly Media, Inc.

[www.oreilly.com](http://www.oreilly.com)

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# Outside the Square



What do these all have in common?



# Remember this...

## Following the Hacker Frontier

- New technology emerges
- Hackers push the limits
- Entrepreneurs apply hacker insights and make technology easier for users
- Technology gets incorporated into ubiquitous platforms
- Hackers move on

## Watch the Alpha Geeks

- New technologies first exploited by hackers, then entrepreneurs, then platform players
- Two examples
  - Screen scraping predicts web services
  - Wireless community networks predict universal Wi-Fi



*Rob Flickenger and his potato chip can antenna*

# The new killer apps

## The New "Killer Apps"

Google

eBay

amazon.com.

salesforce.com  
WISDOM FOR SUCCESS!

YAHOO!

PayPal

MAPQUEST.

## What Makes Them Interesting To Me

- The Internet, not the PC, is their platform
- Built on top of open source, but not themselves open source
- Services, not packaged applications
- Exploring how to become platform players via web services APIs
- Data aggregators, not just software
- Network effects from user contributions key to market dominance
- The most successful are "semantic learning systems", leveraging implicit metadata

# 1. Users Add Value

The screenshot shows a real estate website interface. At the top, there are navigation links for "For Rent", "For Sale", and "Rooms". Below this, a search bar is set to "City: Philadelphia" and "Price Range: \$1500 - \$2000". A map of Philadelphia is displayed on the left, with a popup window for a property at "Moore St & S Broad St Philadelphia". The popup shows a price of "\$1,544" and the title "Beautiful Modern 2 bedroom bi-level 1 1/2 bath". It includes four small images of the property's interior. To the right of the map is a list of other properties, each with a price, a small icon, and a title. The list includes properties such as "Excellent 3 Bed 2 Bath", "House for rent in Gladstone", and "House for rent - 3000 sq ft, on 2nd floor, near to Parkview, 1500".

The users  
add value to that  
application!

with travel plan,

## 2. Network Effects by Default

Directions mapping portlet

Map Width: 12.86 mi

Route total time = 12.7 min, distance = 9.74 mi.

Directions portlet

Route total time = 12.7 min, distance = 9.74 mi

Map

- 1 Turn right on Grant McConachie Way travel West 2.38 mi (3.7 min).
- 2 Continue on Arthur Laing Bridge and travel North 0.14 mi (0.2 min).
- 3 Continue on the ramp and travel Northeast 0.39 mi (1.2 min).
- 4 Continue on Marine Dr SW to Marine SW bearing West 0.10 mi (0.2 min).
- 5 Continue on Granville St and travel Northwest 4.89 mi (5.3 min).
- 6 Turn right on Seymour St/Hwy 99 and travel East 0.83 mi (0.9 min).
- 7 Turn left on Georgia St W/Hwy 99/Georgia St and travel Northwest 1.0 mi (1.0 min).
- 8 Turn right on Cardero St and travel Northeast 0.08 mi (0.2 min).
- 9 Turn left on Bay Shore Dr and travel Northwest 0.00 mi (0.0 min).
- 10 Turn right to reach your destination the Northeast.

to

data  
on.

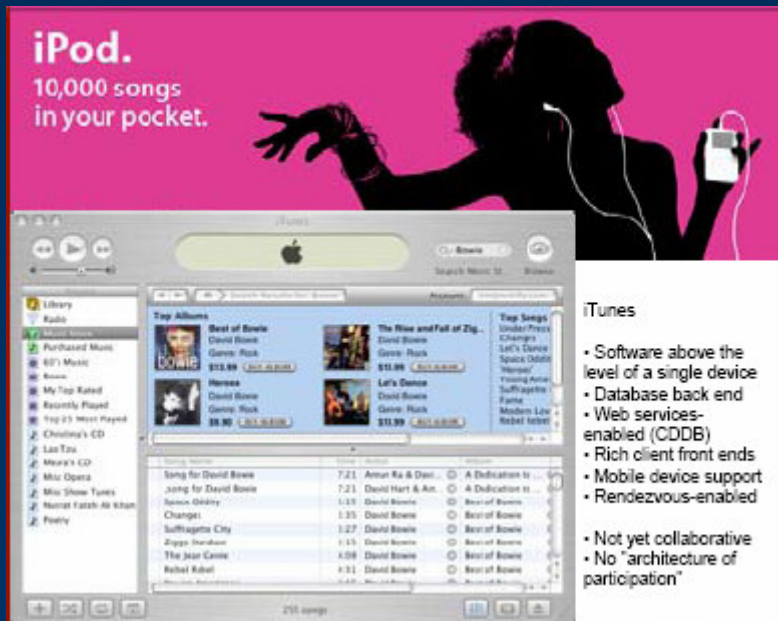
# 3. The Perpetual Beta

- When devices and programs are connected to the internet, applications are no longer software artifacts, they are ongoing services.
- Therefore:
  - Do not package up new features into monolithic releases, but instead add them on a regular basis as part of the normal user experience (Agile).
  - Engage your users as real-time testers, and instrument the service so that you know how people use the new features.



## 4. Software Above the Level of a Single Device

- The PC is no longer the only access device for internet applications, and applications that are limited to a single device are less valuable than those that are connected.



iPod.  
10,000 songs  
in your pocket.

iTunes

- Software above the level of a single device
- Database back end
- Web services-enabled (CDDDB)
- Rich client front ends
- Mobile device support
- Rendezvous-enabled
- Not yet collaborative
- No "architecture of participation"

- *Therefore*: Design your application from the get-go to integrate services across handheld devices, PCs, and internet servers. (cf post-GDA mapping)

# 5. Data is the Next “Intel Inside”

- Applications are increasingly data-driven.
- Therefore:
  - Owning a unique, hard-to recreate source of data may lead to an Intel-style single-source competitive advantage.
- Some data is a commodity and impossible for any one party to own, but access to the data can be controlled through legal means.
- Therefore:
  - If you can't own the data, own the namespace or registry for the data.

# 6. A Platform Beats an Application Every Time

- Spot the difference?
  - Excel vs Lotus 1-2-3
  - Word vs WordPerfect
  - Internet Explorer vs Netscape
- Dare I say: GIS SDK vs Avalon & VS.NET?
- Make your platform accessible to Alpha Geeks
  - MapPoint and MapQuest are not Hacker friendly (cf 1.0)
  - Neither is Spatial Smart Tag!



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# Lock in...

## Desktop Application Stack



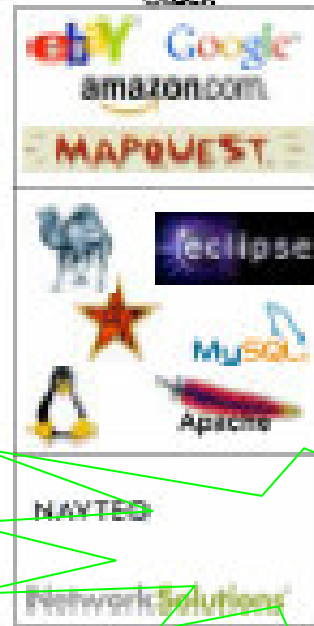
Proprietary Software  
(Control by API)

(ArcObjects)

System Assembled from  
Standardized  
Commodity Components

Hardware Lock In  
By a Single-Source Supplier

## Internet Application Stack



Proprietary  
Software As a Service

Integration of Commodity  
Components

Subsystem-Level Lock In

# Two Types of Platform

- One Ring to Rule Them All



- Sort-of OK in business but not in the internet.

- Small Pieces Loosely Joined



- An architecture of participation means that your users help to extend your platform
- Low barriers to experimentation mean that the system is "hacker friendly" for maximum innovation (not just OpenGIS)
- Inter-operability means that one component or service can be swapped out if a better one comes along
- "Lock-in" comes because others depend on the benefit from your services, not because you're completely in control

## 6. A Platform Beats an Application Every Time

- Web 2.0 / Where 2.0 applications are built of a network of cooperating data services.
  - Therefore:
    - Offer web services interfaces and content syndication, and re-use the data services of others.
    - Don't just slavishly follow OpenGIS or GIS vendor standards!
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# Conclusion

“The future is here.  
It’s just not evenly distributed yet!”

-- William Gibson

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# Outside the Square



What do these all have in common?

They have shown that you don't need a GIS to produce a map!

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