



JavaOne™

java.sun.com/javaone

Duke Riding the Geospatial Wave

Chris Holmes (OpenGeo)
Steve Citron-Pousty (deCarta)
James Macgill (Google)
Wilfred Springer (TomTom)

@DukeSpatial

PAN-5773

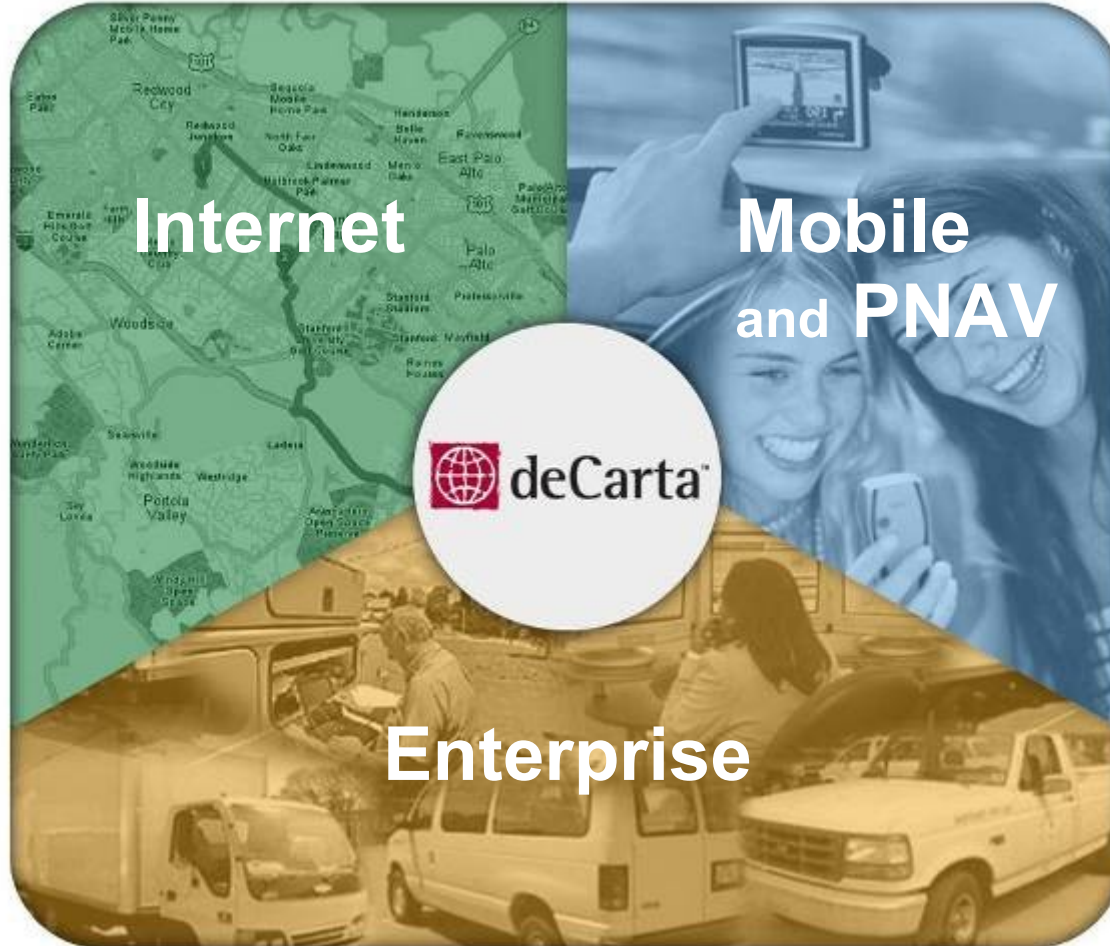


deCarta

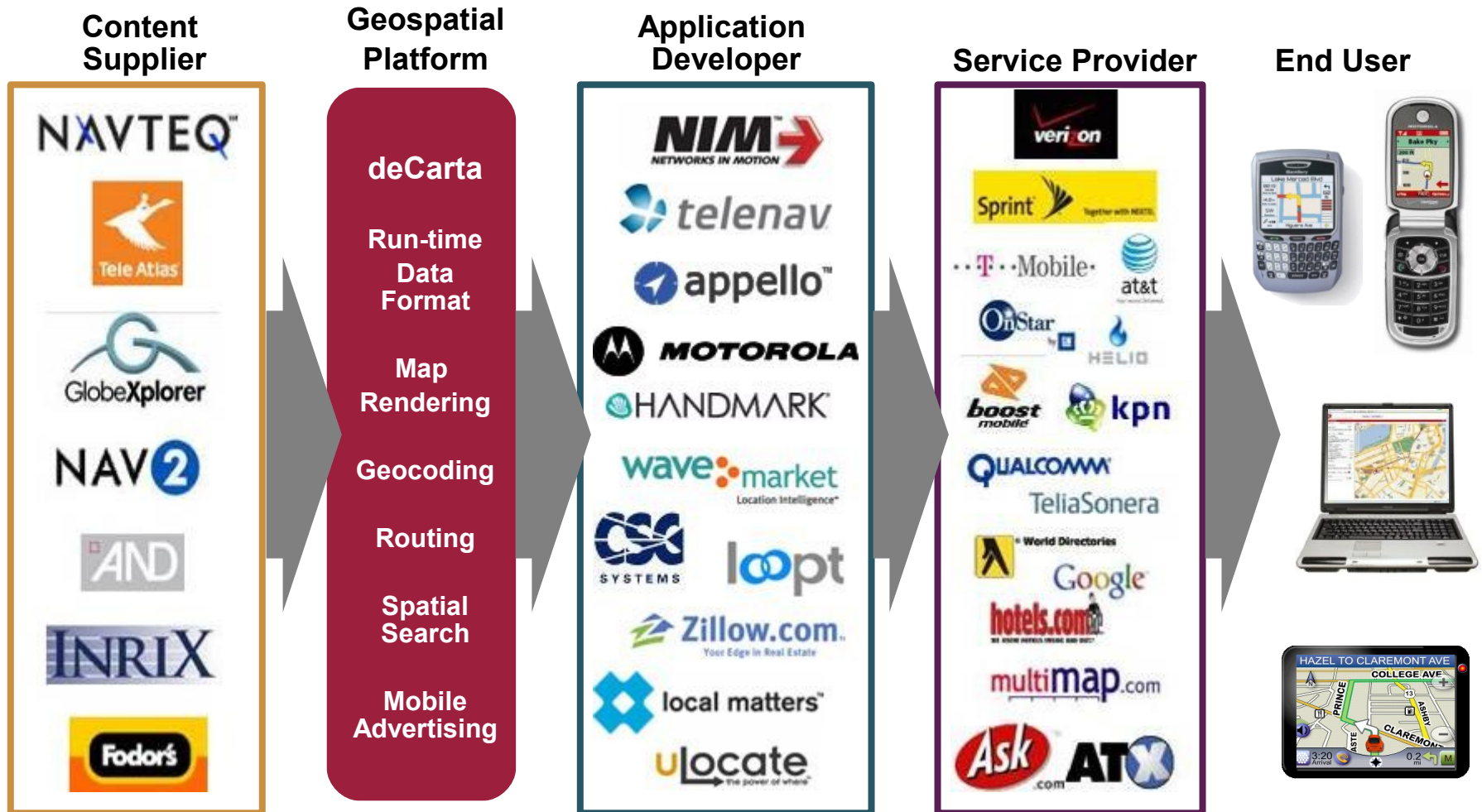
A large, light blue arrow pointing to the right, positioned behind the word "GOAL".

GOAL

deCarta's technology powers 3 market segments of the Location industry

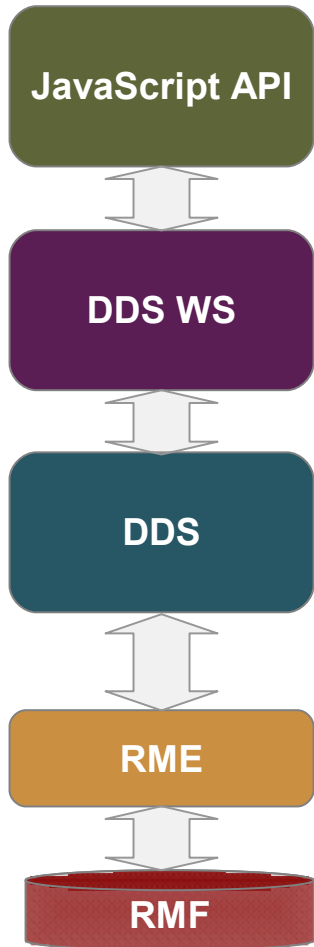


deCarta is the leading geospatial software platform in a complex LBS Value Chain



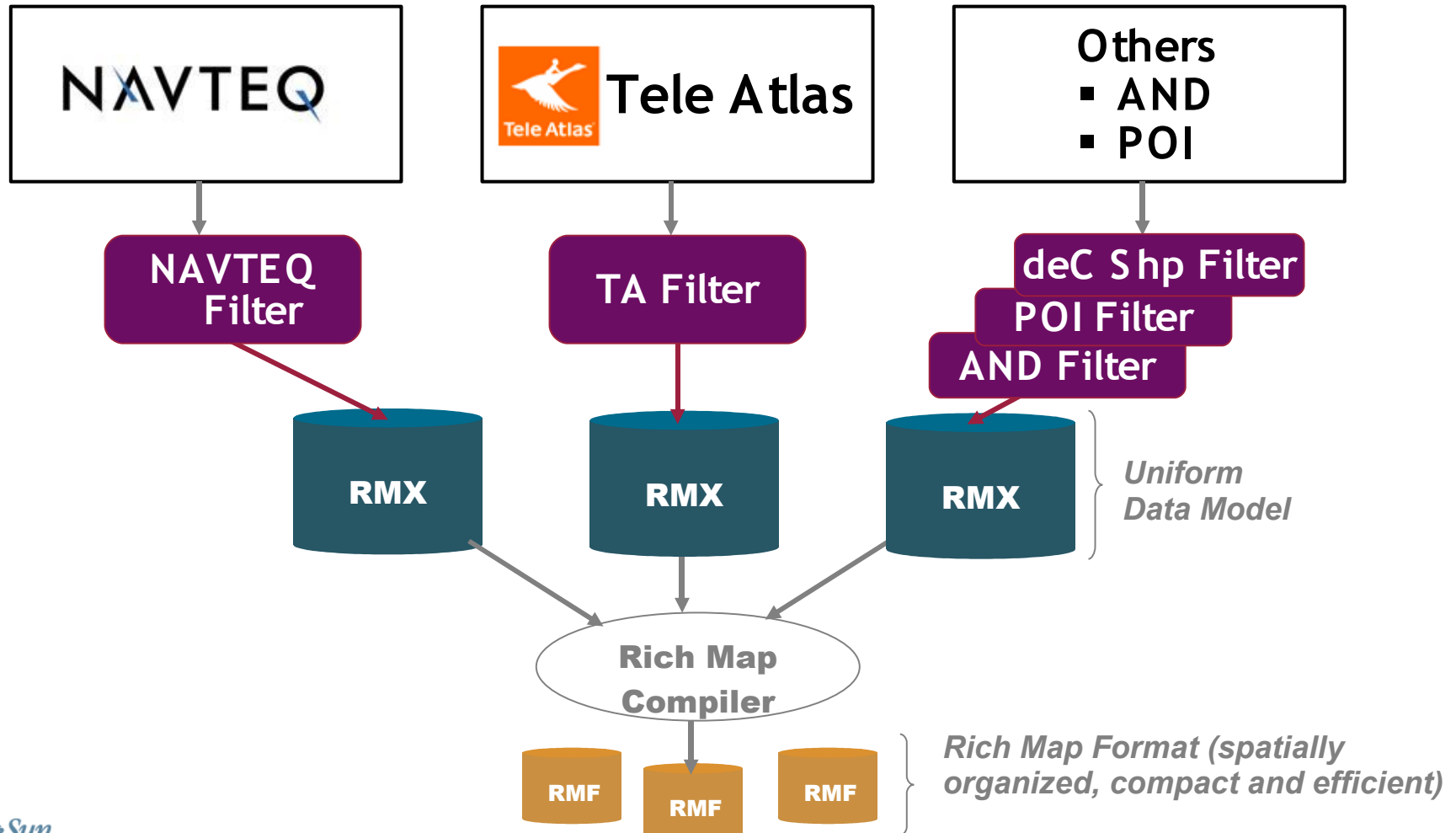


4 APIs: Mix and Match - under a single license

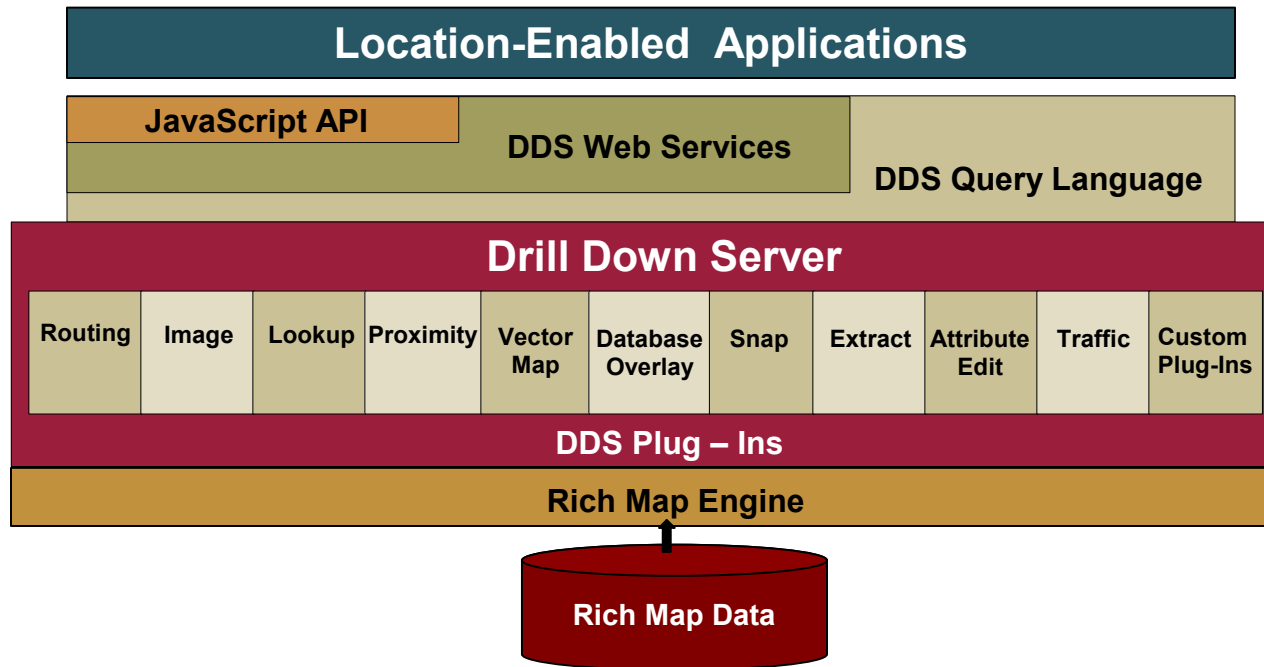


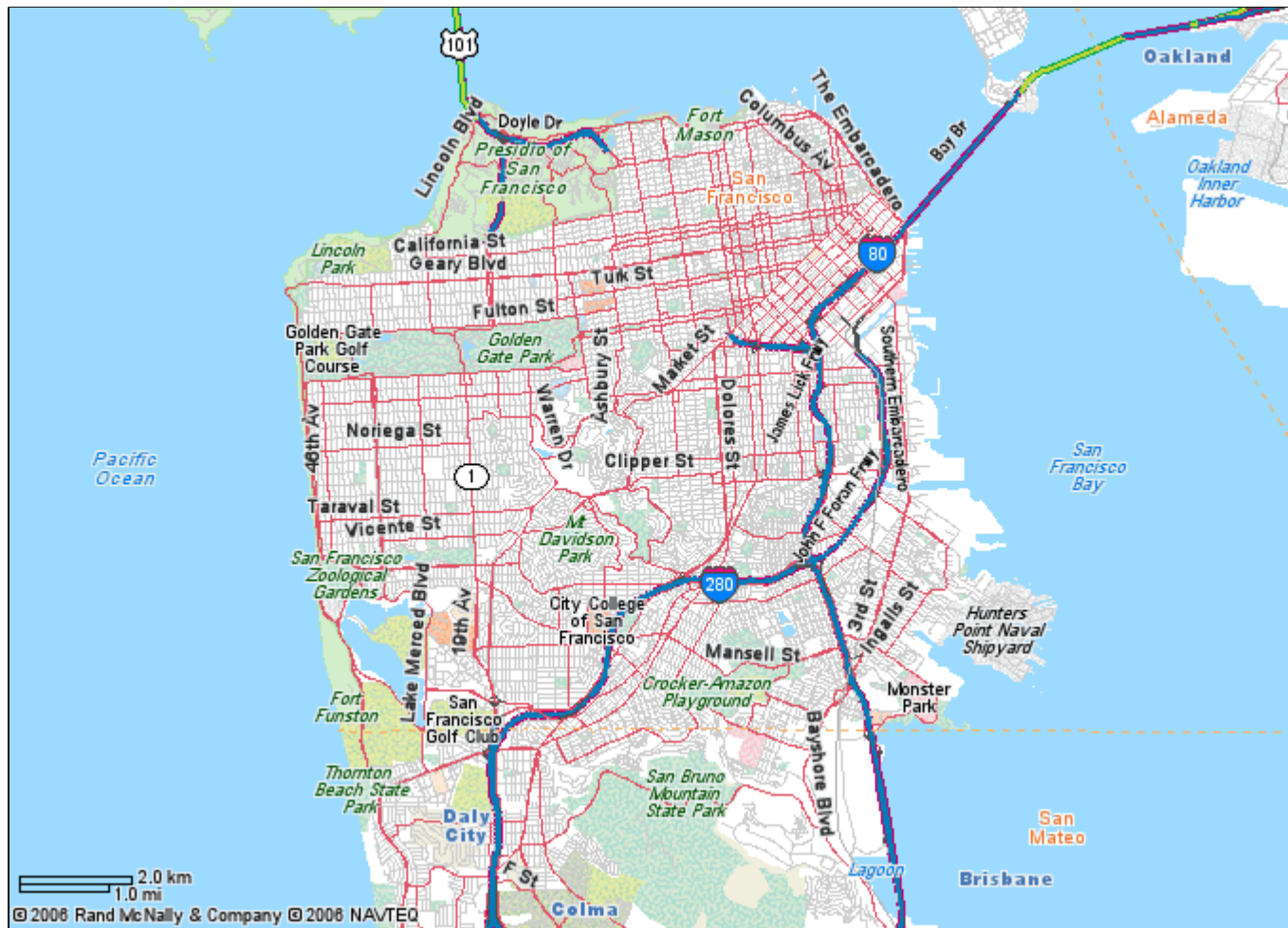
API	Interface and Communications	Advantages
JavaScript API	<ul style="list-style-type: none">▪ AJAX style HTTP requests	<ul style="list-style-type: none">▪ Much simplified Browser Integration
Web Services	<ul style="list-style-type: none">▪ XML over HTTP▪ OGC/OpenLS Compliant	<ul style="list-style-type: none">▪ Rapid application development for both mobile and internet solutions▪ Platform independent▪ Supports Service Oriented Architecture (SOA)
DDS	<ul style="list-style-type: none">▪ Client/Server▪ Proprietary Query Language▪ Socket-based over TCP/IP	<ul style="list-style-type: none">▪ Rich Feature Set▪ Robust and Mature Toolkit▪ Platform Independent▪ Extensible▪ Suitable for internet and wireless solutions
RME	<ul style="list-style-type: none">▪ C Libraries	<ul style="list-style-type: none">▪ Small and Portable▪ “Atomic” Level Control for:<ul style="list-style-type: none">–Map Rendering–Routing–Spatial Searching–Data Edits and Updates

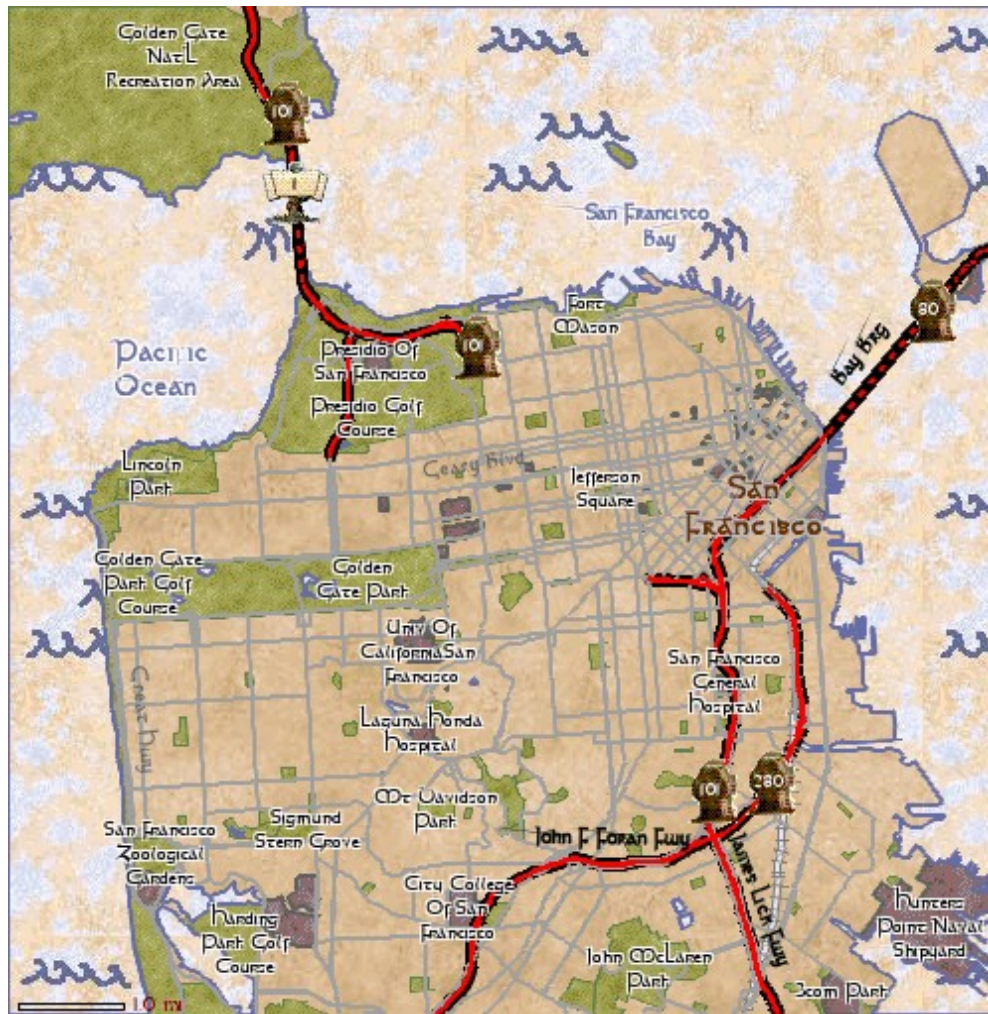
deCarta IP: Leverage an efficient data format (RMF) for high-speed processing



Drill Down Server Plugins









deCarta™

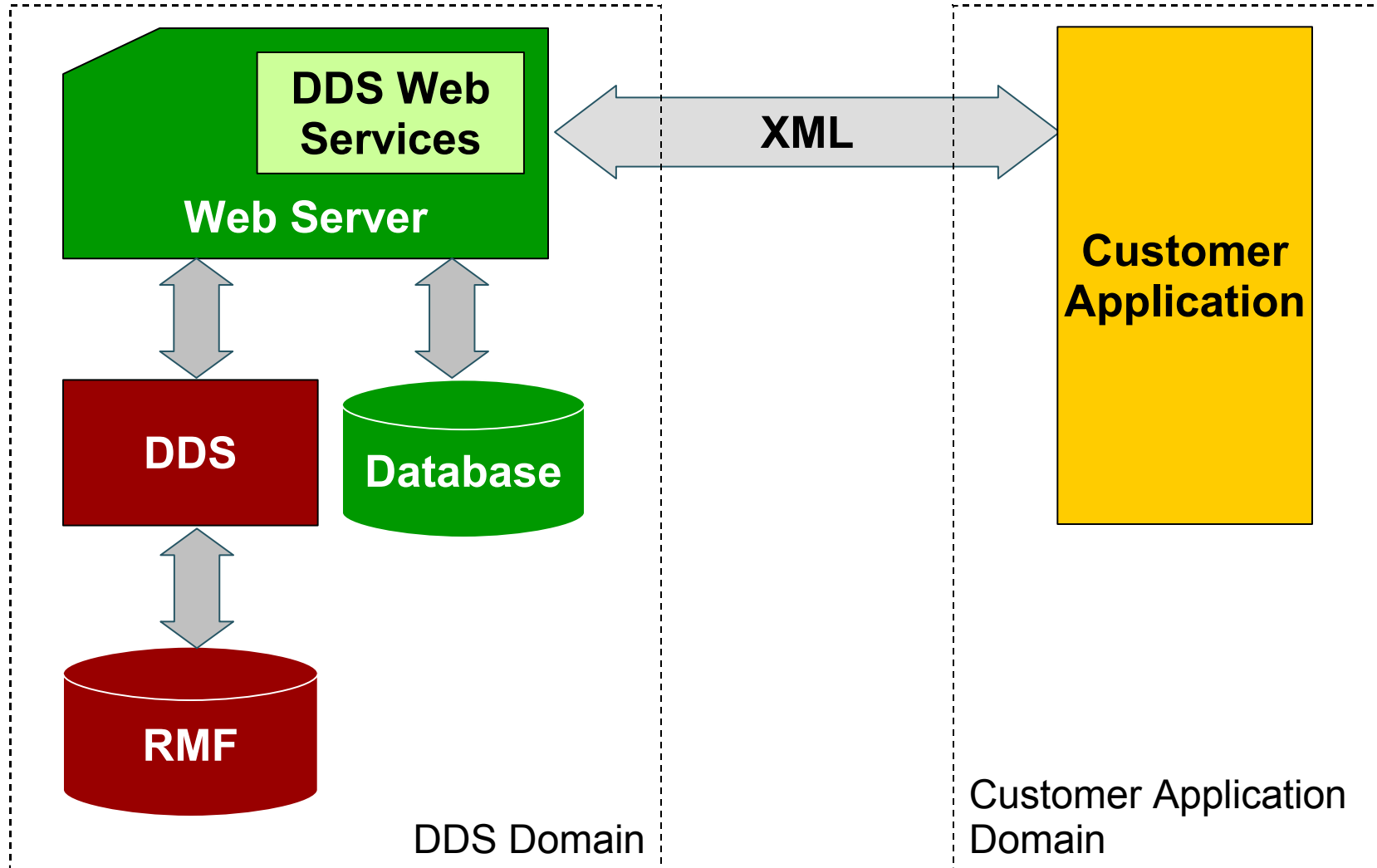
中国-大陆-香港-台湾



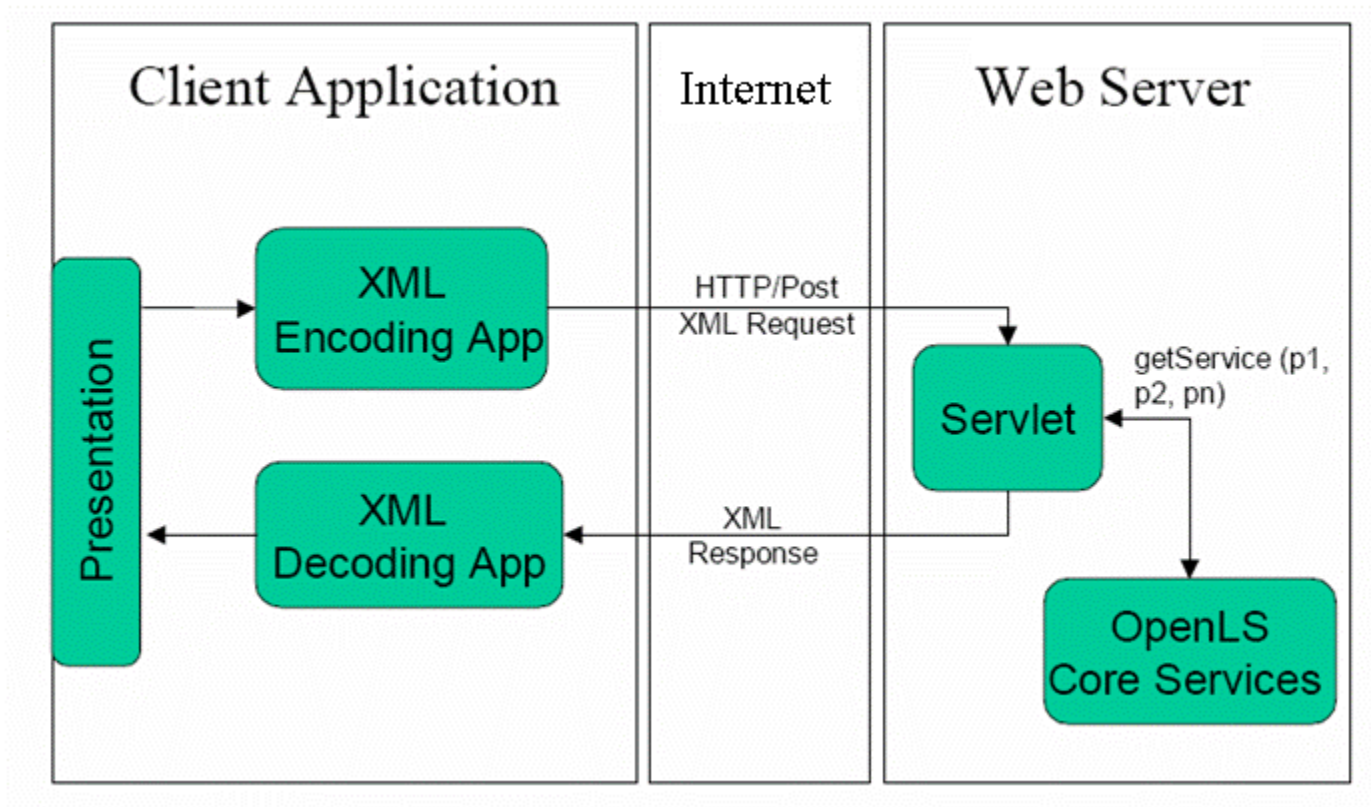
Traffic Manager functionality

- Flow Functionality
 - Detour routing based on flow
 - Alternate routes
 - Local detour routes
 - Generate flow highlights for a map view
 - Find flow conditions based on a location
- Incidents Functionality
 - Find incidents for a map view
 - Find incidents based on a location
- Real Time and Predictive Capability

DDS Web Services architecture



Usage Pattern for OpenLS Response/Reply Pairs



ReverseGeocode01.xml request

ReverseGeocode01.xml response

A reverse geocode request...

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ns1:XLS ns1:lang="en" version="1" xmlns:ns1="http://
www.opengis.net/xls">
  <ns1:RequestHeader clientName="xxxx" sessionID="999"
clientPassword="xxxx"/>
  <ns1:Request requestID="10" maximumResponses="25"
methodName="ReverseGeocodeRequest" version="1.0">
    <ns1:ReverseGeocodeRequest>
      <ns1:Position>
        <ns2:Point xmlns:ns2="http://www.opengis.net/gml">
          <ns2:pos>41.003 -72.002896</ns2:pos>
        </ns2:Point>
      </ns1:Position>
    </ns1:ReverseGeocodeRequest>
  </ns1:Request>
</ns1:XLS>
```

that specifies location by lat-lon

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
... snip for space
<ns1:ReverseGeocodeResponse>
  <ns1:ReverseGeocodedLocation>
    ...returns found point and...
    <ns2:Point xmlns:ns2="http://www.opengis.net/gml">
      <ns2:pos>41.003 -72.002897</ns2:pos>
    </ns2:Point>
    ...address and location information
    <ns1:Address countryCode="US">
      <ns1:StreetAddress>
        <ns1:Building number="(100 - 198), (101 - 199)"
      >
        <ns1:Street>1st Ave</ns1:Street>
      </ns1:StreetAddress>
      <ns1:Place type="CountrySubdivision">NY</
ns1:Place>
      <ns1:Place type="Municipality">NEW YORK</
ns1:Place>
      <ns1:PostalCode>11111</ns1:PostalCode>
    </ns1:Address>
  </ns1:ReverseGeocodedLocation>
</ns1:ReverseGeocodeResponse>
</ns1:Response>
</ns1:XLS>
```

Current DDS Web Services functions

- **Existing DDS Web Services Functions**
 - Tiled maps
 - Route services
 - Geocoding
 - Reverse geocoding
 - Directory services (POI)
 - External POI data access
 - Server side point, line and polygon overlay
 - More...

JavaScript™ APIs today

■ JavaScript API Features

- Draggable hybrid/satellite map
- Dynamic map styles
- Customized pin styles
- Numbered pins
- Custom Information Window
- Event handling using EventRegistry on map and pins
- Click-by-click waypoint routing
- Freeform geocoding
- Reverse geocoding
- Multiple route styles
- Dynamically retrieve POIs
- More...

ONE THING TO REMEMBER

**developer.decarta.c
om**

TomTom 

The TomTom logo, which consists of two hands cupping a globe.

GOAL

Routes'R Us



Backed by Java™ Platform

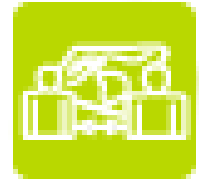
> Provide the best routes

- **IQ Routes™** give us the best routes and the best estimated time of arrival, with and without traffic information



> Provide the best maps

- **MapShare™** gives us always up-to-date maps by means of a huge community

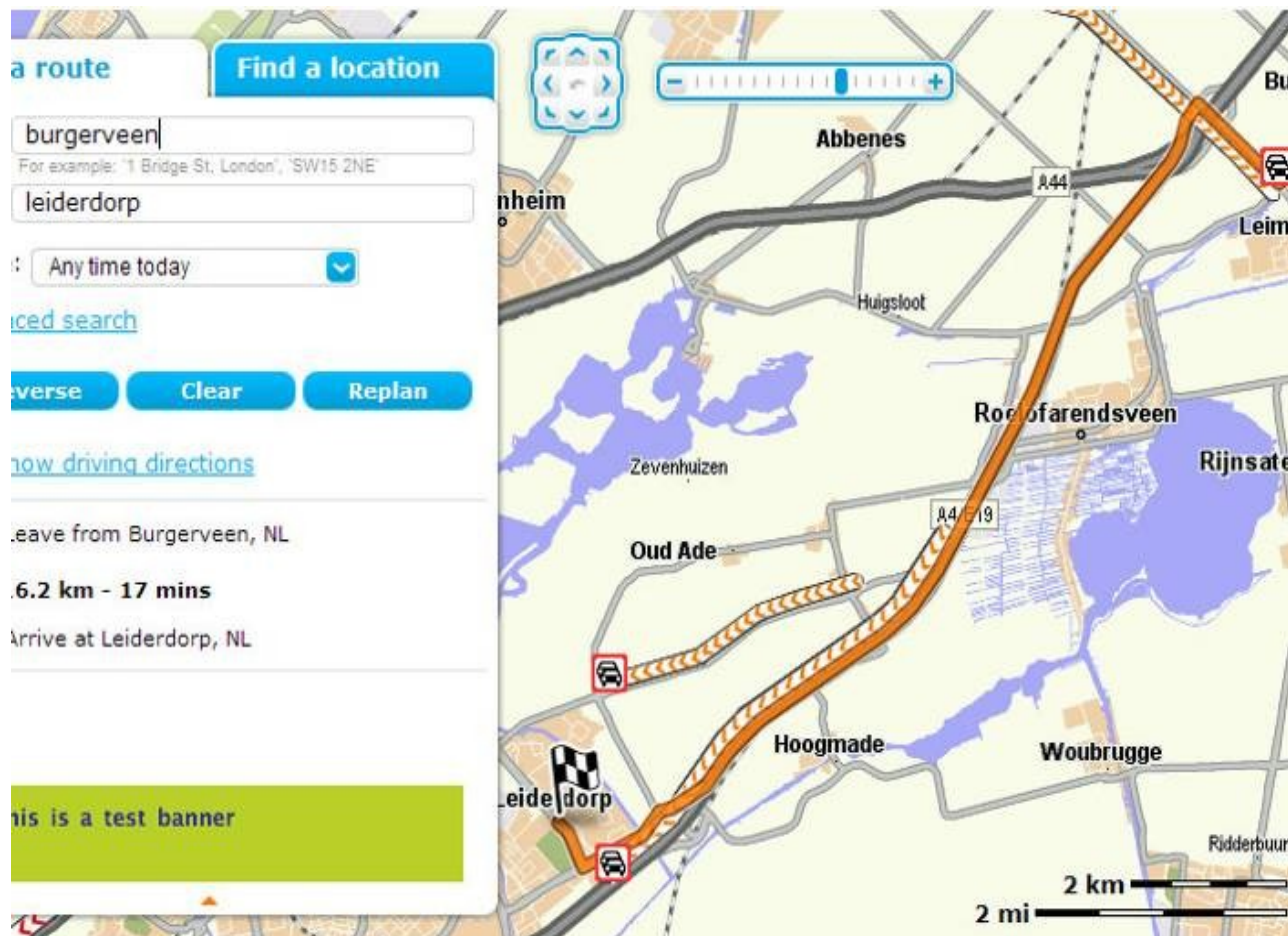


> Provide the best traffic information

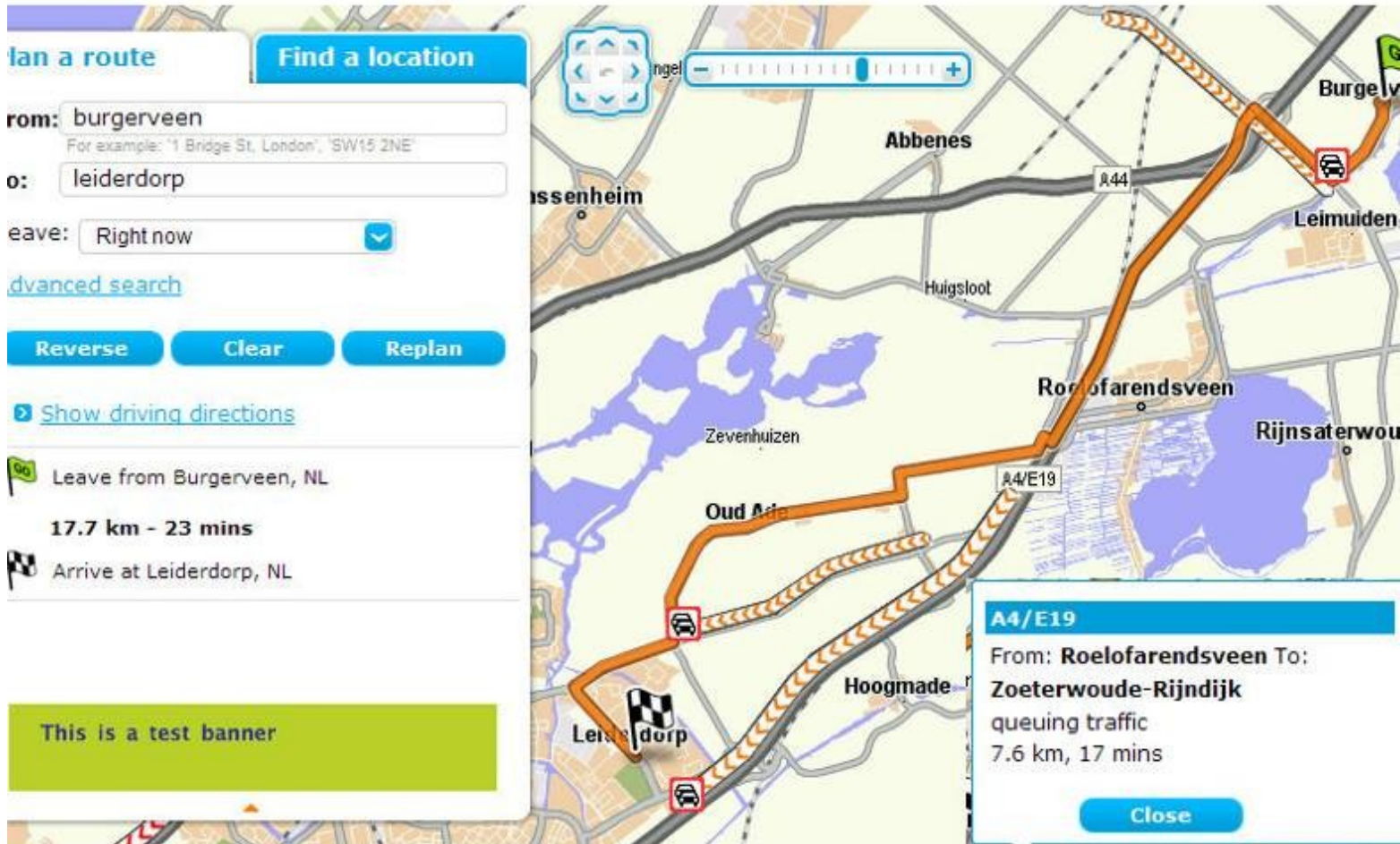
- **HD Traffic™** based on historical analysis of the road network and real-time probes



HD Traffic Example (1)

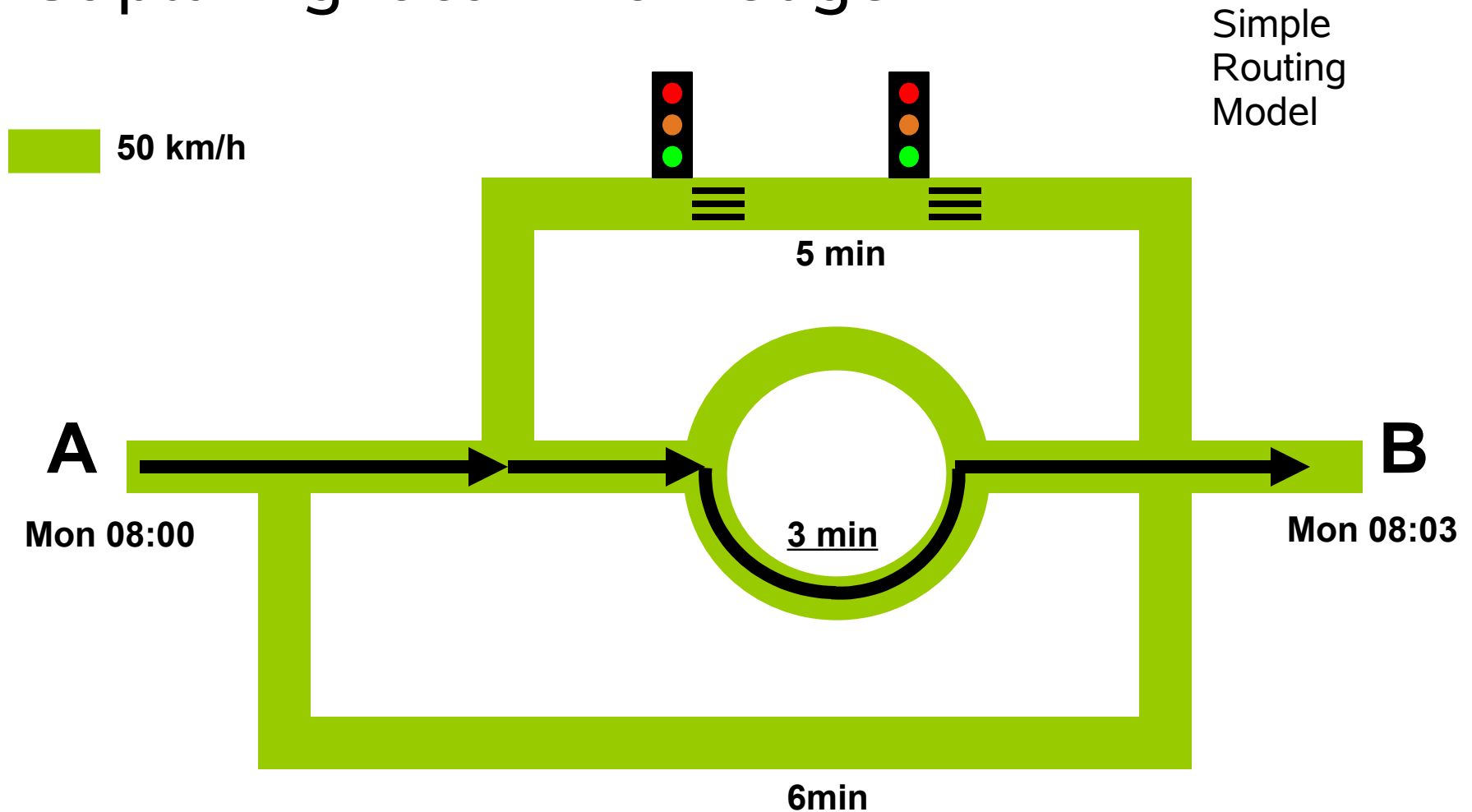


HD Traffic Example (2)

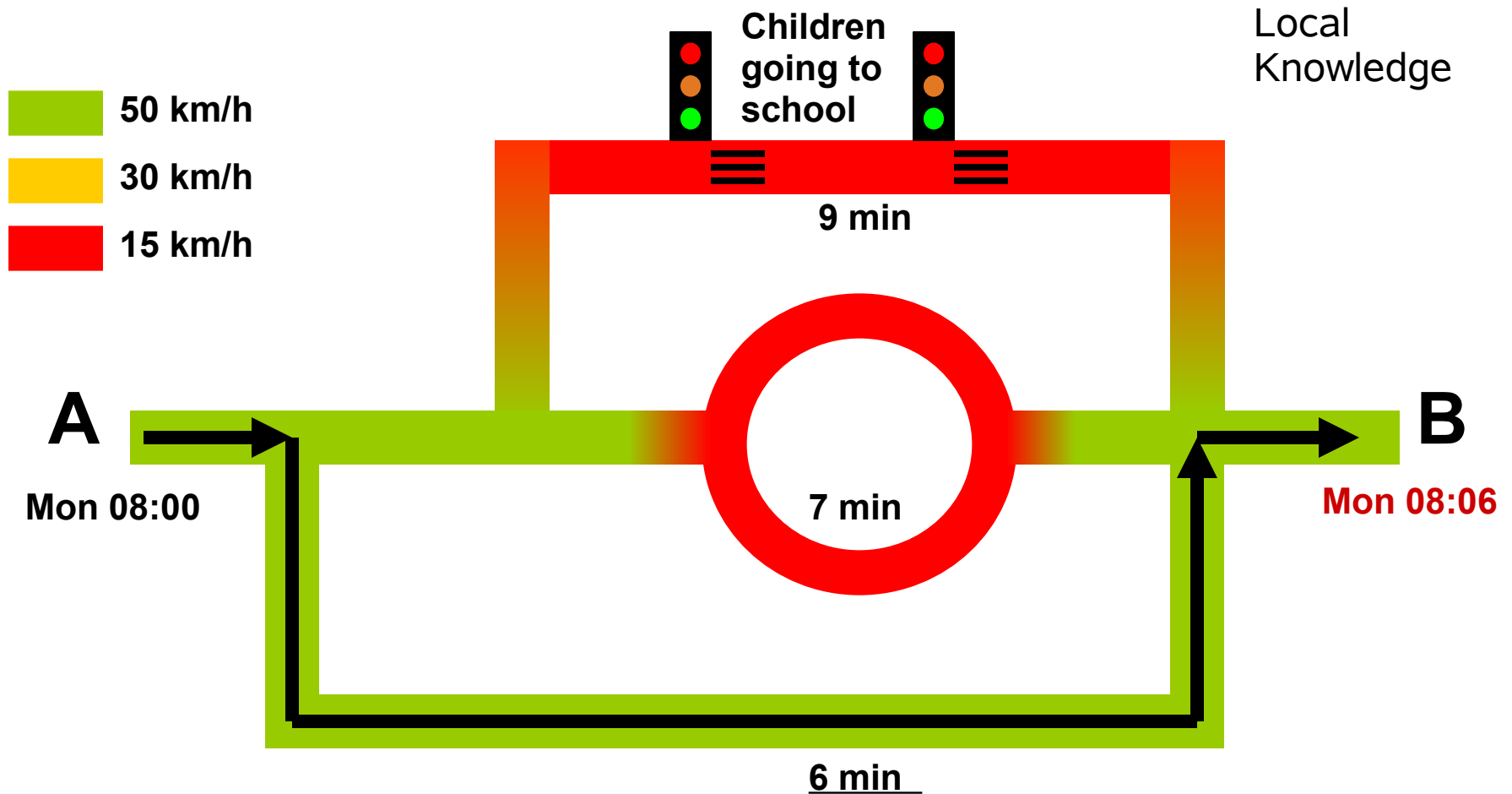


The screenshot displays a navigation application interface. On the left, a sidebar contains a search form with the following fields: "From: burgerveen", "To: leiderdorp", and "Leave: Right now". Below the form are buttons for "Reverse", "Clear", and "Replan", and a link for "Show driving directions". A summary box shows the route details: "Leave from Burgerveen, NL", "17.7 km - 23 mins", and "Arrive at Leiderdorp, NL". At the bottom of the sidebar is a green banner that reads "This is a test banner". The main map area shows a route from Burgerveen to Leiderdorp, with a highlighted orange line indicating the path. The route passes through Zevenhuizen, Oud Arie, and Hoogmade. A traffic information popup is visible in the bottom right corner, showing a red car icon and the text: "A4/E19", "From: Roelofarendsveen To: Zoeterwoude-Rijndijk", "queuing traffic", "7.6 km, 17 mins", and a "Close" button.

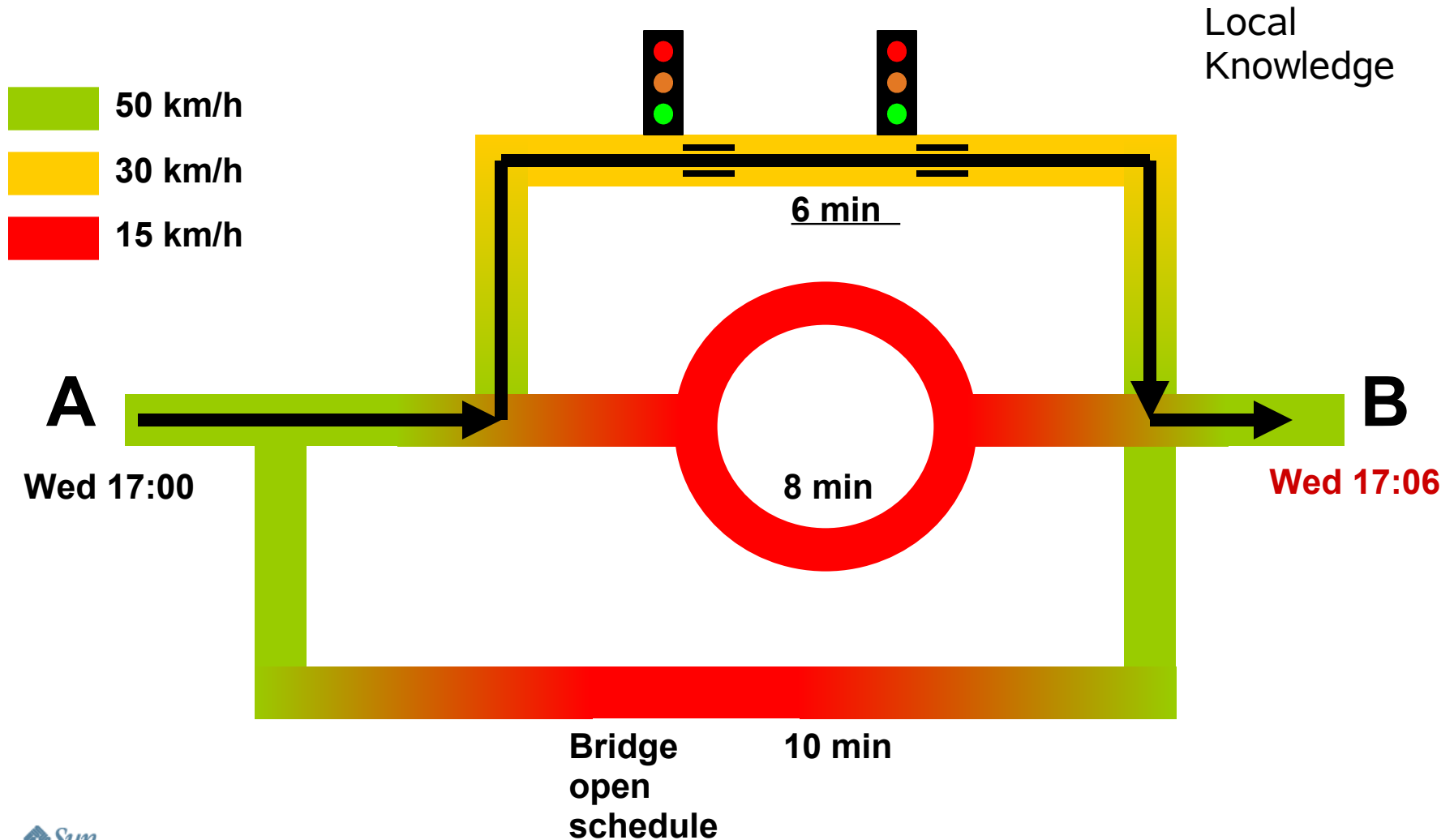
Capturing local knowledge



Capturing local knowledge



Capturing local knowledge



Capturing local knowledge

Map are huge:

- EU + US = 80,000,000 road stretches
- TeleAtlas = +/- 2,000 employees

How do you keep this data up-to-date?

- TomTom has over 10,000,000 end-users
- Over 500,000,000 GPS measurements/day
- Over 10,000,000,000 km of driving
(approx. 1,000 samples per street, road, alley, everywhere)
- Over 1,000,000,000,000 samples in total!

Open Source Geospatial

A large, light blue, stylized arrow pointing to the right, composed of several parallel lines of varying lengths, creating a sense of motion and direction.

GOAL

OpenGeo.org

- Social Business aiming for full cost recovery, extra revenue reinvested in our Open Source projects
- Mission driven, to build the geospatial web, but revenue comes from competing with proprietary GIS players
- Offering consulting and Enterprise support packages
- Division of The Open Planning Project, not for profit in New York

What we're working towards

- The best geospatial web-based software
- The Open Geospatial Web
- Geospatial information as available and accessible as possible, open to help solve the world's problems.
- Enable explosion of collaborative mapping 'crowd sourcing' projects
- Make collaborative mapping as big as the open source software movement

OpenGeo Stack

- Set of open source components that are well supported and tested together
- Operate all through Open Standards
- Work with proprietary protocols as well: ArcSDE, Oracle, Google Maps, Google Earth, Virtual Earth, DB2, ArcIMS, ect.
- Therefore can easily swap out and combine with existing proprietary and open source solutions

The reference stack

- PostGIS/Postgresql
- GeoTools
- GeoServer
- GeoWebCache
- OpenLayers

PostGIS

- Spatial Extensions to Postgresql, GPL licensed plugin
- Native geometry types - point, line polygon
- Perform spatial operations in the database against geometries (bounding box, intersects, buffer, ect.)
- Robust and accurate spatial functions
 - Unfortunately MySQL right now just doesn't compare, though they've made progress

GeoTools

- Leading open source Java geospatial toolkit, LGPL, founded in 2000
- Initially focused on applets, GT2 is general geospatial toolkit
- Used in desktop and server GIS
- Handles projections, common data model for GIS data, reading and writing different formats, rendering maps, ect.
 - Supports: PostGIS, Oracle Spatial, ArcSDE, DB2, MySQL, Shapefiles, Geotiff, ArcGrid, MrSID, JP2K, and more

GeoServer

- J2EE geospatial web server - connects existing data sources to the 'Geospatial Web', GPL
- Best standard implementations (WMS 1.1.1, WCS 1.0, 1.1 (RI), WFS 1.0 (RI), 1.1 (RI), SLD, Filter, WFS-T (RI), KML, GeoRSS)
- Great Google Earth support (funded by Google), with Geo Search coming soon
- Through the web editing of map data
- Spring, Acegi, Struts, and 20 more OS Java libs
- Web 2.0 output - GeoRSS, GeoJSON, KML - on Google Earth and Maps, Virtual Earth
- GPL, working on dual license model

GeoWebCache

- Caching layer to accelerate maps on the web, LGPL licensed
- Divides dynamic maps in to static tiles
- J2EE war, built with Spring
- Drop in configuration with GeoServer
- Expose layers on Google Earth, Virtual Earth, Google Maps, OpenLayers
- Very fast, different backend options for scalable caches

OpenLayers

- Pure JavaScript open source equivalent to Google Maps, works with standard APIs
- Draw tiles from Google Maps, Virtual Earth, Yahoo! Maps, ect., combine with standards like GeoRSS, GeoJSON, WMS, WFS
- Easy to swap out base map providers, not locked in
- Advanced editing, versioning

Learn more

- <http://opengeo.org>
- <http://geoserver.org>
- <http://geowebcache.org>
- <http://openlayers.org>
- <http://cholmes.wordpress.com>

More Open Source Geospatial Java Technology

- Open Source Geospatial Foundation
 - <http://osgeo.org>
 - Umbrella for a variety of geospatial projects
- GeoNetwork – catalog / portal builder
- gvSig – desktop GIS
- JTS Topology Suite – robust geometries and spatial operations
- uDig – desktop GIS built on GeoTools and Eclipse
- deegree – geospatial web server
- Spatial DB in a box – JTS plus H2, HSQL, Derby for embedded spatial database (works in progress)



OSGeo and the Summer of Code 2007

- Plugins for multidimensional raster data sources. (GeoTools)
- Caching data in uDig
- JTileCache
- New Transformation Algorithms for GeoTools and uDig
- Implementation of An Interactive GeoRSS tool in uDig
- 3D Rendering Pipeline for GeoTools

OSGeo and the Summer of Code 2008

- H2 database spatial indexing
- Image mosacing/pyramidal geotools plugin
- Raster-Map-Calc for uDig
- OpenJUMP-3D
- GeoWebCache Improvements - REST API
- JMagick integration with ImageIO-EXT
- Digital Elevation Model for uDig

THANK YOU



Chris Holmes
Steve Citron-Pousty
James Macgill
Wilfred Springer

PAN-5773



Mobile Market New LBS models will emerge as mobile devices evolve

On-board

Connected Navigation

Off-Board



Personal Navigation Device



Smartphone

Points of Interest
Dynamic data
(e.g. gas prices, movie times)
Local Search
Map updates
Real-time traffic

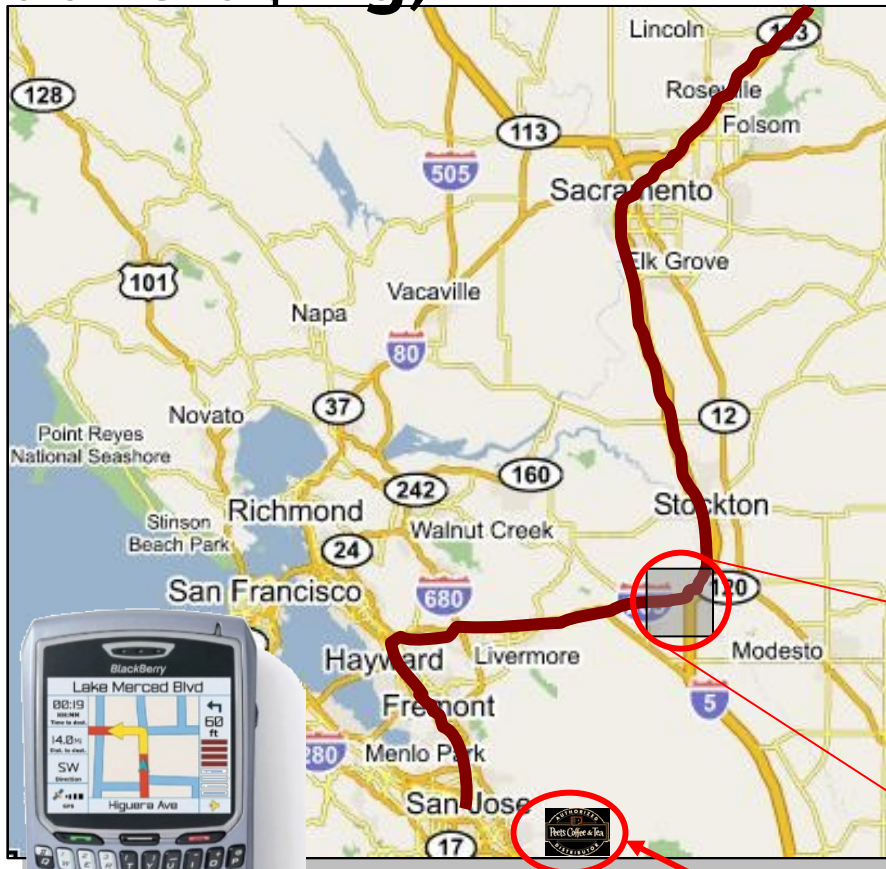


Handset

- Connected Navigation Services will combine the user experience of the PND and the benefits of connectivity from the connected handset
- Services and content will be subsidized by high value mobile advertising



Our spatial key and routing strengths, deCarta can power location-relevant Content (Oh say adverti\$ing)



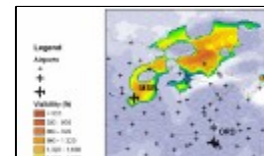
- Can be combined with preferences to drive tailored services
- Traffic and safety information
- Sponsored Search
- Offers



Location and
Time relevant
content

Known
Location
Time

Location Based
Offer



Upcoming work GeoServer

- Google Earth Super Overlays
- Geo Search accessible
- Versioning - wiki type operations
- More granular security
- REST configuration interface
- New user interface (please help!)
- Geosynchronization

Upcoming GeoWebCache

- Better REST Interface
- JavaScript driven configuration and seeding interface
- Expiration listener, to WFS-Transactions, ect.
- Distributed Tilecache?

Upcoming OpenLayers

- Versioning improvements
 - Rollback
 - History
- GeoExt - Ext.js mapping components
- Style editing, choose colors and rendering rules through the web

Chris Holmes Geospatial Web Goal

Internet made it so citizens demanded e-government, let's build a Geo Web that's so compelling and easy to use that the question 'why isn't my government making its geospatial data available' comes from everyone, not just 'the experts'.

He had brought a large map representing the sea,
Without the least vestige of land:
And the crew were much pleased when they found it to be
A map they could all understand

“What's the good of Mercator's North Pole and Equators,
Tropics, Zones, and Meridian Lines?”
So the Bellman would cry: and the crew would reply,
“They are all just conventional signs!”

Other maps are such shapes, with their islands and capes,
But we've got our brave Captain to thank”
(So the crew would protest) “that's he's brought us the best
A perfect and absolute blank!”

-- *From “The Hunting of the Snark”, by Lewis Carroll*