Thinking spatially at Bank of America

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Benefits of thinking Spatially?

Complex Analysis Made Simple

Reflection of the Real World

Share Analysis Across Lines of Business

It Impacts the Bottom Line $\$
The evolving retail landscape

• Channel usage and preference are changing daily as technology improves, affecting overall cost to serve
The branch isn’t dead yet, but its different

**Past**
- Designed to fulfill a high volume of simple transactions
- Cashing checks, depositing cash
- Large downtown facilities

**Present**
- Designed to meet sophisticated customer needs
- Provide access to specialists
- Problem resolution, complex transactions
- Conveniently located smaller facilities

**Future**
- Continued transaction automation
- Sales focus on human interactions

- Result is fewer locations required but with greater access to specialists
  - High volume to high value
  - Current network needs to be retrofitted/downsized or relocated

- Spatial is key
  - Smaller physical footprint - Hub and spoke model to efficiently deploy resources
Enhanced Center staffed to meet Varied and complex needs of the trade area

High Volume center with recently opened new remote to offload simple transactions

Combination of Assisted and non assisted services

Fully automated drive up services
High value customers

Hybrid center with average transaction volumes
Customers show propensity to use after hours services

On Campus FF Remote
Additional remote in retail strip along high VPD corridor
Our behaviors remain influenced by proximity – “How valuable is your time”

Stars Can Align
Customers find alternate channels economically superior...
Representative Channel Options for Routine Transactions

<table>
<thead>
<tr>
<th>Channel</th>
<th>Distance to Location</th>
<th>Time to Location (Round Trip)</th>
<th>Cost of Personal Time @ $50 per Hour</th>
<th>Representative Direct Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless</td>
<td>6 inches</td>
<td>5 seconds</td>
<td>$.07</td>
<td>$.00</td>
<td>$.07</td>
</tr>
<tr>
<td>Telephone AVEU</td>
<td>20 Feet</td>
<td>1 Minute</td>
<td>$.83</td>
<td>$.08</td>
<td>$.83</td>
</tr>
<tr>
<td>Internet</td>
<td>50 Feet</td>
<td>2 Minutes</td>
<td>$1.66</td>
<td>$.80</td>
<td>$1.66</td>
</tr>
<tr>
<td>ATM</td>
<td>4 Miles</td>
<td>40 Minutes</td>
<td>$33.33</td>
<td>$1.00</td>
<td>$34.33</td>
</tr>
<tr>
<td>Branch</td>
<td>5 Miles</td>
<td>50 Minutes</td>
<td>$41.67</td>
<td>$2.00</td>
<td>$43.67</td>
</tr>
</tbody>
</table>

As access to providers becomes more convenient, it also becomes cheaper for customers when considering their personal time.

...and so do financial institutions
Channel Transaction Costs, 2007

<table>
<thead>
<tr>
<th>Channel</th>
<th>Cost per Transaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online</td>
<td>$0.01</td>
</tr>
<tr>
<td>ATM</td>
<td>$0.25</td>
</tr>
<tr>
<td>Telephone</td>
<td>$0.50</td>
</tr>
<tr>
<td>Branch</td>
<td>$1.00</td>
</tr>
</tbody>
</table>

CFC Research: Unlocking Branch Value: Essay II, 2009
Getting location specific
GIS at Bank of America

• GIS has been in use at Bank of America for more than 10 years.
  - Products have ranged from MapInfo, Alteryx, Microsoft, Cognos and Esri

• Currently run Esri Business Analyst in a Citrix environment.
  - Citrix helps manage the software installations/ upgrades and improves processing speed.
  - A custom web based solution was designed by Esri which closely mirrors some of the functionality of Business Analyst Online.
  - Associates with smart phones may use BAO.

• The GIS user community consists of power users and casual users with support from data partners

• Users vary from classically trained geographers to senior executives with no formal background in geography/planning
From region to site

Regional Analysis: Step 1
“What Regions?”
Identify metropolitan areas with highest potential opportunity to build customer base and grow revenue
Top Markets, Build to Levels
Network Strategist

Target Zone Identification: Step 2
“What Micro Market?”
Identify which intersections/destinations are best positioned to current and forecasted opportunity and develop list of target zones
New build, Optimization
Market Planner

Site Selection: Step 3
“What Site?”
Identify which target zones have available real estate that can be used to add a new location and meet the bank’s internal financial hurdles
Developer site plan, real estate
Location Planner and ATM Relationship Manager
Key inputs when considering distribution

**Controllable**

- BAC Network
  - Where are our current locations?
  - Where are we currently looking?
  - Areas that are not currently part of a BC or remote
  - ATM trade area where we can fill a gap?
  - Areas to avoid because we already adequately serve population?

**Not-Controllable**

- Demographics
- Regulatory
- Competition Environment
- Retail
- Physical Geography

**Key Data Inputs**

- **Site specific** – location, usage, profitability
- **Demographics** (block group) – Daytime population, HH growth rate, income levels
- **Customer Locations** – stripped of personal information
- **Regulatory** – Low and moderate income populations, and minority populations
- **Competition** – location, deposits, open date
- **Retail** – shopping centers, key retailers
- **Physical geography** – streets, rivers, railroads
11 Bank of America: Confidential

Business Analyst - Standard Basemap

UMass campus served by multiple ATMs

Strong retail destination, currently served with remote ATM

Divided highway, and UMass campus separates Amherst from Hadley

Moderate income populations – student housing

New filing for a competitor opening

Former BAC location, now a new competitor.

Main Amherst BC, prominently located downtown convenient to full-time and student community

Supermarket with in-store competitor
Thinking spatially at Bank of America

- Spatial/GIS/location technology is one of the primary tools to manage the following processes:
  - Market investment prioritization
  - Branch and remote ATM planning
  - Regulatory compliance
  - New branch forecasting
  - Customer spotting
  - Attrition modeling
  - Merger and Acquisitions
  - Risk mitigation
  - Asset management
  - Logistics
  - Real estate appraisal
  - Commercial RFPs
  - Investor relations materials
Questions?
Thank you!

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Process Automation at Bank of America

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Vice President, Market Strategy

July 2014
Real Estate Applications
“Where to Invest”
- Hotspot Analysis
- Invest/Divest Geographies
- Customer Spotting*
- Household Penetration Rates
- Comparables Modeling*
- Consolidation Modeling
- Competitive Analysis

Operational Applications
“How to Invest”
- Channel Usage Analysis
- Product Adoption Analysis*
- Specialty Customer Analysis
- Language Analysis
- BAC Customer Segmentation
- Specialist Placement
- Human Resource Applications

Commonly Used ArcGIS Tools

Business Analyst Applications
- Trade Area Analysis
- Spatial Overlay (Custom .bds)

Model Builder
- Setup Store using XY data
- Buffer
- Drive Times
- Remove TA Overlap
- Repair Geometry
- Merge
- Copy Features

General Tools
- Join
- Spatial Join
- Dissolve
- Feature to Point

Network Analyst
- OD Cost Matrix
- Location Allocation

Time Slider*

*Example in Presentation
Customer Spotting-Model Builder

- SQL Database enabled
- Load customer data points
  - Filters 100+ million records (hhlds x sites)
- Data organization allows us to spot:
  - Users by Dependency
    - All Users, Teller Users, ATM Users
- Customer derived trade areas
  - Business Analyst: 40-60-80% rings
  - Model Builder: Automates process

Step 1

- Subject Site IDs in .txt file
- Customers of Subject Sites
- Filtered data set to SQL Database
  - (6-months of customer usage data)

Step 2

- Customer Derived TA Rules pre-set
- Applies symbology of layer that is turned off in MXD

- Repeatability: I get the same answer at 9am or 5pm
- Reproducibility: Carlous will get the same answer as me
- Much Faster:
  - ODBC > Access > MapInfo: 30 Minutes
  - SQL > ArcGIS > Model Builder: 5 Minutes
Customer Spotting: West Fresno BC

- Customer points removed

- Customer Centered (Not Store Centered)
- Weighted by transaction volumes (Max-limits)
- Outlying Customers excluded (> 50-Miles)
- Simple Trade Areas
Adoption of Product Offering: Time Series
Comparables Data Pull Process

- Subject Sites
- Hotspot Data (E.g. Retail Synergies)
- BAC and Census Geography

Creates NOLAP Geographies/Output

Merges Subject Sites w/existing network to create NOLAP Geos

ESRI Demographics

BAC Customer Data

Language Data

BAC Opportunity Data

Competitor Data

Creates OLAP Geographies & Output

Join Fields: Tying data together
Zoom of Store Setup Process
Thank you!

John Gargiulo

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