Analytical Customer Relationship Management

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Presenter Background

- Oct 1988 – Sept 1999
  - Professor, University of Minnesota – academic experience
- Oct 1999 – April 2000
  - Chief Data Mining Architect, Amazon.com – e-commerce experience
- May 2000 – April 2001
  - Director of Data Analytics, Yodlee – e-finance experience
- May 2001 – August 2001
  - Chief Technology Officer, Chingari – entrepreneurship experience
- September 2001
  - Professor, University of Minnesota
  - Technical advisor to two Venture Capital firms in the Silicon Valley

Outline

- Technology trends
- Shift in marketing approach
- Amazon.com case study: personalized consumer marketing
- Yodlee case study: web business intelligence
- Analytics behind e-marketing
- Privacy issues
- Concluding remarks

Technology Trends

- Internet growth
  - Faster than any other infrastructure
- Data collection
  - Rapid drop in storage costs
  - Dramatic improvement in resolution and rate of data collection 'probes'
- Data analytics
  - Increasing deployment of warehouses
  - Major leap forward in data mining technologies and tools

Becoming possible to <u>really</u> understand what your customers want – even at the individual level!!

Infrastructure Adoption in the US

Millions of users

120

60

0

Radio   TV   Cable   Internet

1922   1950   1980   1995   2000
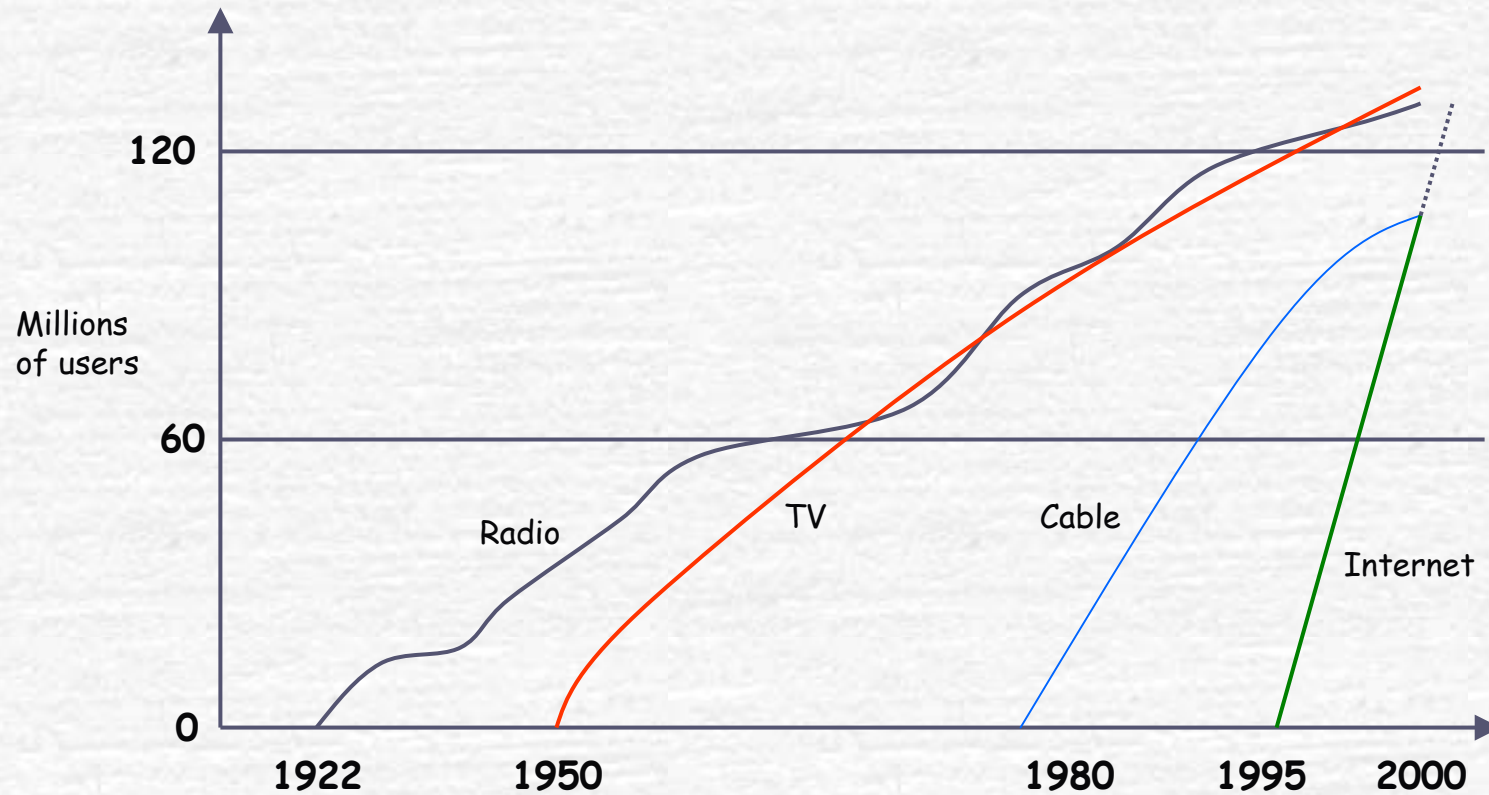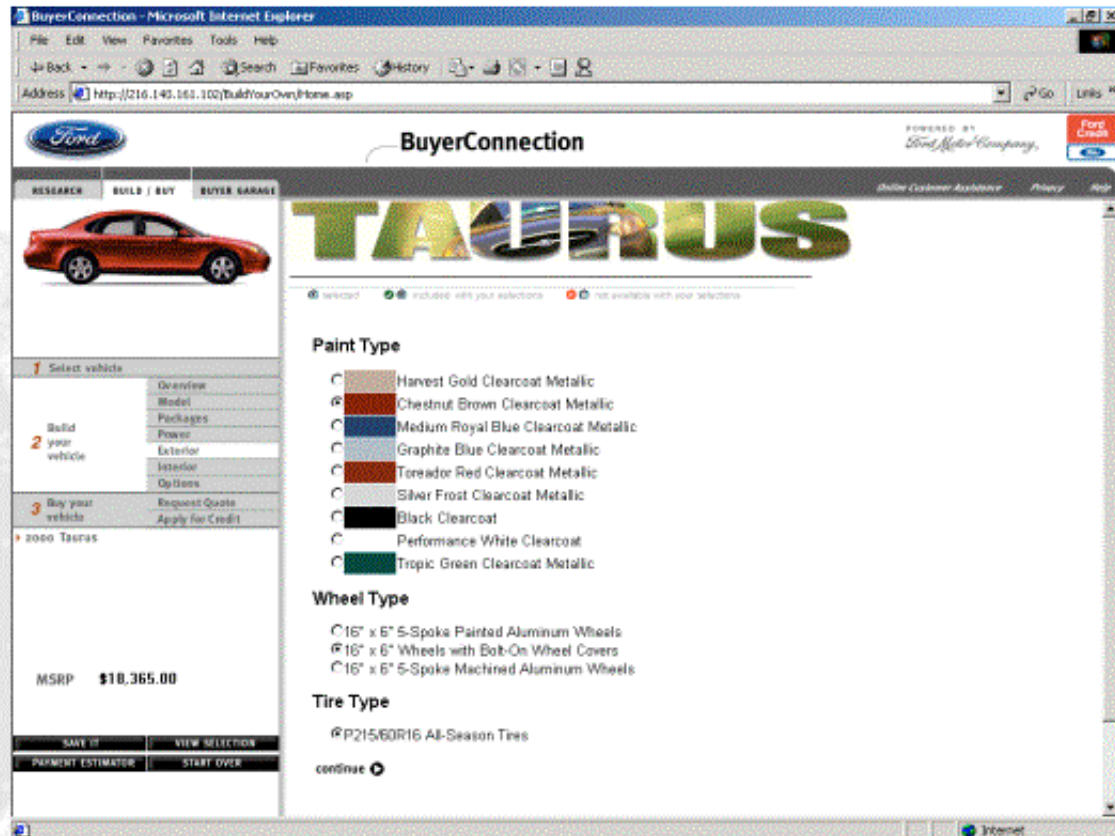
Marketing – 75 years ago

• Production – a la Adam Smith
• You can have any color as long as it's black – Ford Motor Co.

CRM-Forum 4

Marketing - today

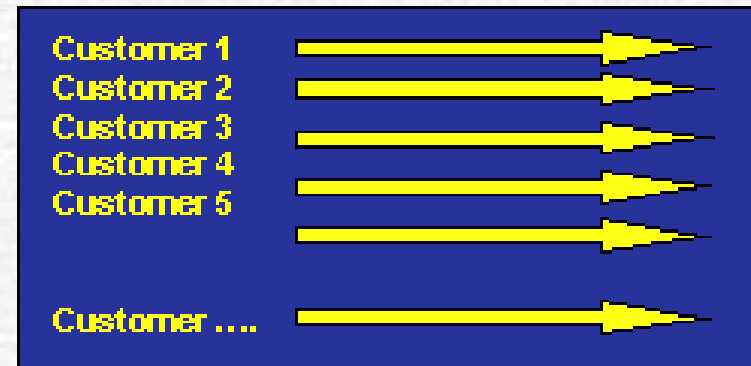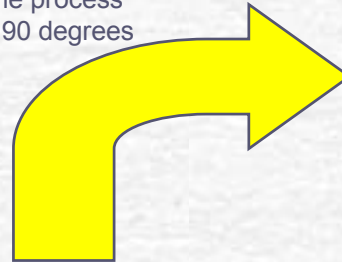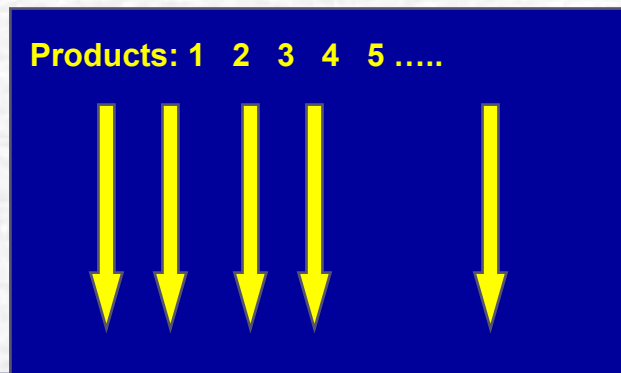**Add the spice of flexibility, courtesy of robotics, computers ...**

New approach to marketing

TO: Finding products that are right for each customer

TURN the process through 90 degrees

Customer 1	
Customer 2	
Customer 3	
Customer 4	
Customer 5	
Customer ….	

FROM: Finding customers that are right for each product

Products: 1 2 3 4 5 …..

To achieve this we need to align around

•Organization and culture
•Business processes and skill
•Measurement and incentives
•Information management
•Technology

"Mass Customization" – *B. Joseph Pine*

- Mass production
  - Cheap to produce
  - Efficient to produce
  - Uniform features/quality
  - 'one size fits all' approach
  - Optimize production cost

- Customization
  - Expensive to produce
  - Inefficient to produce
  - Customized features
  - 'tailor made' approach
  - Optimize customer satisfaction
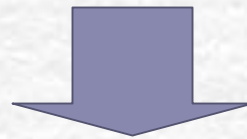
- Mass customization
  - Cheap & efficient to produce
  - Customized features
  - 'tailor made' approach
  - Optimize production cost & customer satisfaction

We have indeed come a long way ...

CRM Functions - 1

- Customer care & support functionality
  - Incident assignment/escalation/tracking/reporting
  - Problem management/resolution
  - Order management/promise fulfillment
  - Warranty/contract management
- Marketing functionality
  - Campaign management
  - Opportunity management
  - Web-based encyclopedia, configurator
  - Market segmentation
  - Lead generation/enhancement/tracking

CRM Functions - 2

- Executive information functionality
  - Extensive & easy-to-use reporting
- ERP integration functionality
  - Legacy systems
  - Web data sources
  - 3rd party information – data overlays
- Excellent data synchronization functionality
  - Mobile synchronization with multiple field devices
  - Enterprise synchronization with multiple database/application servers

CRM Functions - 3

- Sales functionality
  - Contact management profiles and history
  - Account management including activities
  - Order entry
  - Proposal generation
- Sales management functionality
  - Pipeline analysis, e.g. forecasting
  - Sales cycle analysis
  - Territory alignment
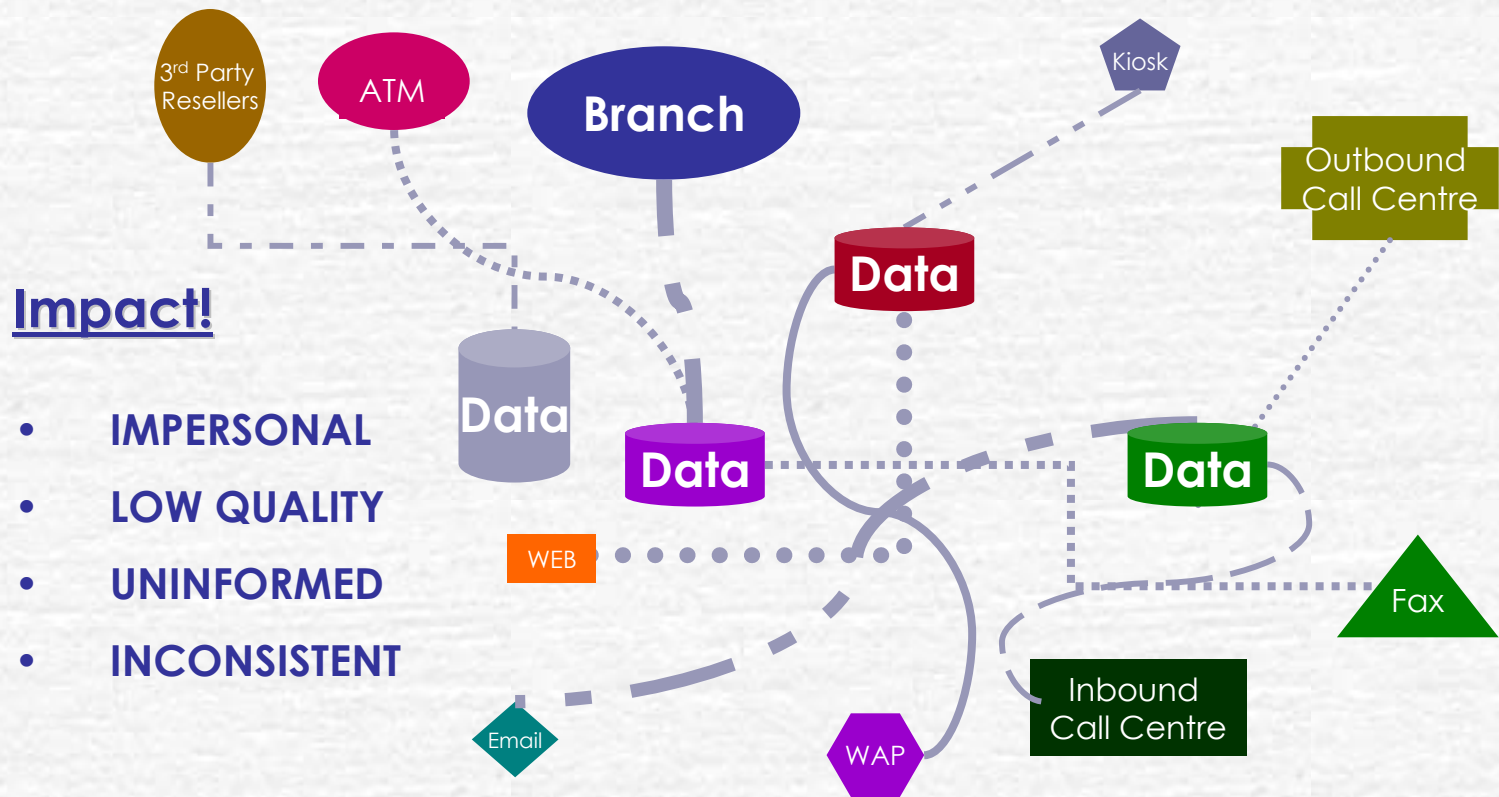 - Roll-up and drill-down reporting

CRM Functions - 4

- Telemarketing/telesales functionality
  - Call list assembly
  - Auto dialing
  - Scripting
  - Order taking
- Time management functionality
  - Single user and group calendar/scheduling
  - E-mail
- Field service support functionality
  - Work orders, dispatching
  - Real time information transfer to field personnel via mobile technologies

Traditional Growth of CRM Functions in an Organization

THE PRESENT
MULTIPLE CHANNELS & DATA STORES / IMPERSONAL SERVICE

3rd Party Resellers

ATM

Branch

Kiosk

Outbound Call Centre

Data

Impact!

Data

Data

Data

- **IMPERSONAL**
- **LOW QUALITY**
- **UNINFORMED**
- **INCONSISTENT**

WEB

Fax

Inbound Call Centre

Email

WAP

I In Confidence

Vision for Customer Driven CRM

MULTIPLE CHANNELS & DATA STORES / PERSONALISED SERVICE

Impact!

- **PERSONALISED**
- **HIGH QUALITY**
- **INFORMED**
- **CONSISTENT**

Circular diagram with **DATA** at the center surrounded by channels: Kiosk, WEB, iTV, Email, 3rd Party Resellers, WAP, Fax, Branch, ATM, Call Centre.

Where Does CRM Fit?

Database Companies
For Example Oracle

Data mining Companies
For Example NCR

TRUE CRM SPACE
Utilising CRM Support systems

Customer Data

Products & Services

Analysis

MIS

Segmentation

Customer Profile

Market Information

Organisation Strategy

Treatment Strategy

Customer Care

Product Maintenance

Business Acquisition

Customer Interaction Channels

Customers

CRM Support Systems

Database, Data Mining & Data Warehousing

CRM System

CRM Success Factors

- Determine functions to automate
- Automate what needs automating
- Gain top management support and commitment
- Employ technology smartly
- Secure user ownership
- Prototype the system
- Train users
- Motivate personnel
- Administrate the system
- Keep management committed

Analytical CRM

Analytical CRM - Outline

- Definition
- The Analytical CRM loop
- Customer segmentation & analysis
- Customer targeting
- Customer loyalty & its impact
- Customer retention

Analytical CRM Definition

The CRM Equation:

Customer Relationship Management =
      Customer Understanding + Relationship Management

Customer Understanding: Analysis of customer data to gain deep understanding down to the level of individual customer

Relationship Management: Interaction with the customer through various channels for various purposes

Analytical CRM: Use customer understanding to perform effective relationship management

CRM Analytics Loop

Hypothesis generation

Analysis

Action

Results
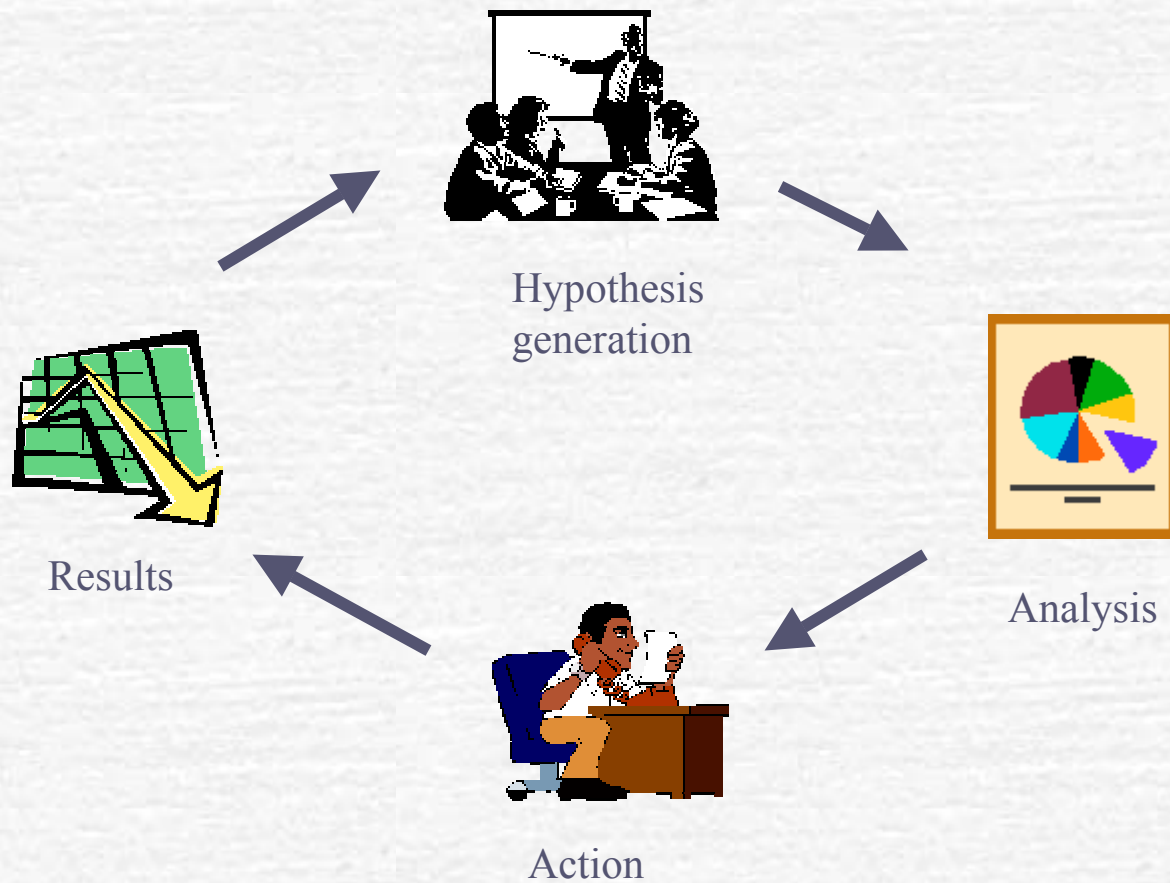
Amazon.com's Case Study: Personalized Consumer Marketing

The continuing relationship ...
Amazon.com "Loyalty" model

Need Creation **anticipate/stimulate**

Information search **provide /assist**

Evaluate alternatives **assist / negate**

Purchase transaction **optimise /reward**

Post purchase experience **add value**

Need Creation
(attract to website)

Need Creation   anticipate/stimulate

From: Amazon.com [music-store-news@amazon.com]
To: dick@dickstr.demon.co.uk
Cc:
Subject: Anne-Sophie Mutter's "The Four Seasons"

Dear Amazon.com Customer,

We've noticed that many of our customers who've purchased CDs by
Yo-Yo Ma also enjoy music by violinist Anne-Sophie Mutter. For
this reason, you may like to know that Mutter's new recording of
Vivaldi's "The Four Seasons" has just hit the shelves. For the
next few days, you can order your copy at a savings of 30% by
following the link below:

http://www.amazon.com/exec/obidos/ASIN/B00002DE2L

Further Need Creation
(upon reaching website)
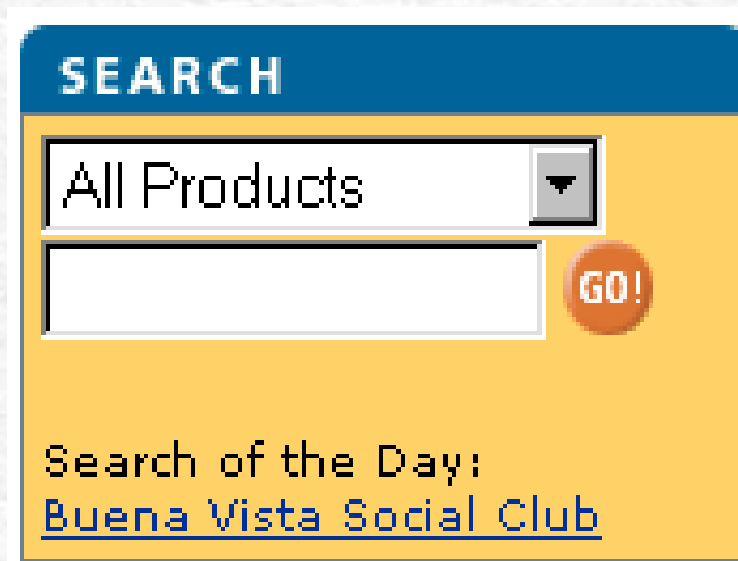
Browse Purchase Circles

- **Geography**

  Countries, States, Cities...

- **Government**

  Independent, Military...

- **Organizations**

  Nonprofit, Professional...

- **Companies A-Z**

  Business, Entertainment...

- **Education A-Z**

  Colleges, Universities...

Information Search

Information search ← **provide /assist**

All Products
Popular Music
Classical Music
DVD & Video
Toys & Games
Electronics
Software
Home Improv.
Auctions
zShops
sothebys.amazon

SEARCH

All Products ▼

GO!

Search of the Day:
Buena Vista Social Club

Evaluation of Alternatives

Evaluate alternatives ◀ **assist / negate**

Purchase Optimisation/Reward

Purchase transaction ← **optimise /reward**

- 1-click purchase
- 'slippery check out counter' vs. 'sticky aisles'

WELCOME TO
Amazon.com Refer-A-Friend
Invite Your Friends to Amazon.com, and We'll Thank You Both

Post-purchase experience

Post purchase experience

add value
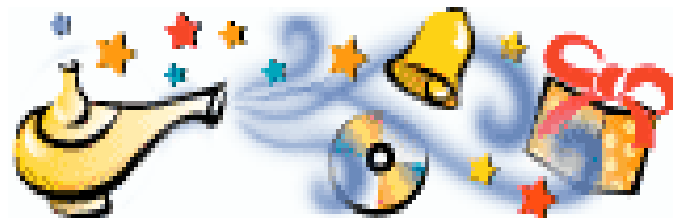
Wish List

Your 1-Click and Gift-Click Settings

Account Management

Your Account

Your Orders

- View or change [my open orders only ▼] **GO!**

- See the status of all your orders
- Cancel orders that have not entered the shipping process
- Edit the shipping options and addresses on unshipped orders

Your Items

- View items ordered [in the last three months ▼] **GO!**

Community & Services

- Manage Your Wish List
- Manage Your Member Page
- View/Edit Only for Friends
- Manage Your Subscriptions
- Manage Your Reminders
- Refer a Friend

Your Account Settings

- Access or change your 1-Click settings
- Manage your Address Book
- Change your e-mail address or password

Why is loyalty important

- Amazon's 'customer lifetime value' model (for book buyers
  - Average $50 for first time purchase
  - Average $40 per visit thereafter
  - Average of one visit per 2 months
  - Assume customer will be active for 10 years – not validated yet ☺
- '4 buys and you are hooked' empirical law
- Use Alexa data to bring back 'prodigal sons' (and daughters)

Build more loyalty faster

LTV

Time
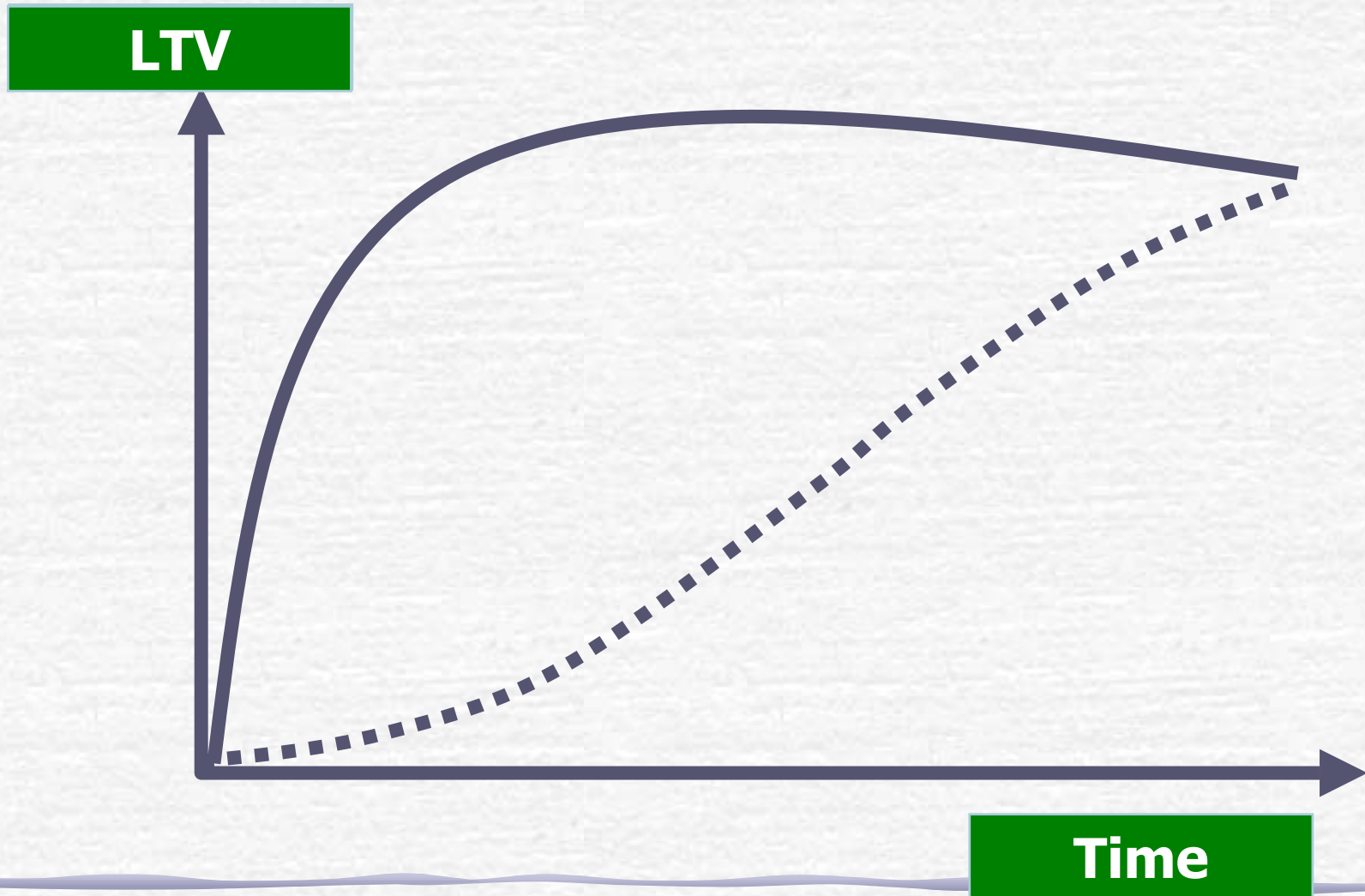
The 'Virtuous Cycle'
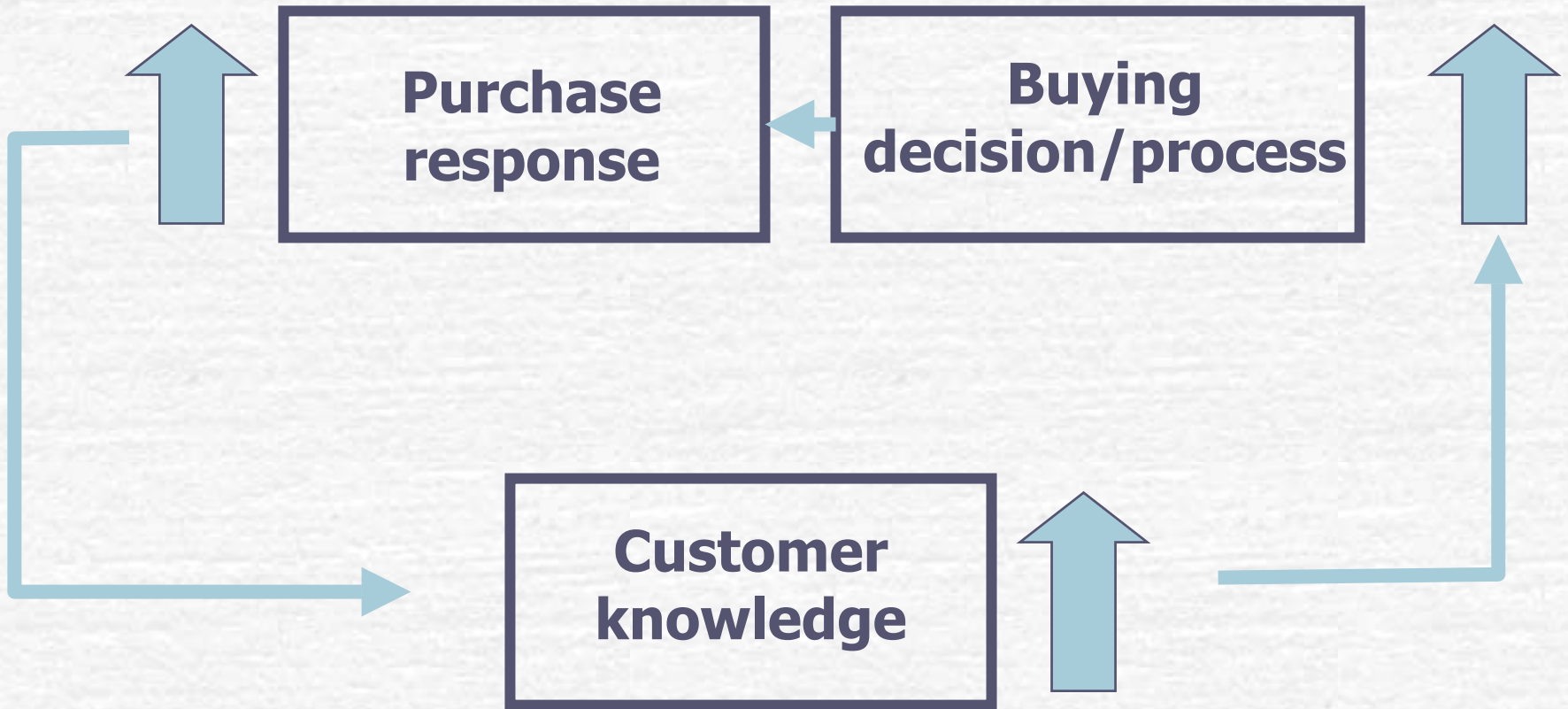
Internet Marketing Insight – *Jeff Bezos*

- Role of
  - Advertisement – get customer to the store
  - Customer experience – get customer to buy
- Brick & mortar stores
  - Getting customer to store is the hard part
  - Shopping cart abandonment is not common, since the overhead of going to another store is very high – especially in Minnesota winters!
- Marketing expenses
  - 80% for advertisement; 20% for customer experience

> The 80-20 rule is reversed for on-line stores
> – *Jeff Bezos*

Remarks on Amazon.com

- A very innovative company – the poster child for e-commerce
- Is pushing the envelope in personalization
- Customers love it
- Will it make money – we're all waiting to see

A company of the future, with a product of the past, in a market of the present

Yodlee.com Case Study: Web Business Intelligence

Current Situation: Consumer Confusion

"It takes me two hours to get to all my accounts"

"I can't look at my assets across accounts"

"I can't remember all my user IDs and passwords"

"I want the web to work for <u>me</u>, not the other way around"

"This is overwhelming......I need some help"

"Make it easier for me!"

Solution – Personal Information Aggregation

Aggregation Service Model

Communication Site
(content partner)

Finance
Site

Travel
Site

**Content
Acquisition**

Aggregation
Service
Provider

**Aggregation,
Analysis,
Personalization**

AOL

AOLfinance

MyCiti

Citibank

Applications

Connected
User

Mobile
User

**Presentation &
Interaction**
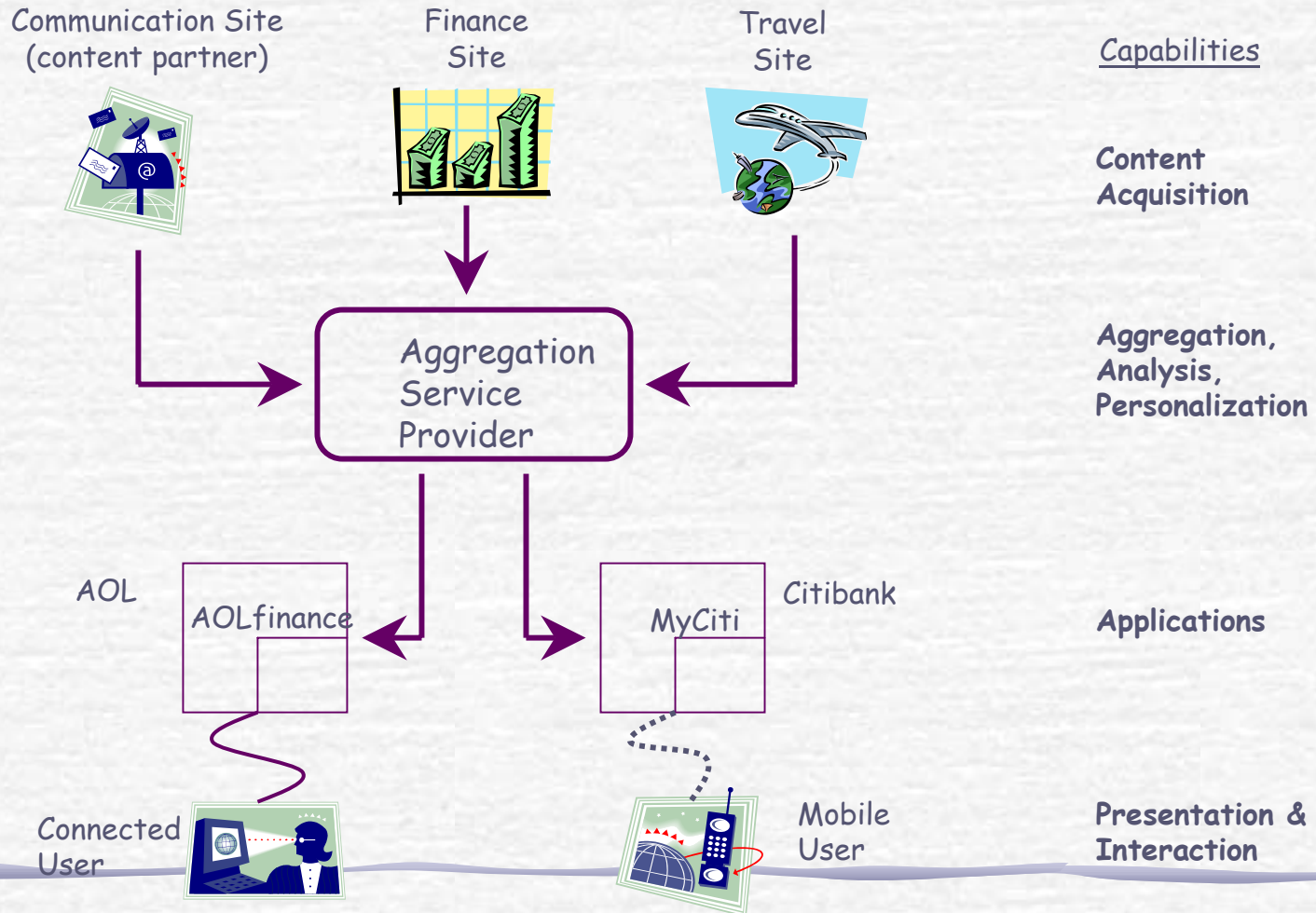
Business Intelligence Benefits to Corporation

- 'Tip-of-the-iceberg' analysis for a brokerage house
- Lifestyle preference analysis of banking customers for a survey
- 'True-wallet-share' analysis for a credit card organization
- Dynamic targeting for banner advertisements, e-mail campaigns, etc.

'Tip-of-the-Iceberg' Analysis for a Brokerage House

Asset Based Tiers	Number of Users
< $20K	7579
$20K - $100K	2539
$100K - $500K	1994
$500K - $1M	525
$1M - $5M	547
$5M - $25M	106
> $25M	9

- This brokerage house treated customers with net worth > $1M as 'high net worth' (HNW) customers with specialized services
- Almost none of the customers in the green region had > $1M with this brokerage

Household Lifestyle Preference Analysis for a Survey

Financial Preferences

- 53% have at least one online banking account

- 51% have an online credit card account -- higher than Yodlee users as a whole

- 31% also have an E*Trade account, and 11% also have a Schwab account

- Have a preference for FirstUSA over Citibank, the opposite preference for users as a whole

- The most popular credit card is American Express

Lifestyle Preferences

25% make travel reservations online -- fewer than users as a whole

- Expedia is more popular as an on-line travel site than Travelocity

- 49% have a frequent flier account -- higher than users as a whole

-The favorite frequent flier programs are United, Delta, American, in that order

- Half as many of co-brand users shop on Ebay than users as a whole

'True-Wallet-Share' Analysis for a Credit Card Organization

Range	Total Users	Discover	American Express	Mastercard	Visa	Other	Average Total
< $100	462	4.13	-467.40 (152)	0	-29.76 (87)	-60.29 (272)	-190.74
$100 - $200	232	-12.67 (39)	120.17 (66)	0	89.95	167.10 (156)	149.44
$200 - $500	643	36.97 (107)	253.77 (207)	0	218.94 (135)	272.42 (421)	342.99
$500 - $1000	968	75.57 (182)	571.09 (378)	0	597.83 (217)	623.36 (593)	893.47
$1000 - $2000	1386	174.55 (292)	988.97 (540)	837.25	1018.50 (323)	1078.01 (866)	1471.38
$2000 - $5000	2422	263.27 (432)	2156.30 (1099)	957.69	2087.75 (601)	2358.22 (1579)	3297.58
$5000 - $10000	1732	620.80 (354)	4091.64 (814)	3648.40	3976.93 (483)	4966.61 (1200)	7100.20
$10000+	1696	1332.48 (452)	10111.75 (1010)	1923.16 (9)	8934.39 (642)	14649.52 (1341)	22329.56

Analysis of credit card balance habits of user base

• There are 1386 people, each of which carries a total balance between $1000 and $2000 on all credit cards that (s)he owns

• 292 of these 1386 people own discover cards, and carry an average balance of $174.55

• 540 of these 1386 people own AmEx cards, with an average balance of $988.97

• 323 of these 1386 people carry one or more Visa, with an average Visa network balance of $1018.50

Business Implications of True Wallet Share Analysis

- A credit card offeror knows exactly how much money customers holding its cards spend (every month) on its card vs. that on the competition's cards

- Offeror can target users falling within various segments for specific customer acquisition, retention, etc. purposes

- Detailed profile and history information of these users can be used for precision targeting and customer messaging through various channels including ad serving, e-mail campaigns, promotions, etc.

- If transaction level detail information of these users is analyzed, it can be determined exactly which credit cards are being used by aggregation users as a whole for what kind of lifestyle activity, e.g. travel, entertainment, shopping, groceries, etc; this can help partner decide which market segments to focus on

Business Implications (contd.)

- The analysis above, if carried out at an individual user level detail, can be used to target individual customers with specific promotions, etc.

- Transaction level detail can be classified into charges to specific organizations, department stores, airlines, etc. This will identify the top organizations that aggregation users spend money at, either on the partner's card or on a competing network. This would be useful in determining which organizations to partner with for customer retention, and acquisition, respectively

- All of these analyses if performed periodically, and tracked over time, can provide valuable insight into the evolving credit balance distribution and usage behavior at the user population or individual user level

Targeted Ad Serving

Targeted Ad Serving (contd.)

The Analytics Behind e-CRM

Web Logs – Record of consumer behavior

```
looney.cs.umn.edu han - [09/Aug/1996:09:53:52 -0500] "GET mobasher/courses/cs5106/cs5106l1.html HTTP/1.0" 200
mega.cs.umn.edu njain - [09/Aug/1996:09:53:52 -0500] "GET / HTTP/1.0" 200 3291
mega.cs.umn.edu njain - [09/Aug/1996:09:53:53 -0500] "GET /images/backgnds/paper.gif HTTP/1.0" 200 3014
mega.cs.umn.edu njain - [09/Aug/1996:09:54:12 -0500] "GET /cgi-bin/Count.cgi?df=CS home.dat\&dd=C\&ft=1 HTTP
mega.cs.umn.edu njain - [09/Aug/1996:09:54:18 -0500] "GET advisor HTTP/1.0" 302
mega.cs.umn.edu njain - [09/Aug/1996:09:54:19 -0500] "GET advisor/ HTTP/1.0" 200 487
looney.cs.umn.edu han - [09/Aug/1996:09:54:28 -0500] "GET mobasher/courses/cs5106/cs5106l2.html HTTP/1.0" 200
        . . .                        . . .                           . . .
```

◆ Access Log Format

IP address userid time method url protocol status size

  mega.cs.umn.edu   njain   09/Aug/1996:09:54:31   advisor/csci-faq.html

◆ Other Server Logs: referrer logs, agent logs
◆ Application server logs: business event logging

Shopping Pipeline Analysis

'sticky' states
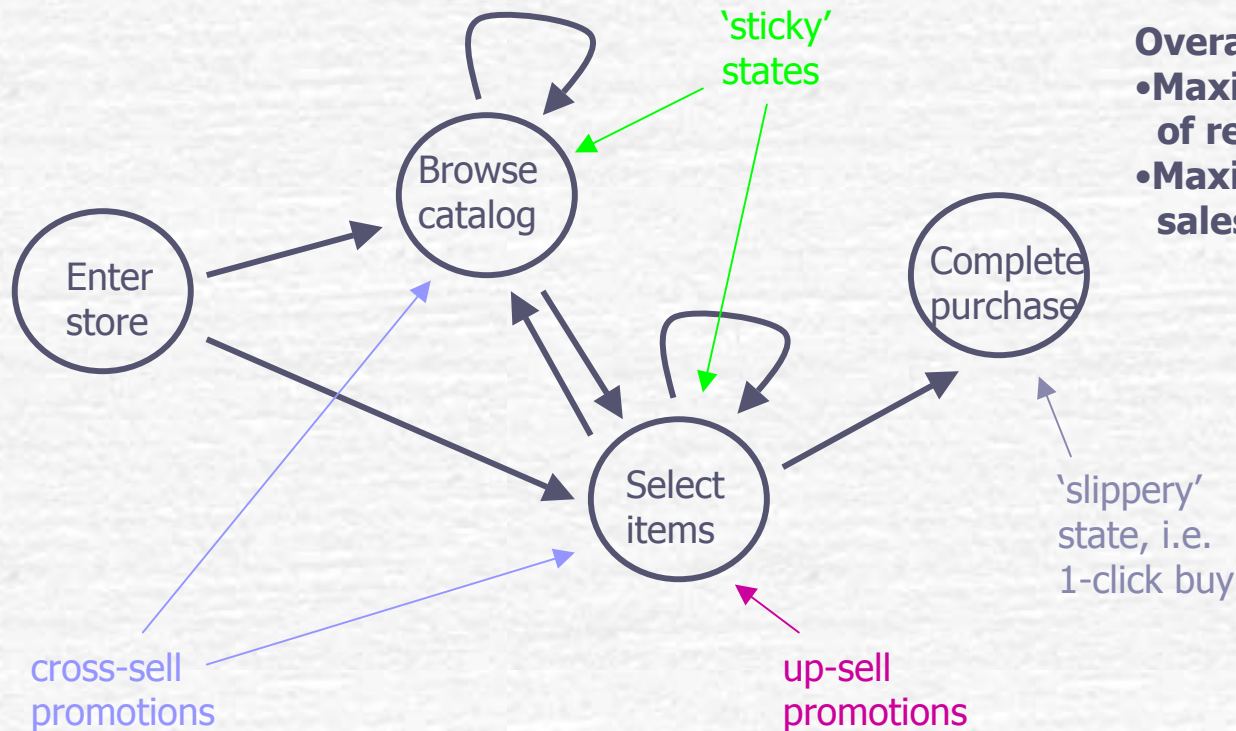
Overall goal:
- **Maximize probability of reaching final state**
- **Maximize expected sales from each visit**

Browse catalog

Enter store

Complete purchase

Select items

'slippery' state, i.e. 1-click buy

cross-sell promotions

up-sell promotions

- Shopping pipeline modeled as state transition diagram
- Sensitivity analysis of state transition probabilities
- Promotion opportunities identified
- E-metrics and ROI used to measure effectiveness

Original Amazon Model for Customer Segmentation

dollars spent in past quarter

1500

1000

H

M

500

1   2   3   4   5   6   7

number of purchases in past quarter

Light buyers

Medium buyers

Heavy buyers

Super heavy buyers

Customer M - medium
Customer H - heavy
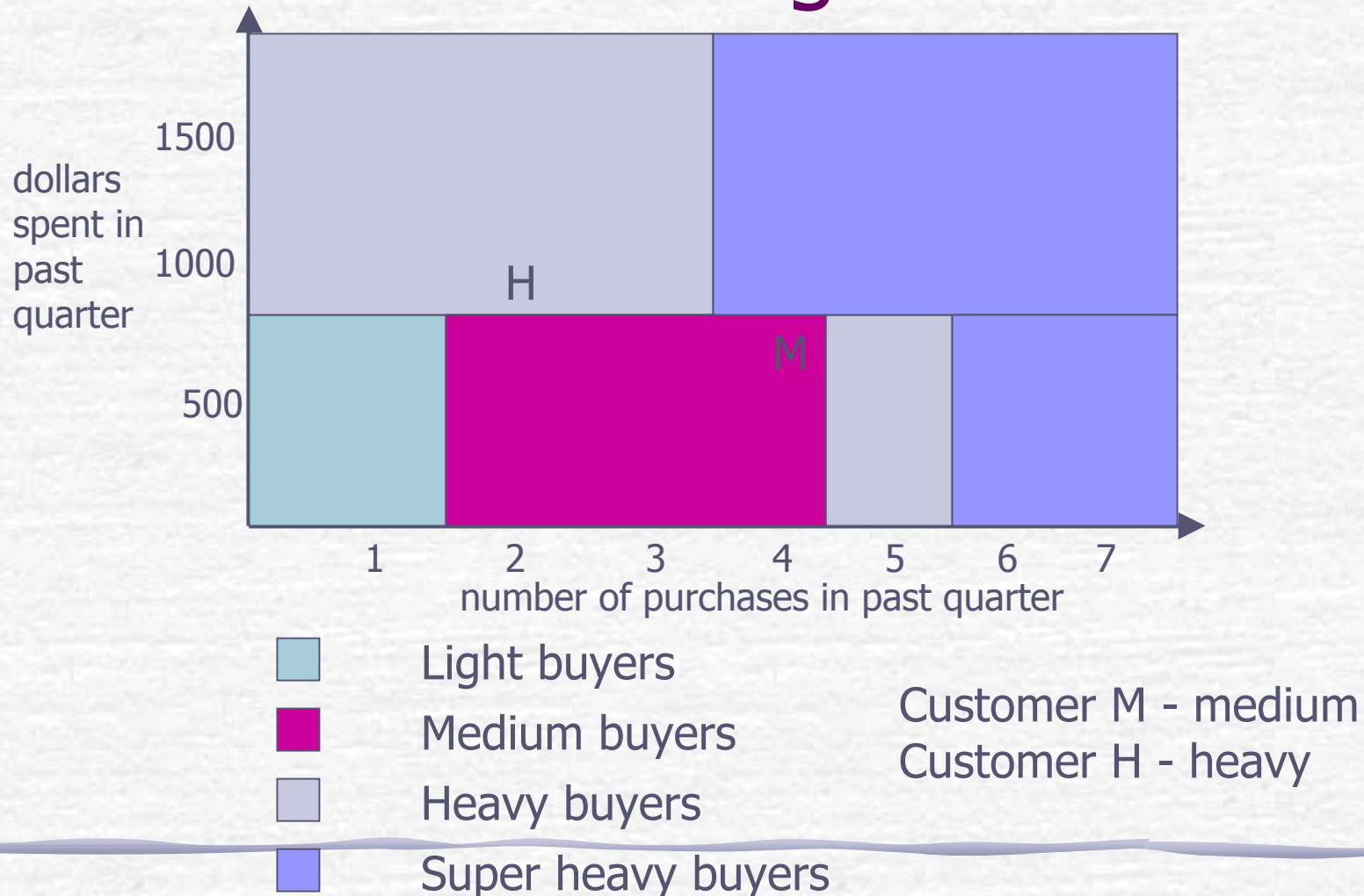
Data Driven Customer Segmentation Model

frequency

monetary
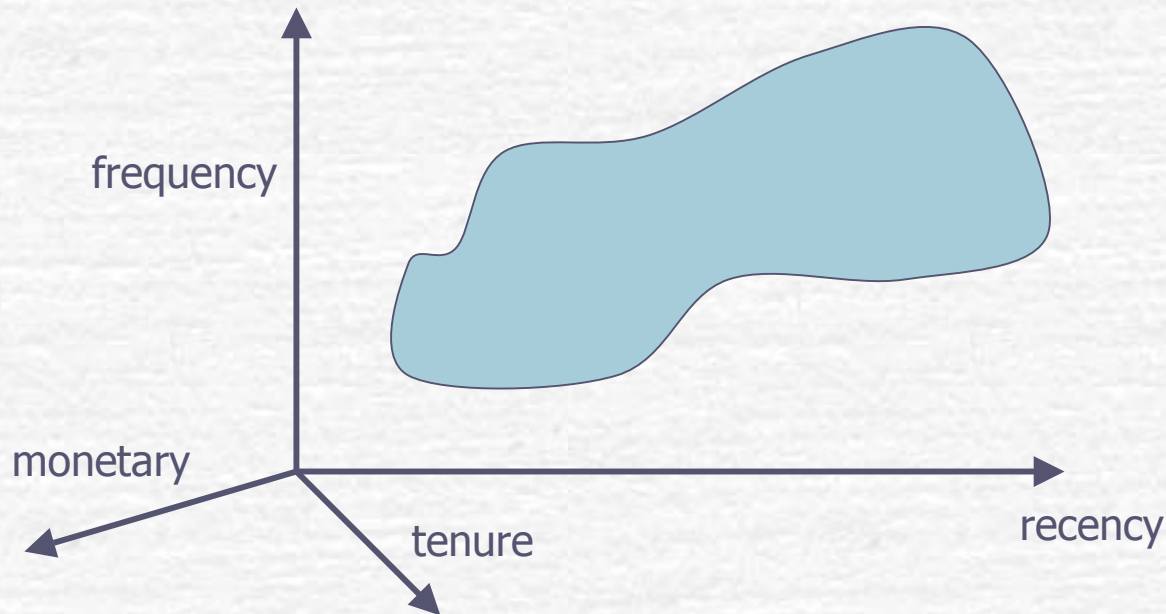
tenure

recency

- modeled customers in a 4-dim space
- used PCA to determine relative weights
  of each dimension
- Composite Score = w1*recency + w2*frequency +
                w3*monetary + w4*tenure

Customer Score Interpretation

	Recency	Frequency	Monetary	Tenure	Composite Score
	...	...	...	...	...
Cust M	10 days	4 times	$480	3 months	80%
	...	...	...	...	...
Cust H	30 days	2 times	$900	10 months	72%
	...	...	...	...	...
	...	...	...	...	...

- Cust M => frequent visitor but low spender
  - => potential for acquiring higher wallet share
  - => focus on improving relationship
- Cust H => infrequent visitor but heavy spender
  - => focus on sustaining relationship

Customer Segmentation & Segment Analysis

Customer segmentation

- Purpose of segmentation is to identify groups of customers with similar needs and behavior patterns, so that they be offered more tightly focused
  - Products
  - Services
  - Communications
- Segments should be
  - Identifiable
  - Quantifiable
  - Addressable
  - Of sufficient size to be worth addressing
- Two approaches to segmentation
  - cluster common characteristics, and then map out behavior patterns
  - Separate out behavior patterns, then identify segment characteristics

Imagine if customer base were segmented as follows
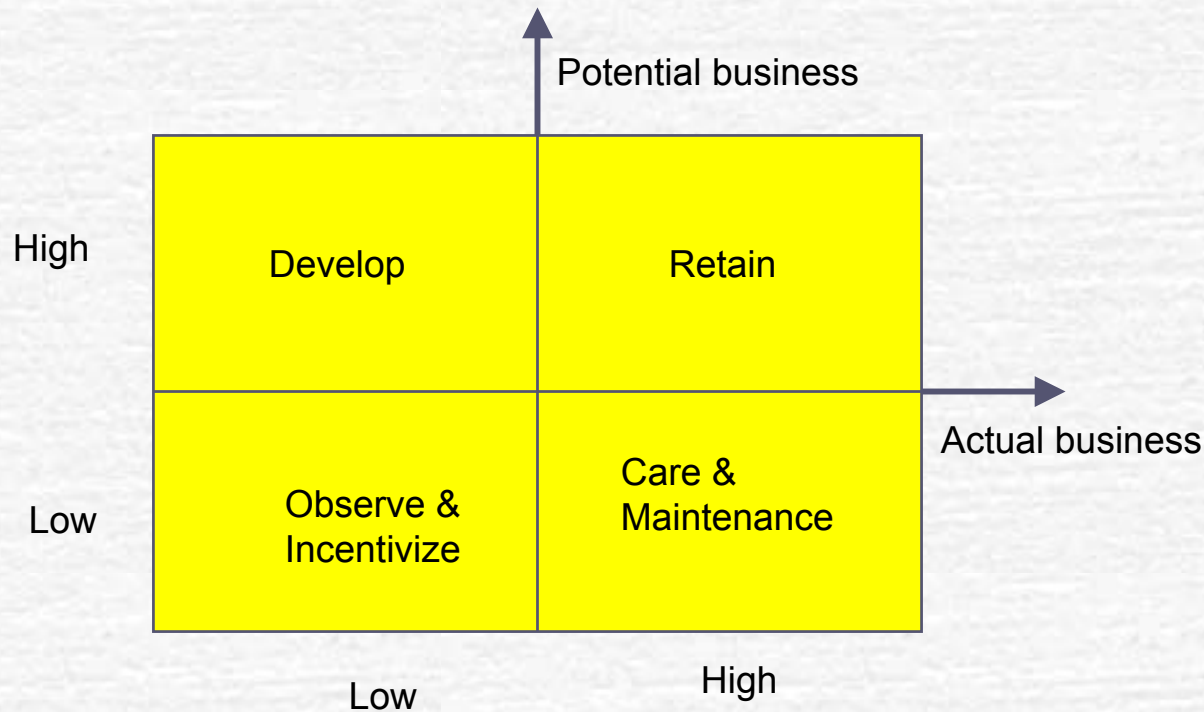
Targeted communication to each segment

Express profits as deciles, and ask questions
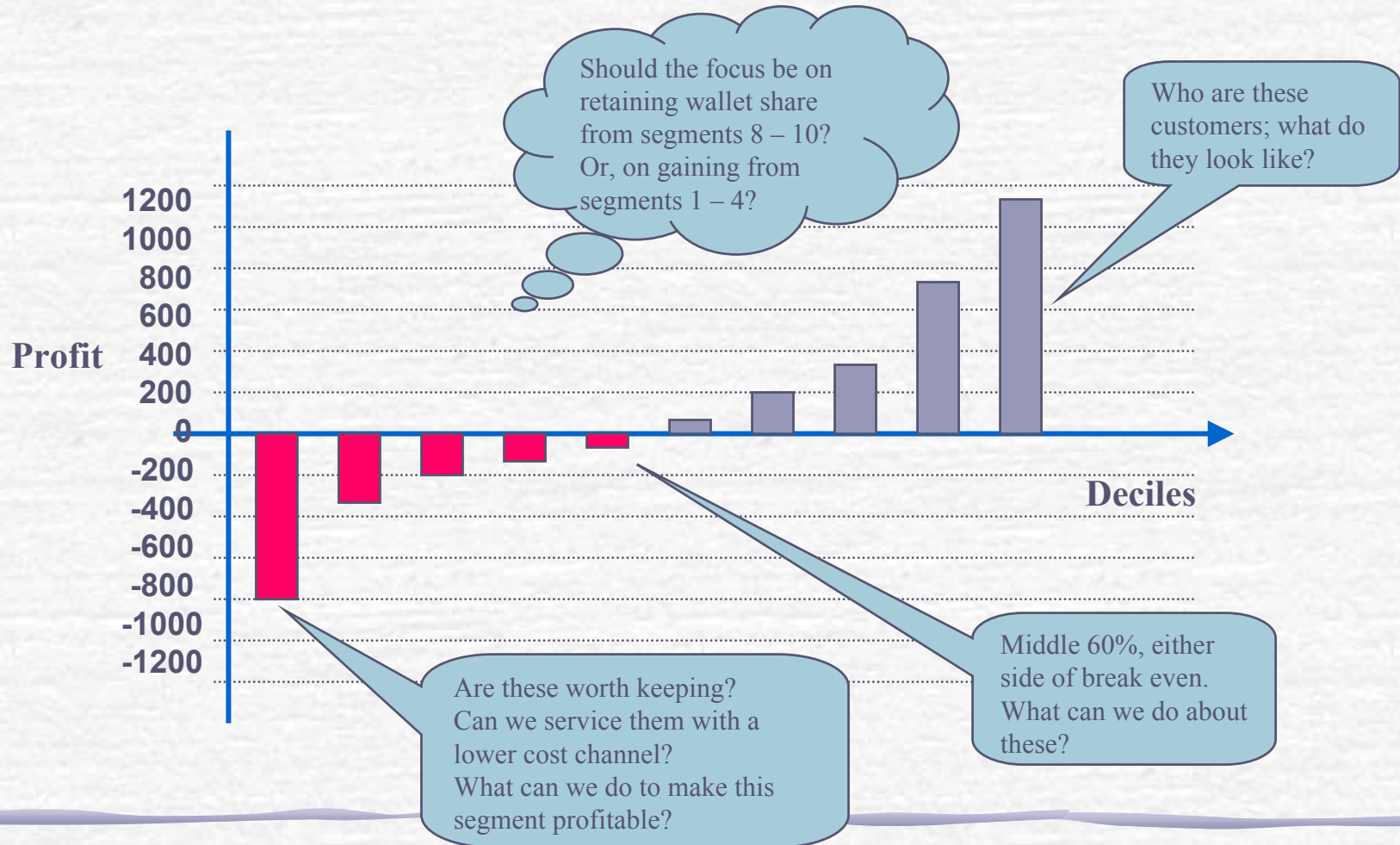
Dig deeper – larger product catalog may not necessarily mean more profit!

Products Offered

12
11
10
9
8
7
6
5
4
3
2
1
0

Profit Deciles
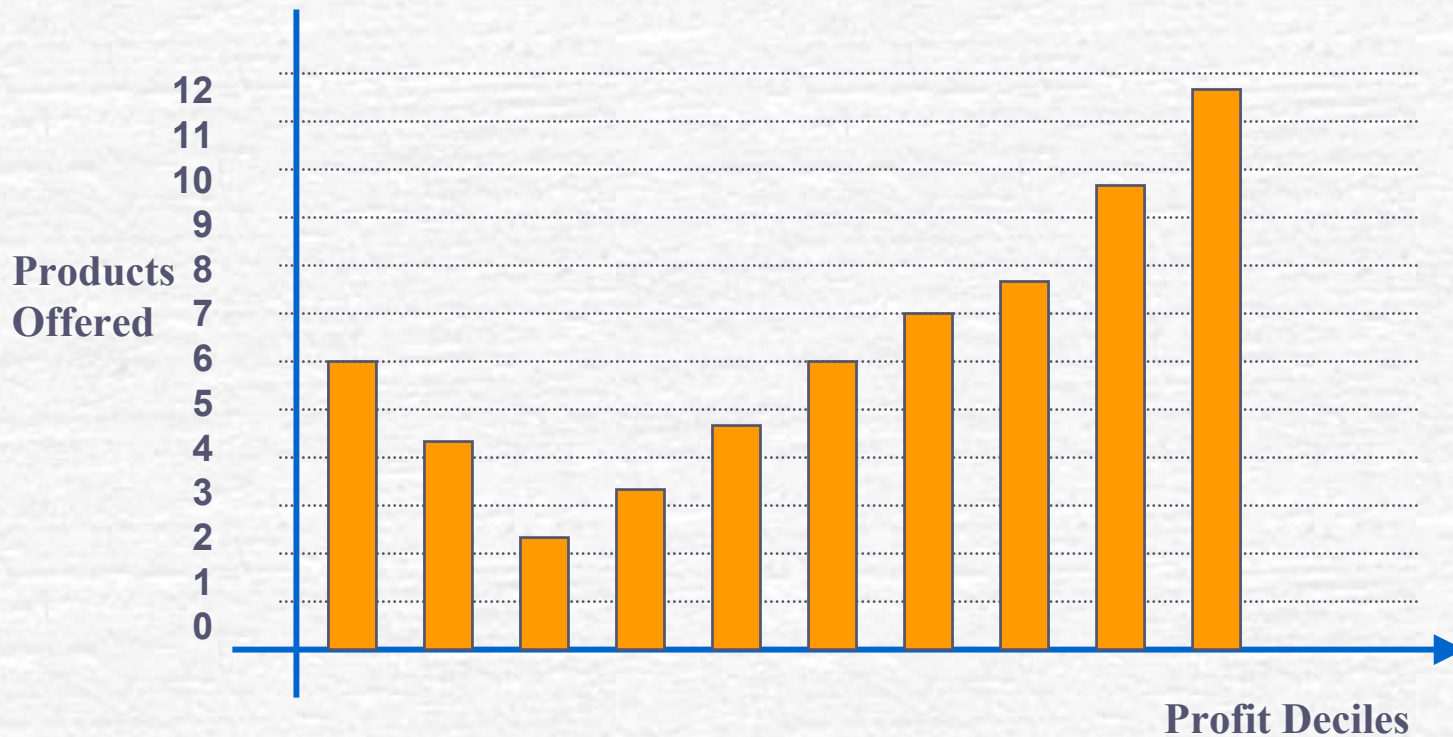
Privacy Issues

let's begin with some real examples …

Problem: Shopping for spouse's anniversary – too much clutter
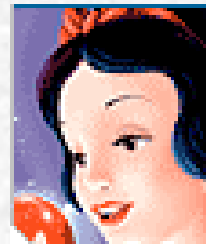
Solution: Focused and relevant advertisement

Problem: Tired of mistreatment by financial institutions …

- You have tons of money in your investment portfolio

- But you are over-worked and slipped a couple of credit card payment deadlines – after all you are busy managing your investment portfolio ☺

- Credit card institution treats you like a deadbeat ☹

Solution

- Why not let the credit card institution know what your investment portfolio balance is? Impress them ☺

- Perhaps even authorize credit card company to transfer funds from your investment account to cover the payment? Or maybe not ☺

So, what's the catch…

- Shopping example
  - Allow the vendor to collect detailed information about you and build an accurate profile
  - Junk mail is only a nuisance for the receiver, but <u>an expense for the sender!</u> – the sender wants to avoid it more than the receiver!!
- Credit card example
  - Allow the credit card company and investment company to share your information
- Multiple online accounts example
  - Hand over your account names and passwords to aggregation service
  - Sounds scary – but over 1.5 million people have done this in about 18 months' time!!

let's now talk about privacy ...

- Merriam Webster definition
  - **a:** the quality or state of being apart from company or observation **b :** freedom from unauthorized intrusion

- Justice Oliver Wendell Holmes
  - "the right to be left alone"

- Operational definition
  - Collection and analysis of personal data beyond some limit

Public Attitude Towards Privacy

- A (self-professed) non scientific study carried out by a USA Today reporter

- Asked 10 people the following two questions
  - Are you concerned about privacy? 8 said YES
  - If I buy you a Big Mac, can I keep the wrapper (to get fingerprints)? 8 said YES

- ACM E-Commerce 2001 paper [Spiekermann et al]

- Most people willing to answer fairly personal questions to anthropomorphic web-bot, even though not relevant to the task at hand

- Different privacy policies had no impact on behavior

- Study carried out in Europe, where privacy consciousness is (presumably) higher

Public Attitude (contd.)

- Amazon.com (and practically every commercial site) uses cookies to identify and track visitors
  - 97.6% of Amazon.com customers accepted cookies
- Airline frequent flier programs with cross promotions
  - We willingly agree to be tracked
  - Get upset if the tracking fails!

- Over 1.5 million people have trusted the aggregation service (called Yodlee) with the names and passwords of their financial accounts in less than 18 months
- Adoption rate has been over 3 times the most optimistic projections

Medical data is (perhaps) an exception to this

What people really want

- Some people <u>will not share</u> any kind of private data at any cost – the 'paranoids'

- Some people <u>will share any data</u> for returns – the 'Jerry Springerites'

- The vast majority in the middle wants
  - a reasonable level of comfort that private data about them will NOT be misused
  - Tangible and compelling benefits in return for sharing their private data – Big Mac example, frequent flier programs

Remarks on Privacy

- Is it 'much ado about nothing'?
  - If indeed data collection was outlawed, and thus personalization impossible, wouldn't the public lose – faced with generic, undifferentiated products/services?
  - Given the public's attitude about privacy (as shown in their actions), are privacy advocates barking up the wrong tree?
  - Is it just a matter of time or generational issue, e.g. adoption of credit cards
- Where do we stand?
  - Current position - loss of your privacy <u>may be</u> beneficial for <u>you</u>
  - Emerging position (post September 11th) - loss of your privacy <u>will be</u> beneficial for <u>everyone</u>
  - Critical emerging debate - i**s privacy a right or a privilege?**

Concluding Remarks

- Internet is a high bandwidth, low latency, negligible cost, interactive channel to the customer
- Very high adoption rates for this channel
- Processing speeds and storage capacities continuing to increase while costs continue to fall
- Data analytics technology has grown rapidly
- Consumer marketing is ready for a paradigm shift
- Innovative companies have moved ahead
- Privacy is an issue, but not much of a concern

That's all folks!!

Questions?

Comments?