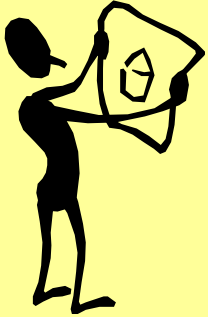


# Personalized eCommerce Systems



Alexander Nikov

## Outline

1. **Introduction**
2. Ways to personalize eCommerce systems
3. Customization vs. personalization
4. Personalization methods
5. One-to-one personalization technologies
6. eCommerce personalization tools
7. Personalized eCommerce recommendation systems
8. Advanced personalization in eCommerce

slide 2 of 130

## What is Personalization?

Why does it matter in eCommerce?

slide 3 of 130

## Definition of Personalization in eCommerce

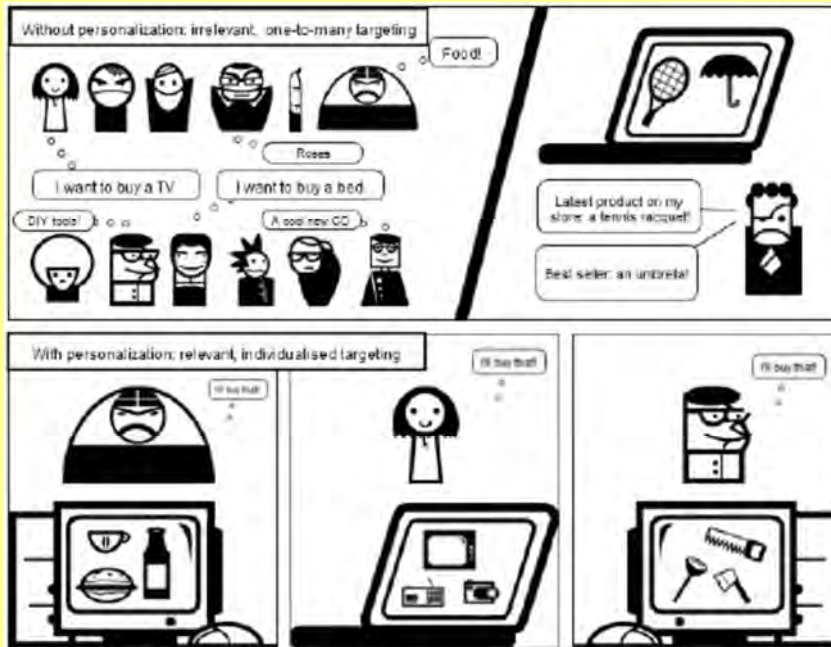
- Personalization in eCommerce is real-time adaption of content using individual behavioral data to ensure relevancy, to maximize available opportunities for revenue-generation or brand engagement.
- Puts the
  - **right content** in the
  - **right format** to the
  - **right person** at the right time
- Helps to
  - **persuade** visitors to look at certain content or **behave** in a certain way
- Helps “**convert** browsers into buyers”

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## Personalization

- What's Personalization?
  - The process of customizing the contents and structure of a web site to the specific and individual needs of each user taking advantage of the user's behavior patterns.
- Why need Personalization?
  - Technique to maintain closed relationships with clients.
    - analyzing clients preferences.
    - providing differentiated service to preferred clients for Internet based applications.
  - Important role in a one-to-one marketing strategy to enhance both customer satisfaction and profits on an E-commerce site.

slide 6 of 130



Source: <http://www.slideshare.net/>

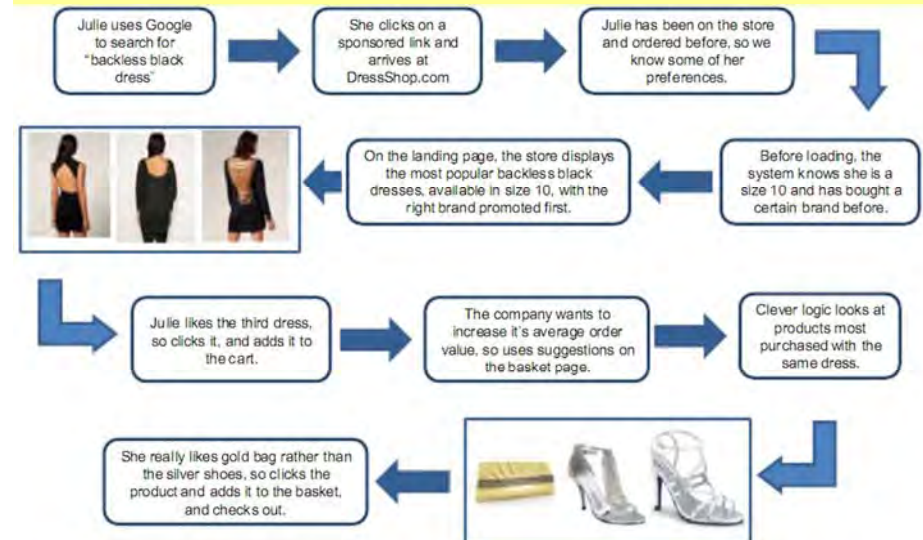
slide 5 of 130

## Personalization

- What is the need for personalization?
  - Need to know client's preferences.
    - What did clients buy?
    - What did clients want or like?
    - What things will the client be interested in?
  - Steps to personalization.
    - Collect user's behavior.
    - Analyze user's behavior from collected data.
    - Predict user's behavior using analyzed results.
    - Recommend things which client will be interested in.

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## eCommerce personalization example



Source: <http://www.slideshare.net/>

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## Interpretation of Website Personalization, Aug 2010

% of senior-level marketers worldwide



Note: n=217; respondents were asked "What does personalizing a website mean to you?"  
Source: Maxymiser survey, provided to eMarketer, Sep 23, 2010

120024

www.eMarketer.com

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## Meaning of eCommerce personalization

### Visitors and customers – reduces stress:

- Are presented with relevant content that they are interested in
- Are able to complete their purchase journey quicker
- Have better buying experiences

### Businesses – increases revenue:

- Improve conversions
- Increase order value and basket size
- Improve repeat purchases
- Gain valuable behavioural data to use in promotional email marketing and other areas of the business

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## eCommerce personalization statistics

**62%** of online shoppers find product suggestions useful

**56%** of online shoppers are more likely to return to a site with personalized recommendations

**45%** of online shoppers are more likely to shop on a site with personalized recommendations

Source: <http://www.slideshare.net/>

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## eCommerce personalization statistics (cont.)

**76%** of recommended products bought by customers on Levi Strauss' online store

**82%** of online shoppers are aware of product recommendation/personalization technology

**25%** average revenue generated through our personalization technology

Source: <http://www.slideshare.net/>

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## eCommerce personalization evolution

- 1. Customization and basic use of data**
  - Best sellers, “Welcome back Jenny”, last viewed items
- 2. Content orientation**
  - Collaborative filtering: people who bought this also bought
- 3. Profiling**
  - Individual visitor profiles, using behaviours and interests
- 4. Clickstream**
  - “Follows” a visitor around a site and adjusts based on similar sessions
- 5. Attribute Shadowing**
  - Adjusting suggestions around based on attributes a visitor has declared interests in
- 6. Geo-targeting and geo-variables**
  - Location and other location-variables, e.g. weather



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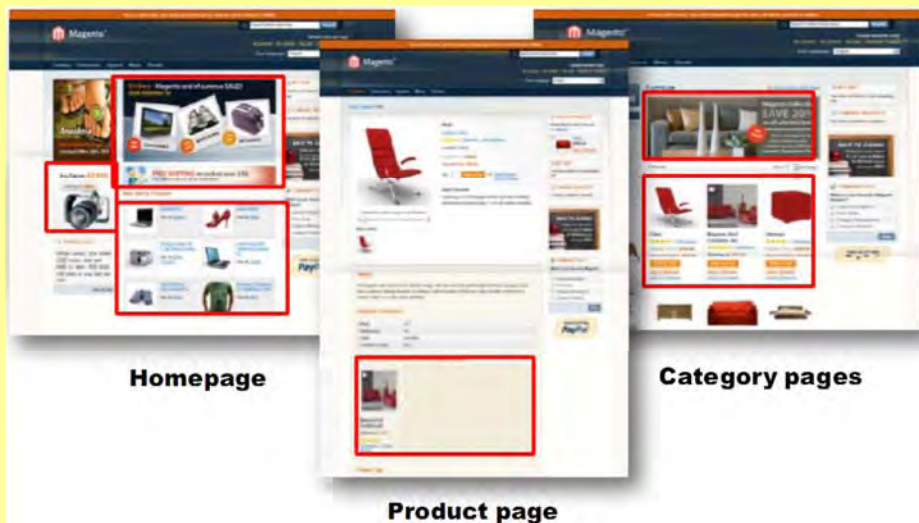
## eCommerce personalization evolution next stage: Situational targeting

- **Situational targeting**
  - will understand individual visitor contexts
  - demonstrate machine learning about cause and effect relationships of external variables with behaviour on site
  - deep understanding of intent and contexts

multiple-identity  
understanding weather multi-variable  
personality-variables situation  
location context  
specific multi-event

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## Where eCommerce personalization?



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## Where eCommerce personalization? (cont.)

- **On the store:**
  - Basket/Cart page
  - 404 pages
  - My Account pages
  - Wishlist pages
  - Blog and content pages
  - Search pages
  - Landing pages
  - Tag pages
  - “My Suggestions” pages
  - Menu navigation



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## Where eCommerce personalization? (cont.)

- **Beyond the store:**

- **Transactional Emails**
- **Promotional Emails and Newsletters**
- **Mobile sites**
- **Mobile apps**
- **In-store kiosks**
- **Personalized direct mail/catalogs**
- **Behaviourally targeted advertising**
- **Affiliate widgets**



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## 1. Let People Identify Themselves

- Let people tell you who they are
- Let people tell you what they like
- Welcome them back
- Welcome them to a “club”

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## 2. Treat Them Like Individuals

- Track their activity at your site
- Identify their patterns
- Suggest products and services to them

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### 3. Treat Them Like a Herd

- People are social animals
- They like to do what others are doing
- Tell them that people like them are doing something else

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### 4. Use Dynamic Content

- Static HTML pages are dead
- Dynamically create HTML pages based upon what you know about them

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### 5. Reach Beyond the Browser

- Send them personalized email
  - Invite them to items of interest
  - Suggest a particular action you think they'll enjoy
- Broadcast faxes are still viable
- Enable wireless technology (see next slide)

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### 6. Enable Wireless Technology

- Allow Web clipping using smartphone devices
- WAP enable your Web site
- Send messages to the user's pager if they've requested
- Prepare your site to handle less robust browsers (e.g., Windows Mobile)
- Be prepared to handle new communication devices (XML will help)

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## 7. Include Dynamic Banner Ads

- Ensure what you're promoting is complementary to what the user is doing or what you WANT the user to do
- Use profiles of this person and others to determine appropriate placements
- Use software that allows for "campaigns"

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## 8. Reduce the "Friction"

- Make it easy to buy
- "One click" purchases
- Remember preferences
- Send reminders (e.g., anniversaries)
- Set up automatic purchases (e.g., drug refills)

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## 9. Keep Site Fresh

- Make the site different every time people return
- Give them a reason to return (email reminders work well)
- Don't sell swimsuits in December
- Use campaigns for special promotions and/or special customers

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## 10. Be Creative

- Think like your customers/ask your customers
- Come up with an idea for your business that's never been done before in your industry and is now enabled through the Internet
- Try/learn, try/learn, try/learn...nobody has all the answers

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## Customization

*... is user driven*

## Personalization

*... is computer driven*

## Customization

- Customization is defined by Jacob Nielsen, a well-known usability expert, as being driven by the user.
- For example, customization could include:
  - Color
  - Background/pictures
  - Font size
  - Icon size
  - Cursor size/tracking
  - Double click speed
  - Etc.

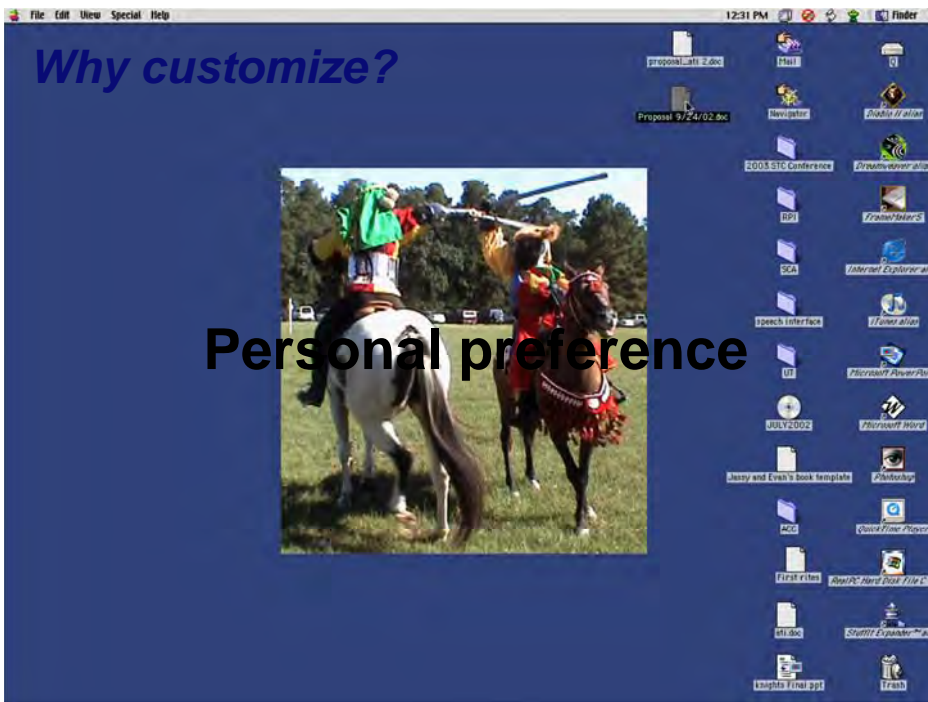
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## Personalization

- **Personalization** he defines as being computer driven, by some sort of algorithm or user model based on the user's selections, demographic information, etc.
- The two are closely related and often the dividing line between the two is vague.
- Let's look at some examples of both customization and personalization.

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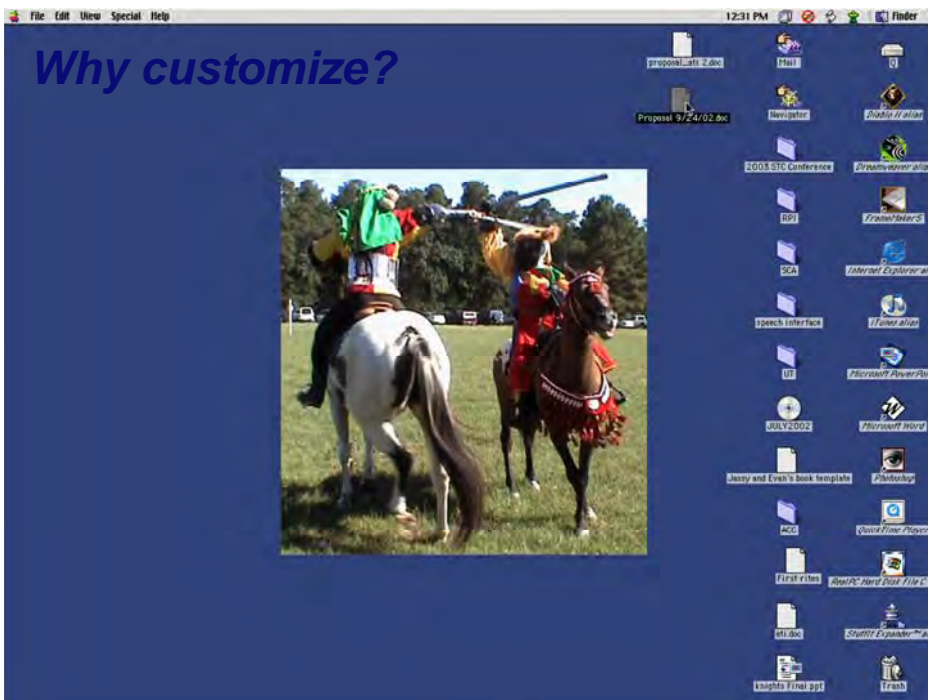




## Why customize?

- One of the common reasons for customization is personal preference.
- How many of you change the background, fonts, or icons whenever you get a new computer?

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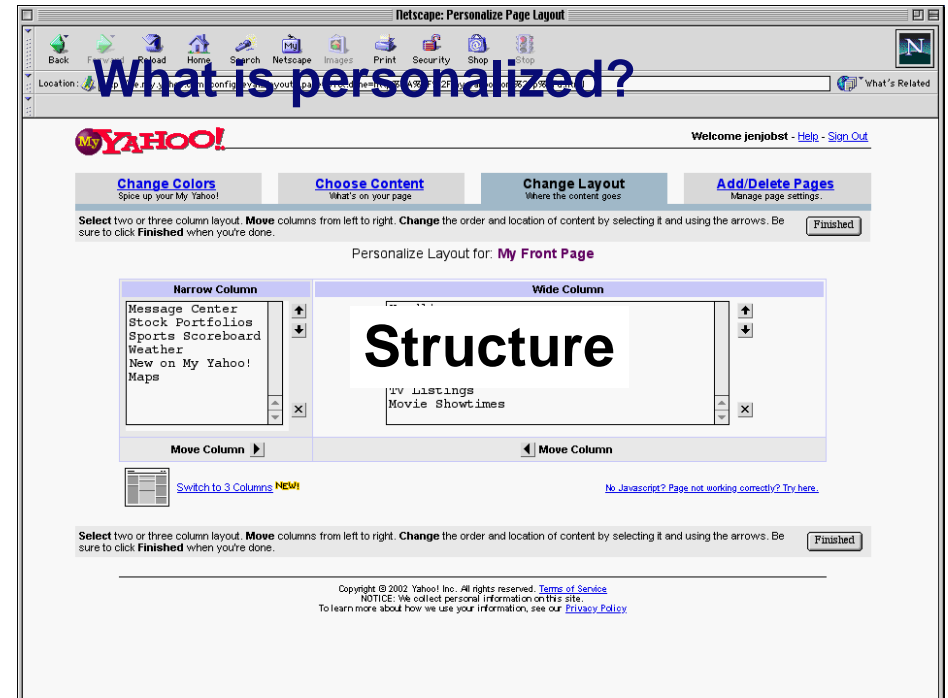
## Why customize?

- Here's an example of a customized background. Notice
- I've changed the background color as well as image
- I've arranged the applications
- I use most over on the right hand side.
- I've also put the files that are currently in use on the desktop, though
- I might move them elsewhere after
- I'm done with them.
- I've also changed the resolution and icon size.

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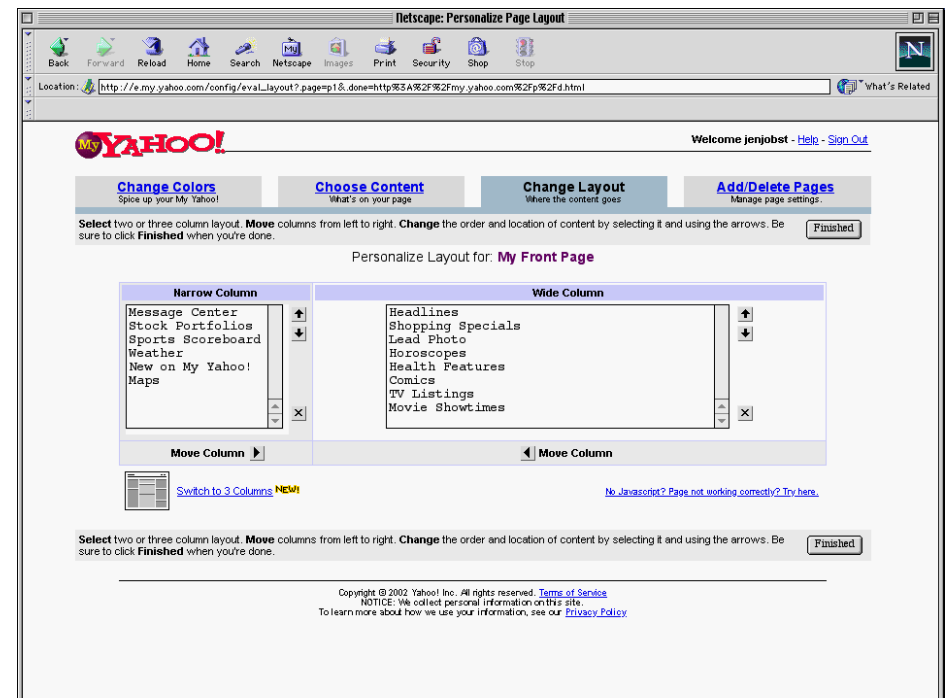
## Why personalize?

- Cater to different levels of user expertise
- Provide different UIs for different levels of authorization
- Cater to user's habits
- Allow for multiple languages
  
- For example, software developers vs. managers at a vendor site
- For example, Dr. AA and BB probably see a different page than we do when they go to the class website since they have administrative privileges
- For example, my.yahoo.com or amazon.com
- Multinational companies often have their website available in different languages; which language is served up may depend on your browser settings



## What is personalized?

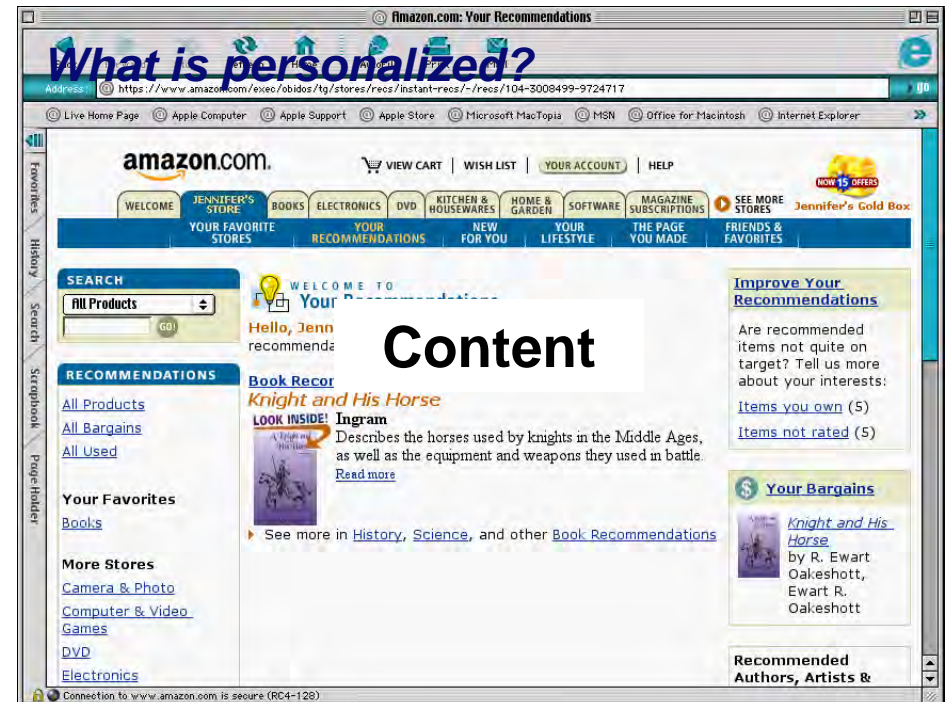
- Personalizing the structure of an application or web site means altering things like available links, layout, etc.
  
- Let's consider the "my yahoo" page displayed on previous slide.
- The user is allowed to control many aspects of the page, including the content ( myyahoo.com is one of the top-rated sites for personalization).
- Users can include stock quotes from their portfolios, local weather, local movie showtimes, news headlines, a calendar, and the list goes on.
- You might also note that you can choose where to \*put\* each of these items on your web page, so you're also personalizing structure.



# What is personalized?

- Let's consider the "my yahoo" personalization page displayed.
- The user is allowed to control the structure and content of the page (my.yahoo.com is one of the top-rated sites for personalization).
- Here you can select from a two or three column display, and you can control not only which information is displayed (e.g. local weather, news headlines, stock quotes, etc.), but also the order in which it is displayed.

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# What is personalized? Content

- Content is perhaps the most frequently personalized aspect of a web site.
- Content personalization is based mostly on who you are:
  - Software engineer vs. manager (visiting a vendor site)
  - Dr. AAI or BB visiting our class home page (authorization)
  - Experienced user vs. novice user
  - User habits (e.g. the pull down menus with "hidden" menu items in Word 2000 and 2003)
  - What language you speak (for multinational sites, anyway)

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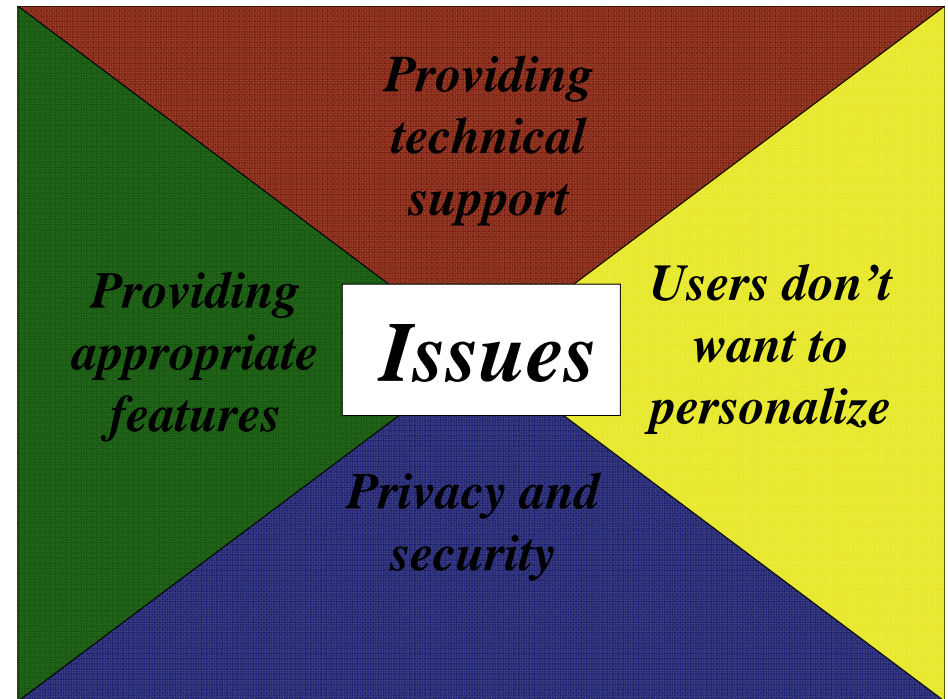




## What is personalized? Content

- Content is perhaps the most frequently personalized aspect of a web site.
- Here's a site that's very dangerous for me: amazon.com. Not only do they sell books (and I think that most of us in this room can agree that books are pretty hot items) but they also have taken past buying habits into account, as well as books I already have (so they're sure not to recommend those) and suggest new books that I might order.
- Does this marketing strategy work?
- Content personalization can be based on different user models such as:
  - Software engineer vs. manager (visiting a vendor site)
  - Dr. AA or BB visiting our class home page (authorization)
  - Experienced user vs. novice user
  - User habits (e.g. the pull down menus with "hidden" menu items in Word 2003 and 2007, or the amazon.com site shown here)
  - What language you speak (for multinational sites, anyway)
  - Others?

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## Personalization methods

- **adaptive presentation**  
techniques for adapting the content of pages (Web pages) to the user.
  - **adaptive navigation**  
techniques for adapting the hypertext links to the user.
- Overlap!* some manipulation of link anchors in a Web page changes the link structure.

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## Adaptive presentation

- Adapt the content of a page to the user. (e.g. beginners may need different information than expert users.)
- Adapt the media selection to the user. (some users may prefer text, others images, others video, others audio, etc.)
- Combination: some users may prefer long detailed presentations, others short ones.

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## Adaptive navigation

- In hypermedia applications there is a lot of navigational freedom (i.e. many links).
- Some paths may not be meaningful: the author did not foresee the user's choice of links to follow.
- Adaptive navigation means dynamically altering the link structure while the user is browsing.

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## Adaptive presentation: methods

- **additional, prerequisite or comparative explanations:**  
pieces of content that are sometimes shown.
- **explanation variants:**  
an explanation is always shown, but it may be different for different users.
- **sorting:**  
the order in which the information is presented is different for different users.

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## Adaptive presentation: techniques

- **page variants:**  
alternative versions of whole pages are selected; only a few versions are feasible.
- **fragment variants:**  
alternative versions of parts of a page are selected; together they form many versions of the same page.
- **stretchtext:**  
show relevant details expanded; non-relevant details are collapsed (but can be expanded).

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## Adaptive presentation: low level

- **conditional text:**  
fragments are conditionally included.
  - if only one fragment is shown at the same time for the whole page => page variants
  - if conditional text is used to select between alternative paragraphs => fragment variants
- **frame based techniques:**  
used with natural language generation.

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## Adaptive navigation: methods

- **guidance:** global or local  
help the user to select appropriate links.
- **orientation support:** global or local  
tell the user where she is in the whole structure of pages and links.
- **personalized views:**  
offer adapted views on the link structure.

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## Adaptive navigation: techniques

- **direct guidance:**  
a “next” button leads to the most “relevant” page (the best page to read next).
- **link sorting:**  
links to subsequent pages are sorted from most relevant to least relevant.
- **map adaptation:**  
a fish-eye view with only relevant links.

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## Adaptive navigation: techniques

- **link hiding:**  
hide that a content piece is a link anchor.
- **link removal:**  
remove the link anchor (this changes the content of the page).
- **link annotation:**  
change the presentation of the link anchor.
- **link disabling:**  
make the link anchor active or inactive.

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## User Modeling

- a *user model* represents the user's state of mind:
  - **knowledge** (about the subject domain)
  - **preferences** (media, verbosity, ...)
  - **background** (education, job, task, ...)
  - **experience** (with computers and with AHS)

We concentrate on representation of knowledge.

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## User modeling (cont.)

The *domain* is divided into **concepts**.  
For each concept the user's knowledge is represented as a *value*.

- **Boolean model**: known or unknown.
- **discrete model**: a few values, like unknown, learned, well learned, well-known.
- **continuous model**: range, e.g. [0..1], or an approximation like a percentage.

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## Maintaining a User Model

- Each request is processed individually by a Web-server, CGI-script and/or Servlet. The user model must be saved in and restored from a file or database.
- The script knows when which page is requested.
- It is possible to also invoke a script when the user leaves a page. Thus it is possible to record the "reading time" for each page.

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## Adaptive navigation in HTML

- **direct guidance**: the link destination of the "next button" is changed, but the button always looks the same.
- **link sorting**: the text in the HTML page must be sorted; (even absolute positioning using CSS is insufficient to do sorting).
- **map adaptation**: HTML is not graphical; only a "table of contents" style map can be generated; otherwise images are used.

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## Adaptive navigation in HTML

- **link hiding, link annotation:** using CSS one can create link anchors with different properties, like color; hiding is a special case of annotation: color is black.
- **link removal:** this is done through conditional text: conditionally delete the anchor.
- **link disabling:** this is done by removing the anchor tag, and by coloring the text like links.

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## Using Dynamic HTML

- Dynamic HTML makes it possible to conditionally show or hide fragments.
- It is possible to combine a link with a (Java- or VB)Script function which determines the “real” destination of a link. (This can be used to implement direct guidance.)
- Absolute positioning offers a very limited way to do sorting.

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## Conclusions

- PES can be realized on the Web (with some limitations and browser-dependent features).
- Adaptive presentation and adaptive navigation are mixed because of HTML.
- The process of generating (adapted) pages must be done through server-side scripts.
- The process of updating the user model must be done through server-side scripts.

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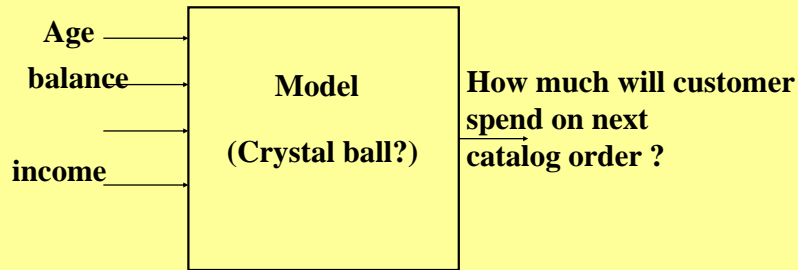
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## Predictive Modelling

- A “black box” that makes predictions about the future based on information from the past and present



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## What is Data Mining?

- It is the exploration and analysis by automatic or semiautomatic means, of large quantities of data in order to discover meaningful patterns and rules.

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## Why now? (A historical perspective)

- Because data is now available (wasn't always)
- Distributed sources
- Technology evolution
- Competition (do what you can to outdo)

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## Why DM?

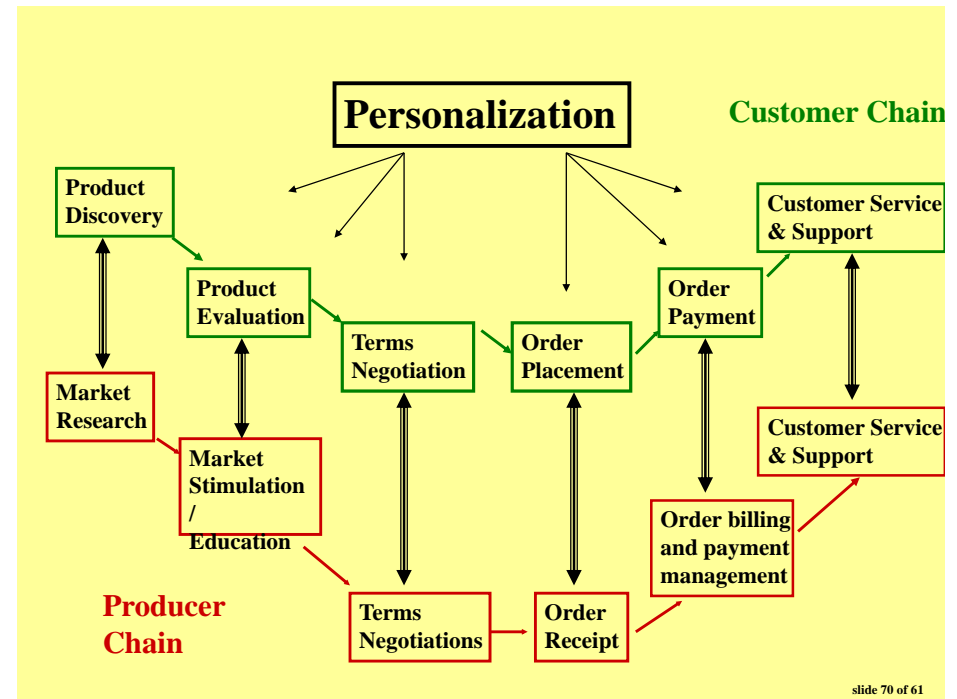
- CRM (Customer Relationship Management) - important success factor in E-commerce
  - price differentiation no longer enough
  - customer service more important
- Links with suppliers already exist (B2B) - JIT, joint forecasting, planning, procurement
- Current emphasis on links with customers - feedback, input in design, etc.

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## Personalization in Ecommerce

- Positive:
  - much better chance of personalization
    - customer identification
    - tracking across visits and within visit
  - ability to do 'what if' experiments
- Negative:
  - cost of switching is much less
  - is web based shopping good for 'touchy feely' things
  - price differentiation across geographies not easy

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## Use of Personalization

- In addition to storing and retrieving information on the individual's profile "on the fly"
  - can also use mining software to analyze the information in the database to make recommendations or comments specific to the individual

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## Impact of Personalization

- Customer relationship
- Learn more about customers
  - learn and understand the why and how they prefer to do business with your organization
- In tandem with tracking provides you with a tool to monitor your website
  - what works, what doesn't, what makes your audience "click"

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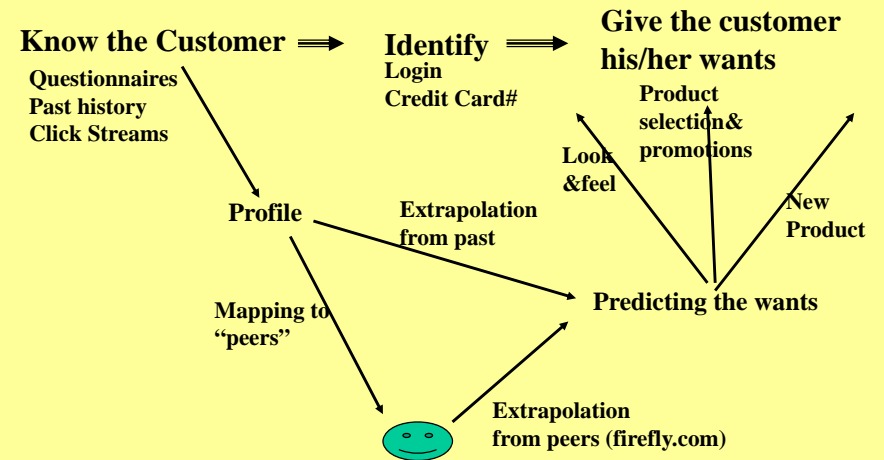


## Security and Privacy as Barrier to Personalization

- Large number of customers concerned about personalization (double click!)
- will they pay more to preserve privacy?
- Some falsify info to preserve privacy
- customers give more info to trusted site
- need secure site with clear privacy policies stated at site

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## Personalization



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## Know the customer

- Cookies
  - backlash (users do not trust them)
- OPS: Open Profiling Standard
  - combined with eTrust certification
- Registration
  - User certificates: logons
- Key Question:
  - how do you know that this customer is same as that goes to your storefront
  - need standard warehouse techniques like address resolution, cred.card resolution etc.

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## What if no profile???

- Deduce
  - collect information: history of purchases, time spent on pages
  - ask questions (offer rewards)
  - combine with database marketing data
- Predict behaviour
  - buy probabilities
  - build customer relationship
- mining is key!

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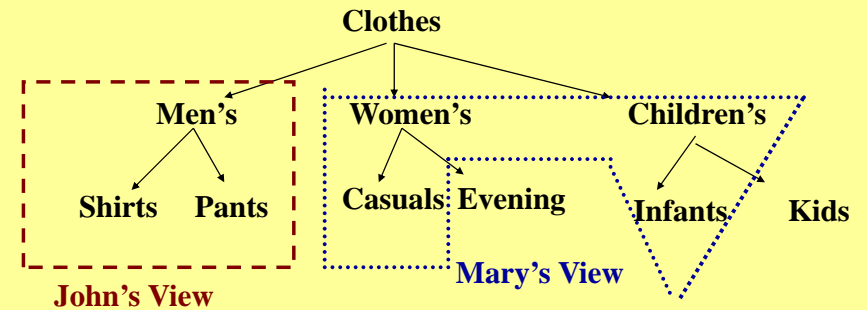
## Storefront Personalization

- Customers visit Store Website
  - Howard buys ties
  - Rob buys Baby Products
  - Ray buys toys
  - Amy buys clothes
- Provide a view of the store to these customers
  - present them with what they are likely to buy?
    - Howard: ties, and men's formal wear
    - Ray: Toys and gadgets
    - Rob: Infant, Toddler section
    - Amy: Women's Clothes section

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## More Actions: Product Presentations & Promotions

### Basic Storefront Product Hierarchy



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## Data Mining Problems

- Classification/Segmentation
  - Binary (Yes/No)
  - Multiple Category (Large/Medium/Small)
- Forecasting (how much)
- Association Rule extraction (market basket analysis)
- Sequence detection
  - balance increase -> missed payment -> default

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## Typical DM tasks

- Prediction and Classification
  - Directed
  - Decision trees, Neural networks, memory based reasoning, logistic regression
  - Examples:
    - How many units will be sold on a given day?
    - What will be the stock price on a given day?
    - Will a customer buy the product or not?

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## DM tasks

- Affinity grouping
  - Undirected
  - Which products go together naturally?
  - The beer-diaper syndrome?
  - Market basket analysis
  - Examples:
    - Which products peak in demand simultaneously?

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## DM tasks

- Clustering task
  - Undirected
  - Segmenting into similar clusters
  - Different from classification
  - Examples
    - Customers with similar buying profiles
    - Products with similar demand patterns

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## DM success factors

- Integration with data warehouses and DSS
- Users should develop a good understanding of techniques
- Recognize that these tools cannot automatically find patterns without being told what to do
- Most methods now used are extensions of analytical methods that have been around for decades

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## Data Complications

- Noise
- Missing data
- Transformation
  - numeric data
  - text
- Need to differentiate between variables you can control and those you cannot
  - Actionable: size of discount, number of offers etc.
  - Non-actionable: age, income ..

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## Data Mining Techniques

- Market Basket Analysis
- Memory Based Reasoning
- Cluster Detection
- Link Analysis
- Decision Trees and Rule Induction
- Neural Networks
- Genetic Algorithms
- OLAP

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## Cluster Detection

- Undirected data mining
- Finds records that are similar to each other (clusters)
- Clusters are found using geometric methods, statistical methods, and neural networks
- Good way to start any analysis

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## Market Basket Analysis

- Form of clustering used for finding items that occur together (in a transaction or market basket)
- Likelihood of different products being purchased together as rules
- Planning store layouts, limiting specials to one of the products in a set,...

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## Support and confidence

- For a rule that says: If A then B
- Support is defined as the ratio of number of transactions that include both A and B to total number of transactions
- Confidence is defined by the ratio of the number of transactions that include both A and B to the number of transactions that include A.
- How do you specify 'significant' support and confidence ?

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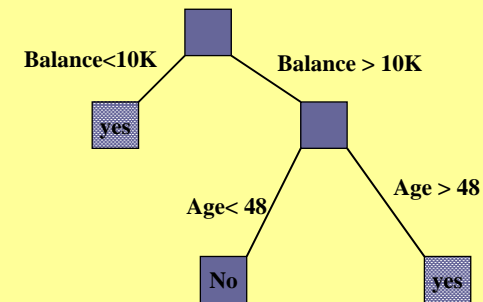
## Data Mining Algorithms

- Four algorithms commonly cited
  - Association Rule (used in over 90% of the cases!)
  - Nearest Neighbor
    - quick and easy but models get large
  - Decision Tree
  - Neural Network
    - difficult to interpret and large time

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## Decision Trees

- Series of if/then rules
  - easy to understand, complexity in implementation



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## Defining eCommerce personalization

	Type of eCommerce interaction	Definition	Example
Personalization	One to one	Custom Web pages are delivered to individuals based on explicit or inferred inputs.	Amazon.com shows different home pages to customers based on previous clickstream path and/or purchase behavior.
	One to many	A finite set of Web pages is delivered to customers based on how those customers map to predetermined segments.	Virgin Mobile's Web site asks customers which regional Web site they want to set as their default navigation option.
Generalization	One to all	A single clickstream path or set of items appears to all customers, regardless of their previously exhibited behavior or intent.	Weather.com does not cookie users and only displays custom content if users specify that they want it.

Source: Forrester Research Inc.

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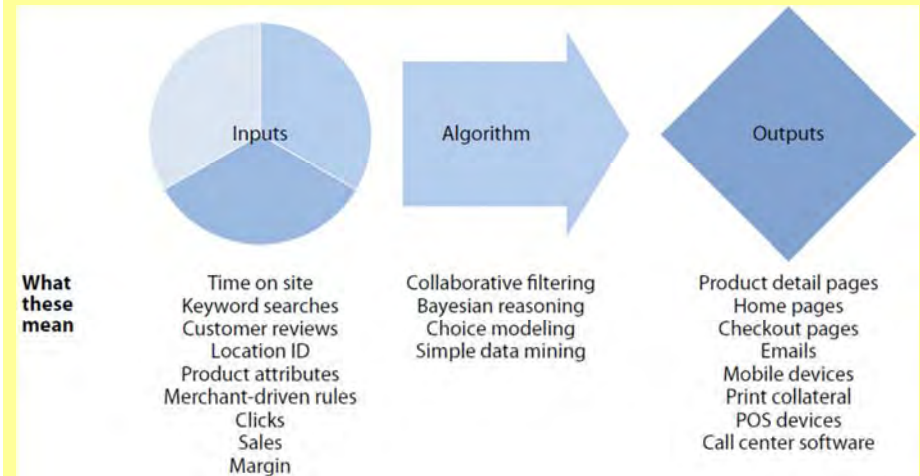
## Examples of eCommerce personalization

Personalization type	How it works	Comments/examples
Greeting visitors	Usually triggered by a customer login.	Typically a salutation such as "Welcome back, John Smith."
Saved shopping carts	Cart has products stored for an extended period of time, usually more than 24 hours.	Frequently depends on a Web site's server capacity and the length of a consumer's purchase cycle for a given product.
Saved email preferences	Marketers ask customers which type of email marketing messages they would like to receive (or how frequently) and communicate with customers accordingly.	While effective, most email marketing by retailers continues to be "batch and blast."
Registries/wishlists	Products are associated and stored with a given customer profile.	Most effective for heavy gifting Web sites.
Saved profile/account	Typically saves billing, shipping, and credit card information for buyers.	Amazon's 1-Click ordering: critical for convenience-driven, frequent shoppers.
Product configurators	Tools create unique products, usually a shell product with some customizable attributes.	While popular with customers, configurators are more often a logistical or operational hurdle.
<b>Domain of personalization tools</b>		
Web site segmentation	Creates different clickstream or navigation paths or different product offers for customers based on implicit or explicit data.	Some sites showcase one version of a site for new visitors and another for repeat visitors.
Personalized cross-sells	Products are showcased on a product detail page that are likely to drive upsells or longer time on site.	"Customers who purchased this also purchased ..." and "Customers like you may like ..."
Filtering	A series of questions filters a customer's preferences and creates a finite list of options to suit his/her needs.	High-ticket items such as cars, large home appliances, and consumer electronics are typically the categories that leverage this most frequently.

Source: Forrester Re

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## eCommerce personalization tools How They Work?



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## eCommerce personalization tools

- Versioning tools
- Simple cross-sells
- Advanced cross-sells
- Interactive filtering solutions

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## eCommerce personalization tools: Versioning tools

These tools typically personalize an experience by first defining segments of consumers and then serving up different iterations of key pages of Web sites (e.g., a home page, checkout page, or offer page)

An example of such an execution would be showcasing different versions of a home page to different visitors (e.g., new versus repeat) or different offers to different segments of consumers.

In some unique situations, the data that informs the outputs can also be used across channels to create unique email programs or even differentiated print campaigns for individual customers. As a result of their approach, these programs typically require extensive creative resources to support the various "versions" of an optimization campaign.

For companies that want to slowly test what works first or want to carefully control their messaging, these tools can be extremely effective.

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## Versioning tools Example

- **Key characteristics:** Versioning tools enable sites to showcase different executions of site elements such as the home page to different customers.
- **Pros:** Creates more relevant paths to discover products than a “one-for-all approach.”
- **Cons:** Often requires extensive resources to analyze segment data and execute different creative treatments.

Source: Forrester Research, Inc.



## eCommerce personalization tools Simple cross-sells tools

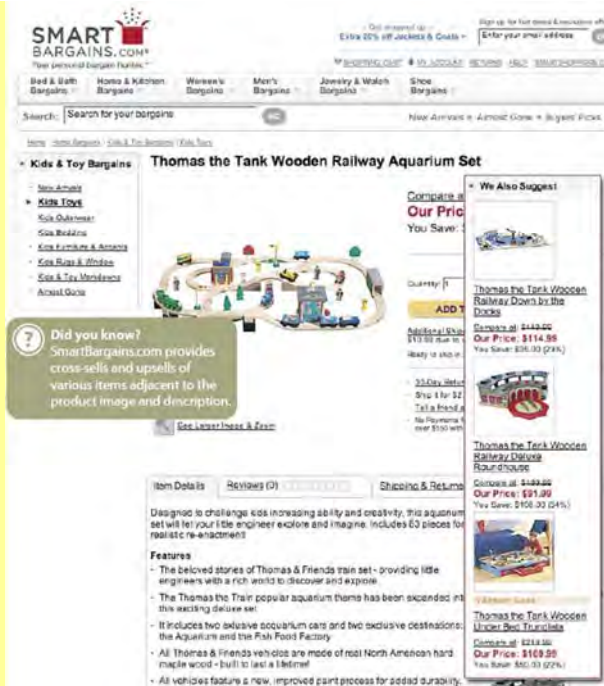
- These tools take implicit and sometimes explicit data and simply place what they believe to be the most relevant “adjacencies” in a predefined box on a Web page.
- These are often low-complexity, inexpensive, easy-to-integrate, and simple solutions that help to automate the tedious processes of Web site merchandising or cross-selling.
- Small to midsize retailers and other small eBusinesses typically are the most active customers of these tools, and companies such as Avail Intelligence, Baynote, CleverSet, and Loomia are solid providers of such solutions.

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## Simple cross-sells tools Example

- **Key characteristics:** Simple cross-sells provide customers with associated products, usually only at the product detail page. Usually, a fixed number of items reside in the same spot on a given page.
- **Pros:** Easy ways to drive increased average order value, as well as engagement with a site, particularly when automated.
- **Cons:** Business rules determining cross-sells often have to be massaged to most effectively showcase the most effective cross-sells.

Source: Forrester Research, Inc.



## eCommerce personalization tools Advanced cross-sells tools

- These tools incorporate all of the features of simple cross-sells but also have the capability to push suggestions to other parts of a site or company (e.g., a home page, outgoing email programs, POS systems, or call centers).
- Advanced cross-sell solutions run the gamut from souped-up single-cross-sell solutions that can operate seamlessly in different areas of a Web site to more sophisticated solutions that create completely different navigation experiences for different customers.
- The key element that distinguishes advanced cross-sells is that they take outputs and feature them dynamically in a manner that is more than just “a box on a page”.
- Blockbuster, for instance, works with a company called ChoiceStream to provide recommendations at virtually every stop during a visitor’s session, similar to Netflix’s execution.

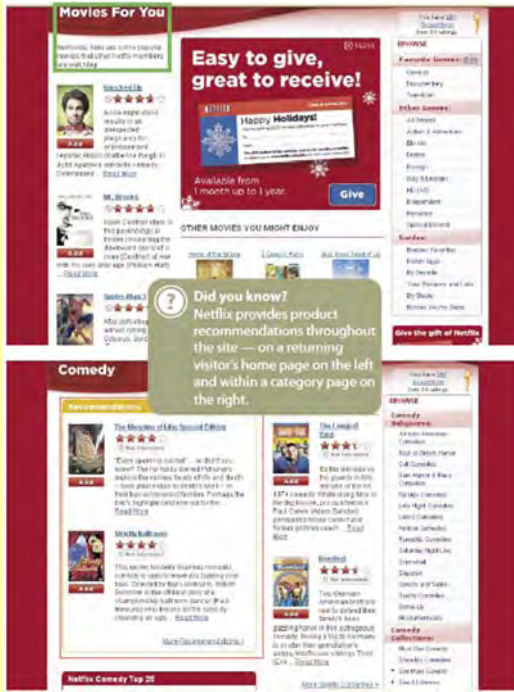
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## Advanced cross-sells tools Example

- **Key characteristics:** Advanced cross-sells are integrated more extensively than just on a product detail page; they can appear on home pages, category-level pages, checkout pages, or in emails or during call center contacts.
- **Pros:** Creates a potentially very relevant experience for customers as they click through every page of a Web site.
- **Cons:** More difficult to execute than simple cross-sells because it touches more pages; the best executions often require significant page/site redesign efforts. It is most effective when a site has significant traffic or an enormous assortment of SKUs.

Source: Forrester Research, Inc.



## eCommerce personalization tools Interactive filtering solutions

- Given the vast assortment of products available online, consumers are often overwhelmed by the process of finding an appropriate match for their needs. Interactive filtering tools ask consumers for specific inputs, usually by posing a series of questions and then matching responses based on their preferences.
- The key factor that differentiates these tools from the other eCommerce personalization tools is that consumers essentially “raise their hand” and say what sort of information they want, and companies work to provide specific data or products that meets those needs.
- Companies such as Zafu.com and Karmaloop.com employ interactive filtering tools particularly well. Zafu asks consumers to answer a series of questions and matches difficult-to-fit products (e.g., jeans or lingerie) with respondents’ needs. Karmaloop, which works with the company MyBuys, gives customers the opportunity to receive email or RSS alerts based on specific products or brands that they may be interested in.

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## Interactive filtering solutions Example

- **Key characteristics:** A series of questions is posed to customers, and a broad set of products is narrowed; explicit customer preferences yield specific product recommendations.
- **Pros:** Empowers customers to find products that suit their needs and enables Web sites to tailor broad assortments to customers who may not know what they want.
- **Cons:** Sometimes difficult to create appropriate attributes for search that are meaningful to customers..

Source: Forrester Research, Inc.



## Which eCommerce Personalization Engines Work For Which Companies?

The following work best when a firm has:	Versioning tools	Simple cross-sell tools	Advanced cross-sell tools	Interactive filtering tools
Extensive resources (e.g., headcount, budget) to dedicate to personalization engines	✓	☐	✓	☐
An extremely broad or complex assortment of products	☐	✓	✓	✓
A need to exert close control/ input over content displayed on its site	✓	☐	✓	✓

Source: Forrester Research, Inc.

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## Outline

1. Introduction
2. Ways to personalize eCommerce systems
3. Customization vs. personalization
4. Personalization methods
5. One-to-one personalization technologies
6. eCommerce personalization tools
- 7. Personalized eCommerce recommendation systems**
8. Advanced personalization in eCommerce

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## Why Personalize

- User Perspective:
  - Information Overload (Too many options to explore)
  - Save Time, Money
  - Find Opportunities
- E-commerce:
  - Sell more stuff
  - More Enjoyable Shopping Experience

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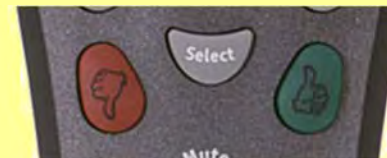
## Risks of Personalization

- What if it's wrong-
  - Harder to find items of interest
  - Increase Time and Cost
  - Fewer sales
  - Frustrated Users or Upset users.
- Invasion of Privacy
  - Accidentally revealing confidential information
  - History
  - Preferences
  - Unauthorized sharing with others

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## How to determine user preferences

- User Customization- User Creates model
- Explicit Feedback: User indicates likes and dislikes
- Implicit Feedback: Infer from user actions



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## Personalized eCommerce recommendation systems

- What's a personalized recommendation system?
  - Analyze user's behavioral patterns and recommend new products that best match the individual user's preferences.
- Existing recommendation techniques
  - Rule-based filtering technique
    - Use demographic information
  - Collaborative filtering technique
    - Use other user's rating value with similar preference
  - Content-based filtering technique
    - Compare user profile and product description
  - Item-based filtering technique
    - Analyze association among products

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## Personalized Recommendation Methods

- Rule-Based
  1. Mike likes Terminator 2
  2. Terminator 3 is the sequel to Terminator 2
  3. If you like a movie, you will like the sequel
- Content-Based
  1. Mike likes Terminator 2 (SciFi)
  2. Termination 3 is SciFi
  3. You'll like things whose descriptions match other things you like
- Person to Person Collaborative
  1. Mike likes Terminator 1 and Terminator 2
  2. Terminator 3 is like by Dennis who also likes T1, and T2
  3. You'll like things that the most similar people to you like
- Item to Item Collaborative
  1. Mike likes Terminator 2
  2. People who buy Terminator 2 also buy Terminator 3
  3. You'll like things that that are frequently purchased with things you like.

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## eCommerce recommendation system

- First, make each user's instance.
  - User's behaviors are collected from XML-based web sites.
  - Save them as instance.
- Second, build each user's profile.
  - Analyze each user's instance.
  - Make each user's profile using them.
- Third, recommend the products with Top-N similarities.
  - Personalized recommendations are made by comparing the similarity between the information about new products and user's profile.

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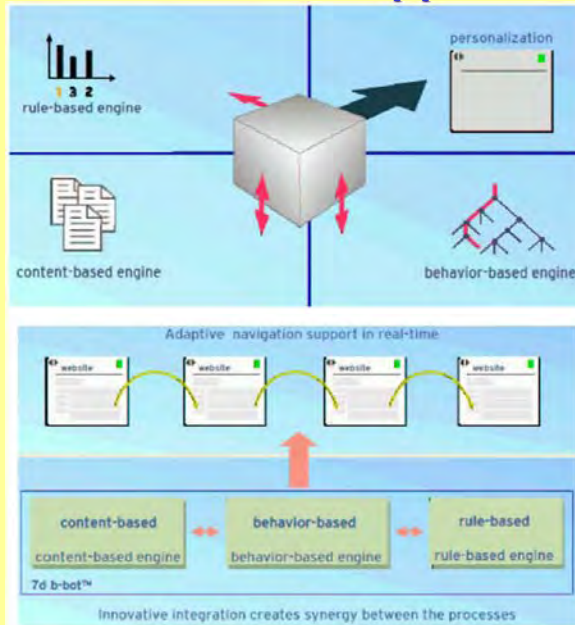
## Recommendation Approaches

- 1. Content-based recommendation
- 2. Behavior-based recommendation
- 3. Rule-based recommendation

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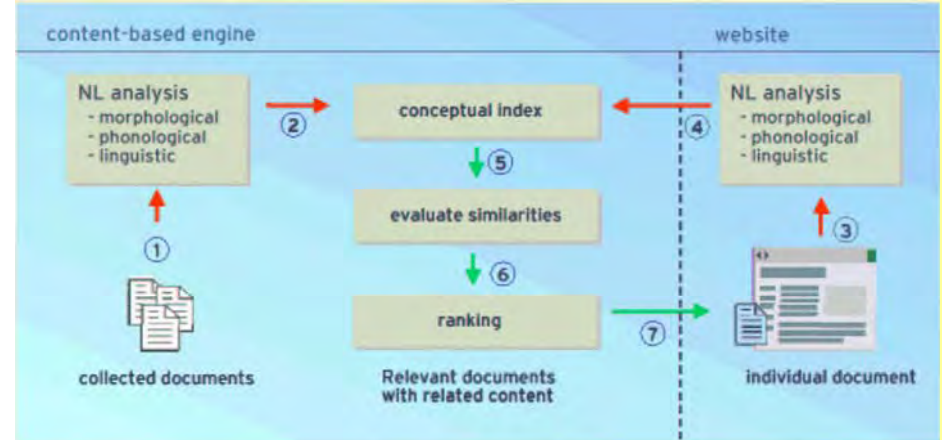


# Recommendation Approaches



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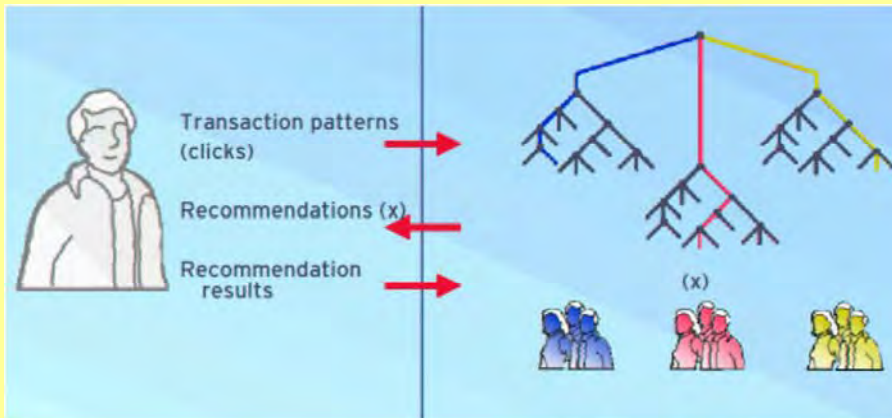
# Content-based recommendation



Goal: Given a particular document, recommend similar documents

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# Behavior-based recommendation



- In the example,  $U$  is assigned to the second (red) group on the basis of his page selections to date
- Accordingly,  $S$  recommends pages that members of this group have visited and/or rated positively
- Information about users consists mainly of page selections (as opposed to explicit ratings)

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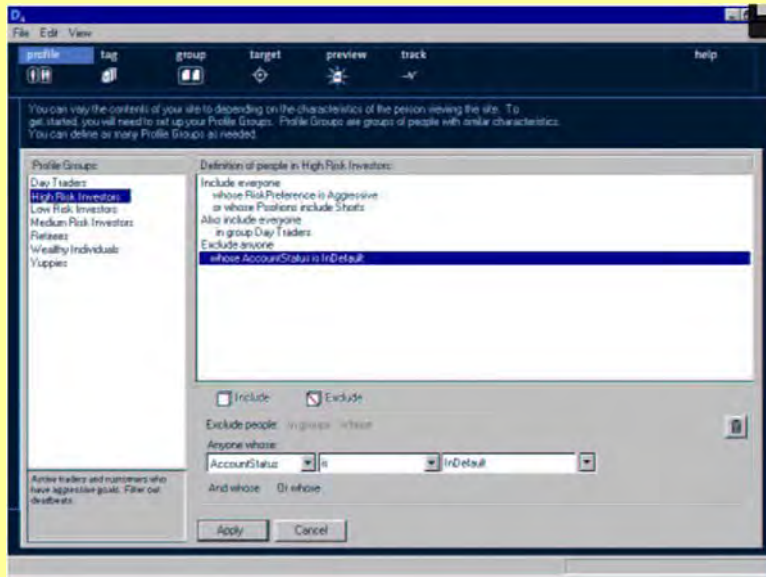
# Rule-based recommendation



- This graphic indicates how rules are defined and applied in the b-bot

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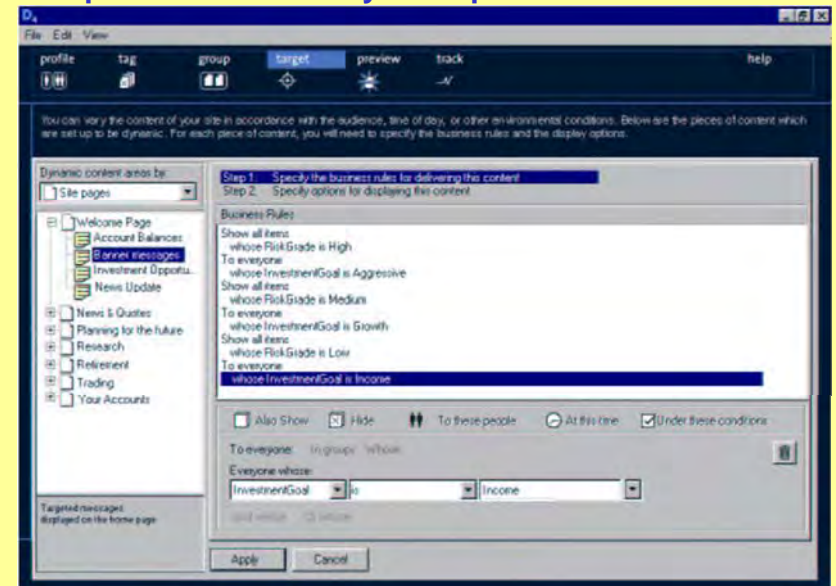
## Example 1 from ATG's Dynamo personalization server



- Even without technical knowledge, an administrator can define user groups in terms of particular attributes

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## Example 2 from ATG's Dynamo personalization server



- In a similar way, the administrator can specify which objects within a given category should be shown to which groups

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## Support for analysis and evaluation



- As with many other personalization servers, a monitoring component allows various types of analysis of user's behavior

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## Personalized Recommendation Example

My Best Bets	
10:30 AM 320 MAX	<b>Two Weeks Notice</b> (PG-13, 2002) A millionaire (Hugh Grant) confronts his feelings for his lawyer (Sandra Bullock), who is quitting after five years of service. (Duration: 1 Hour, 45 Min.) ✓ <a href="#">Rate it</a> • <a href="#">Don't recommend again</a>
11:45 AM 344 SHOTOOP	<b>How to Lose a Guy in 10 Days</b> (PG-13, 2003) A columnist (Kate Hudson) tries to make a man (Matthew McConaughey) dump her, but he bets his boss that she will fall in love. (Duration: 2 Hours) ✓ <a href="#">Rate it</a> • <a href="#">Don't recommend again</a>
3:35 PM 157 LOVEP	<b>Groundhog Day</b> (PG, 1993) February 2nd keeps repeating for a cynical TV weatherman (Bill Murray) sent to watch the groundhog in Punxsutawney, Pa. (Duration: 1 Hour, 45 Min.) ✓ <a href="#">Rate it</a> • <a href="#">Don't recommend again</a>
8:00 PM 320 MAX	<b>Bruce Almighty</b> (PG-13, 2003) After a bad day at work, a frustrated reporter (Jim Carrey) meets God (Morgan Freeman) and receives his divine powers for one week. (Duration: 1 Hour, 45 Min.) ✓ <a href="#">Rate it</a> • <a href="#">Don't recommend again</a>
10:00 PM 327 WOMAX	<b>Down With Love</b> (PG-13, 2003) In 1960s New York, a womanizing journalist (Ewan McGregor) tries to make a feminist author (Renée Zellweger) fall in love with him. (Duration: 1 Hour, 45 Min.) ✓ <a href="#">Rate it</a> • <a href="#">Don't recommend again</a>
4:35 AM (Tue.) 329 SMAX	<b>My Big Fat Greek Wedding</b> (PG, 2002) Family tensions arise after a woman (Nia Vardalos) falls in love with a man (John Corbett) who is not Greek. (Duration: 1 Hour, 40 Min.) ✓ <a href="#">Rate it</a> • <a href="#">Don't recommend again</a>

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## Comparison of eCommerce recommendation approaches

Clixsmart Navigator	Adaptive Information Server	Adaptive Web Sites	Angara Converter	7d b-bot
<b>1. Are adaptations made to individual users or to groups?</b>				
Individuals	Individuals	To date no tailoring; development of tailoring for subgroups is planned	Groups	Individuals and/or groups
<b>2. What form do adaptations take?</b>				
Rearrangement of menu hierarchies	Rearrangement of options within menus	Generation of new index pages	Changes in content of pages	Changes in content, layout, and/or structure
<b>3. To what extent do the adaptations demand <i>U</i>'s attention?</b>				
Unexpected changes might be distracting	Unexpected changes might be distracting	No attention demanded	<i>U</i> may never notice adaptation	(Depends on particular form of adaptation)
<b>4. What sort of explicit input is <i>U</i> required to supply?</b>				
None	None	No explicit input (later version: perhaps a bit)	Some specification of demographic information	In some cases: ratings, specification of demographic information
<b>5. How much additional effort is required to administer the system?</b>				
Little or no domain-specific administration	Little or no domain-specific administration	Webmaster postprocesses proposed index pages	Collection and use of marketing data	(Depends on parts of system used)

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## Personalization in Practice

- In November 2006, Forrester Research revealed:
- “Nearly half of consumers who visit a landing page
- leave in under
- • **<8 (eight) seconds.**
- • To build relevance, brands must start with
- segmentation models that enable personalization
- and deliver targeted function, content, and images.”

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## Anonymous Personalization: An Oxymoron?

- Using personas to drive P doesn't require you to get every customer to log in and fill out a profile. The information you need to create your personas can be gleaned even without the customer's active participation, and without your knowing who the customer is.
- For instance, your Website lets you learn about your visitor—even if she remains anonymous—by seeing what types of products she browses, what articles she reads, what searches she runs, or what questions she asks on the self-service site. With this information, your Website content can be dynamically tailored for your visitor in an instant, as soon as the visitor is associated with a persona.
- For example, let's say you're selling sporting goods. You have a promotion about running shoes on your home page. An anonymous user comes to the site, ignores the running shoes, and starts looking at mountain bikes. When he comes back to the home page, it would automatically and dynamically switch out the running shoe ad, replacing it with an ad about biking equipment and accessories. Show him something more relevant to his needs, and he is more likely to buy. That is anonymous yet effective personalization.
- These days, many consumers are also more willing to share information or answer a few questions as they shop—as long as they believe the information they provide will improve the recommendation they receive in return. For example, a running-shoe store may prompt a shopper for her arch type, running style, body frame, and brand preference before making a personalized recommendation.

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## Personalization Informed by Customer History and Past Behavior

- The more you know about the customer, the more relevance you can infuse into your interactions.
- Building on the sporting goods example above, now let's say you can identify the shopper.
- Your site should have access to her buying history so that you know what products she already owns as well as which ones have interested her historically. When she puts a pair of running pants in her shopping cart, you will want to make her a cross-sell offer. But rather than offer her the same jacket she just bought last week, you'll offer her a different accessory.
- That's **history-based personalization**.

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## Personalization That Selectively Offers a Live Interaction

- Monitoring your customers' actions in real time can bring P to the truly intimate level. Now you can personalize not only the content you display to your customers but also the type of service you offer, either across your whole site or just on sections that customers tend to abandon or find tricky to navigate.
- Let's say your shopper puts a big-ticket item in her cart, such as a plasma TV or a US\$1,000 handbag. But then the shopper hesitates; rather than checking out, she begins to look at the shipping information page. You don't want to lose her purchase. The new trend here is proactive click-to-call, a capability that lets you pop up a window and offer live help with a message that says, "If you have a question about shipping, click here to speak with a representative." Once the shopper clicks, she goes to the top of the agent queue, and her phone rings instantly, connecting her to a customer service agent who completes the sale.
- **Click-to-call** is probably not a worthwhile tactic for saving the sale of a US\$10 CD, but for a US\$3,000 TV, it's absolutely worthwhile. In some markets, **click-to-chat** can work equally well, proactively offering the prospect an instant live chat session with a customer service agent. Oracle's experience in deploying this technology shows that this kind of service can increase conversion rates by as much as 50 percent.
- For the best results, you can extend cross-sell personalization to the call center. When a customer connects to the call center for that US\$1,000 handbag, you want the agent to have access to the same history-driven, cross-sell offer that would be presented on the Website—the shoes, in the right size, that go with the handbag. You want to drive the call center with tools that increase order size, not just reduce costs. That is the epitome of effective, cross-channel offer management.

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## Multistage, Scenario-Based Personalization

- The stark reality of today's marketplace, with all of the options customers have before them, is that a single instance of a relevant interaction rarely evolves into a lasting relationship. The good news is that with segments or personas in place, personalization can help drive and track the full purchase cycle.
- As an e-seller, you can drive even more relevance into your customer relationships by introducing multistage, scenario-based personalization.
- A *scenario* is a way of taking a rich set of customer interactions and facilitating them across marketing, selling, and service encounters. The sequence of events that make up a scenario is designed to lead the customer along the path toward achieving the specific business goal that you define. These different events, or *stages*, can be triggered by or timed to correspond with the actions that each customer takes. A scenario can last a few moments or extend over weeks or months; it can be relatively simple or have many paths. Using scenarios, you can engage, track, and communicate with the customer throughout his purchase decision process. As he potentially moves away from your site to look at competitors, a well-timed, relevant interaction driven by scenarios can give that customer a reason to come back to your site.
- For scenarios to work well, you first need to determine precise business goals for your particular segments or personas. Are you looking to close the first sale? Increase purchase frequency? Increase the average order amount? With target goals defined, you can begin designing multistage scenarios that correspond to the behaviors of your customers and prospects. This kind of personalization introduces a series of preset responses that correlate to customers' actions. For example, if a customer visits your Website and asks to be notified of your holiday special but then does not respond when he receives that e-mail, the next step is automatically triggered. That step may be a reminder phone call from a sales person. If, after a week passes, the prospect still does not respond, a second communication could be initiated: this time, perhaps an e-mail with an even better offer.
- **Multistage, scenario-based personalization** doesn't focus on a single transaction but rather a series of interactions that ultimately lead to the desired outcome. By introducing triggers at critical interaction points that take your customer into account, you can help lead that customer down the optimal path. With multistage personalization, you are monitoring and responding to events as they happen and reaching out to the customer to start a meaningful and relevant dialogue. The best multistage scenarios span across channels. Some customer interactions will trigger an e-mail response, while others may activate a customer service call. Still others may prompt a sales call. Some of these

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## Searchandising and Automated Personalization

- Connecting customers quickly and easily with the products they seek is at the heart of personalization.
- Searchandising and automated personalization are two new advanced personalization techniques now coming of age and bringing with them the power to truly guide prospects down the desired path.

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## Searchandising

- Principle of *searchandising*: The consumer is looking to find an item. The merchandiser is looking to sell an item. These two goals were once totally independent of each other on the Web. Yet they should be two sides of the same coin—in fact, two uses of the same technology. That's searchandising.
- For example take a basic shoe-shopping experience: Say the shopper searches for shoes, and you carry 1,000 different styles. You need to be able to determine what shoes you should present, in what order, and with what information. Should you present practical or Prada? Making that determination starts with a logical first step of recalling the customer's purchase history, profile, and segment, and then presenting the shoes most in line with those criteria. Taking it a step further, your presentation should match your merchandising strategy. Perhaps you have a particular vendor relationship that favours one brand over another, or a particular shoe on special, or knowledge that a particular shoe sells best within a specific segment. The merchandiser ought to be able to specify, as part of the catalog data, which shoes should appear first in a search. In essence, you want to be able to present all of this in the context of the multiple facets of a shoe (such as color, style, brand, size, and cost) so that consumers can opt to see—or you can opt to present—only shoes in a certain price range, by a popular designer, or in the customer's size.
- All of this is searchandising—allowing the merchandiser to drive how search results are presented.
- Personalized searchandising drives search results not only by merchandising strategy but also by purchase history, profile, and segment of the prospective customer—ultimately serving to increase basket size and conversion rates.

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## Automated Personalization

- Way to keep customer interactions highly relevant.
- Recommendation engines (sometimes called *collaborative filtering*): A number of online megastores are famous for this technique—"people who bought this item also bought these items." Where do those recommendations come from? A common frustration with some of these engines results from purchases made as gifts. If you buy a children's book for your nephew's birthday, you may receive offers for similar products from then on.
- A better approach is one based on advanced personalization. Like search, recommendations ought to be personalized and driven by your merchandising strategy. The most sophisticated approach to personalized selling automates recommendations more intelligently—according to both the purchases made and the segment or persona the shopper belongs to.
- Automated personalization modifies recommendations according to other information you have about the shopper, rather than assigning customers to segments based solely on their most-recent purchases.
- For example, a New England gardener should always receive recommendations for hardy plants, even if he bought plants on one occasion for his uncle in Palm Springs. At the same time, if the merchandiser is pushing roses instead of marigolds, the customer should get that recommendation.
- Recommendation engines built into the e-commerce platform—and integrated with the catalog, profiles, purchase history, search, and merchandising—will lead to true competitive advantage.

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