Agenda

### E-commerce
1. E-commerce systems: Characteristics and functions
2. E-commerce systems: Case study
3. E-commerce systems: European analysis

### M-commerce
4. M-commerce systems: Characteristics and functions
5. M-commerce technology
6. M-commerce applications
7. M-commerce application development
8. M-commerce trust, security, and payment
9. M-commerce issues

Beyond m-commerce:
10. U-commerce: The next step after m-commerce?
Lecture 6
Mobile commerce applications

Objectives:
- To describe different types of applications used in mobile commerce
- To discuss case studies of mobile commerce in businesses
- To identify the characteristics of applications that are appropriate for mobile commerce

Types of m-commerce applications

<table>
<thead>
<tr>
<th>Some application types (Varshney and Vetter):</th>
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<tbody>
<tr>
<td>• Mobile financial services</td>
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<td>• Mobile advertising</td>
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<td>• Mobile inventory management</td>
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<td>• Mobile product location and shopping</td>
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<td>• Mobile proactive service management</td>
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<td>• Mobile business services</td>
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<td>• Mobile auction</td>
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<td>• Mobile entertainment</td>
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<td>• Mobile office</td>
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<td>• Mobile distance education</td>
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<td>• Mobile information access</td>
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Mobile financial services

- B2C and B2B
- Providing various types of financial services
- Mobile banking (m-banking)
  - Example: check bank-account balance
- Mobile brokering (m-brokering)
  - Example: purchase or sell stocks/securities
- Mobile funds transfer
  - Example: transfer funds between bank account and stock broker
- Mobile electronic payment
  - Example: pay bill, creditor
- Micro payments
  - Example: pay for small purchases such as Coca Cola, parking

Mobile advertising

- B2C
- Sending targeted advertisements to individual customers
- Examples:
  - Send advertisement to customer that is personalize for customer’s interests/needs
  - Send advertisement to customer based on where customer is located (location-based marketing)
- Can be accomplished through SMS (Short Message Service): messages limited to 160 characters
### Mobile inventory management

- Tracking location of goods, boxes, etc.
- Tracking location of people, military troops, etc.
- **Examples:**
  - "Rolling inventory" management: management of inventory in trucks, trains, etc.
  - Just-in-time delivery of components in an assembly plant
- **Potential customers:** shipping companies, assembly plants, airline industry, public transit industry, supermarket chains, etc.

### Mobile product location and shopping

- **B2C and B2B**
- Locating specific items for potential purchase
- Could include comparing prices
- May include purchasing item
- **Example:**
  - Locate specific model of television at several stores
  - Compare prices of the same model television at different stores
  - Purchase television at one store
### Mobile proactive service management

- **B2C and B2B**
- Transmitting information related to the need for product service
- **Example:**
  - Mobile automobile service
  - Equip cars with sensors that transmit information related to servicing needs
  - Service providers could compete for services

### Mobile business services

- **B2C and B2B**
- Providing business services to clients
- **Example:**
  - Mobile automobile-insurance claims adjustment
  - May include sending photo of damage
## Mobile auction

- C2C or B2B
- Providing auction services for customers to buy or sell items
- Example:
  - Mobile auction of agricultural products conducted from the field

## Mobile entertainment

- B2C
- Providing entertainment services
- Examples:
  - Games
    - Download game and play on mobile device
    - Play game online (multiple-player)
  - Download music and play on mobile device (MP3)
  - Video-on-demand
  - Gambling/betting
### Mobile office

- **B2E**
- Providing office services to employees who are away from the office
- Example:
  - Access to e-mail for employees using mobile devices

### Mobile distance education

- **B2C**
- Taking courses online
- May require streaming audio and video
- Requires powerful processing capabilities found in notebook computers
- Example:
  - Take course while commuting on public transit
## Mobile information access

- B2C and B2B
- Downloading information by customers, vendors
- Examples:
  - Access product specifications prior to purchase
  - Access weather information
  - Access news

## Applications for vehicle-mounted devices

- Applications that are designed for customers in moving vehicles that have special wireless vehicle-mounted devices (e.g., OnStar, GPS, etc.)
- Telematics: use of vehicle-mounted system with wireless communication and device location technology
- Examples:
  - Emergency notification
  - Travel mapping
  - Traffic advisory
  - Vehicle insurance rate adjustment
  - Rental car rate adjustment
Vehicular mobile commerce

- M-commerce in which the vehicle (car, truck, bus, train, plane, etc.) is an integral part of the m-commerce system (Varshney)
- Goes beyond current telematics applications

Potential vehicular m-commerce applications

- Vehicle as internet hot spot: base station in vehicle with satellite or terrestrial connection to internet
- Vehicle as content provider to other vehicles: music, games, etc.
- Vehicle as part of intelligent transportation system: pay toll, locate parking, locate vehicle in emergency, etc.
- Vehicle as part of highway management tool: collect data on driving habits, highway conditions, speed, etc., and transmit to central location for analysis
- Vehicles provide wireless diagnostic tools to nearby vehicles
- Vehicles send safety messages to nearby vehicles
- Vehicles send advertising to nearby vehicles
Location-based commerce

- Applications that rely on identifying location of customer
- Sometimes called l-commerce
- Requires that device have location technology
- Automatic identification of customer is useful

Examples:
- Location-based marketing: target advertisement to location of customer
- Emergency services: provide emergency services (e.g., ambulance) to location of customer
- Delivery service (e.g., pizza delivery)
- Mapping and navigation
- Tracking (e.g., delivery truck)

Taxonomy of mobile applications

- Classification of mobile applications
- Hard to identify how new applications fit with others
  - Something entirely new?
  - Significant variation of existing application?
  - Retread of what we already have?
- Classification of mobile applications helps:
  - Users – identify application to determine best use
  - Developers – identify opportunities for new applications
  - Researchers – describe and compare applications
- Taxonomy:
  - Based on 7 dimensions that describe the interaction between the user and the application
  - Several categories in each dimension
Taxonomy of mobile applications: Dimensions

- Temporal dimension: when user and application can interact
  - Synchronous: real time
  - Asynchronous: delayed

- Communication dimension: direction of information flow between user and application
  - Informational: application to user
  - Reporting: user to application
  - Interactional: bi-directional

- Transaction dimension: whether user can purchase goods and services through application
  - Transactional: user can purchase
  - Non-transactional: user cannot purchase

Taxonomy of mobile applications: Dimensions

- Public dimension: whether application is available to the general public
  - Public: can be used by any user
  - Private: only available to third-party selected users

- Multiplicity (participation) dimension: whether user views use alone or with others
  - Individual: one user
  - Group: multiple users

- Location dimension: whether location of user modifies how application functions
  - Location-based: application uses user’s location
  - Non-location based: application does not use user’s location

- Identity dimension: whether identity of user modifies how application functions
  - Identity based: application uses user’s identity
  - Non-identity based: application does not use user’s identity
Taxonomy of mobile applications: Examples

- **Mobile financial services (mobile banking):** asynchronous, interactional, transactional, public, individual, non-location-based, identity-based (bank has to verify user’s identity)
- **Mobile auctions:** synchronous, interactional, transactional, public, group, non-location-based, identity-based
- **Mobile inventory management:** asynchronous, reporting, non-transactional, private (used by company-authorized person), individual, location-based (location of inventory items), identity-based (only a few authorized users can perform and manage such inventory)
- How do you classify the application for your project?

Case studies

**Early adopters (Radding):**
- iMode
- Fidelity Investments
- United Air Lines

Other cases:
- Mobile portals
- Mobile information services
- Mobile directory services
- Mobile financial services
- Mobile e-tailing
- Mobile entertainment
- Mobile travel services
M-commerce case: iMode

- Portal to many applications
- Shopping guides: locations of shops in shopping malls in Tokyo and other cities
- Maps and transportation: maps of routes on major public transportation systems
- Ticketing: airline tickets, movie tickets purchased online
- News and reports: access to global news, traffic conditions, weather reports, air pollution indexes
- Personalized movie service: updates on latest movies such as location and times
- Entertainment: games, chat, photos, etc.
- Dining and reservations: location of restaurants; reservations made online

(Source: Turban, et. al.)

M-commerce case: Fidelity Investments

Fidelity Investments:
- Mutual fund investment firm
- Manages over 150 mutual funds for individual investors

M-commerce application: Fidelity Anywhere
- Started in 1998 as “Instant Broker”
- Customer can:
  - Receive real-time quotes and market indices
  - Initiate trades
  - Check order status
  - Monitor portfolio balance
  - Perform other tasks
- Requires PDA with communications capability or Internet-enabled mobile phone
- Features depend on device: more for PDA, less for mobile phone

http://personal.fidelity.com/products/stocks/bonds/content/ib.shtml

Wireless site: http://www.fi-w.com/fiw/FiwHome
M-commerce case: United Airlines

M-commerce application: United Easy/Access
- Started in 2000 as “Proactive Paging”; expanded several times
- Customer can:
  - Check flight availability
  - Book a flight
  - Receive flight schedule changes
  - Check flight status
  - Check frequent flyer miles
  - Perform other tasks
- Requires PDA with communications capability, Internet-enabled mobile phone, or pager
- Features depend on device: more for PDA, less for phone, much less for pager
  [http://www.united.com/page/article/0,6722,66,00.html](http://www.united.com/page/article/0,6722,66,00.html)

Other examples

- Mobile portal: provides access to many mobile services
  - Yahoo!Mobile: [http://mobile.yahoo.com](http://mobile.yahoo.com)
    - Wireless site: [http://yahoo.com](http://yahoo.com)
  - Google Mobile: [http://mobile.google.com/web_search.html](http://mobile.google.com/web_search.html)
    - Wireless site: [www.google.com/xhtml](http://www.google.com/xhtml)
- Mobile information service: push or pull
    - Wireless site: accessed through carrier partner
    - Wireless site: [http://m.cnn.com](http://m.cnn.com)
  - Mobile directory service: provides directory of businesses at a location
    - Go2.com: [www.go2.com](http://www.go2.com)
      - Wireless site: go2.com
Other examples

- Mobile financial services: banking and trading
  - Nordea Bank WAP Solo (Finland):
    - Wireless site: https://mobile.nordea.fi/
    - Next slide for details
  - Charles Schwab:
    http://www.schwab.com/public/schwab/investing/account_types/account_features/wireless_access
    - Wireless site: http://wireless.schwab.com/

- Mobile e-tailing:
  - Amazon.com Anywhere:
  - Coke Cola: purchase from machine with mobile phone
Other examples

- Mobile entertainment: music, games, dating service
  - Wireless site: not available
    - Wireless site: [http://www.bluesq.com/wap](http://www.bluesq.com/wap)
  - WebDate Mobile: [http://www.webdatemobile.com/](http://www.webdatemobile.com/)
    - Wireless site: Requires subscription fee

- Mobile travel service:
  - Virtually There (Sabre): [https://www.virtuallythere.com/new/webPhone.html](https://www.virtuallythere.com/new/webPhone.html)
    - Wireless site: accessed through carrier partner

mobi domain

- .mobi used for some mobile sites
- Site must be optimized for mobile devices
- Nevada ski conditions:
  - Wireless site: [nvski.mobi](http://www.nvski.mobi)
Characteristics of m-commerce applications

- Needed by customer/business at varying locations
- Needed by customer/business immediately
- Inconvenient or impossible to provide wired access
- Small amount of:
  - Data entry required
  - Information displayed
- Location specific

- Not all these characteristics are necessary for m-commerce applications

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<thead>
<tr>
<th>Mobile vs. fixed e-commerce applications</th>
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<td><strong>Timeframe</strong></td>
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<td><strong>Variable Location</strong></td>
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<td><strong>Fixed Location</strong></td>
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## Future m-commerce applications

- **High degree of personalization:**
  - System knows who user is, what user prefers, personal details, etc.
  - Example: Personal reminder system
    - System sends message when wife’s/girlfriend’s birthday is approaching
    - Suggest gift, flowers, restaurant

- **Location-sensitive:**
  - System customizes services to user’s location without requiring user to enter location
  - Example:
    - You order a taxi when you are out for your wife’s/girlfriend’s birthday
    - System automatically sends your location to taxi company

## Future m-commerce applications

- **Context aware:**
  - System bases response on context within which user operates
  - Context:
    - Information that characterizes the situation of the user
    - Includes who (identity), where (location), what (activity), when (temporal), and why (reasoning for behavior and actions)
    - Examples: characteristics of user location such as weather, activity user is engaged in, time and date, reason for user’s location, activity, and time
  - Context aware application adjust behavior based on user context
  - Example:
    - System knows weather at your location when you are out for your wife’s/girlfriend’s birthday
    - Recommends alternative activities such as nearby movie instead of walk in the park
### Comparison of m-commerce in the U.S. and other countries

The US is behind Europe and Japan in the innovative use of wireless technology and applications.

Why?

### Lack of single 2G mobile phone standard in U.S.

- **U.S.**: CDMA, TDMA, GSM
- **Europe**: GSM
- **Japan**: CDMA

**Next standards:**
- 2.5G: GPRS – widely implemented in Europe
- 3G: WCDMA/UMTS – implemented in Japan & Europe years ago, U.S. behind with CDMA2000
Fewer mobile phones in U.S.

Mobile phone penetration – 1Q03
Source: Merrill Lynch 2003

Differences in wireless and wireline Pricing

- **U.S.**
  - Wireline – less expensive (unlimited calls for a fixed rate)
  - Wireless – more expensive (pay to make and receive calls; unlimited calling plans are very expensive)

- **Europe**
  - Wireline – more expensive (pay per call) but becoming less expensive
  - Wireless – less expensive (only pay to make calls)
More mobile applications outside U.S.

- Mobile bookmaking (gambling) in U.K. (Blue Square)
- Mobile car parking payment in Finland
- Location-based mobile games ("pervasive gaming") in Sweden (It's Alive)
- iMode in Japan

Wider acceptance of wired internet in U.S.

- U.S. Internet users (2005): 204 million (69%)
- European Internet users (2005): EU 227 million (49%)

Source: Internet World Stats
More acceptance of wireless protocols and systems outside U.S.

- Europe: WAP
- Japan: iMode
- Europe: SMS
- U.S.: just got started with SMS a few years ago

But … More availability of WiFi in U.S.

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<tbody>
<tr>
<td>United States</td>
<td>4,240</td>
<td>11,024</td>
<td>26,500</td>
<td>38,235</td>
<td>49,706</td>
<td>60,641</td>
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<td>Western Europe</td>
<td>1,083</td>
<td>3,596</td>
<td>7,590</td>
<td>13,520</td>
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<td>32,598</td>
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Source: IDC 2003
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<th>M-commerce application development</th>
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<tr>
<td>- How are m-commerce applications developed?</td>
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<td>- What tools are used in m-commerce application development?</td>
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