Finding the Path from Here to There:

SOME QUESTIONS ABOUT PHYSICAL-MOBILE DESIGN PROCESSES

AMNON DEKEL
THE HEBREW UNIVERSITY JERUSALEM
THE BENIN SCHOOL OF ENGINEERING AND COMPUTER SCIENCE

Introduction

- The mobile phone is the only truly ubiquitous computing platform today.
- ➔The mobile environment will serve as a spring board on which many new **ubiquitous services** will grow.
- The Purpose of this talk:
  - to raise a number of questions which we think need to be addressed in the process of designing, implementing and testing such services.
- The Motivation for this talk:
  - creating **new**, **useful** and **usable** services
  - generate a **critical dialog** about issues that must be solved at the design stage before any real implementation actually occurs

Physical – Mobile Service Scenarios

- We are focusing on 2 major Physical – Mobile models:
  - Location Based Services
  - Information Search and Browsing services

Physical – Mobile Service Scenarios

- We are focusing on 2 major Physical – Mobile models:
  - Location Based Services
  - Information Search and Browsing services
- We have opted to focus on **two generic scenarios** which share a lot in common.
- They enable us to focus on a number of issues that are widely applicable to many additional scenarios.

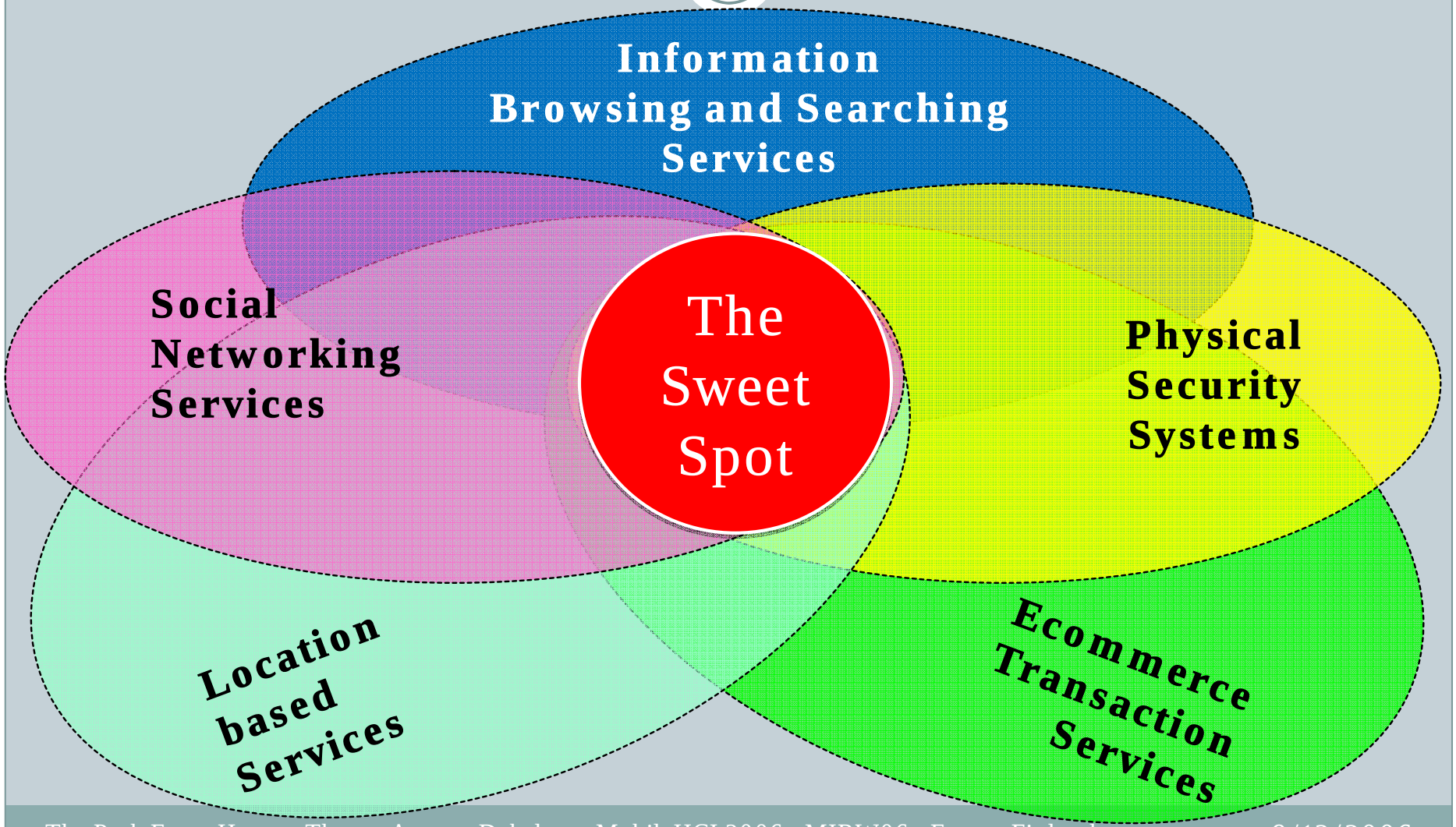
Two Generic Scenarios

- Amazon-on-Earth
  - *Ecommerce transaction services* are merged with *location based information browsing*, *product comparisons*, *collaborative filtering* (for relevant recommendations) , *referrals*, *user annotation*, and *physical security systems*.

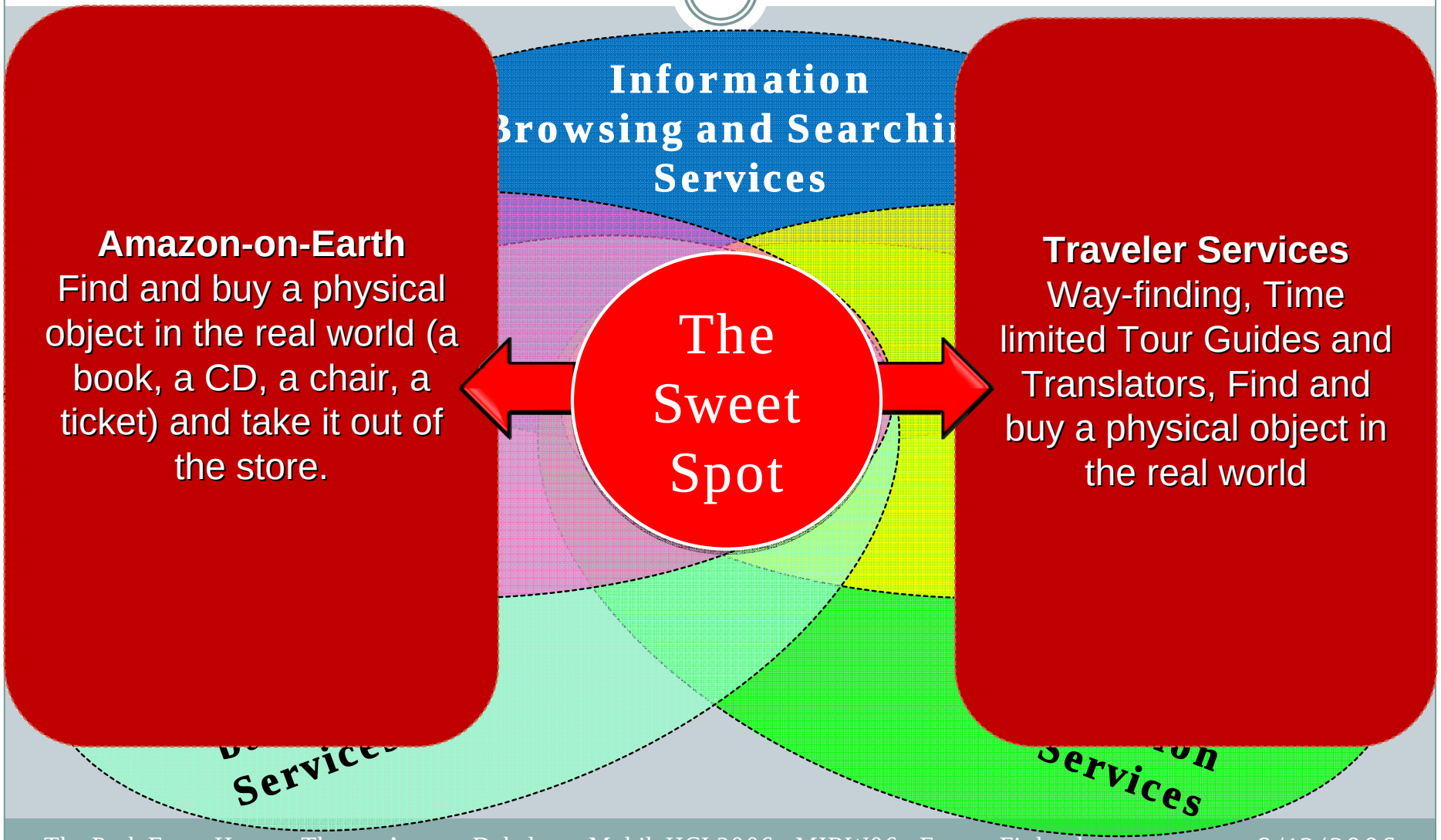
Two Generic Scenarios

- Amazon-on-Earth
  - Ecommerce transaction services are merged with *location based information browsing*, *product comparisons*, *collaborative filtering* (for relevant recommendations) , *referrals*, *user annotation*, and *physical security systems*.
- Traveler Services
  - situations in which mobile traveler needs (*way-finding*, *tourist information*, *translation*, *collaborative filtering*, *referrals*, and *annotation*) and are interfaced with ecommerce transaction services

In Both Scenarios



In Both Scenarios



How do we get from Here to There?

- Translating scenarios into real world services is ***difficult***
- BUT – we argue that *it is NOT technical implementation issues which present the biggest problems*
- The hardest parts are ***the design and implementation of user experiences*** *which will allow people to use such services easily and comfortably.*

How do we get from Here to There?

- We offer some questions that we think will allow us to focus on many of the problems that must be solved at the design stage before any real implementation rollout actually occurs.

How do we get from Here to There?

Category	Questions
Market Research	1. What do people view as useful services within an enabled environment?
Psychological / Person level Research	2. How do we create usable and unobtrusive user interfaces for such services? 3. How should we deal with the constraints of the human information processing system when designing for usability in the field?
Social Research	4. How do we deal with rules of Etiquette when users engage in private interaction in public spaces? 5. How does the physical design of a mobile phone affect the user experience in public spaces ? 6. How do legal limitations affect the services offered (privacy, security, trade secrets)?
Field Studies / Market Research	7. What will people actually do with their cell phones in enabled environments? 8. Are there any social or gender based differences which have an effect on usage patterns of offered services?
Technology	9. How do we best interface a mobile phone to internet based collaborative technologies and services?

1. What do people view as useful services

- The ultimate marketing question
- Motivation: Fit the service to the user's needs
- Take into account the target user's profile
  - What types of phones do they use?
  - What data plans do they buy?
  - What services do they currently use?
- Designing a service without answering these questions can bring about a large waste of time and resources.
- Answering them does not promise success, but at the very least lowers the chances for failure.

2. How to create usable interfaces to services?

- To be *Useful* is not enough
- A service must be ***Usable***
- Take into account the environment*
  - Light (amount, color, direction, ...)
  - Sound
  - Motion
  - Temperature
  - Humidity
- Key Point: ***Trade-offs***
  - There is no free lunch

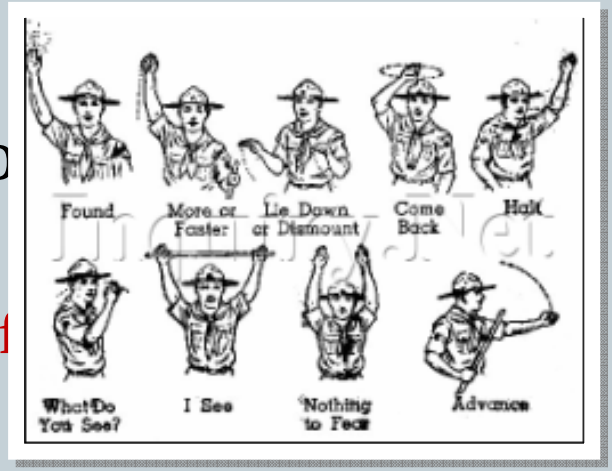
*: apart from the obvious user centered design issues

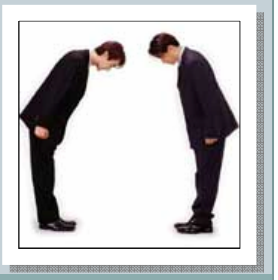
3. How to deal with the limitation of Human Information Processing?

- Focuses on the characteristics of the human perceptual and cognitive systems in order to help in creating more usable systems. i.e.
  - Knowing the limitation of human hearing helps us in designing audio cues as well as compression algorithms.
  - Knowing the characteristics of human vision helps us design more usable screen designs.
  - Knowing the limitation of human memory helps us design better processes and flows
  - etc
- There is knowledge out there- we should use it!

4. How to deal with rules of Etiquette when users engage in private interaction in public spaces?

- Relatively "new" field of research
- Mostly focused on cases of talking o in public settings
  - Appropriateness, voice volume, distance f
- We have some ***new*** challenges
  - **New interaction models** (gesturing, touching, taking pictures,...) might have a hard time in generating user acceptance
  - Research is needed to understand these issues better





5. How does the Physical Design of Cell Phones affect the User Experience in public spaces?

- Most form design till now has focused, correctly, on basic ergonomic issues such as
  - key placement and size, character typography, screen size and resolution, next to overall form factor size and shape for easy handling, sexiness, as well as strength and weight

5. How does the Physical Design of Cell Phones affect the User Experience in public spaces?

- **We ask:** Can a form factor be designed that will allow users to engage in more efficient and pleasurable interaction models, while enhancing a feeling of privacy? (and proper etiquette!)
- We think that the answer is positive, although we have not seen any efforts in this direction yet.
  - We are starting a collaboration with Industrial design students to explore these issues

Illustration only

6. How do legal limitations affect the services offered?

- Having to take into account legal issues is not new to the mobile space (i.e. driving while talking, etc)
- But the new media processing capabilities of phones are raising serious problems
- **Invasion of privacy:**
  - In Japan camera phones are called "up skirt devices"
- **Security Threats** (military and trade secrets)
  - "Remove battery" rules
  - "No phones allowed" rules
- **Ecommerce as a Threat to traditional retailers**
  - Physical browsing and examination in a store but buying somewhere else (cheaper) → electronic counter-measures put in place by stores
  - It will take a while for a market eco-system that works for all to fall into place

7. What will people actually do with their cell phones?

- It is very difficult to know ahead of time what real-life usage scenarios will be
  - SMS was transformed from a seemingly unimportant service ("who wants to text on their phone!?), to a killer application (1+ Billion messages a day), when the network passed a threshold of users – This could not have been anticipated in the "lab"
- Real life Field studies are important to enable our community to understand the users needs better
  - Alas, field studies are expensive
  - We hope that industry can help out in a wider fashion

8. Are there any Social or Gender based differences in usage pattern of such services?

- As an extension of the last point, it is clear that different parts of the general population have different interests and needs.
- Learning about and understanding these needs is crucial to designing and deploying services for these sub-populations.
  - A careful exploration of the differences between age groups, gender and education in relation to these issues will help in the design of fitting services.
- Much work has been done in this space, but rarely, if at all, around issues of new ubiquitous services.

9. How do we best interface a mobile phone to web based services?

- Even though we have stated earlier that the design of new scenarios should *not be driven by available technology*, it is obvious that **the technology available will have an effect on the way services are created and deployed**.
- Some thoughts...

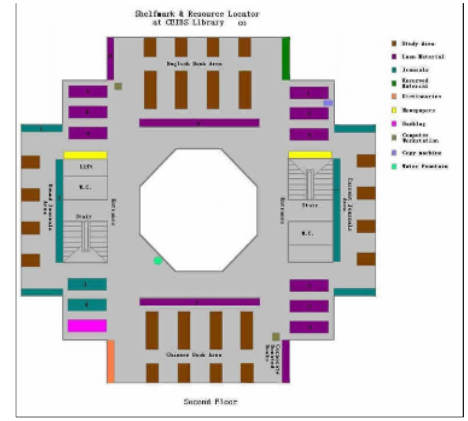
9. How do we best interface a mobile phone to web based services?

- We believe that the mobile services infrastructure should not diverge from the general online services technologies being developed for the non-mobile world.
  - Today's divergent technologies cause serious design, implementation and deployment problems for anyone wanting to roll out a service.
- A major middleware tier is missing that enables easier and quicker rollout of usable services
  - Standard **device abstraction** to enable easier deployment to the multitude of phone models and OS's out there
  - **Media and codec standardization** to enable simpler trans-coding
  - **Presentation level standardization** to enable easier cross device dynamic layout scripting
- Data plans and roaming services will need to be competitively priced

Our Project

- We have started a project that will implement an Amazon-on-Earth scenario in one of our libraries
  - Information search and browsing
  - Location based navigation and services
  - Collaborative filtering
  - Transaction processing

Illustration only



Our Project

- Unfortunately – the **tragic events** of this last summer

Our Project

- Plus this:

- Have not enabled me to bring any news about the project. We will be continuing it this coming semester.

In Summary

- This presentation has tried to raise a number of questions which we feel are important and relevant in the process of designing, implementing and deploying new physical-mobile services.
- We hope that by raising these questions, a critical discourse will develop around them and help drive some research directions and partnerships.

Thanks

amnoid @ cs dot huji dot ac dot il