iClouds - Peer-to-Peer Information Sharing in Mobile Environments

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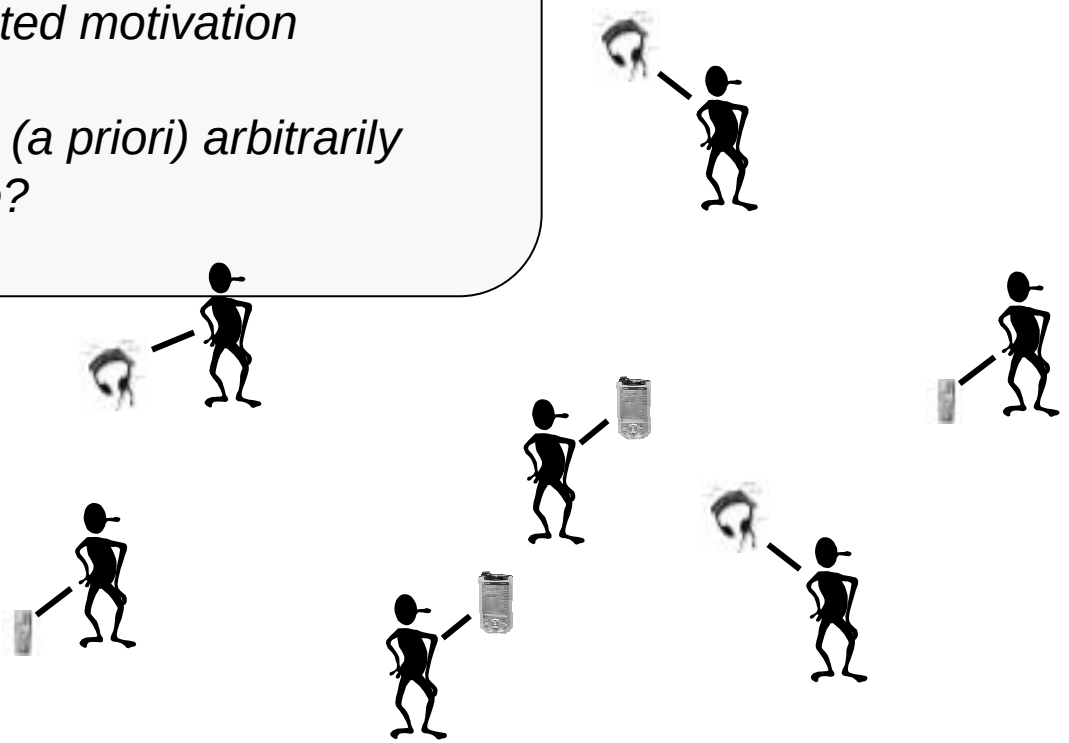
Motivation

A group

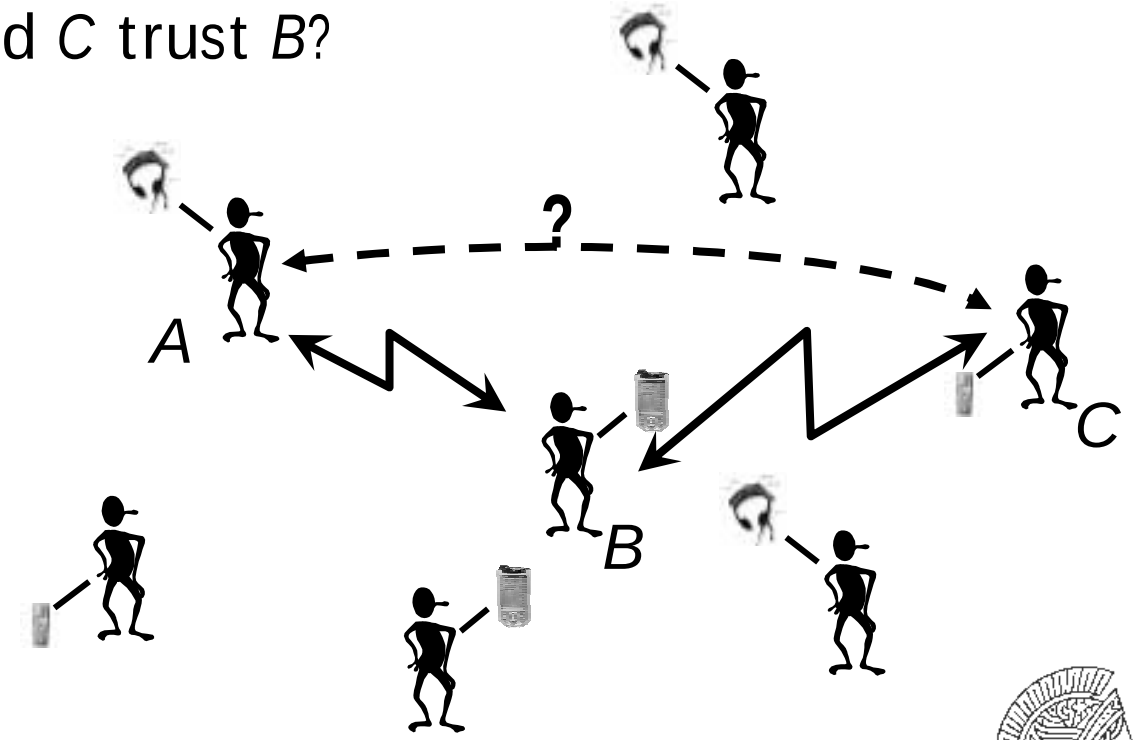
- *may share a common goal*
- *may have a related motivation*

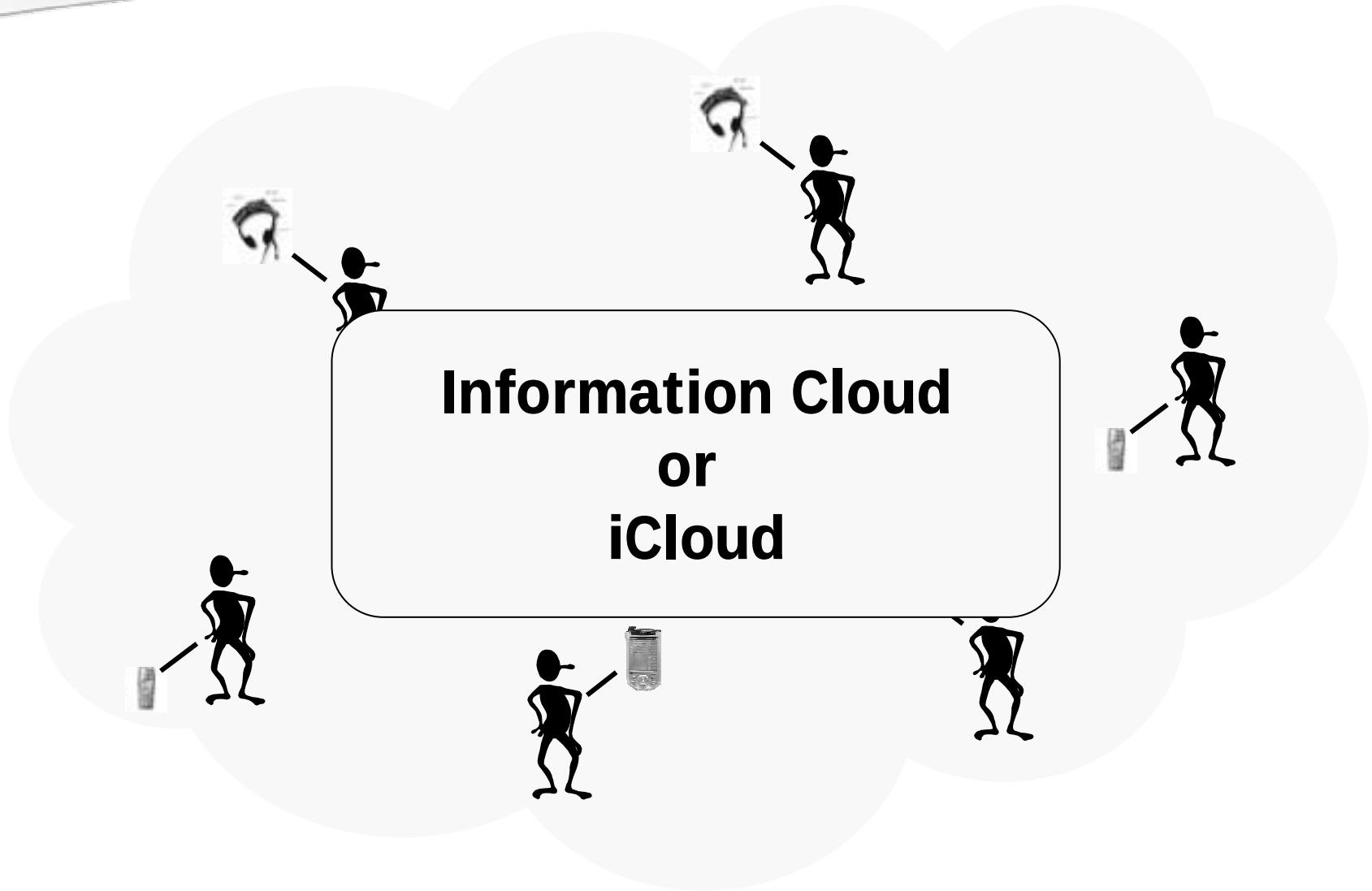
But: Information/resources (a priori) arbitrarily distributed -> how to share?



Anonymous MANETs

- What is the incentive for *B* to forward message from *A* to *C*?
- Why should *A* and *C* trust *B*?




Information Cloud
or
iCloud

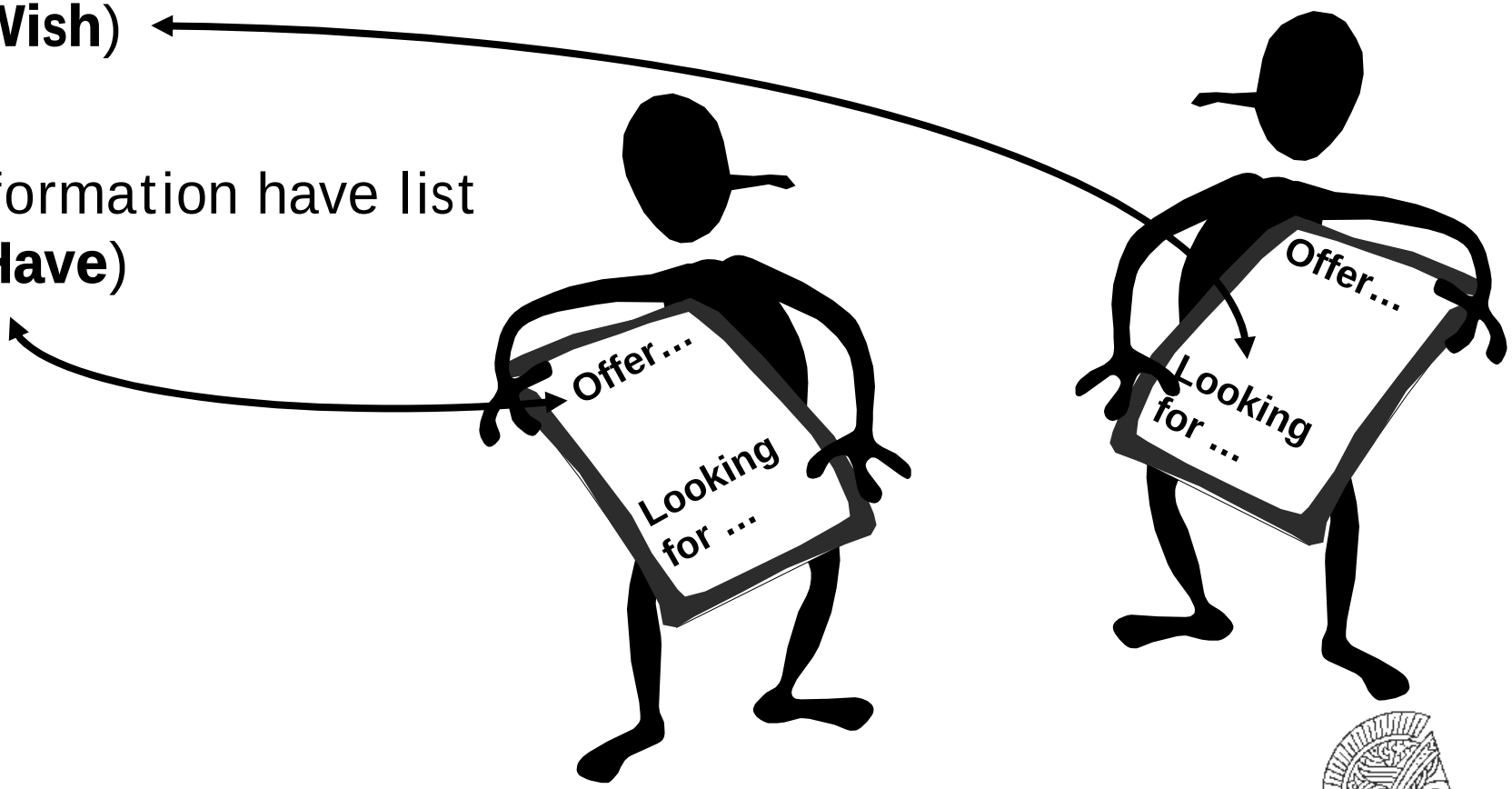
Approach

- combines:
  - idea behind Peer-to-Peer networks
    i.e. users willing to contribute and consume
  - idea behind publish/subscribe systems
  - inherent characteristics of Ad-Hoc networks

- use one-hop communication to share information
  - within a localized group
  - augmented with constrained propagation

Two basic data structures

- Information wish list (**iWish**)
- Information have list (**iHave**)



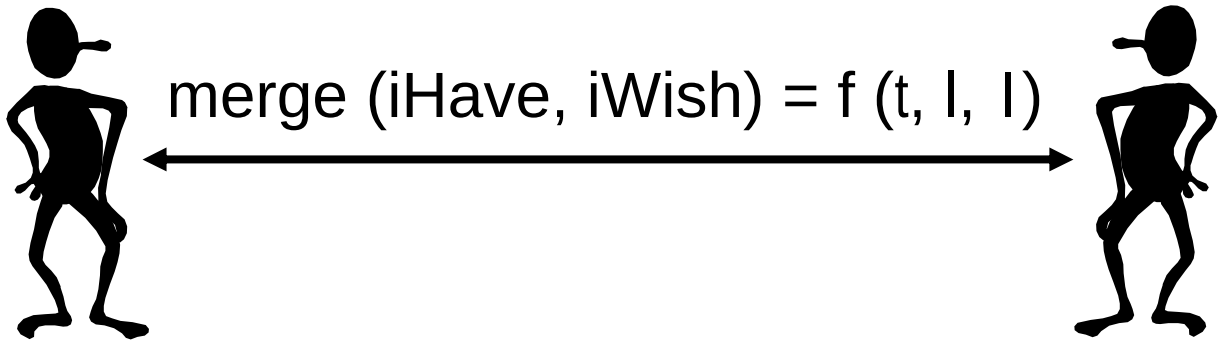
iClouds in a nutshell

- spontaneous one-hop network of humans
- local communication in user's vicinity
  - spontaneous face-to-face meeting possible
  - no infrastructure needed
- digital items to share
  - by interest or
  - using incentives
  - i.e., with or without financial interests
- no a-priori need for user's attention
- supports for small worlds: *"a friend of a friend is a friend"*

Information Dissemination

depends on

- time t
- location l
- information model I



Communication Semantics

Alice

Bob

	Pull (from Bob)	Push (to Bob)
iHave-list	Standard search	Advertise
iWish-list	Active service inquiry	Active search

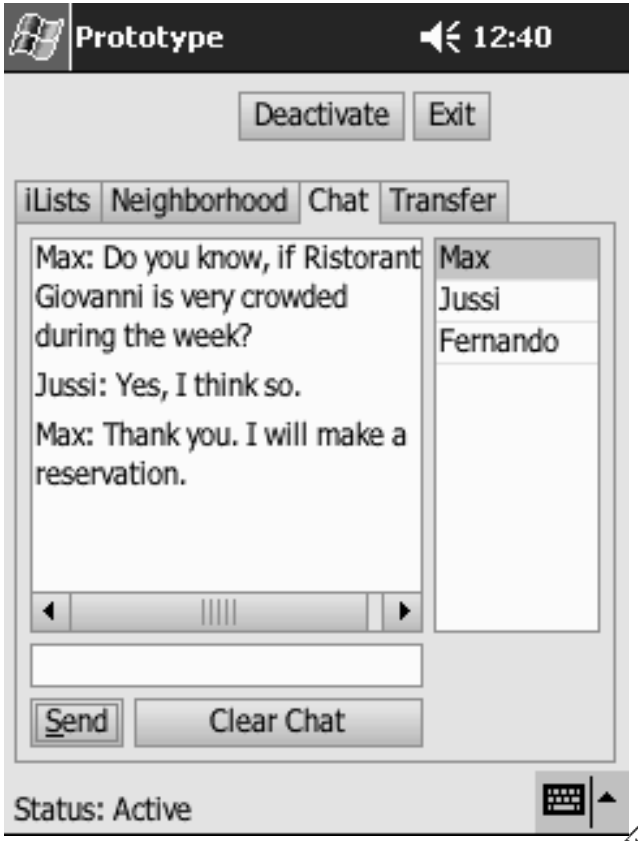
from Alice's point of view

Sample Application Domains

- Local Information Acquisition
- Common Goal Pursuit
  - iClouds device holds incomplete information about a user's knowledge
  - ➢ BUT: iClouds device can act as a *link* to its user
- Advertisement (mCommerce)

Prototype


Prototype
12:48
Deactivate
Exit
iLists
Neighborhood
Chat
Transfer
iHave
iWish
New
Remove
New
Remove
AD: DVD Matrix
Giovanni (Italian Style
Savoia (Italian Style)
AD: DVD
Make it public
Make it public
Status: Active


Prototype
12:40
Deactivate
Exit
iLists
Neighborhood
Chat
Transfer
Max: Do you know, if Ristorant Giovanni is very crowded during the week?
Jussi: Yes, I think so.
Max: Thank you. I will make a reservation.
Max
Jussi
Fernando
Send
Clear Chat
Status: Active

Further Information

- A. Heinemann, J. Kangasharju, F. Lyardet, and M. Mühlhäuser *"Ad Hoc Collaboration and Information Services Using Information Clouds".* 3rd Workshop on Applications and Services in Wireless Networks (ASWN 2003). Bern, Switzerland, July 2003

- A. Heinemann, J. Kangasharju, F. Lyardet, and M. Mühlhäuser "*iClouds - Peer-to-Peer Information Sharing in Mobile Environments".* Euro-Par 2003. 9th International Conference on Parallel and Distributed Computing. Klagenfurt, Austria, August 2003

- A. Heinemann, T. Straub. *"Mund-zu-Mund-Propaganda mit Bonussystemin mobilen Ad-Hoc-Netzen".* Workshop "Mobile Benutzer - Mobiles Wissen - Mobiles Internet". Informatik 2003. 33. Jahrestagung der Gesellschaft für Informatik e.V., Frankfurt am Main, September 2003

- iClouds im Web: http://iClouds.tk.informatik.tu-darmstadt.de