



Distributed Systems Seminar, 3/13/2012

# ROUTINES: WORK RHYTHMS

Presented by Blaž Oštrek



# Agenda

- Overview
- Introduction - work rhythms
- Awareness data
  - Sample
  - Limitations
  - Visualization
  - Patterns
- Detection and modeling
- Implications
  - Group coordination, prediction
- Privacy
- Conclusion
- Questions




# Overview

- Minute-by-minute computer activity
- Location, calendar, e-mail
- Various patterns (time, day, location)
- Group coordination
- Benefits and constraints




# Introduction – work rhythms

- Everyday work (arrival, lunch, ...)
  - Difficult to share sense of time
  - Coordinating activities (time zones)
  - Long-term pattern recognition
  - Convenient time for contact
  - Understanding and tradeoffs
- 



# Awareness data


- Computer interaction logs (keyboard, mouse)
  - Activity location
  - Online calendar
  - E-mail activity (proxy)
  - 20 users up to 10 months
  - Awarenex prototype
- 

# Awareness data - sample


- 3 different groups
- Research group: 2 East, 3 West Coast
- Other researches: 4 East
- Support team: 4 East, 5 West
- E-mail logs: 5 users
- Records began in 2001

# Awareness data - limitations

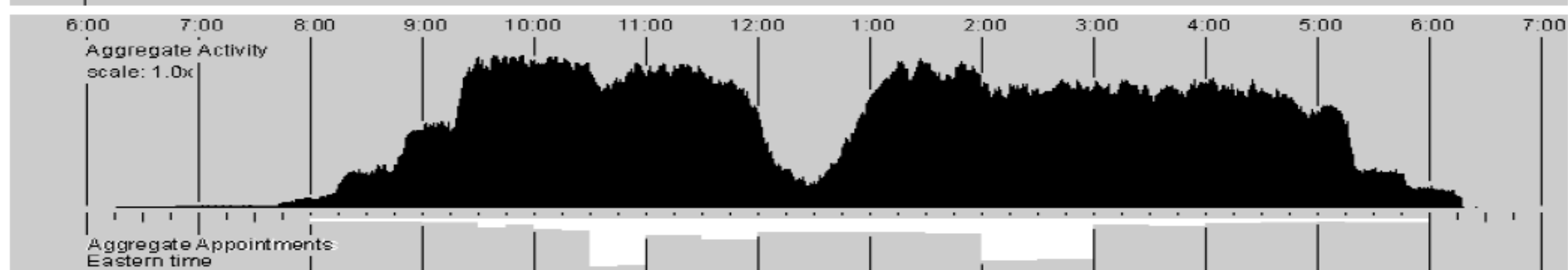
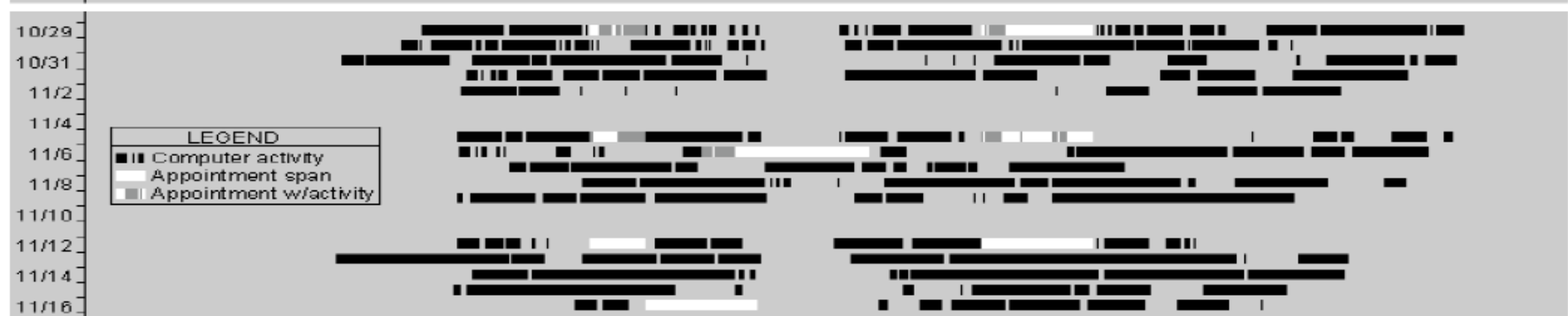
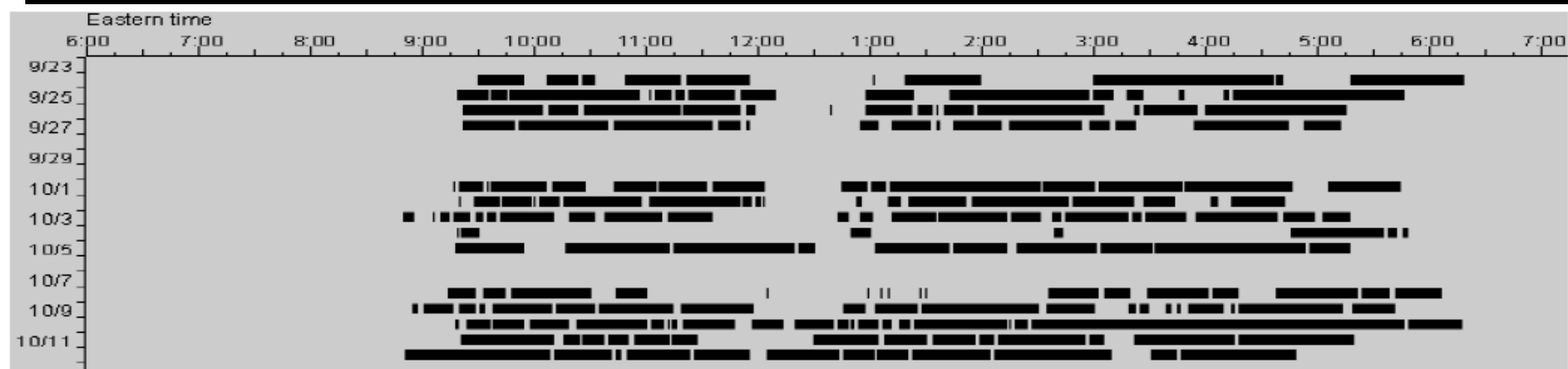
- Reporting down to minute
- Recording only if logged in
- Available for communication?
  - Inactive (reading)
  - Reachable vs. receptive
- Not exact status information
- Meaningful patterns




# Awareness data - visualization

- Visualizing computer activity
  - Activity data of an individual
  - Actogram
  - Beginning of the day, lunch, appointments
  - Augmented calendar information
  - Aggregated histogram
- 



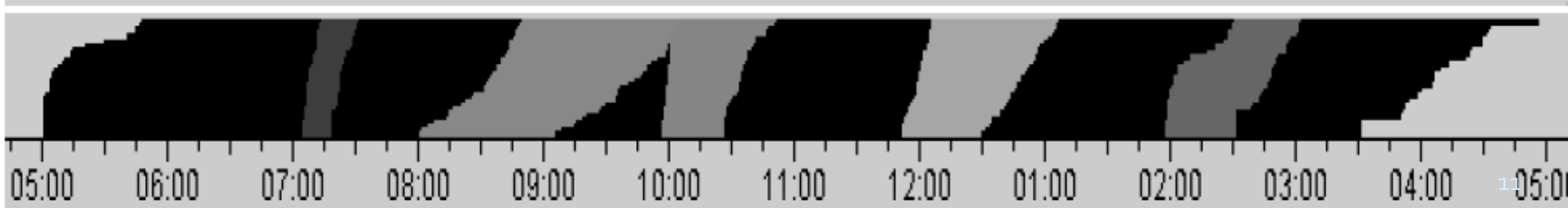
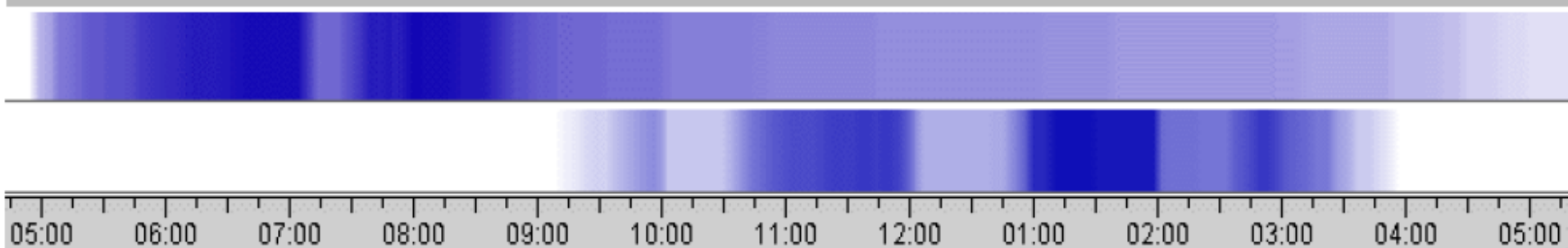
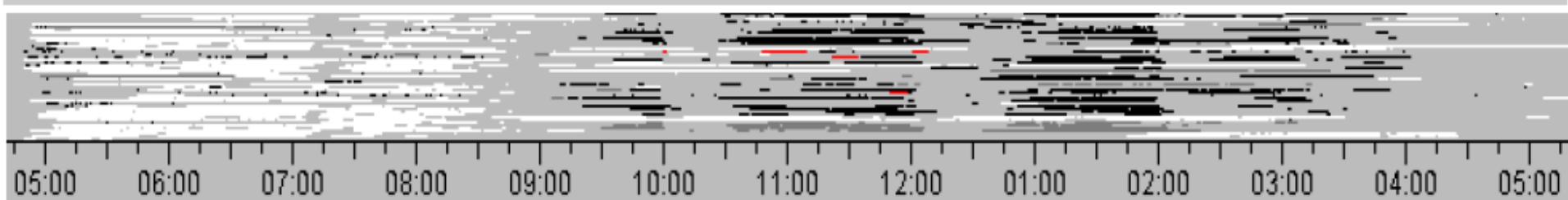
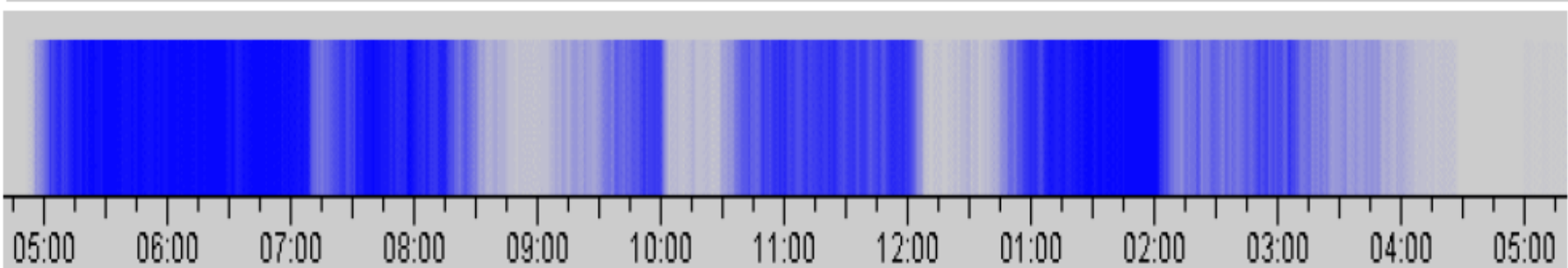
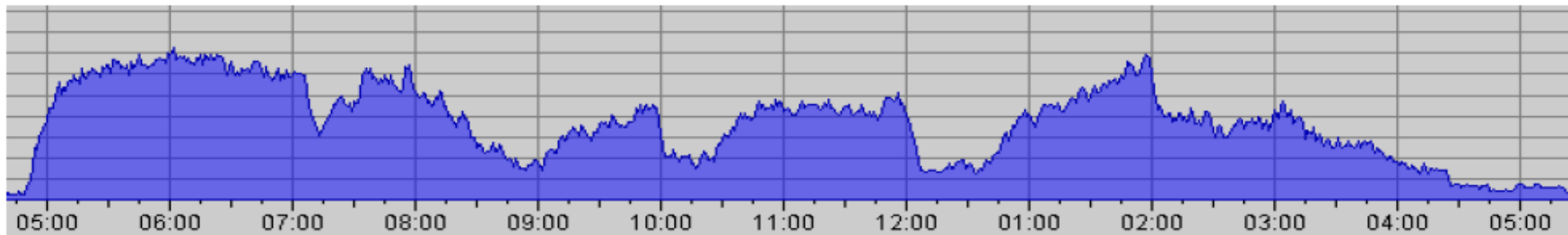





# Awareness data - visualization

- Percent-active graph
- Color saturation gradient
- Compressed actogram
- Model gradient
- Shaped ribbon








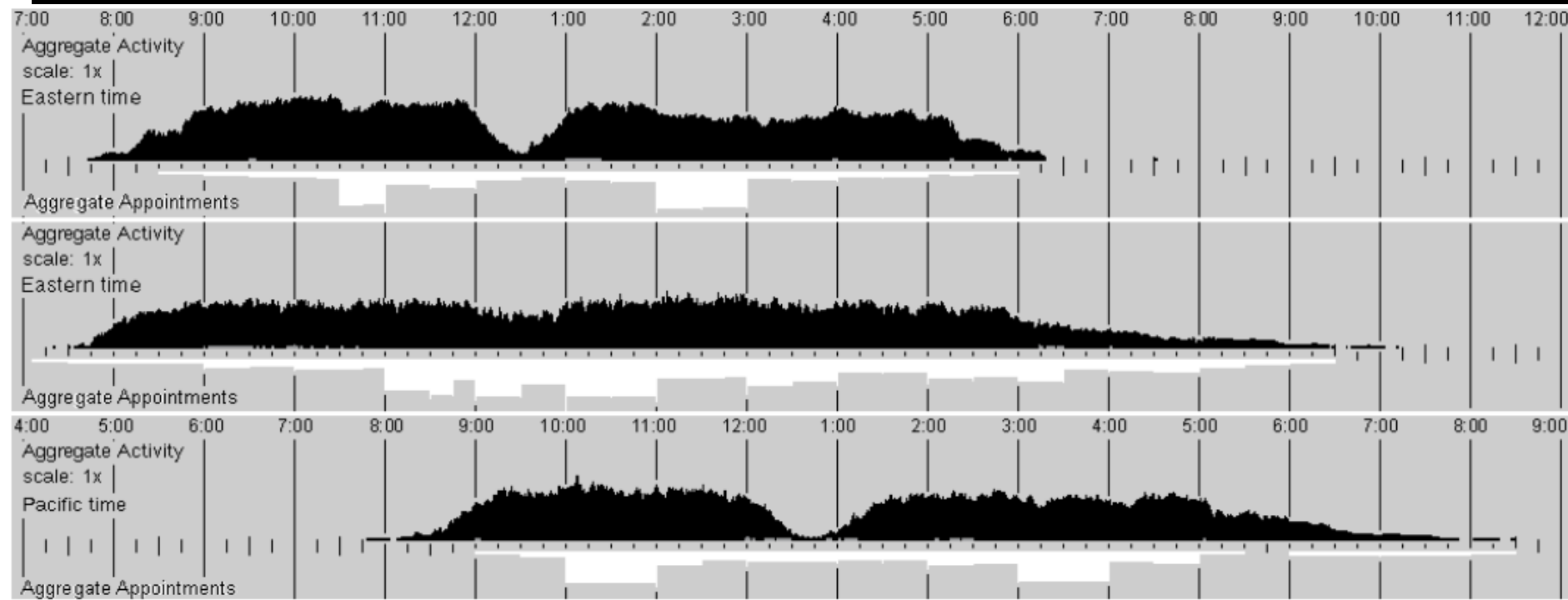
# Awareness data - visualization

- Design study, 9 participants
- Preferred percent-active graph and model gradient
- Clear transitions and locale information
- Accuracy depends on roles
- Change of routines lately
- Potential to be inactive



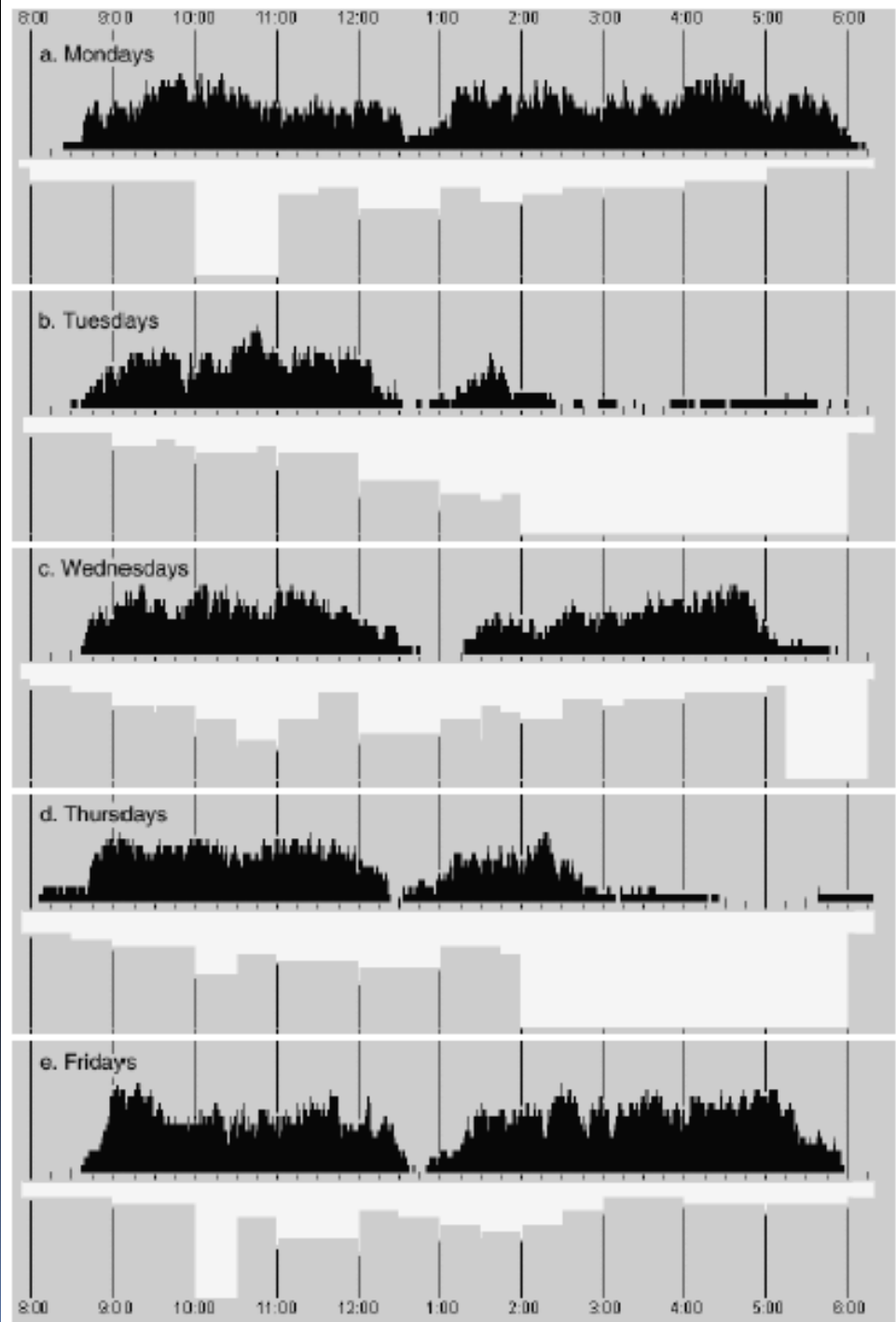
# Awareness data - patterns

- Comparing aggregate activity
  - Scheduled appointments
  - Defined regularity
  - Time-shift
  - Useful in group coordination
  - Overlapping – optimal times
- 

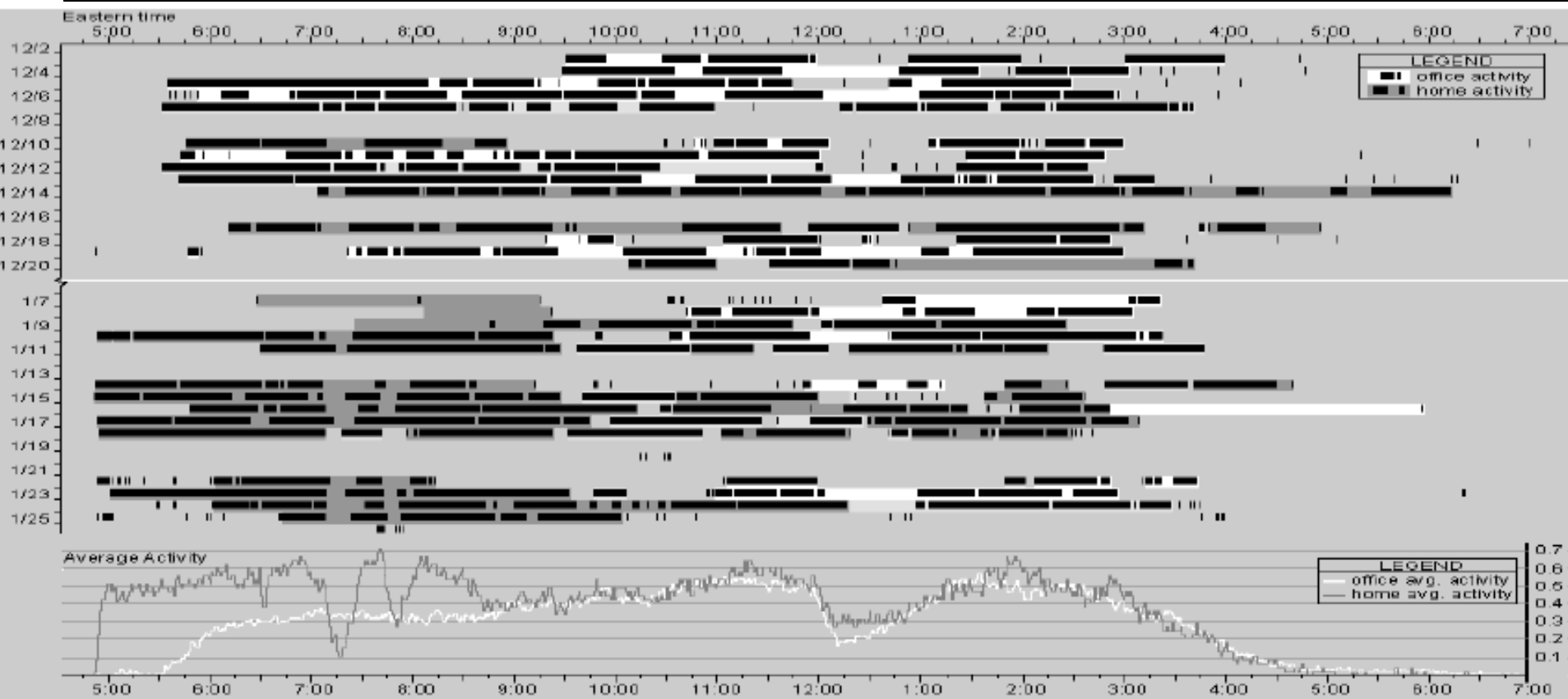


# Awareness data - patterns

- Day of week patterns
  - Activity and appointments, travel time
- Location-dependent
  - Different locale, average (mean) activity
- Variability within and between individuals
  - Predictability, style and role (manager, ...)
- End of inactivity
  - Short and long durations





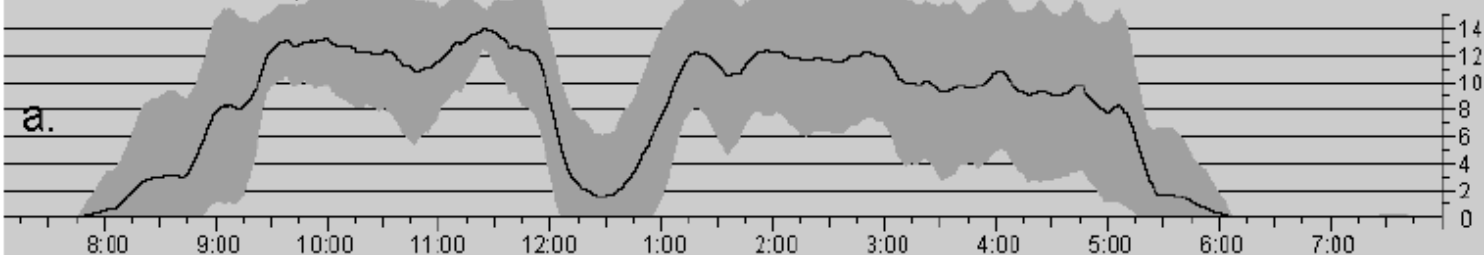


Eastern time  
8:00 9:00 10:00 11:00 12:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00

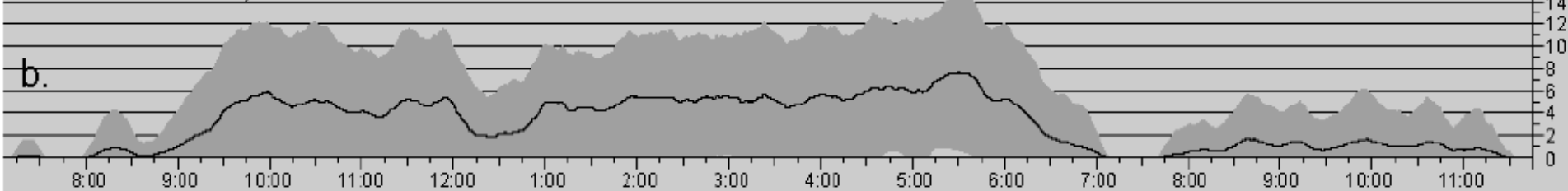
2/26  
2/27  
3/1

LEGEND  
office e-mail  
home e-mail

Mean and Std. Dev. of Activity



Mean and Std. Dev. of Activity



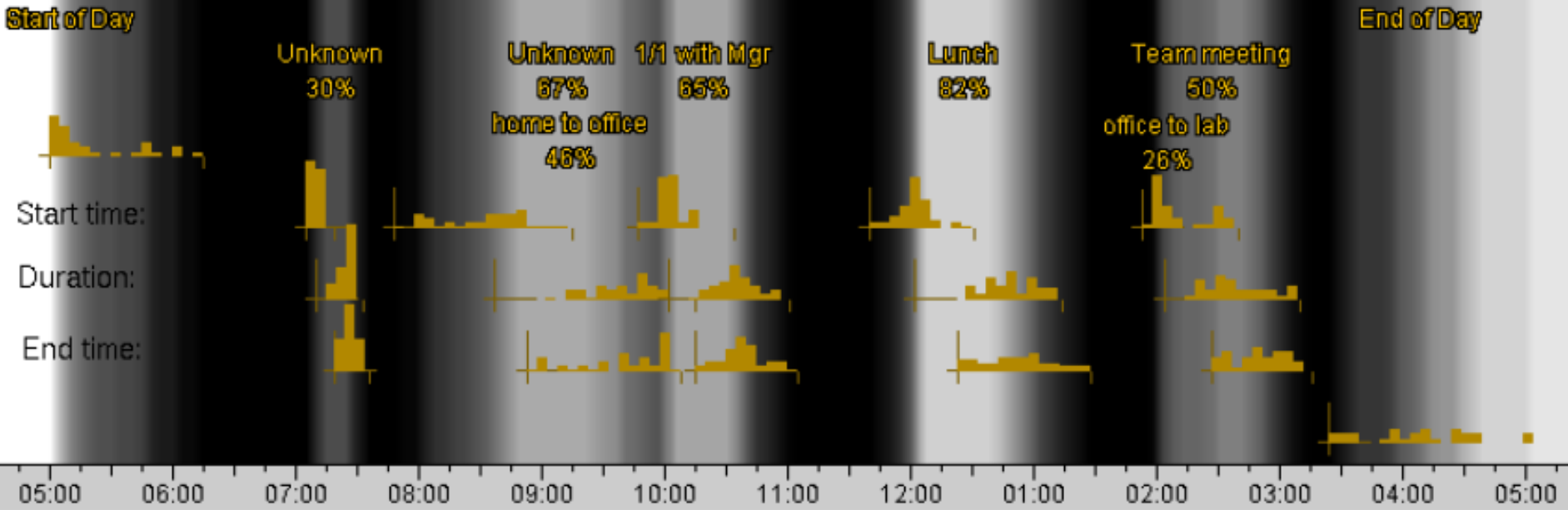
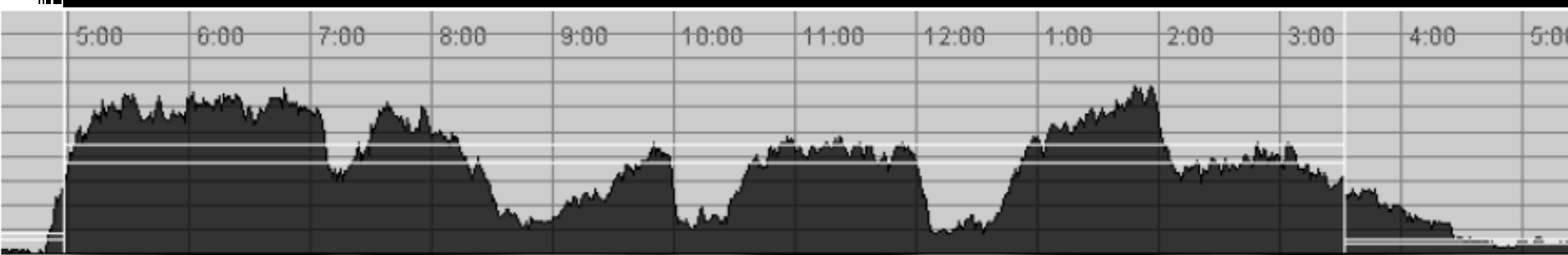


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# Detection and modeling


- Descriptive and predictive rhythm model
- Container of transitions
- Start/end of day, location-change, period of inactivity (lunch, ...)
- Minimize a priori knowledge
- 3 steps:
  - Transition discovery (threshold)
  - Clustering (similarity)
  - Estimate refinement (name)



Percent active level, occurrence frequency, probability distribution



# Implications I

- Group coordination across distance
  - Good time to make a contact
  - Predicting return from inactivity
  - Augmenting calendar accuracy
  - E-mail reading patterns
  - Rhythm cues to remote colleagues
  - Settings based on own history
  - Use of shared equipment
- 

# Implications II

- Reachability at the current and future time
- Inferring away status (lunch, ...)
  - Dynamic model
- Predicting return
  - End time of transition
  - Integration of status

Awarenex: Contact List - 12:14

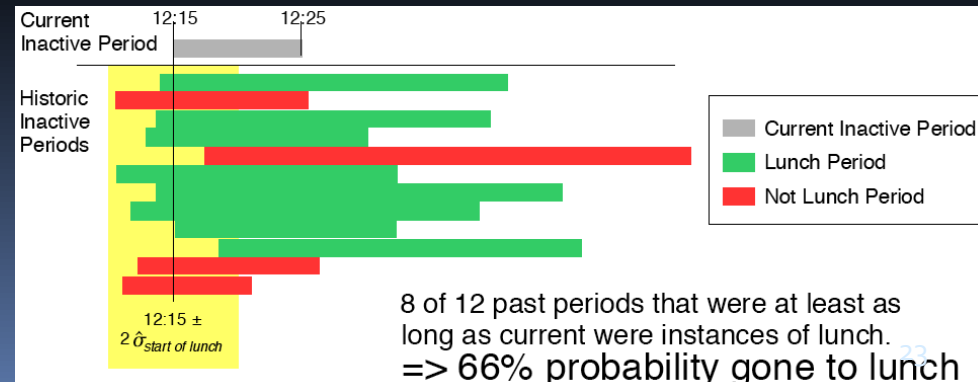
**Contact Status** Help

**Bo office (50m)** ☺

**John office (11m)** {Lunch (75%), ETA < 12:50}

**Rosco office (2+ h)** {ETA < Fri ~5:15}

**Jean office** {1:28 < ETD}






# Privacy

- Collecting and analyzing data
- Revealing sensitive information
- Research - greater exposure
  
- Query and abstracted views
- Levels for authorized users
- Privacy economy (cost/benefit)






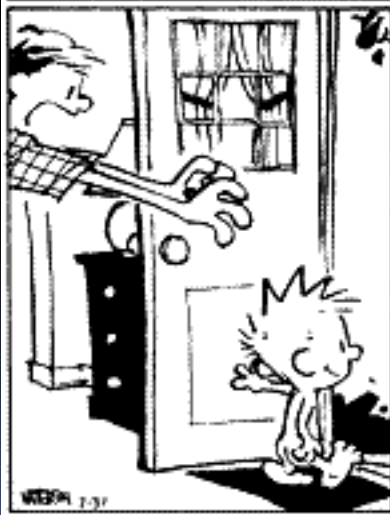
# Conclusion

- Different patterns at different levels
  - Understanding of computer interaction
  - Applications for coordination
  - History activity vs. calendar
  - Privacy and awareness tradeoff
  - Creation of shared sense of time
- 



# Questions

- Small sample
  - Reachable vs. available
  - Study quite old, change in behavior
  - Mobile phones with sensors / combination
  - Power consuming
  - Job position / group patterns
  - Privacy issues
  - Collaboration application test
- 



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