



# Modeling of Crowdsourcing Platforms and Granularity of Work Organization in Future Internet

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# Crowdsourcing in the News

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## Crowdsourcing National Challenges With the New Challenge.gov

By [Alexander Howard](#) / August 31, 2010 3:04 PM / [1 Comments](#)

*ReadWriteWeb.com*

JULY 6, 2011, 10:00 AM ET

## Beatles Great Paul McCartney Plunges Into Crowd Sourcing

*Wall Street Journal*

Monday, April 26, 2010

## "Crowd-Sourcing" IBM to Cut 3/4 of its Permanent Staff by 2017?

*globaleconomicanalysis.blogspot.com*

## CrowdFlower raises \$7M to crowd-source freelance work

March 22, 2011 | [Matthew Lynley](#)

*Venture Beat*

DIGITAL DOMAIN

## When the Assembly Line Moves Online

By [RANDALL STROSS](#)

Published: October 30, 2010

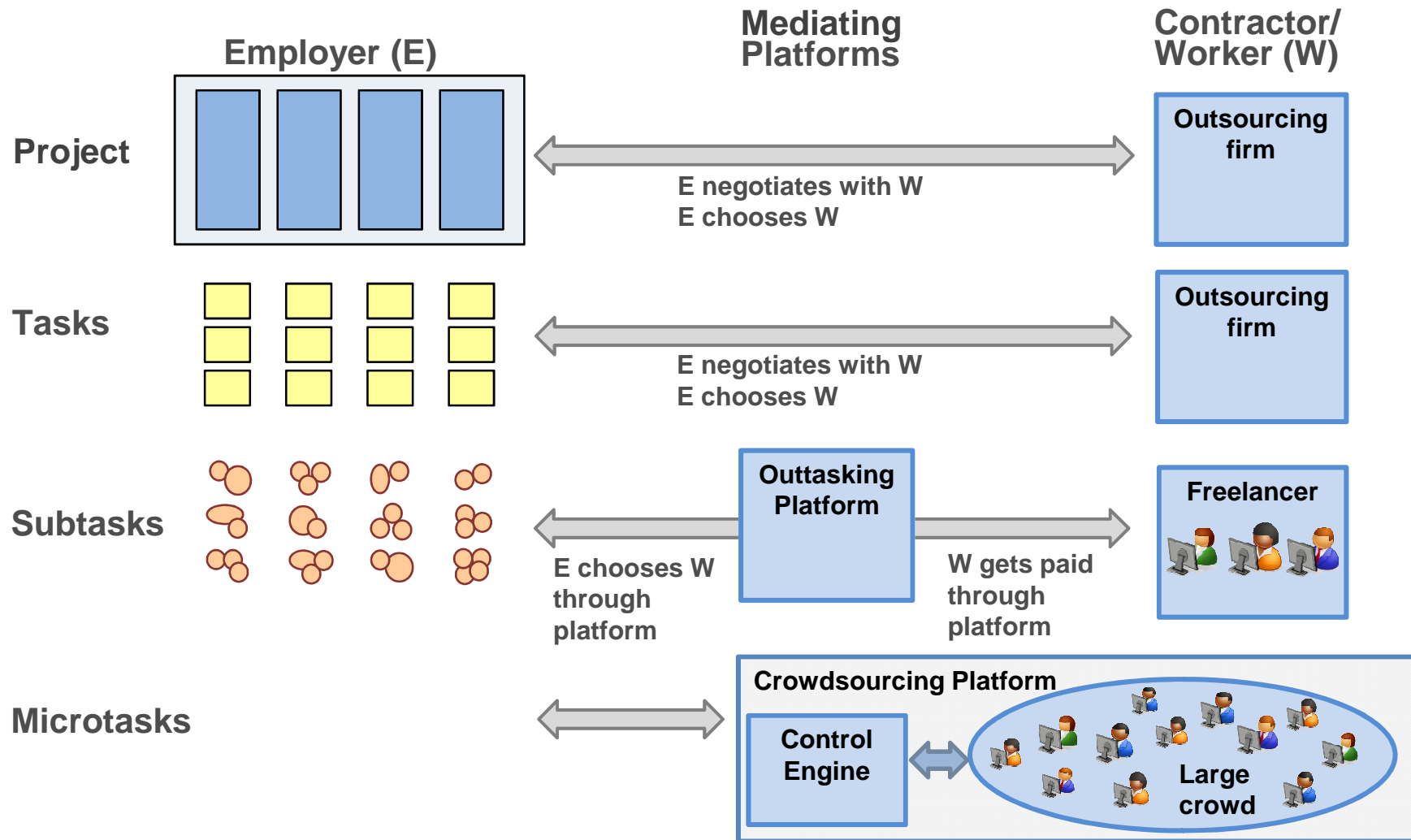
*New York Times*

# Outline

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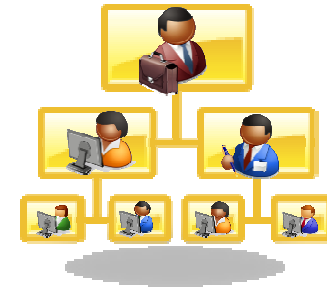
- ▶ Introduction to crowdsourcing
- ▶ Modeling growth of crowdsourcing platforms
- ▶ Activity model for crowdsourcing platform users
- ▶ Conclusion

# Evolution of Work Organization



# Evolution of Work Organization

- ▶ Differences to traditional work organization
  - Very fine granularity of tasks
  - Employer does not select designated worker
  - Mediator between worker and employer
  - Workers choose tasks to work on



- ▶ Questions
  - Employer: Will my task finish in time?
    - ➔ Completion time of tasks
  - Platform operator: Will my platform be successful?
    - ➔ Platform growth
    - ➔ Activity of platform users



# *Modeling growth of crowdsourcing platforms*

# Growth Models for Microworkers.com

- ▶ Measurement data
  - User development of Microworkers.com

- ▶ Growth models

- Bio-inspired

- Exponential growth model

$$N_{exp}(t) = N_0 e^{rt}$$

- Logistic growth model

$$N_{log}(t) = \frac{N_0 \cdot K}{N_0 + (K - N_0)e^{-r_0 t}}$$

- Artificial

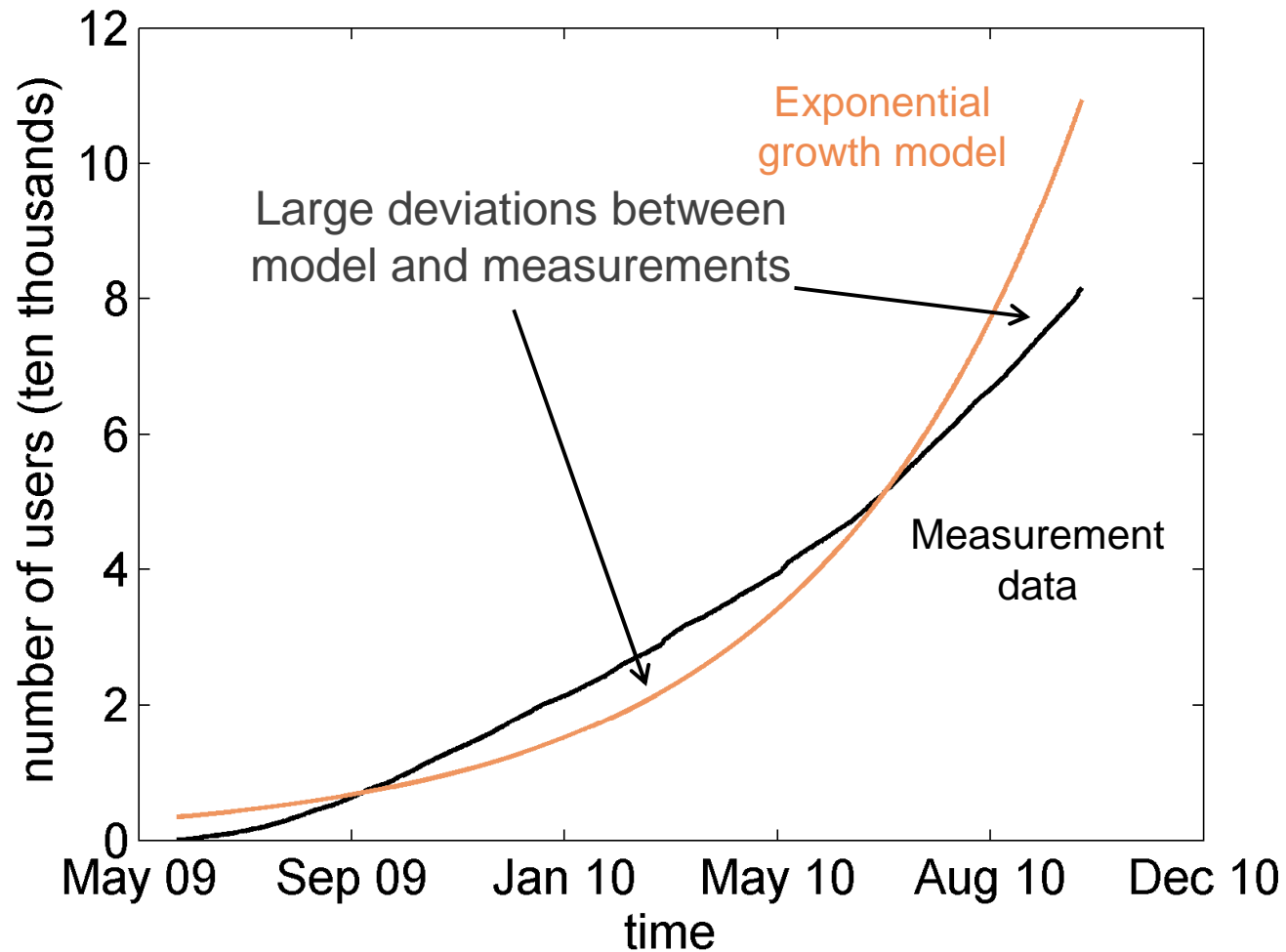
- Square growth model

$$N_{sqr}(t) = at^2 + bt$$

**microWorkers**  
work & earn or offer a micro job

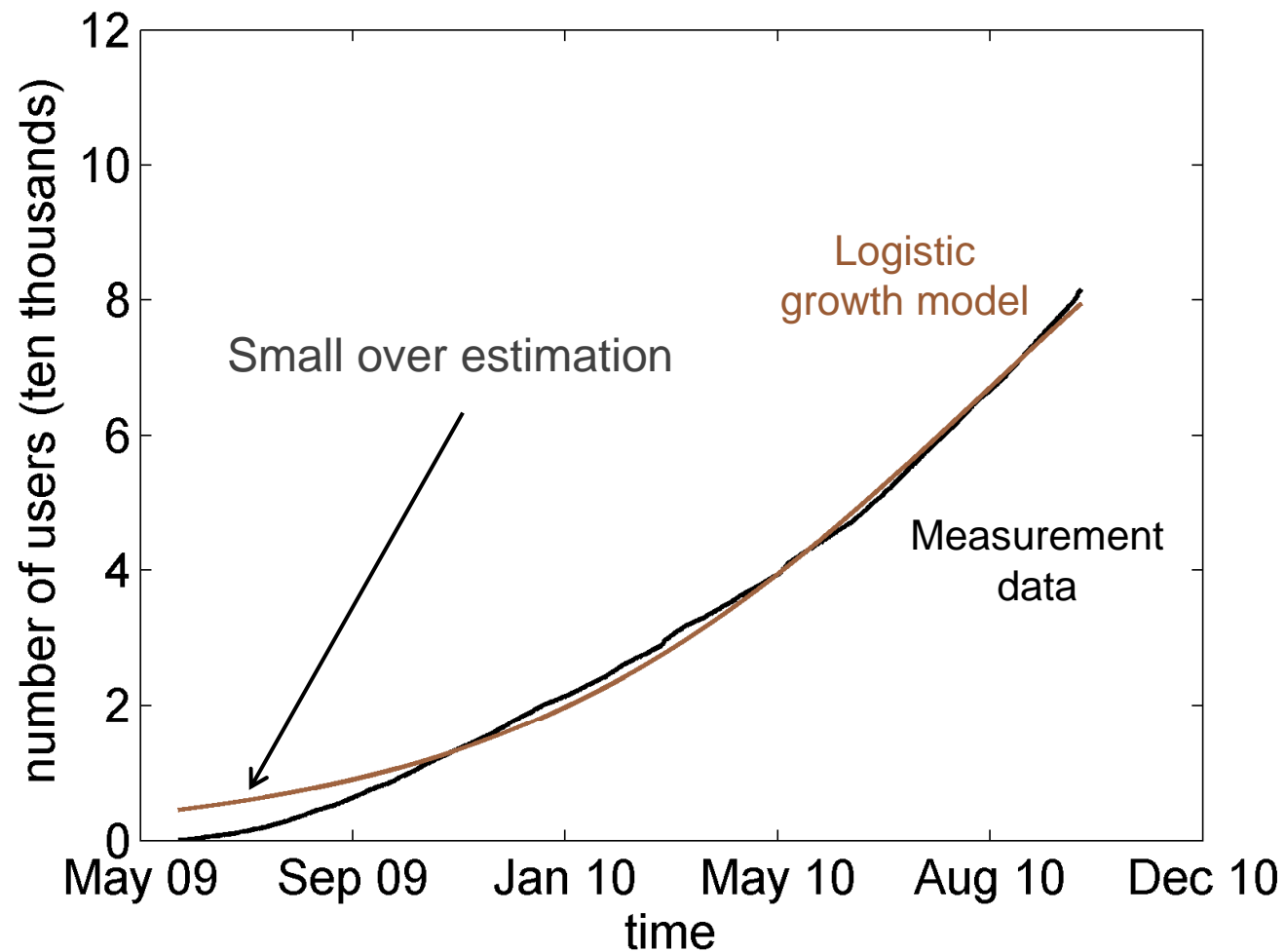


# Exponential Growth Model

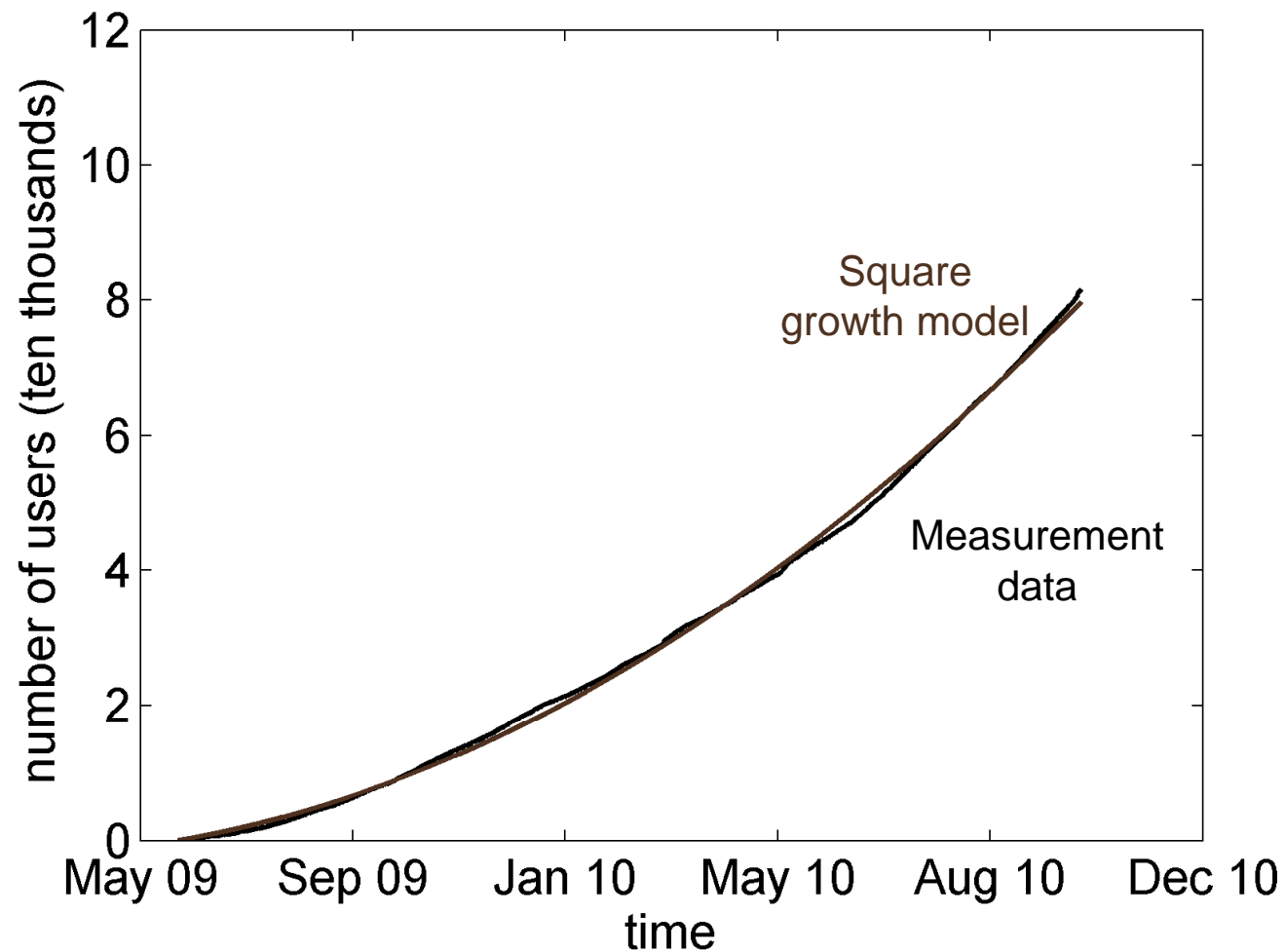




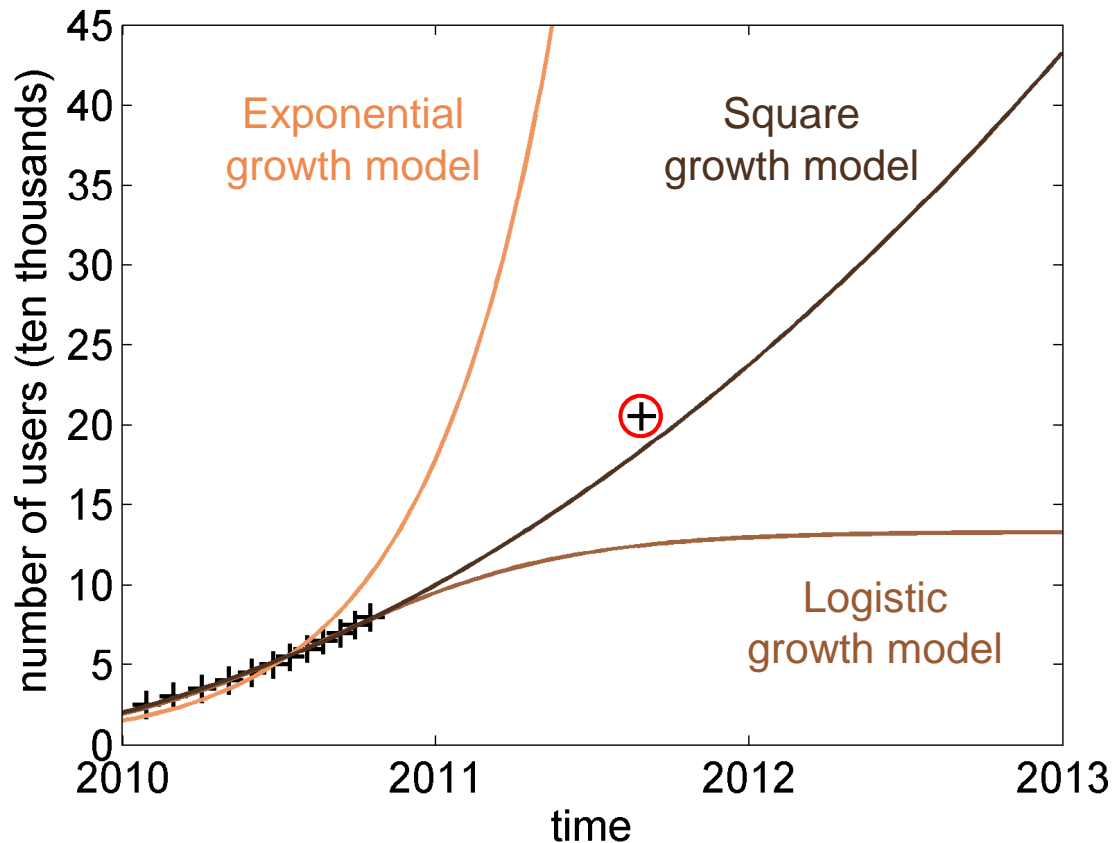
# Logistic Growth Model



# Square Growth Models



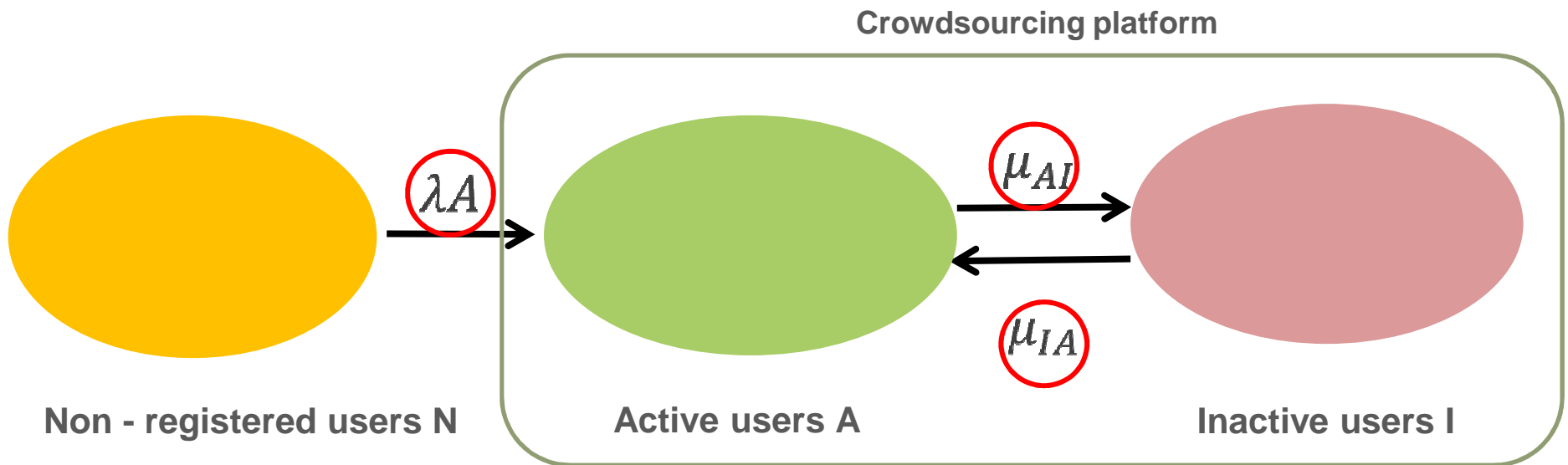
# Growth Estimation



- ▶ Exponential growth model:
  - One million users in 2013
- ▶ Logistic growth model:
  - End of growth: 2012
  - Number of users: About 130,000
- ▶ Square growth model:
  - One million users in 2015

# *Activity model for crowdsourcing platform users*

# Modeling of Crowdsourcing Dynamics



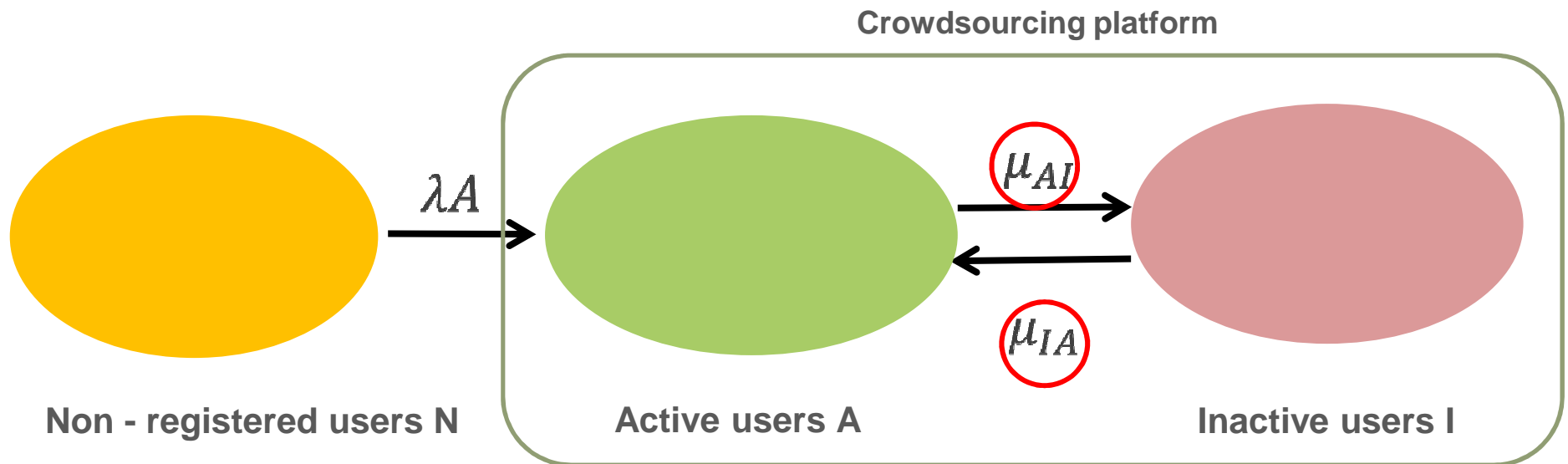
- System description:

$$\frac{dN}{dt} = -\lambda AN$$

$$\frac{dA}{dt} = -\mu_{AI}A + \mu_{IA}I + \lambda AN$$

$$\frac{dI}{dt} = -\mu_{IA}I + \mu_{AI}A$$

# Modeling of Crowdsourcing Dynamics



► User interaction models:

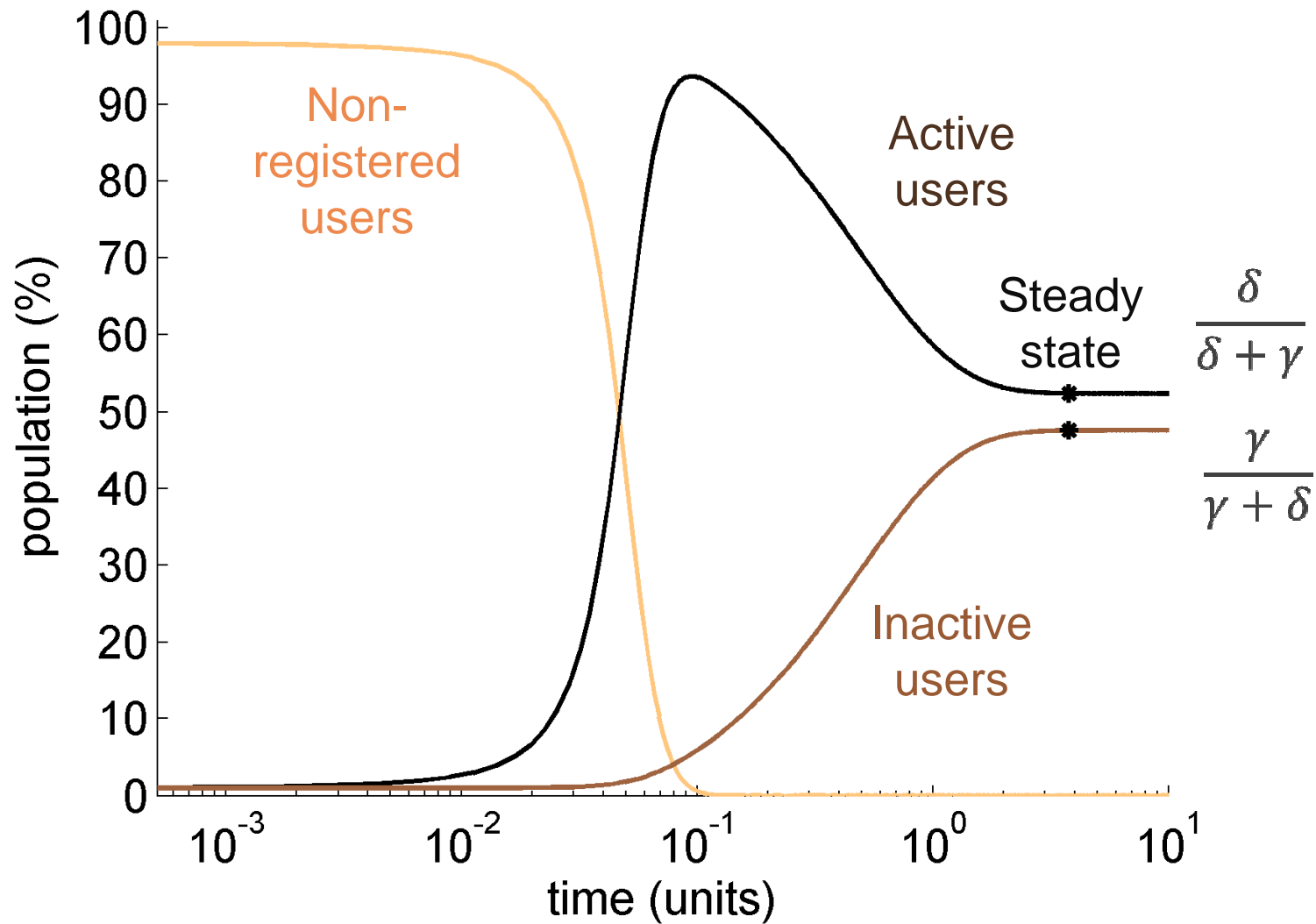
- Local User Decision (LUD)
  - User only influenced by personal opinion

$$\mu_{AI} = \gamma \quad \mu_{IA} = \delta$$

- Globally Influenced Dynamics (GID)
  - Users are influence by global opinion

$$\mu_{AI} = \gamma I \quad \mu_{IA} = \delta A$$

# Platform Dynamics using the LUD Model



# *Conclusion*



# Conclusion

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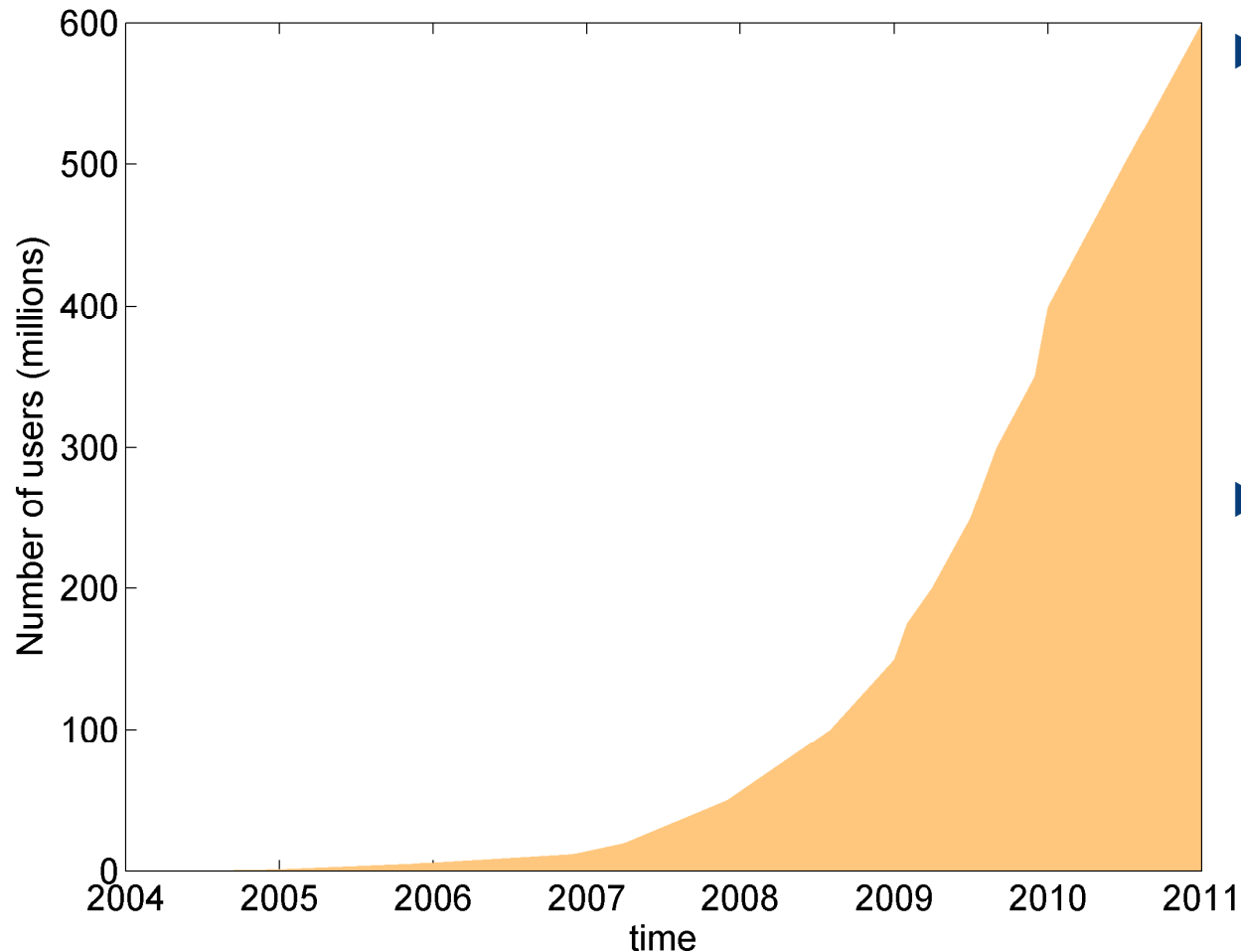
- ▶ Crowdsourcing platforms are
  - A consequence of a new granularity of work organization in the Internet
- ▶ Growth of crowdsourcing platforms
  - Crowdsourcing platforms could become future traffic hotspots
- ▶ Activity of the users on the platforms
  - Estimation of percentage of active users in the steady state
- ▶ Completion times of tasks
  - Completion times are hard to predict

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***Thank you for your attention!***



# Growth of Facebook



- ▶ In 2009 about 350 million users:
  - Most visited web page form business PCs in 2009
- ▶ In 2010 about 600 million users:
  - Most used web page in the USA in 2010