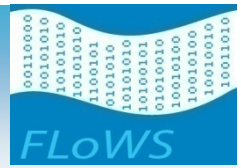


Information Theory for Mobile Ad-Hoc Networks (ITMANET):
The FLoWS Project

FLoWS Team Update:

Andrea Goldsmith

ITMANET PI Meeting
Jan 27, 2011

New Theory and Insights

Key New Theory and Insights

- Thrust 0
  - New definitions of reliable communications in the face of uncertainty
  - Performance over finite time windows
- Thrust 1
  - Network Equivalence
  - Network Coding in Noise/Loss
  - Multiterminal Strong Converses
- Thrust 2
  - Layered and structured codes
  - Control/capacity connections for time-varying channels with noisy and/or rate-constrained feedback
  - Generalized capacity and separation
- Thrust 3
  - Stochastic Multi-period Network Utility Maximization
  - Relaxation and distributed techniques for network optimization
  - Mean Field Equilibrium for Stochastic games
  - Learning in dynamic environments
- Interthrust
  - Coordination via Communication
  - Relaying, cooperation and cognition
  - Network coding
  - Capacity regions for more than 3 users

ITMANET

FLoWS

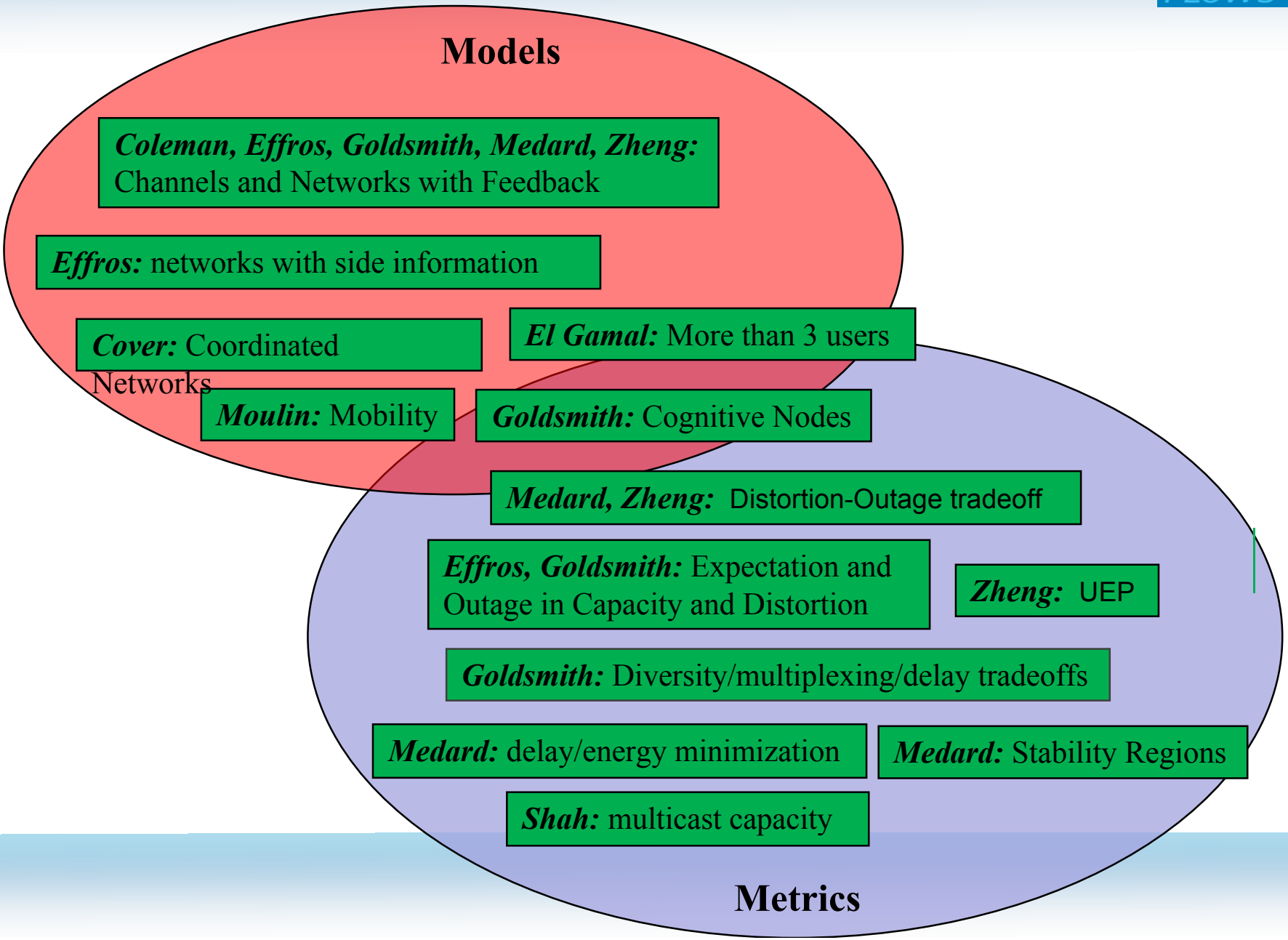
Recent Accomplishments

BRIDGING THE GAP · DARPA · 50 YEARS · POWERED BY IDEAS

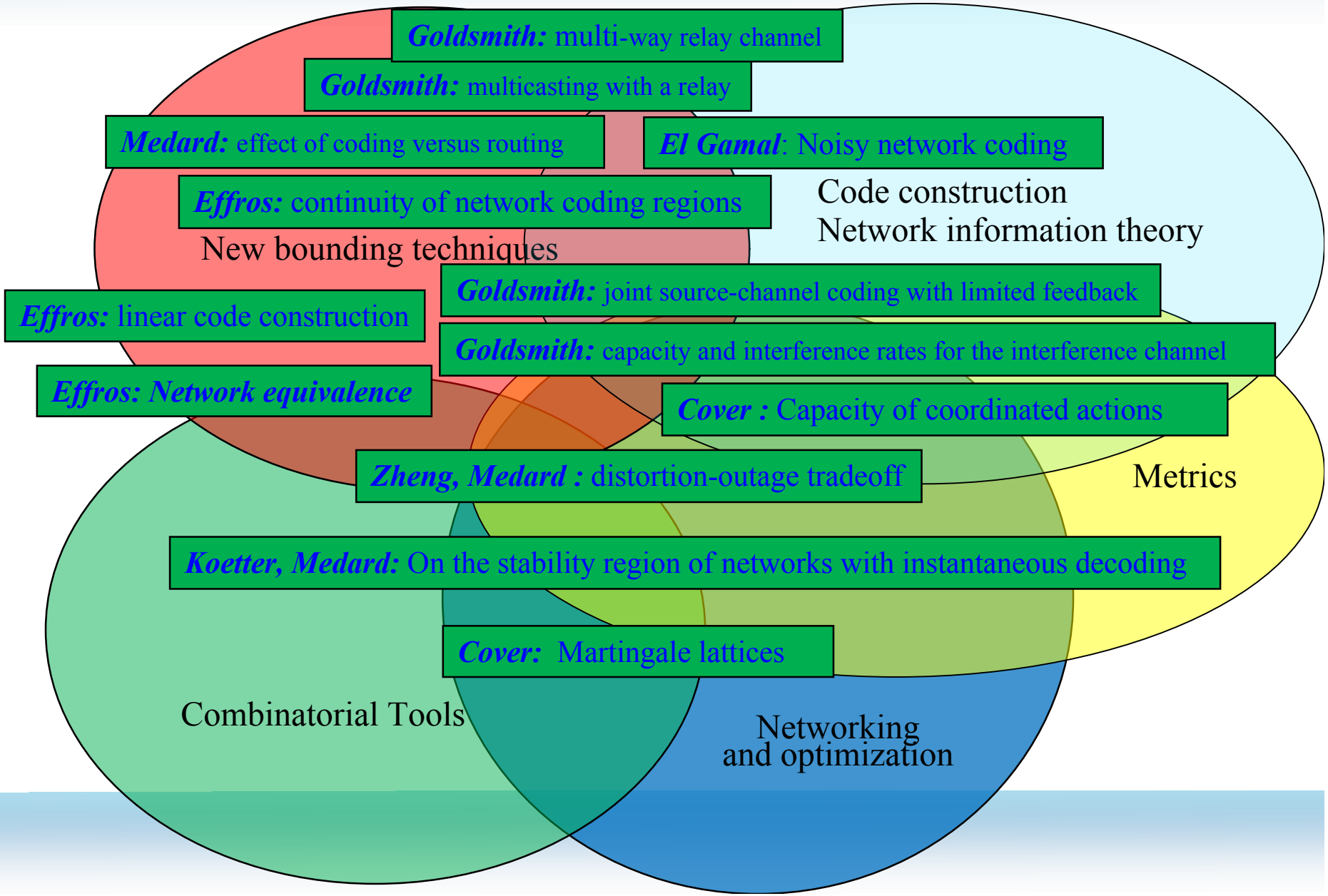
Advanced Technology Office

IPTO INFORMATION PROCESSING TECHNIQUES OFFICE

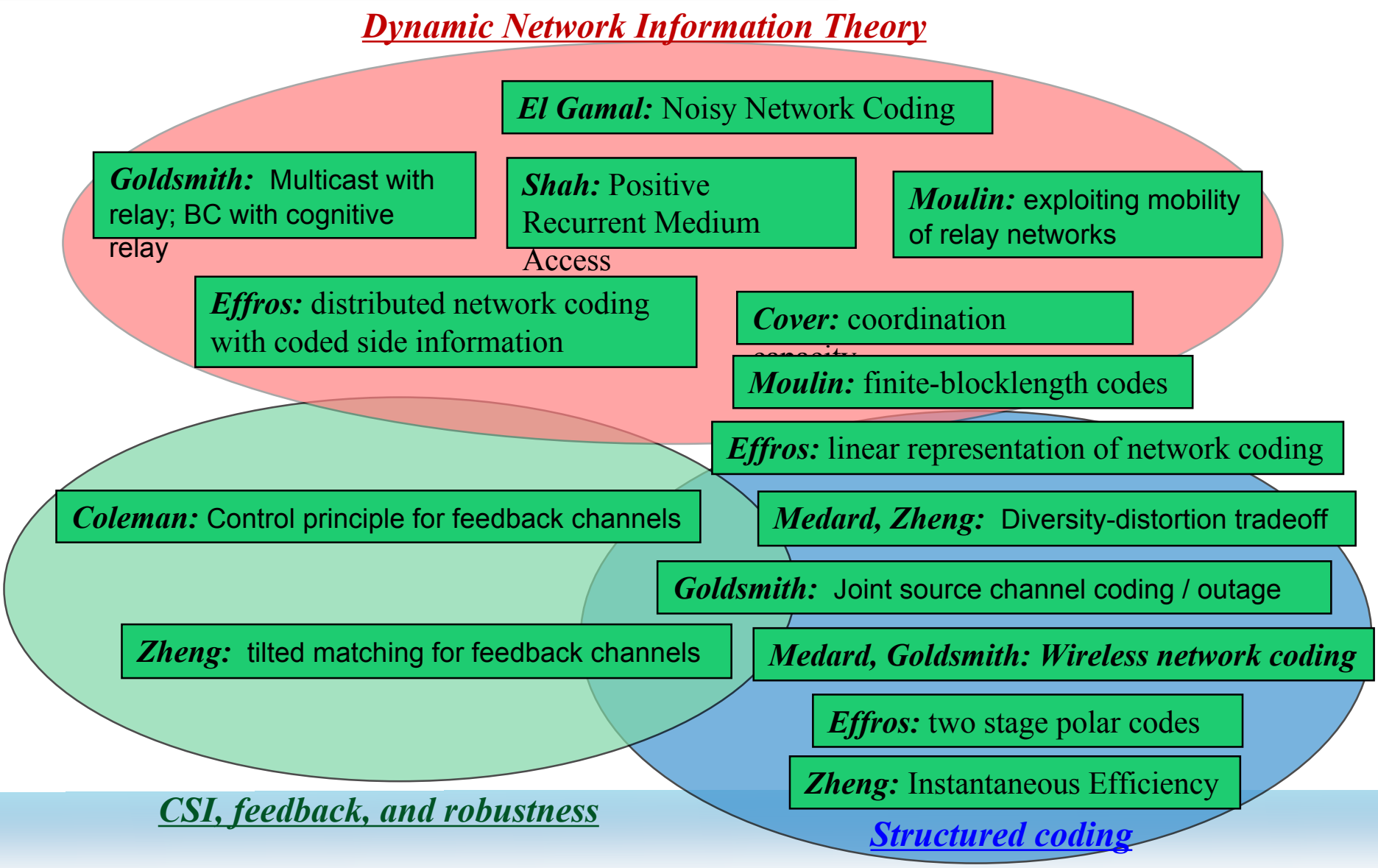
Thrust 0 Recent Achievements



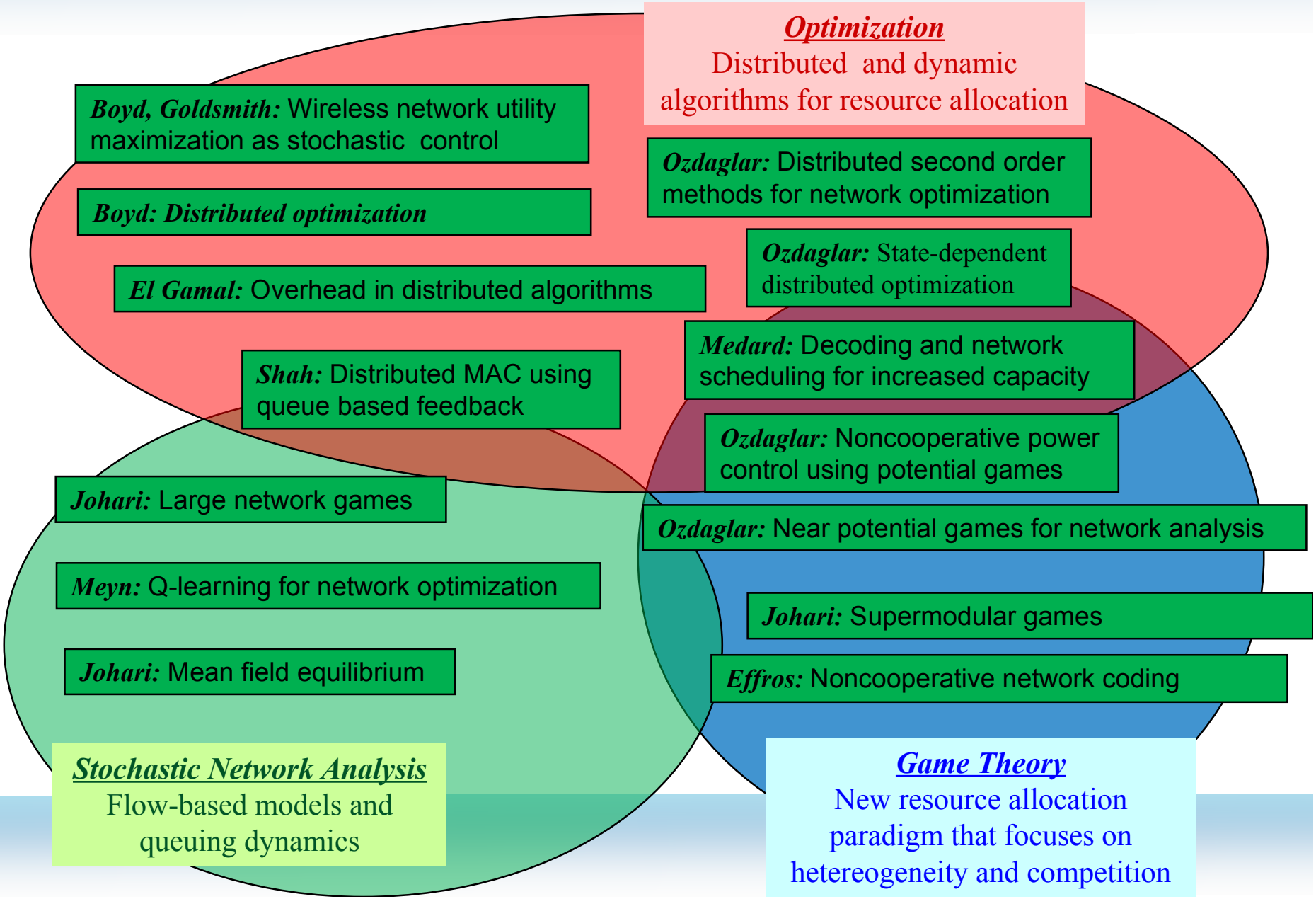
Thrust 1 Recent Achievements



Thrust 2 Recent Achievements



Thrust 3 Recent Achievements



Publications to date

- 5 books or book chapters; 1 more under development
- 46 published/accepted journal papers, 28 submitted
- 169 conference papers (published or to appear)
- SciAM paper appeared
- Comm. Magazine paper to appear this month
- Publications website:
  - http://www.stanford.edu/~adlakha/ITMANET/flows_publications.htm

Phase 4 Progress Criteria

- Demonstrate the consummated union between information theory, networks, and control; and why all three are necessary ingredients in this union.

- Write a monograph to be published by NOW jointly in *Foundations and Trends in Information Theory* and in *Foundations and Trends in Networks* on our new information theory for MANETs. Also publish a shorter version in IEEE Proceedings.

- Use our results to provide challenges and solutions for the broader community that designs and builds MANETs

Work Products (possibly merged with Nequit)
How to maximize ITMANET impact

- Community Website
  - "go-to" website for network information theory
  - Merging of two current websites, with hooks?
  - Get feedback at ITA
- IEEE Proceedings special issue
  - Survey paper on FLoWS results and conclusions
  - Invited papers on all major topics within/between thrust areas
- Survey paper
  - Part of Proceedings Special Issue
- Tutorials and Short Courses
  - (for web and IT school)
  - In each thrust area/across thrust areas
  - Link to website
- Position paper about follow-on programs (ITMANET 2.0)
  - DC Govt/Industry Day for our last meeting

Transitions via DC Day

- Transition to other DARPA programs
- Transition to and synergies with other government research programs
- Transitions to and synergies with corporate research programs/investments

Tech Transfer

- Standards
- Patents
- Company Workshops
- Commercial Transfer