

# Experiences from the COMAP Contest in Mathematical Modeling

Barb Bennie    Ted Wendt

Department of Mathematics  
University of Wisconsin-La Crosse

April 25, 2009

# Outline

- 1 The COMAP Contests in Mathematical Modeling
  - What are the MCM and ICM?
  - Who is involved in the MCM and ICM?
- 2 UW-La Crosse Participation
- 3 Paper Exchange and Review

# Outline

- 1 The COMAP Contests in Mathematical Modeling
  - What are the MCM and ICM?
  - Who is involved in the MCM and ICM?
- 2 UW-La Crosse Participation
- 3 Paper Exchange and Review

# The COMAP Modeling Contests

The COMAP Mathematical Contest in Modeling (MCM) and Interdisciplinary Contest in Modeling (ICM) are intense international mathematical modeling competitions.

- The contest runs annually in the first or second week of February.
- Students compete in teams of three.
- Teams have 96 hours to develop a model, test their model, analyze their results, and prepare a complete written report.

# The COMAP Modeling Contests

Following the contest, students submit their papers for judging by a panel of COMAP judges. The papers are ranked according to a four-tiered system:

- The top 1% of papers are designated **outstanding**.
- The top 15% (approximately) of papers are **designated meritorious**.
- The top 50% (approximately) of papers receive **honorable mentions**.
- Each team that completes the competition and submits a solution is designated a **successful participant**.

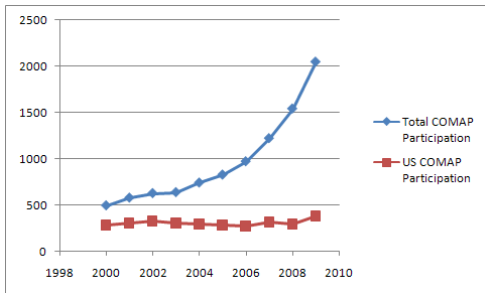
## International Participation

The MCM and ICM are open to teams from around the world.

- A total of 2048 teams participated in the MCM and ICM this year.
- A total of 381 teams from 173 US institutions in 40 states participated.

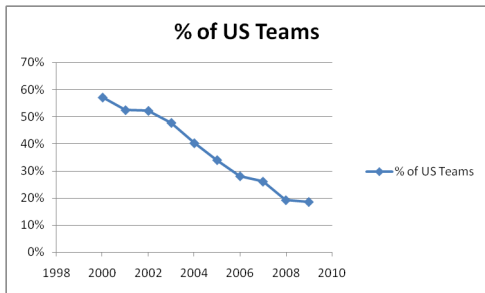
## International Participation

While international participation has skyrocketed, participation amongst US teams has remained stagnant.



## International Participation

This last year, the US accounted for less than 20% of all papers submitted.



## How does Wisconsin rate?

A total of 13 teams from 6 institutions in Wisconsin took part in this year's contest. The following table shows participation rates in neighboring states.

State	Teams	Institutions
Illinois	1	1
Iowa	31	7
Michigan	13	7
Minnesota	9	4
Wisconsin	13	6

# Outline

- 1 The COMAP Contests in Mathematical Modeling
  - What are the MCM and ICM?
  - Who is involved in the MCM and ICM?
- 2 UW-La Crosse Participation
- 3 Paper Exchange and Review

## Our Strategy

- Recruiting
- Preparation for students
- Logistical concerns for advisors

# Recruiting

“Cast a broad net ...”

- We sent a recruiting email to department chairs in the sciences
  - computer science, biology, chemistry, physics, math
- We mentioned the contest (repeatedly) in our own classes
- We encouraged interested students to recruit team mates
- Early in the fall semester, we held a math club meeting about modeling

As a result, UW-L fielded 5 teams of students with diverse majors (mathematics, physics, engineering, chemistry, economics, music, and philosophy) in the 2009 MCM.

## Student Preparation

Preparation sessions were held periodically during Fall 2008 and January 2009. Topics included:

- An introduction to math modeling
- Reading past papers
- Review of general judging criteria
- *Mathematica* training

## Student Preparation

In October 2008, several students who expressed interest in the COMAP MCM, participated in the Midwest Math Modeling Contest (MMMC).

- This was a first annual regional competition
- Students were given 24 hours (rather than 96 hours) to construct a solution, write a summary, and prepare an oral presentation of their results
- Immediate feedback was provided to the participants by peers and faculty
- The competition was hosted by the University of Iowa

## Student Preparation

We provided access to contest related resources through D2L site. Some of the content included:

- Past MCM papers that are available online or in the UMAP journal
  - Various problems
  - Various rankings
- Judges commentaries on past problems from the UMAP journal
- MCM guides from student, advisor and judge perspectives
  - The QUEST of the MCM
  - The paper judging process
  - Tips for teams and advisors

# Logistics

A large challenge with 5 teams was finding good work spaces. We wanted each team to have

- Access to the same room for all 96 hours
- Keys to the building and room for after hours
- No run-ins with building security
- An at least moderately comfortable space

# Logistics

We worked with ITS and other faculty members to secure computers and other resources for the teams. We wanted each team to have

- At least one computer per team member with internet access
  - Power strips and internet cables were scrounged at the last minute
- Access to potentially useful software including Mathematica, LaTeX, Microsoft Word, and SPSS
- Access to a common room with a mini-library of potentially useful books
- Ability to borrow resources from faculty members without bending or breaking the contest rules

# Logistics

Forming teams:

- Team balancing
- Completing partial teams
- Registering committed teams

# Logistics

While most of our work came before and after the contest, there were a few items we attended to during the contest.

- We were there when the contest kicked off to be sure computers turned on, room keys worked, etc.
- We were there when the contest ended to make sure solutions were submitted on time, to the right place, etc.
- Throughout the contest, faculty from the math department delivered meals to the teams.

# Outline

- 1 The COMAP Contests in Mathematical Modeling
  - What are the MCM and ICM?
  - Who is involved in the MCM and ICM?
- 2 UW-La Crosse Participation
- 3 Paper Exchange and Review

# Providing Students with Feedback

Following the contest, students generally receive very little feedback on their work.

## A Structured Peer Review Process

This year, we organized a 13 school, 26 team paper exchange program.

- Each team agreed to review three papers from peers at other institutions.
- Each faculty adviser agreed to review two papers from other institutions.
- All reviewers were given reading guidelines aimed at prompting 'constructive' feedback using criteria similar to COMAP's judging criteria.

## Feedback about the Feedback

### Positive feedback:

- Students enjoyed seeing how other teams approached their problems.
- Faculty (generally) appreciated reading reports from teams other than their own.

### Negative feedback:

- The quality and format of the feedback varied *greatly*.
- Some feedback was seen as 'too critical,' while other feedback was 'not critical enough.'
- Reading papers added to the already busy workload of students.
- Feedback from advisers was not distinguished from feedback from other students.

## Moving Forward

We plan to organize a similar paper exchange involving more institutions following next year's COMAP contests.

Additional MCM/ICM resources are available at

<http://www.uwlax.edu/faculty/wendt>

Please feel free to contact us with questions about the COMAP contests in modeling or about our paper exchange program:

[bennie.barb@uwlax.edu](mailto:bennie.barb@uwlax.edu)

[wendt.theo@uwlax.edu](mailto:wendt.theo@uwlax.edu)