

COURSE  
EVALUATIONS

**YOU SHOULD START GIVING OUT 'E'S  
SO I CAN SPELL FACADE OR DEFACED.**

IF YOU DON'T TURN IN  
AT LEAST ONE HOMEWORK  
ASSIGNMENT, YOU'LL  
FAIL THIS CLASS.

YEAH. BUT IF I CAN FAIL  
THIS CLASS, THE GRADES  
ON MY REPORT CARD WILL  
BE IN ALPHABETICAL ORDER!



**CARTOON OF THE DAY**

**PRIORITIES**

# **How are Course Evaluations Used?**

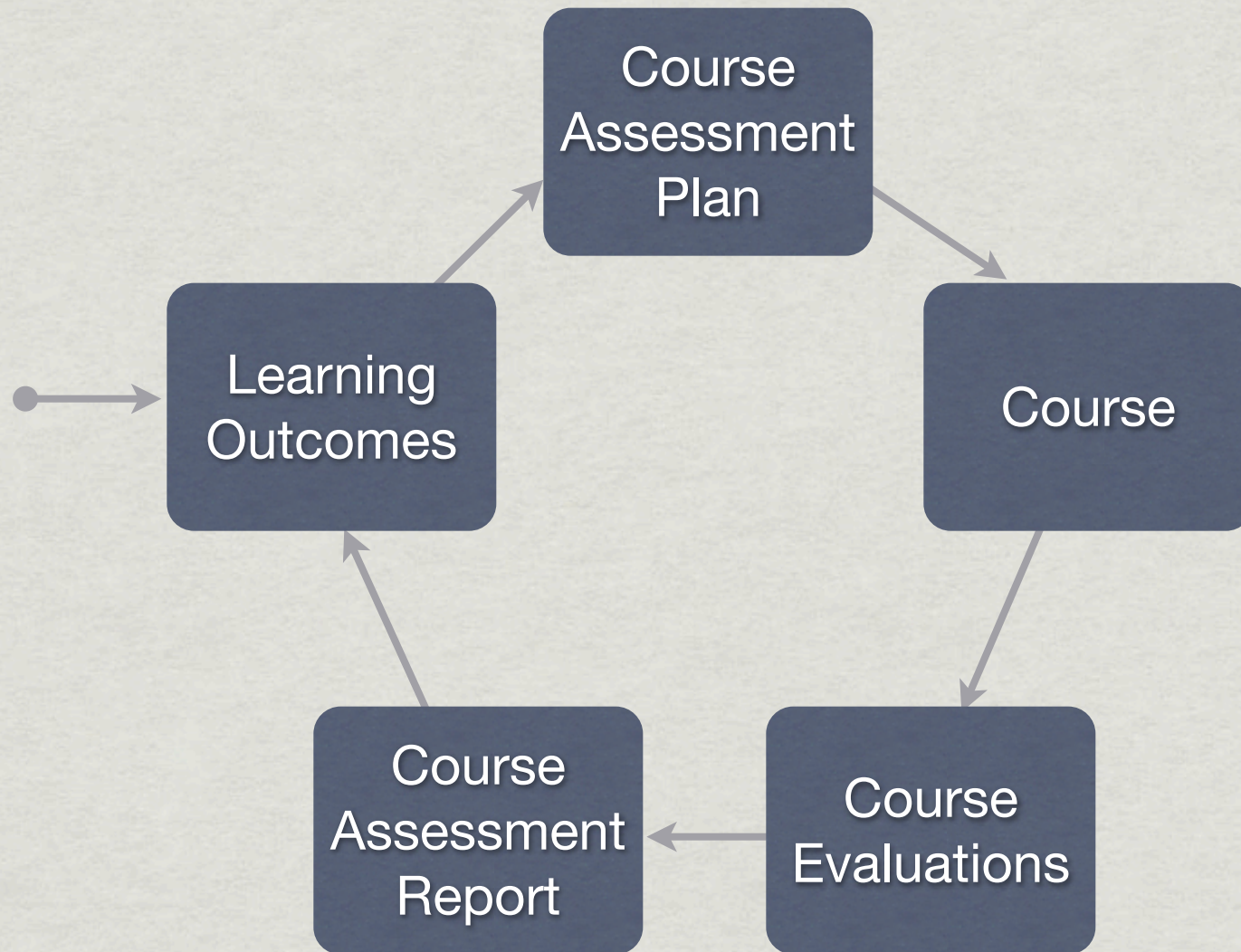
# To Improve Instructor Performance

- \* Comments and summary to instructor
- \* Instructor adds response:
  - \* Plan for improvement
  - \* Explanation for bizarre comments
- \* Package goes to department head for review

# For Promotion and Tenure Decisions

- \* Full set of course evaluations (plus a couple hundred pages of supporting information) goes to Dean and PTR committee
- \* Dean and PTR committee make separate recommendations to President
- \* President has final decision on tenure

# To Improve Courses and Curriculum



# How You Can Be

# Most Helpful

TO ME, TO ROSE-HULMAN, TO  
FUTURE STUDENTS, ...

- \* Give very specific feedback
  - \* What worked well
  - \* What didn't work, and how that could be fixed
- \* Consider your audience
  - \* Instructor (primarily), department head, Dean, PTR committee

# Examples: Useful or Not?

- \* “Everything was good except for Z. Why are we taught one version of Z in class but program in another?”
- \* “An in class lab for Z would have been great.”
- \* “I am still not convinced if this course is any [sic] useful.”
- \* “Assignments greatly reinforced the class material.”
- \* “Curt should improve his aim and/or develop better student-avoidance skills.”
- \* “I think the current work-level, while a little easy, did not hamper my learning, and so lead [sic] to a fairly stress-free learning environment.”
- \* “I'd be happier with a lighter course load in this course than I had, but my style is often to make an assignment as perfect as possible until right before it's due, so I may have taken more time on average per assignment than other people.”

# Examples: Useful or Not?

- \* “P3 is completely unreasonable. The whole final project was just stupid, not very well thought through and not testing your knowledge at all. After doing the Petri net I don't think Curt Clifton is an intelligent [sic] men [sic], because [sic] anyone intelligent [sic] would not assign such an absurd assignment...”
- \* “Without any guidance in how to build larger-scale Petri nets, the final project of the class seemed rather arbitrary and painful...”
- \* “Clifton did a good job of taking an incredibly boring topic and making it interesting. ...
- \* ... By combining power point presentations with white board demonstrations, he was able to address multiple learning styles. His enthusiasm during lectures helped to keep us engaged.”
- \* He's always willing to help outside of class, we've found him in lab with a queue of people waiting for help and he makes sure he can get to everyone...



# CARTOON OF THE DAY

A-MINUS-MINUS

**YOU CAN DO THIS ONE IN EVERY 30 TIMES AND STILL HAVE 97% POSITIVE FEEDBACK**

STATE OF THE  
PRACTICE OF  
FORMAL METHODS

CURT CLIFTON

ROSE-HULMAN INSTITUTE OF TECHNOLOGY

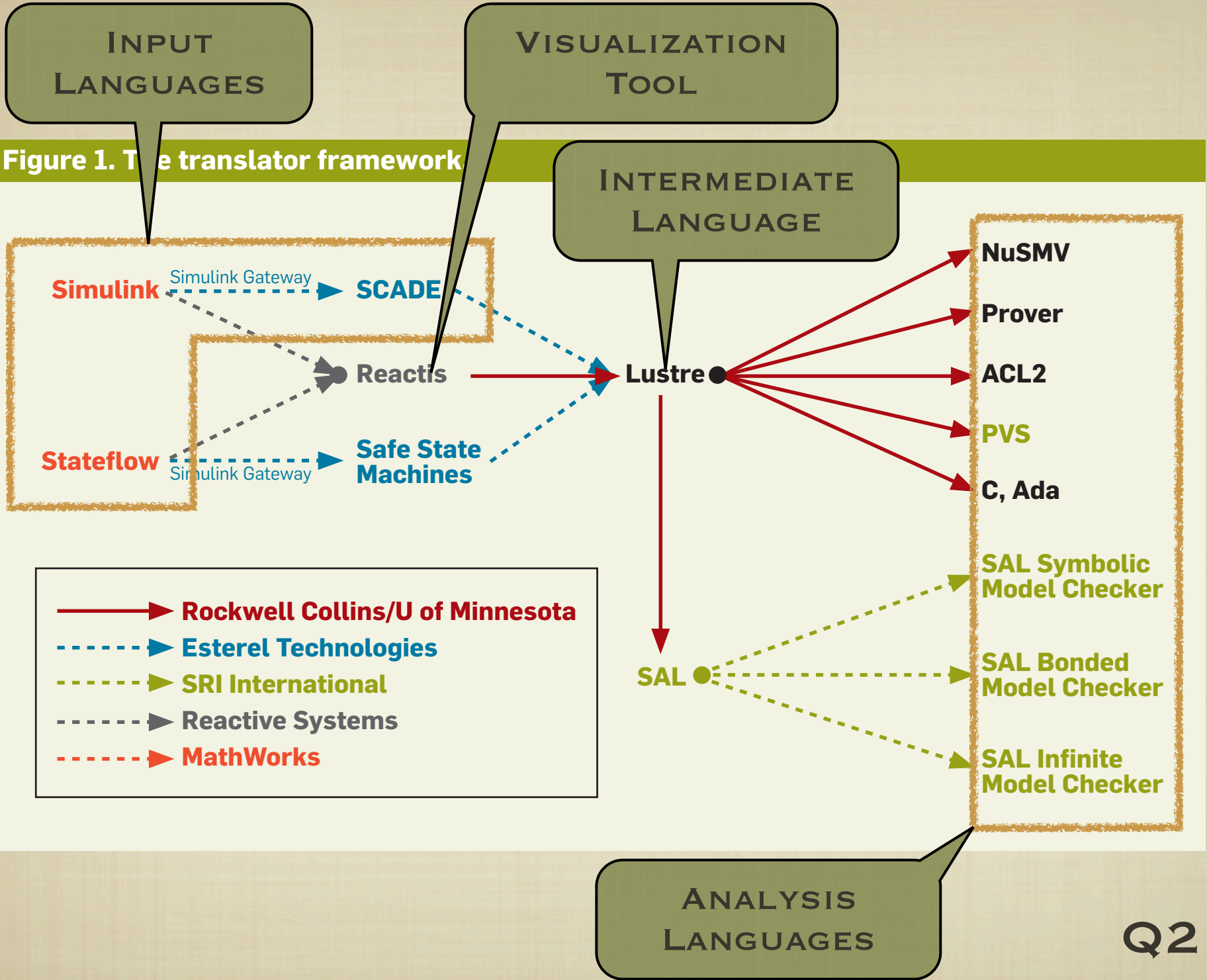
**SOFTWARE ENGINEERS WANT TO BE REAL  
ENGINEERS. REAL ENGINEERS USE  
MATHEMATICS. FORMAL METHODS ARE THE  
MATHEMATICS OF SOFTWARE ENGINEERING.  
THEREFORE, SOFTWARE ENGINEERS  
SHOULD USE FORMAL METHODS.**

**– MICHAEL HOLLOWAY  
NASA LANGLEY  
RESEARCH CENTER**

**Q1**

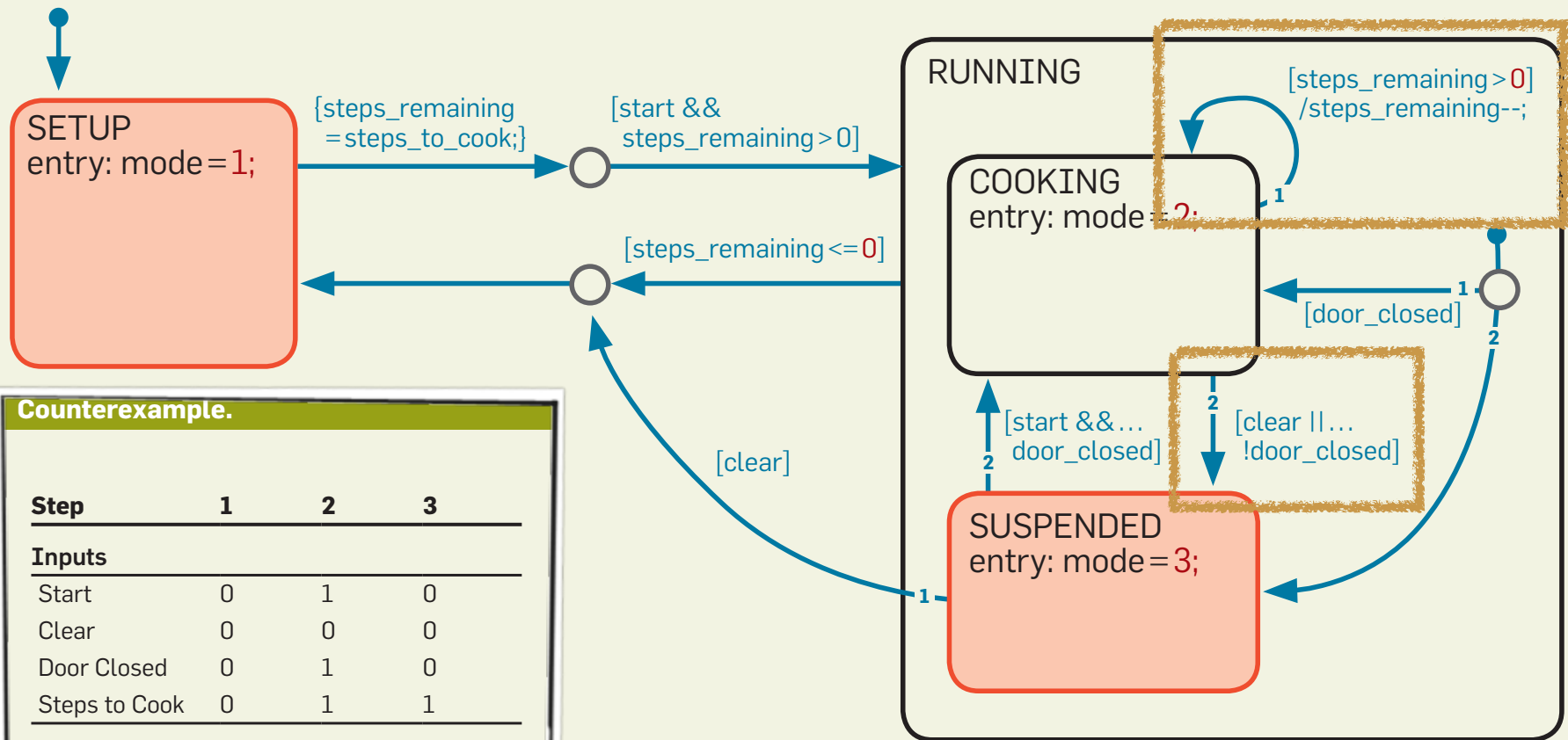
# SOFTWARE MODEL CHECKING TAKES OFF

- STEVEN P. MILLER, MICHAEL W. WHALEN, AND  
DARREN D. COFER
- MILLER AND COFER, ROCKWELL COLLINS
- WHALEN, UNIVERSITY OF MINNESOTA  
SOFTWARE ENGINEERING CENTER



# EXAMPLE

Figure 2. Microwave mode logic.



## Counterexample.

Step	1	2	3
<b>Inputs</b>			
Start	0	1	0
Clear	0	0	0
Door Closed	0	1	0
Steps to Cook	0	1	1
<b>Outputs</b>			
Mode	Setup	Cooking	Cooking
Steps Remaining	0	1	0

**assert Cooking ==> Door\_Closed**

# CASE STUDIES

# ADGS-2100 WINDOW MANAGER

- MODELED IN SIMULINK
- CHECKED IN NUSMV
  - UP TO  $1.5 \times 10^{37}$  STATES
- CHECKED 563 PROPERTIES
  - FOUND 98 ERRORS



**WITHOUT MANDATING IT, DEV TEAM BEGAN MODEL  
CHECKING AFTER EVERY DESIGN CHANGE**

# CERTA FCS PHASE 1

- TWO INDEPENDENT VERIFICATION TEAMS
- ONE USED TESTING
- ONE USED FORMAL MODEL CHECKING
- FORMAL TEAM VERIFIED 62 PROPERTIES
- FOUND 12 ERRORS

- TESTING TEAM
- INVESTED 50% TIME
- FOUND NO ERRORS
- ERROR TYPES:
  - INTERMITTENT
  - NEAR SIMULTANEOUS
  - LONG SEQUENCES

**BOTH TEAMS AGREED THAT MODEL CHECKING WAS MORE COST EFFECTIVE AT FINDING ERRORS**

WHY WERE  
FORMAL METHODS A  
GOOD IDEA HERE?

Q3

# THE EXTERMINATORS

■ BY PHILIP E. ROSS

■ ABOUT PRAXIS HIGH INTEGRITY SYSTEMS

# THE PRAXIS PROCESS

- EXTENSIVE, UP-FRONT WORK ON REQUIREMENTS WITH THE CUSTOMER, USING PROTOTYPES
- MODEL THE SYSTEM REQUIREMENTS IN Z
- IMPLEMENT THE SYSTEM IN SPARK-ADA
  - INCLUDES FORMAL SPECIFICATIONS
  - INCLUDES EXECUTABLE CODE
  - INCLUDES STATIC ANALYSIS TOOLS TO VERIFY THAT SPECIFICATION AND CODE MATCH

# THE RESULTS

- **LESS THAN 1 BUG PER 10,000 LINES OF CODE**
  - **50 TO 1000 TIMES BETTER THAN THE INDUSTRY AVERAGE**
- **PRAXIS CHARGES 50% MORE THAN COMPETITORS**
- **PRAXIS GUARANTEES SOFTWARE**
  - **FIXES BUGS AT NO COST TO THE CUSTOMER**

# REMINDERS

- **HOMework 12**
  - **DUE THURSDAY MORNING**
  - **COVERS [ROSS06A]**
- **PROJECT 3 OR 4**
  - **DUE FRIDAY NIGHT**
- **NO CLASS, PROJECT DAYS REST OF THIS WEEK**