

MATLAB EXPO 2017

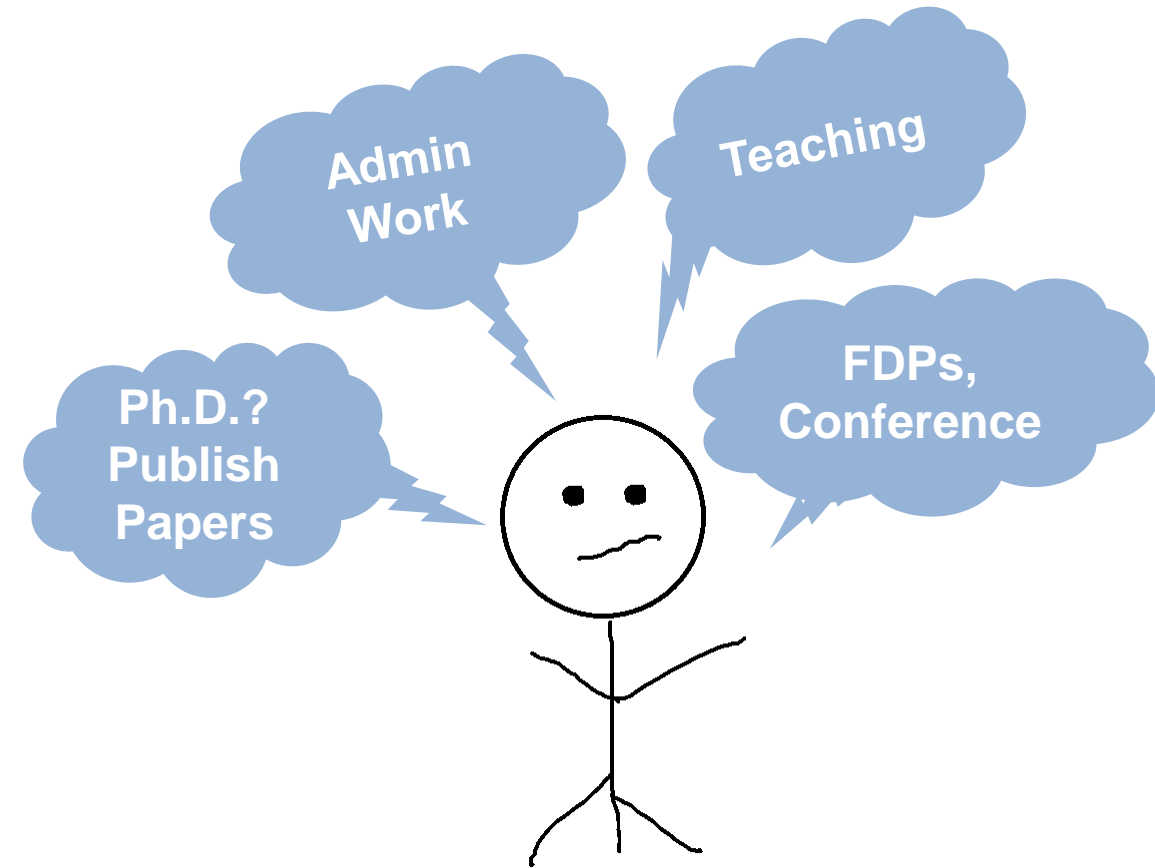
Building a Course Implementation Plan

Anuja Apte
Senior Partner Manager

Viju Ravichandran, PhD
Sr. Education Technical Evangelist
MathWorks India

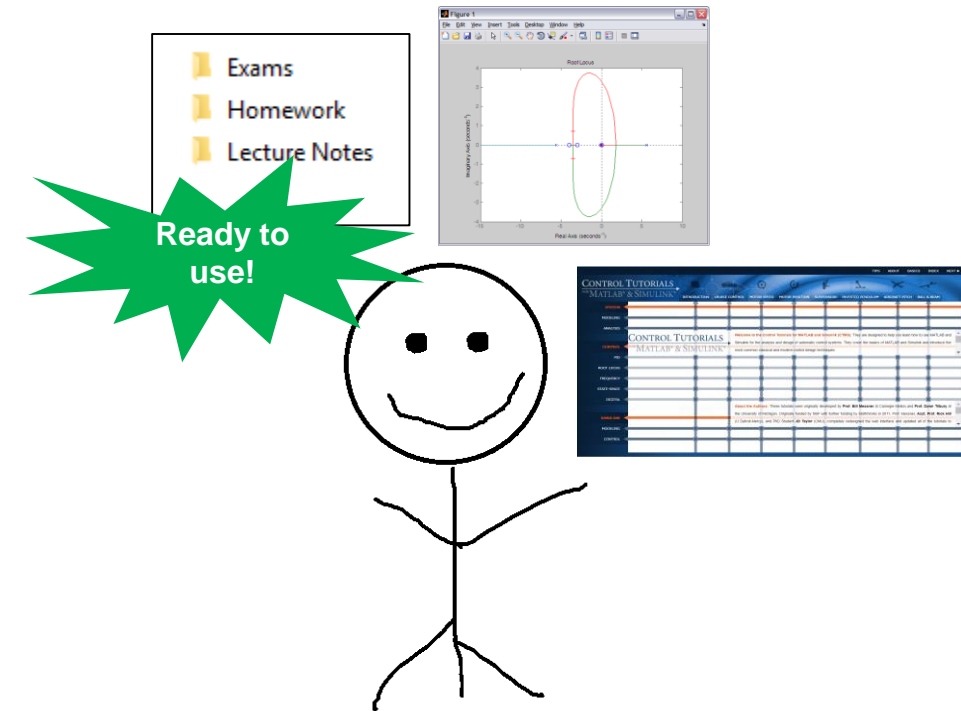
We have heard from you...

- Several competing priorities
- Student-engagement is very important
- Course development is time consuming



Teaching with MATLAB and Simulink

- Saves course development time
- Improves student-engagement
- Equips students for life beyond campus



Controls Tutorials from Carnegie Mellon University

- Syllabus
- 2 MATLAB and Simulink tutorials
- 78 controls tutorials
- 25 lectures
- 21 problem Sets
- 2 labs
- 7 quizzes
- 5 exams

These tutorials were originally developed by **Prof. Bill Messner** of the Department of Mechanical Engineering at Carnegie Mellon University and **Prof. Dawn Tilbury** of the Department of Mechanical Engineering and Applied Mechanics at the University of Michigan. Funding was originally provided by the National Science Foundation under grant number DUE 9554819.

Interview with a real user



Prof. Neela Rayavarapu

- Head of the E&TC Department
- Symbiosis Institute of Technology, Pune
- Areas of interest
 - Control systems, Digital Signal Processing, Multirate systems

How to get started!

- Access and set up requirements
- Teach using controls tutorials
- Curriculum Integration



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Access and Set Up Requirements

- Download the course material from MathWorks website
- Set up the components for your curriculum
 - Campus license - Students and faculty have access on-campus and at home!
 - Other license types – set up lab computers with necessary tools
 - 1 hour webinar by authors that shows how to use the content

Hands-on Overview - Teach Using Controls Tutorials

- Navigating course content

- Demonstrating MATLAB and Simulink examples
 - MATLAB and Simulink Tutorials (applicable to non-controls audience)
 - Introduction to system modeling MATLAB code examples

- Industry examples from the course

Controls Tutorials from Carnegie Mellon University

- Get access to the course materials
- Teach using the course materials
- Integrate in your curriculum



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Building a course

- What are the most common challenges you face while building a course?
- What are the most common challenges a student faces while learning a course?
- What is the most desired outcome of a course for you and the student?

Taking a step back

- Translating concepts from paper into practice involves more than just learning the concepts
- What are some ways you help enable this transition?

Why is Computational Literacy Important?

Learning to Code?



Coding to Learn!

"Computational thinking is a fundamental skill for everyone, not just for computer scientists."

*Dr. Jeannette Wing, Vice President of Microsoft Research
Former Department Head of CS at Carnegie Mellon University*

"Coding teaches me to think in a logical way"

*Trinity School high school student
Accepted at MIT*



How is Computational Thinking Learned?

Computational Thinking

Do students just “pick up” computational thinking?

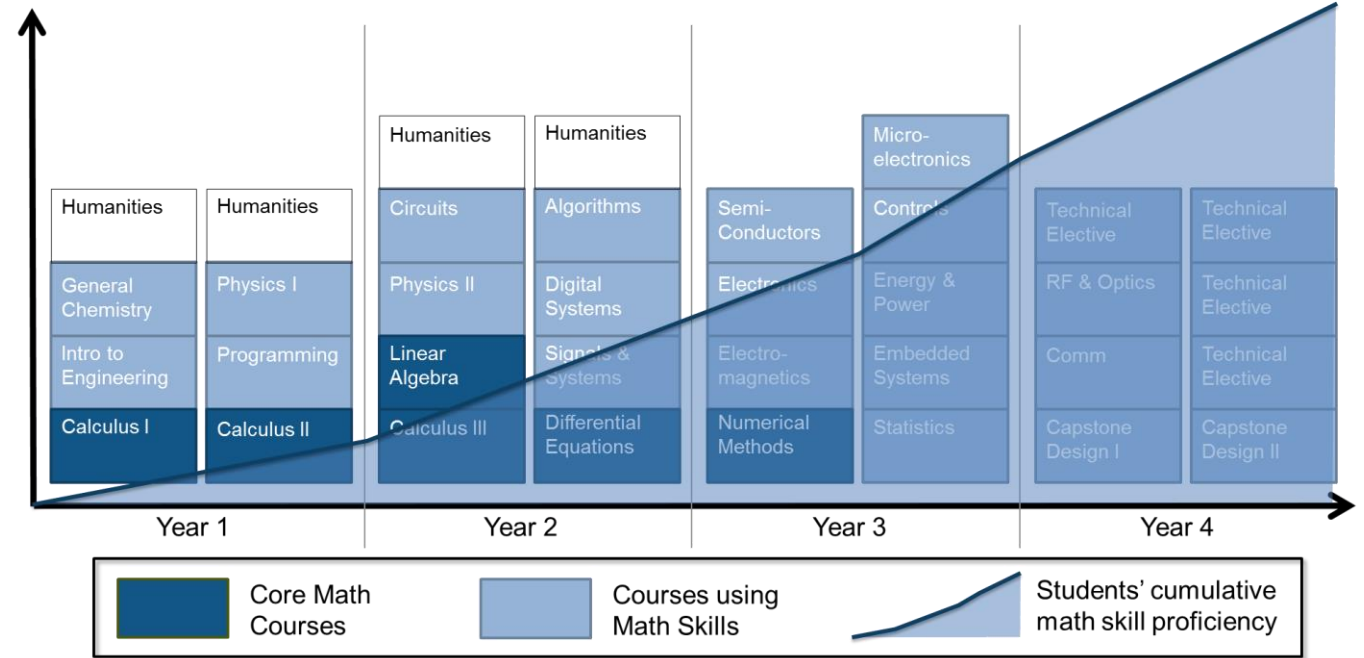
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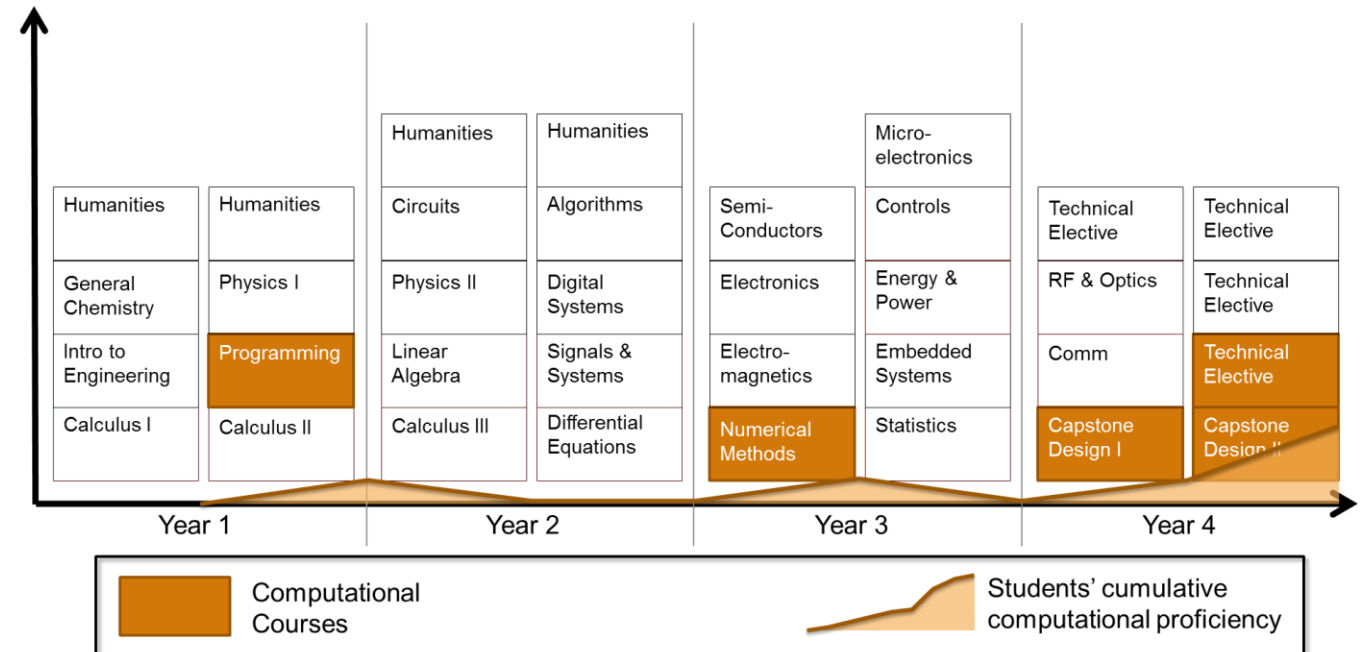
Math Skills

Isn't math taught systematically and reinforced throughout the curriculum?

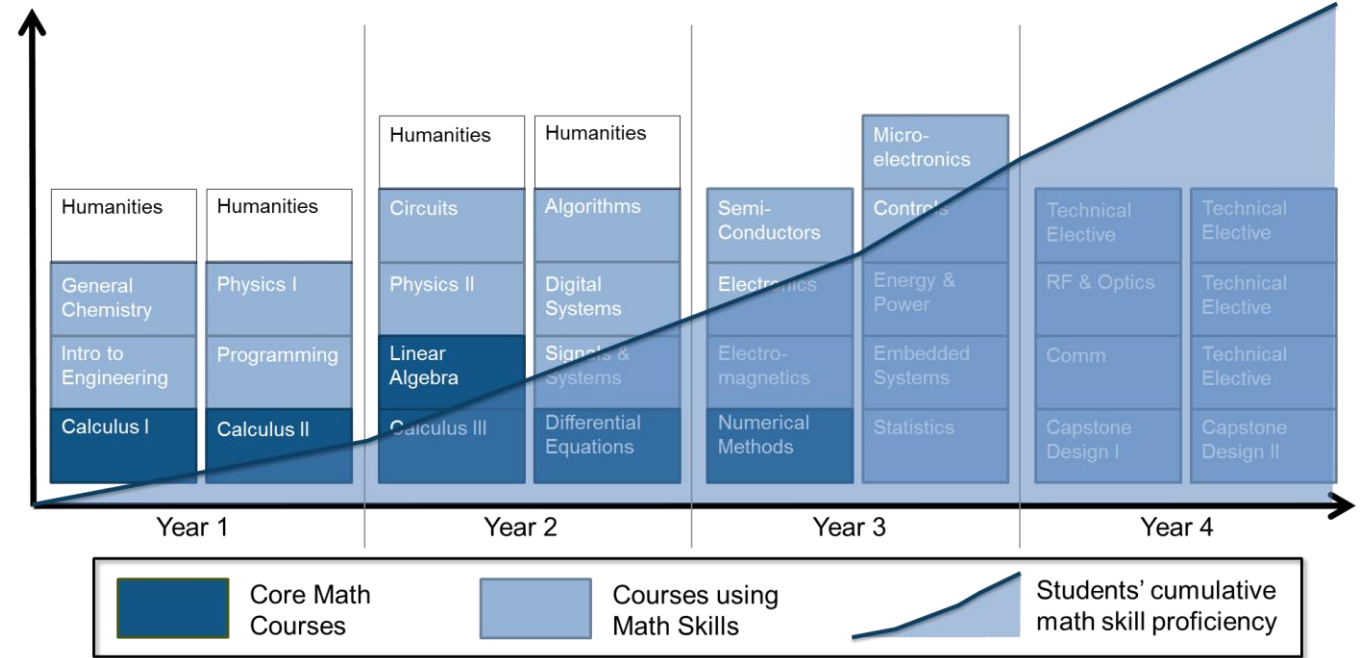
How Math is introduced in the curriculum



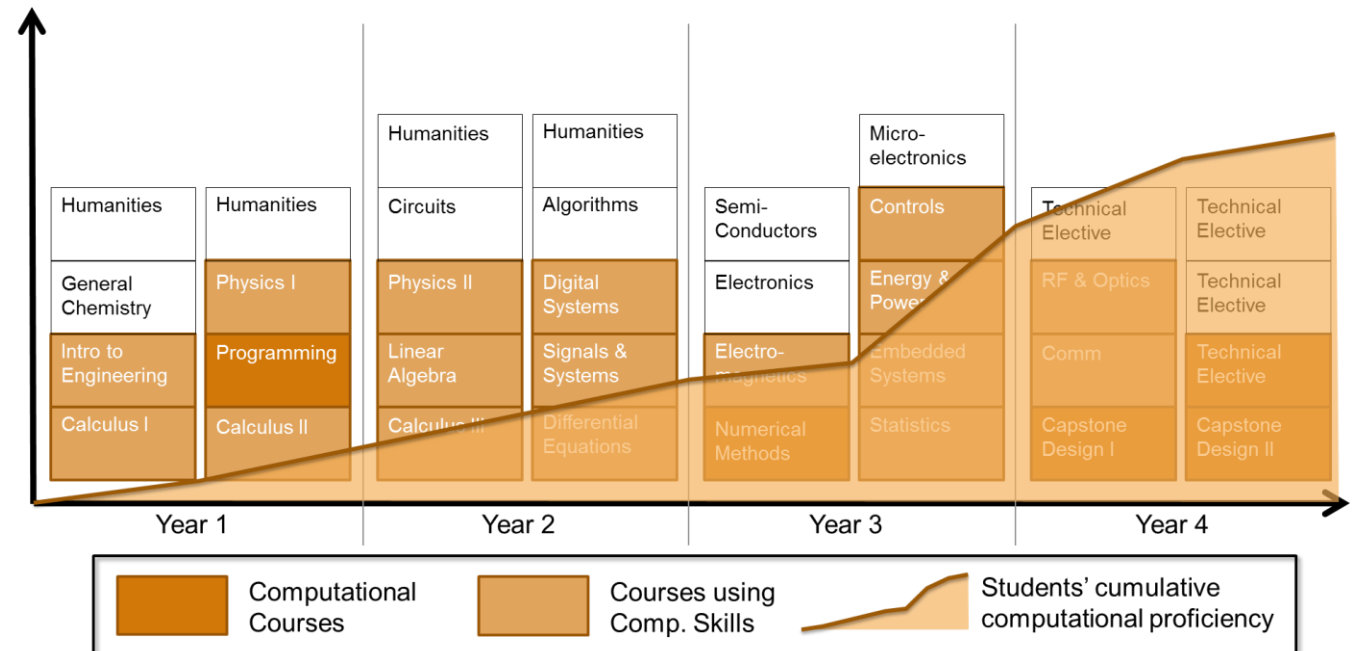
How is Computational Thinking introduced?



How Math is introduced in the curriculum

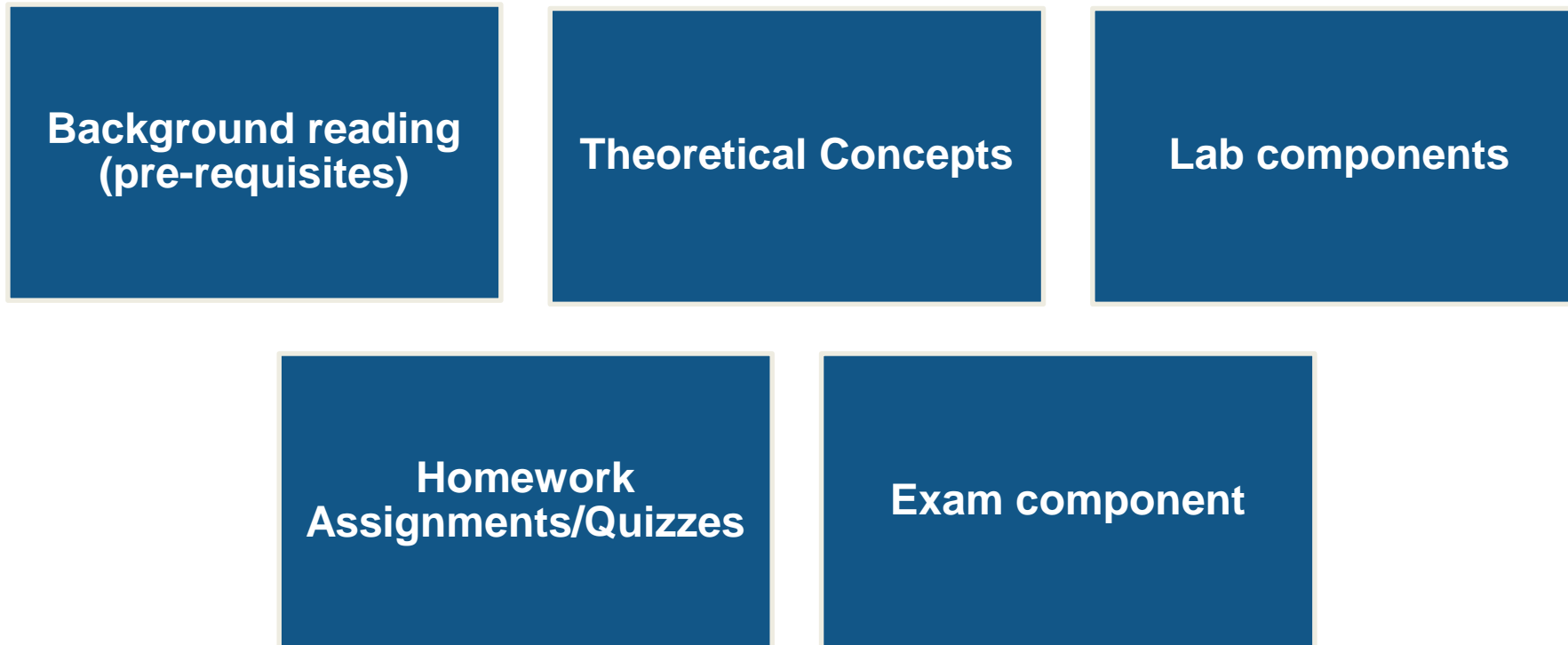


Should Computational Thinking be built up like we introduce Math?



Course Implementation Plan

Components of a course



What components can benefit from the use of a computational tool?

Course Implementation Plan

Course Component	Resources and Tools
Background reading (pre-requisites)	<ul style="list-style-type: none"> • MATLAB Academy – Tool knowledge • Examples and apps illustrating concepts
Theoretical Concepts	<ul style="list-style-type: none"> • Examples and apps to illustrate concepts to facilitate better understanding <p style="text-align: right;"><i>(not a replacement for teaching concepts)</i></p>
Lab Components	<ul style="list-style-type: none"> • Examples, apps, hardware connectivity based exercises
Homework Assignments and Quizzes	<ul style="list-style-type: none"> • Cody Coursework
Exam and Design Projects	<ul style="list-style-type: none"> • Cody Coursework for exams • MATLAB for project design and implementation • Interactive Live Editor & Publish Functionality for project reports

Thank You!