

# Past and future of deal.II

Wolfgang Bangerth

Department of Mathematics  
Colorado State University

# The history of deal.II

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**Nothing was planned.**

**The dudes who started it had not the first idea.**

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The dudes who started it had not the first idea.

## Originally:

- deal.II was a project for Ralf Hartmann, Guido Kanschat, and myself
- We wanted to have a flexible tool for numerical methods research
- We put it on a website “because we could” in 2000

# **The history of deal.II**

**In reality, deal.II is a garage project.**

**Nothing was planned.**

**The dudes who started it had not the first idea.**

**But it works. And we figured a few things  
out along the way.**

# The history of deal.II

**Truth 1:** It's a vibrant project

# The history of deal.II

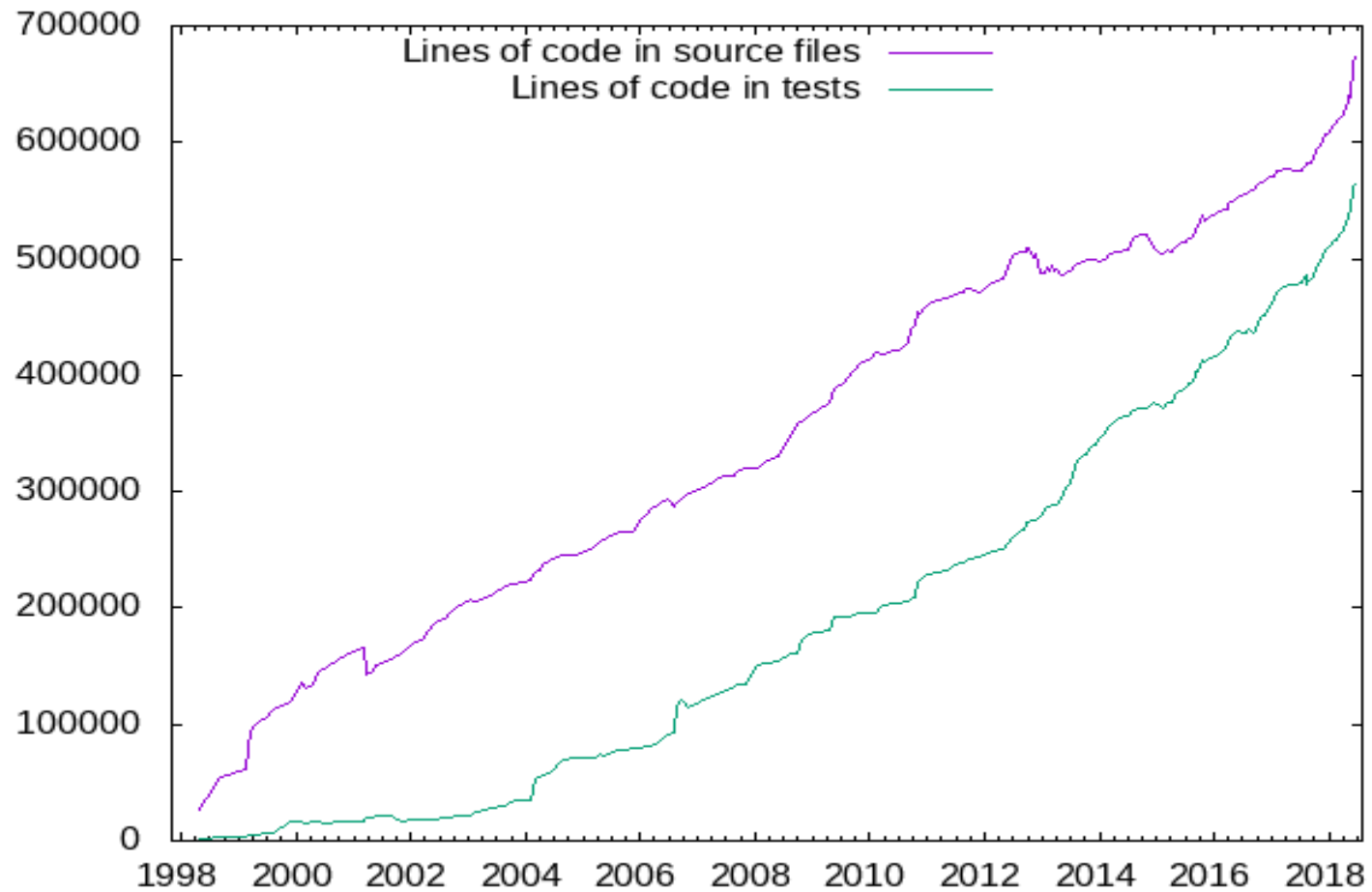
**Truth 1:** It's a vibrant project

This is the sixth *deal.II* user and developer workshop

- 2006 → 2010 → 2012 → 2013 → 2015 → 2018
- # of people on the mailing list at these times:  
80 → 260 → 365 → 219 → 540 → 993
- # of contributors:  
15 → 40 → 100 → 110 → 120 → 192

# The history of deal.II

**Truth 1: It's a vibrant project**



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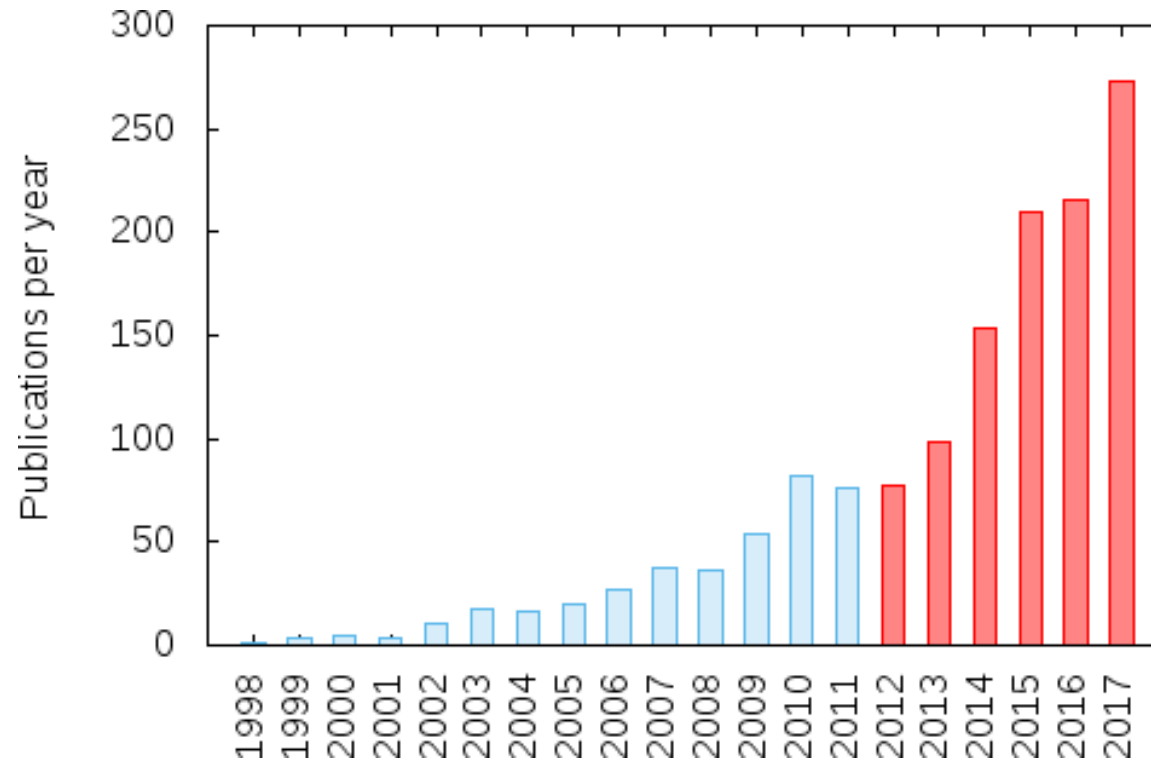
There is a constant stream of new, major features:

- Manifold descriptions
- Support for CAD geometries
- Parallelization improvements
- Configuration management
- Many new tutorial programs
- New finite elements
- ...



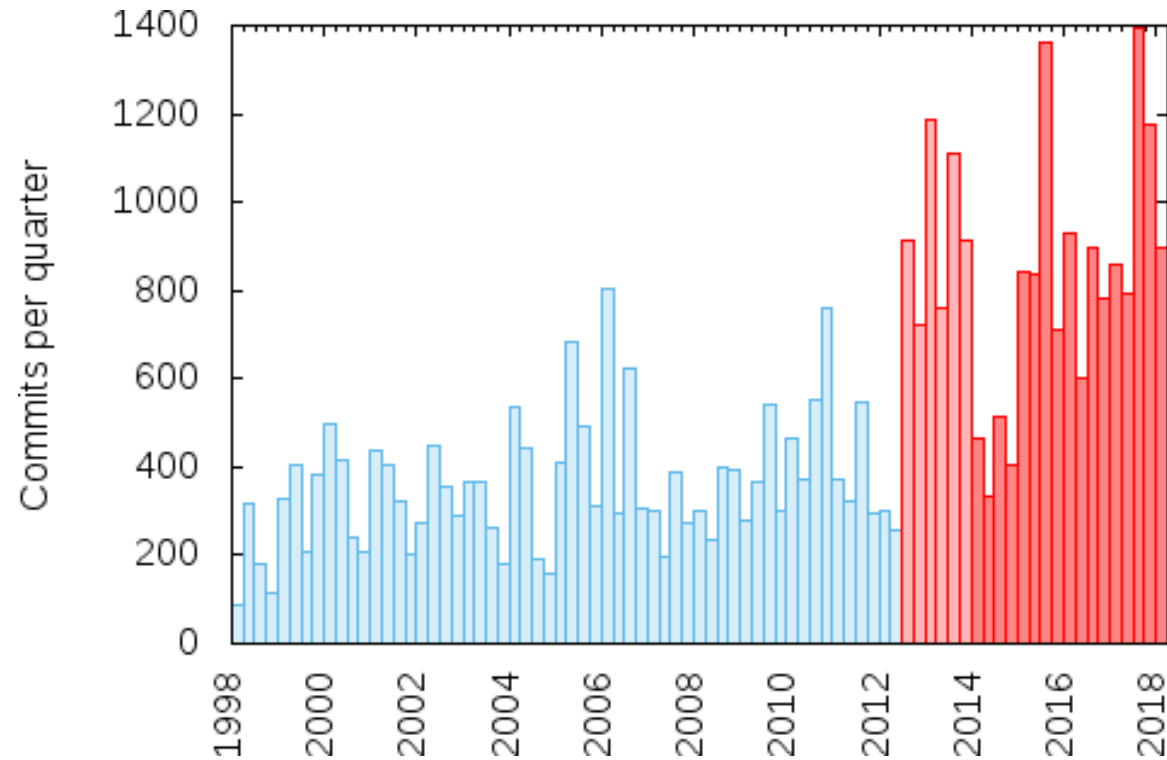
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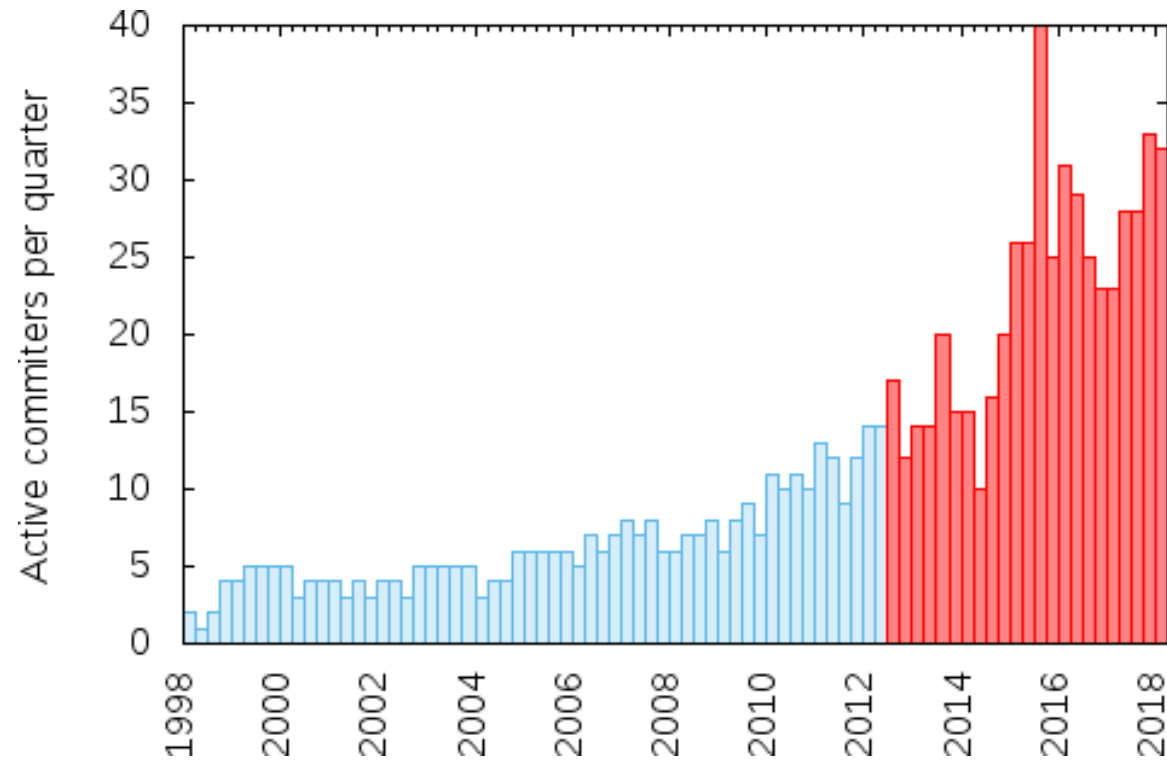
# The history of deal.II

**Truth 1: It's a vibrant project**



# The history of deal.II

**Truth 1: It's a vibrant project**



# The history of deal.II

**Truth 2:** We've learned a few (technical) lessons.

- Managed continuous growth: 2,500 lines per month + tests
- Our code is modular:
  - users don't need to know internals of deal.II
  - developers don't need to know all of the library
- Reasonable documentation:
  - doxygen modules
  - tutorial programs
- We have a pretty good testsuite: ~10,000 tests run after each change
- **But:** Library has become a big piece of code – there is nobody any more who still knows everything

# The history of deal.II

**Truth 3:** We've learned a few social lessons.

- We have attracted many more developers!
- We now have a significant group of dedicated and highly active developer/maintainers:
  - we have redundancy
  - we have diverse expertise
  - they all seem to benefit professionally from this work
- We seem to have developed good strategies for teaching

# The history of deal.II

**Truth 3:** We've learned a few social lessons.

## But there are also challenges:

- A lot more users
  - many more help requests than in the early years
  - but also more people who help with questions
  - searchable forum seems to help
- Nobody knows everything about everything any more
  - nobody can answer all questions
- Interfaces to many more external packages
  - much more complicated interactions
- A lot more actual and potential contributors
- Original developers have less time

## deal.II as a “social project”

deal.II is a project with a “community” that consists of groups

- Library maintainers (“principal developers”)
- Other developers and contributors
- Users
- With every collection of groups, there are problems that we need to work on.

## deal.II as a “social project”

**For example:** Principal developers vs other contributors

- How can we attract more contributors?
- Are we encouraging enough in our attempts?
- Can we make the “bar to entry” low enough?
- Do we give adequate credit to contributors?
  
- How do we ensure the long-term quality of deal.II?
  - Do even first time contributors have to write testcases?
  - How about documentation?
  - How can we enforce our coding styles?
  - Should we accept *every* contribution?



## deal.II as a “social project”

**For example:** Developers vs users

- How can we organize answering mails on the mailing list?
  - Can we organize it more equitably?
  - Can we ensure adequate response times?
  - Can we think of better ways of documenting stuff so that people can find them?
- 
- How can we entice users to become contributors?
  - How can we get users to work together on projects?
  - How can we ensure that people get credit for their work?

# deal.II as a “social project”

**Also:** How do we ensure that future development is financially supported?

## **Rationale:**

- Most researchers are funded for (i) teaching, (ii) work on specific projects, (iii) research as part of their regular job duties.
- They are evaluated based on “research output”

In order to spend time on deal.II, we need to make sure that deal.II is part of their funded projects.

## **Good news:**

- A number of funding agencies do support our work.

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## Good news:

- A number of funding agencies do support our work.
- The US National Science Foundation last week promised Timo Heister and myself \$1.7M !

# What we're here for this week

- Hear about what deal.II is used for
- Make connections
- Hear about what's new in deal.II
- Get to know each other: people who know each other work better together
- Hatch plans for deal.II
- Figure out how to make the “social project” deal.II work better
- Become a contributor yourself!

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**People who know each other work better together:**

- Know each other's opinions
- Don't need to write long emails
- Know about resources others might provide
- Don't as easily misunderstand each other
- Can pro-actively adjust what they do to the other person's taste

# What we're here for this week

## Working on common projects is more fun:

- Someone else may already have part of what you need
- Maybe we can come up with things deal.II could use and that already exist in application code
- Discuss the big things we want in deal.II in the future
- Who can help implement these things?

**For now:**

**Make friends,  
contribute to the code**