

# On The Evolution Of User Support Topics in Computational Science and Engineering Software



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## Motivation

- How does the nature of user support emails change over time?
- Is 'better' documentation sufficient for replacing email support?
- Impact of new hardware architectures and programming models?

## Scope of Study

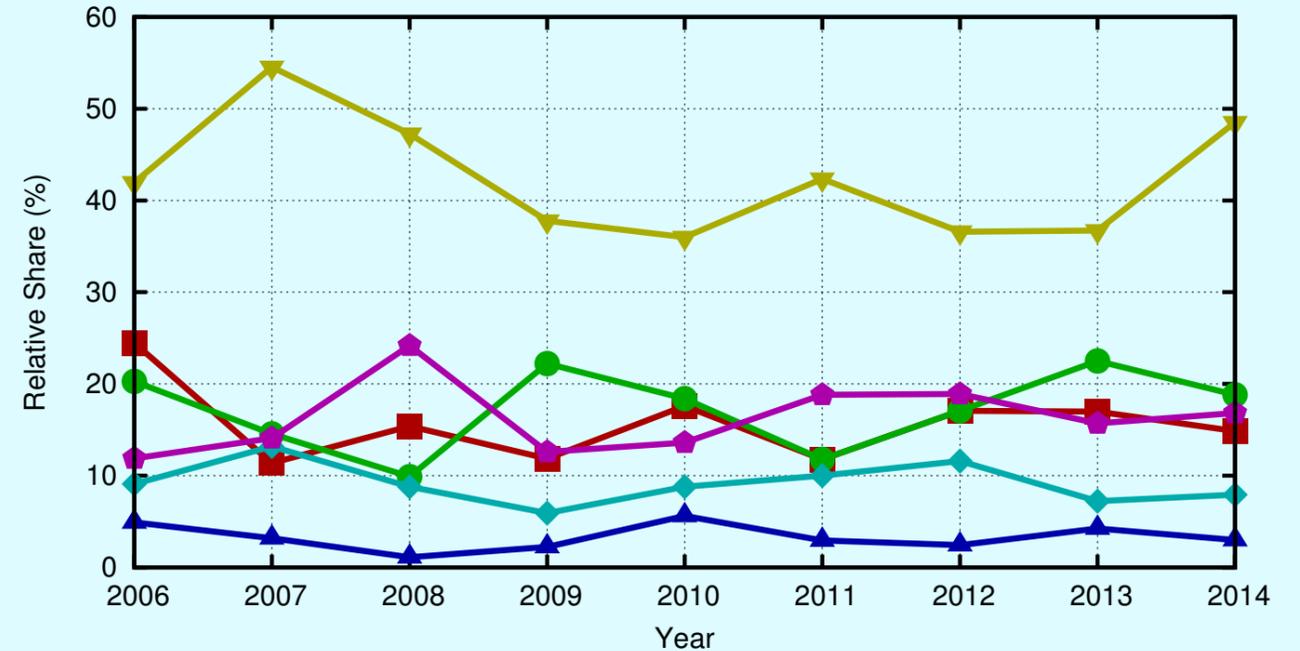
- Categorization of PETSc support email threads since 2006.
- Public mailing list considered: *petsc-users*.
- Mailing lists not considered: *petsc-dev*, *petsc-maint*.

## Email Volume

- Year 2006: 904 emails total.
- Year 2014: 3947 emails total.
- Each email thread assigned to at least one category.

## Email Categorization Results

- **Algorithms:** In-depth discussions and general advice on the best mathematical approaches for setting up a solver for a given problem.
- **Beginner:** Short questions related to documented functionality or on how to deal with basic operations for distributed parallel systems in general.
- **Bug:** Bug reports by users on either the release version of PETSc or new functionality which has not been officially released yet.
- **Features:** Discussions about whether PETSc provides a certain feature, about future directions, or about better explanation of existing features from a user's perspective.
- **Performance:** Email communication about potential performance enhancements for a given machine or hardware architecture. In contrast to the *Algorithmic* section, the user is primarily interested in reducing execution times for an existing solver setup rather than the design of new types of solvers for the problem at hand.
- **Runtime Errors:** Discussions triggered by runtime errors. These may be due to errors in user code such as memory corruption, invalid use of functionality provided by PETSc, or missing functionality in PETSc.



## Conclusions

- No significant change of user support topics from 2006-2014.
- No increase in performance-related emails.
- Involvement of core developers **essential**.
- At least half of all email threads require core developers to be involved.
- 'Better' documentation will **not** reduce support email load considerably.
- Growth of user base does not change nature of support emails.

## Acknowledgment

- DoE ASCR SciDAC Project - Frameworks, Algorithms, and Scalable Technologies (FASTMath).
- Austrian Science Fund (FWF), Grant P23598

## References

- W. Bangerth and T. Heister. What Makes Computational Open Source Software Libraries Successful? *Comput. Sci. & Disc.*, 6:015010/118, 2013.
- M. J. Turk. Scaling a Code in the Human Dimension. *Proc. XSEDE'13*, 2013. doi:10.1145/2484762.2484782

## Whitepaper

- Online: <http://arxiv.org/abs/1510.01122>
- Scan QR code for direct access

