# THE EVOLUTION OF THE DOOCS C++ CODE BASE

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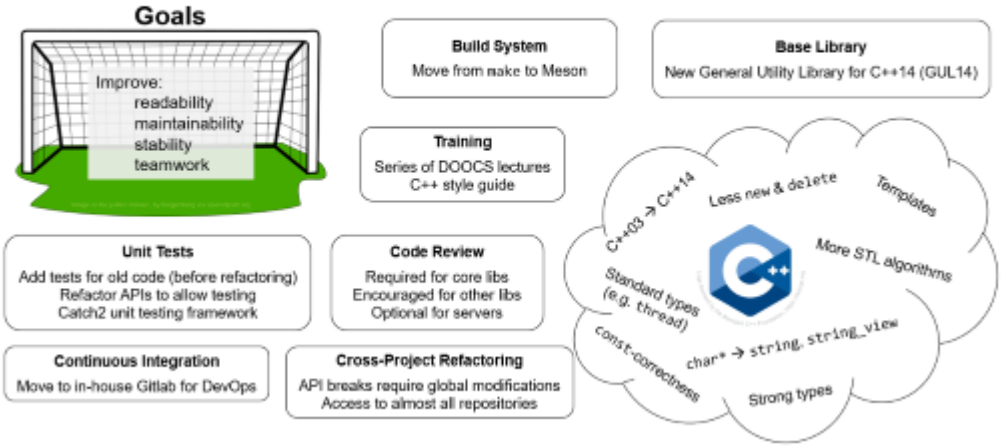
## Modernization of Code and Development Techniques

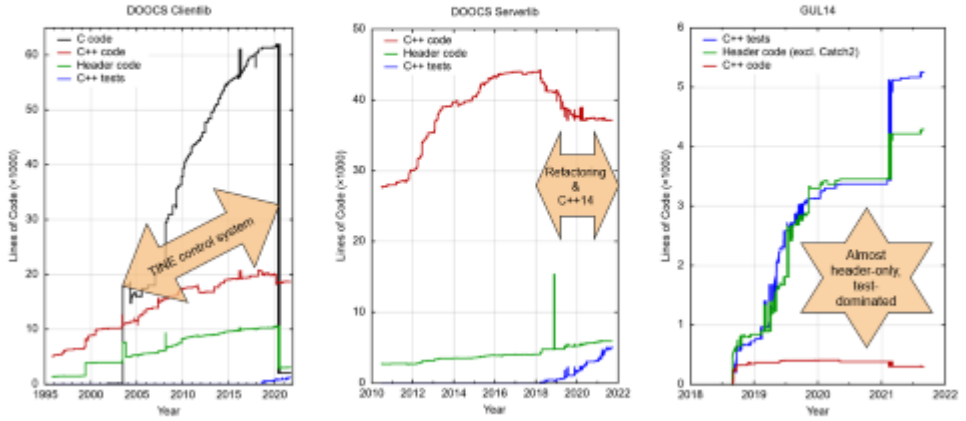
Preparing DOOCS for future projects






## Lines of Code in the Core DOOCS Libraries

... excluding comments or blank lines






## GUL14

General Utility Library for C++14

Base library (think Abseil [Google] or Folly [Facebook], but smaller)

Open source (LGPLv2.1, https://winweb.desy.de/mcs/docs/gul/)

Multi-platform: Linux, MacOS, Windows

Code of wide applicability

No external dependencies except C++/C standard libraries

No control system specific code

Quality standards:

- Style: Code must follow our C++ style guide and should follow the C++ Core Guidelines
- Documentation: Every function, type, etc. must be documented
- Unit tests: Every entity in the library must have associated tests
- Code review: Every commit must be approved by at least one other developer




## DOOCS Fact Sheet

Some facts and figures around the control system

1992: DOOCS is born as a control solution for vacuum devices for superconducting cavity test stands at what will become the Tesla Test Facility TTF. It soon gets ported the HERA proton storage ring.

In the '90s, object-oriented programming becomes a hot trend in software development. DOOCS stands for "Distributed Object-Oriented Control System". To efficiently control hardware and use high-level abstractions, C++ is the natural choice.

DOOCS is built around the SunRPC/ONC RPC remote procedure call which is better known as the protocol behind the network file system NFS.

Today, DOOCS is used at the particle accelerators ARES, European XFEL, FLASH, PETRA III, and numerous smaller facilities at DESY. There are a few external users as well.


3 core libraries: GUL14, clientlib, serverlib

~100 other libraries: hardware support, DAQ, databases, high-level controls, particle tracking, ...

~500 server types: connect hardware devices, process&archive data, run feedback loops, evaluate data, execute advanced algorithms

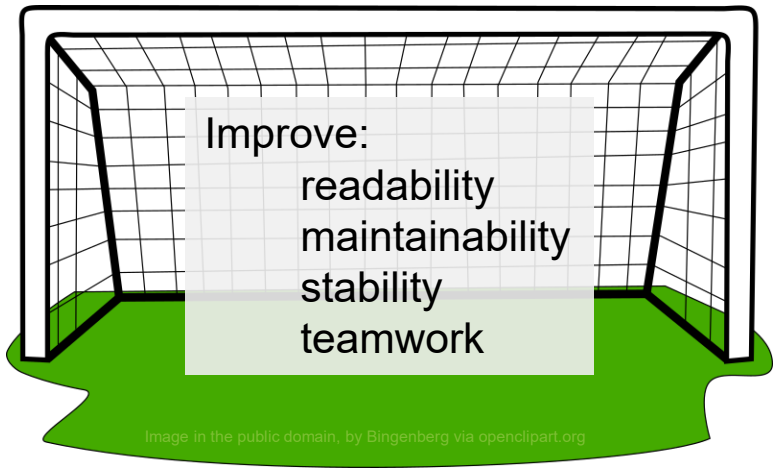
~8000 C++ source files

~1.5 million lines of code

# Modernization of Code and Development Techniques

## Preparing DOOCS for future projects

### Goals




**Build System**

Move from `make` to Meson

**Base Library**

New General Utility Library for C++14 (GUL14)

**Training**

Series of DOOCS lectures
C++ style guide

**Unit Tests**

Add tests for old code (before refactoring)
Refactor APIs to allow testing
Catch2 unit testing framework

**Code Review**

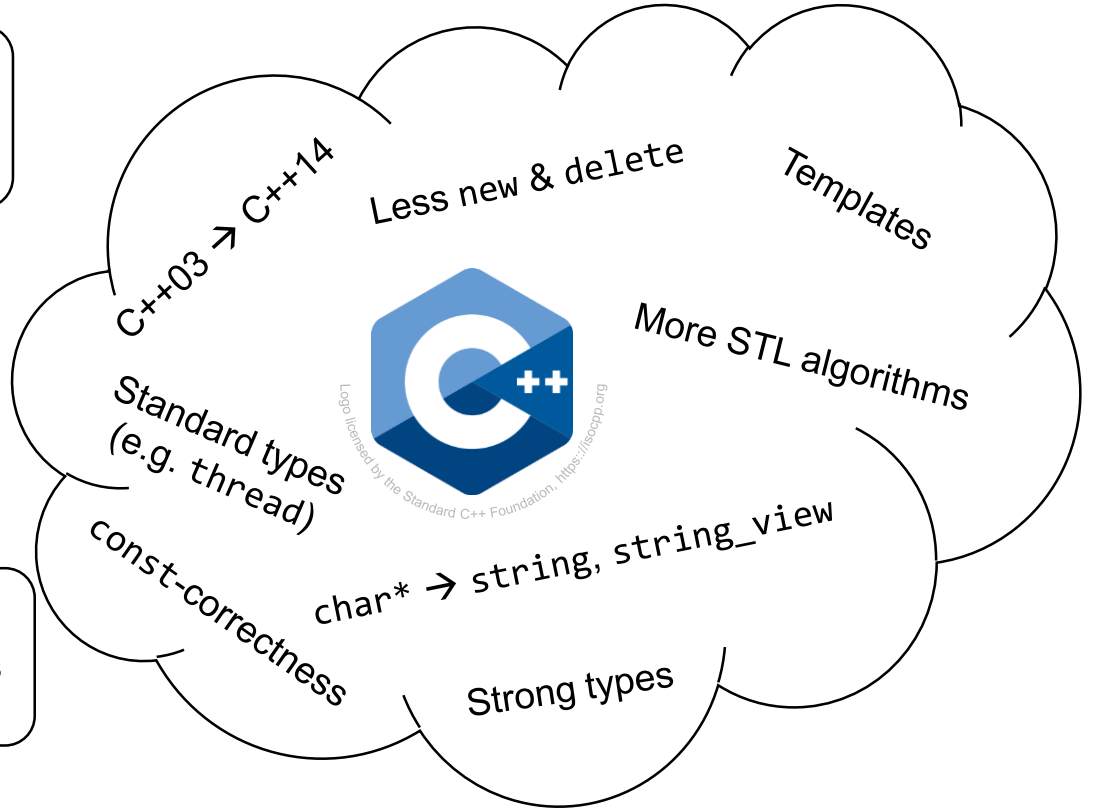
Required for core libs
Encouraged for other libs
Optional for servers

**Continuous Integration**

Move to in-house Gitlab for DevOps

**Cross-Project Refactoring**

API breaks require global modifications
Access to almost all repositories



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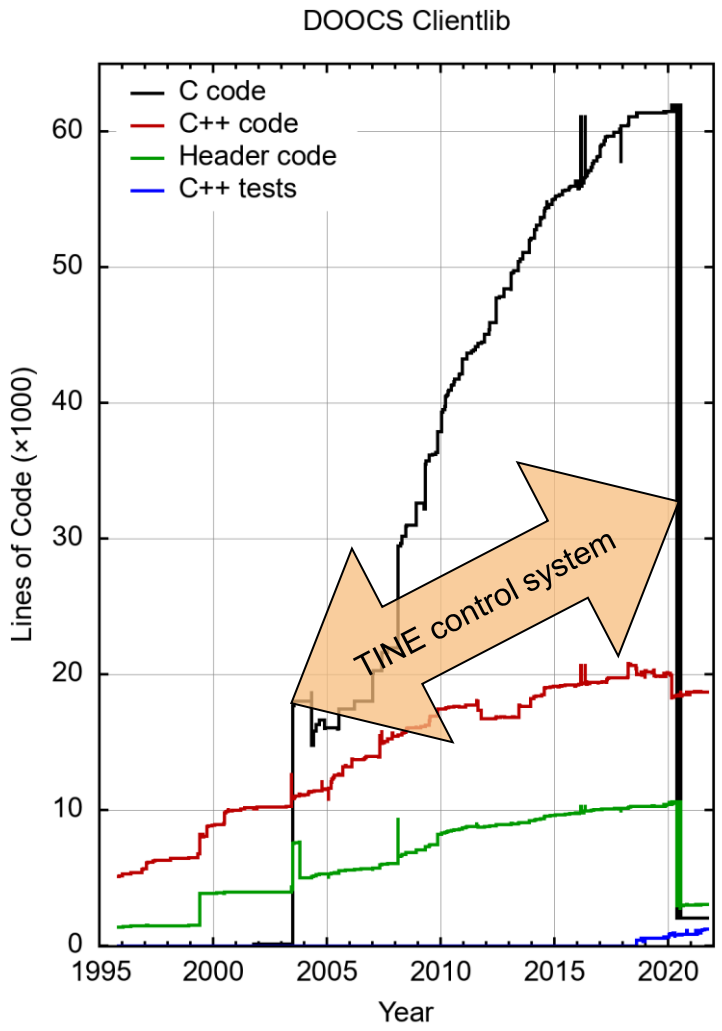


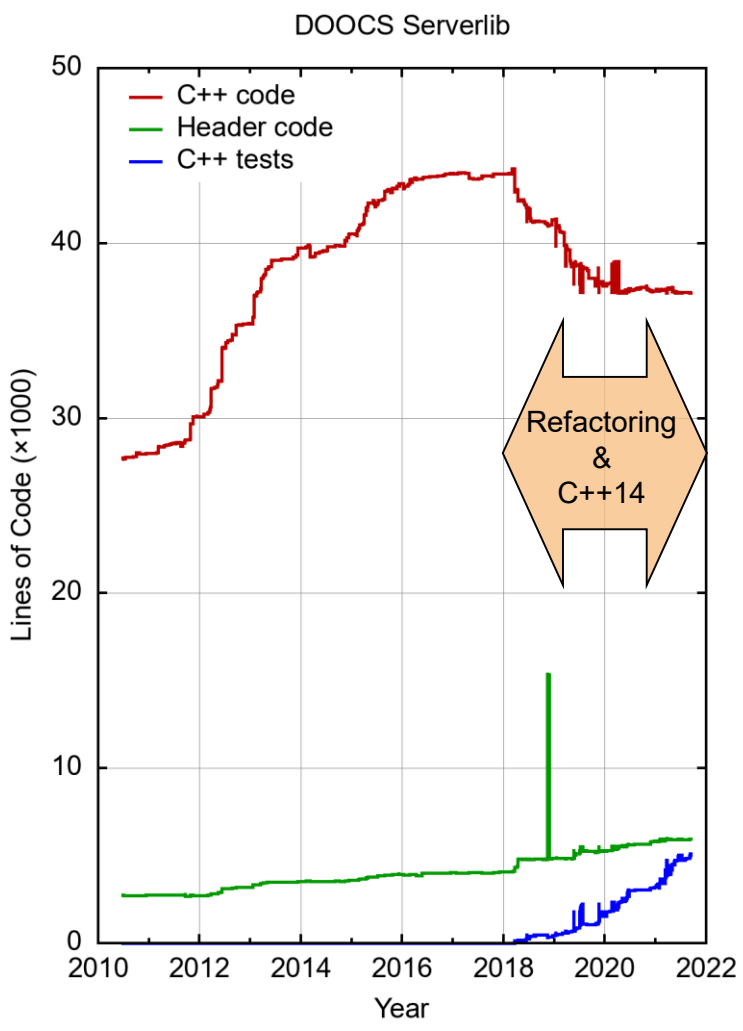


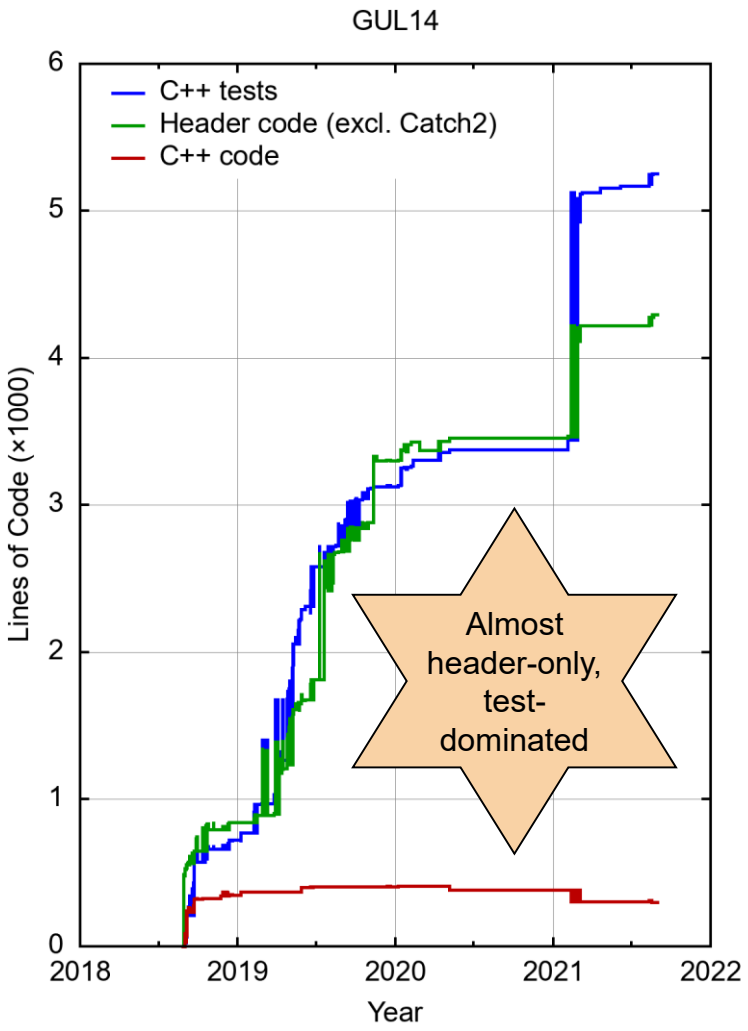

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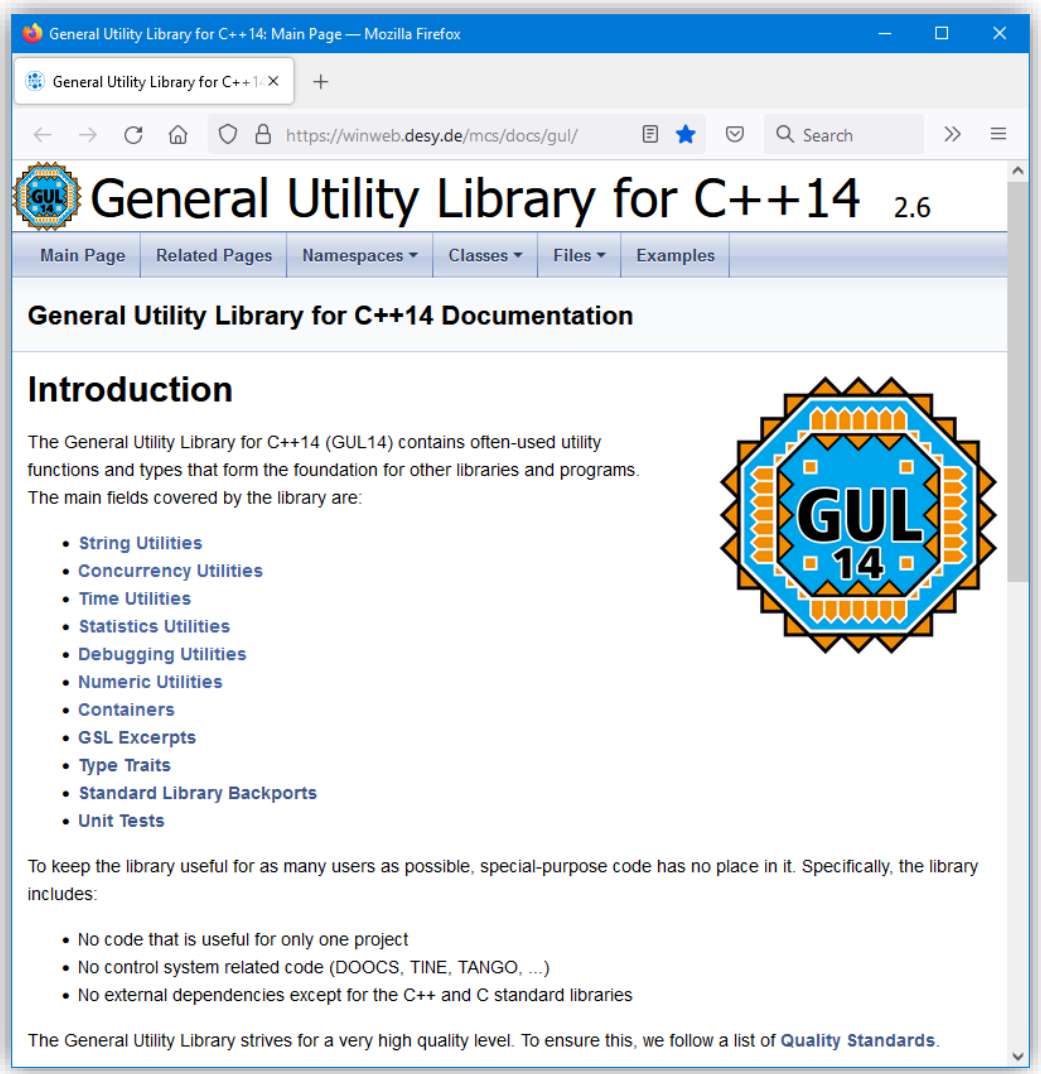

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