Environment for structured mathematical proofs

Mathematical proofs are hard to write. Either one writes too many details, and no-one will want to read the proof. Or one writes too little, and details in the proof will be wrong. And if a bug is found, how does one correct it? Republishes the whole proof? Can bugs in proofs be fixed by others (as a kind of pull request for mathematical proof steps). Can we track dependencies between proofs. Etc. Etc.

To support better mathematical proof writing, I would like to have an environment (consisting of a suitable data format, a storage backend, as well as tools for editing, managing, analysing) for writing (human-readable) mathematical proofs. In its simplest form, a proof would be a hierarchical document with rough proof steps at the top level, and more and more refined proofs steps below that.

The software project would be to design (the basics of) such an environment.

Features (ideally):

- A data format for hierarchical proofs (based on XML, YAML, set of files, …?)
- A backend for storing them (a git repository might already do the trick, possibly)
- Support for editing proofs (in LaTeX, preferably)
- Support for viewing proofs (in the web browser)
- Support for exporting proofs (as noninteractive document, e.g., PDF)
- Infrastructure for feedback / corrections / linking to other proofs etc.
- Analysis (e.g., dependency analysis, what breaks if a proof step is wrong, …)
- Refactoring (changing the syntax of a symbol, for example)
- Theorem prover support (for the most detailed level of proof steps)

Of course, this is a list of features for a long-term project. Within the software project, only the most basic features would be covered.

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