“There is no code so big, twisted, or complex that maintenance can't make it worse.”

- Gerald M. Weinberg
Software Maintenance

- **Anti-Patterns:**
  - Informal bug tracking
  - Not allocating post-release staffing
    - Bad prior release distracts team
  - Not paying off technical debt

- **Code maintenance during and after development**
  - You need a process to identify bugs and track to resolution
  - Most software is an update, not a clean-slate project
  - Ongoing effort is required to repay “technical debt”
Managing Bugs

- Map reported issue to an actual bug
  - L1/L2/L3 support to capture bug report
  - Sorting out duplicate reports takes effort
- Prioritize the bug fix (e.g., risk table)
  - Combination of frequency, business cost
- Find someone with right skills to fix it
  - Does this derail new development tasks?
  - Quick and dirty? Or a solid re-engineer fix?
- Validate the fix
  - Did you inject a new fault with the fix?
- Package the fix and deploy it
  - Hot patch? Defer to future schedule release?

- Risk table example:
  - High consequence defect
  - With low probability of occurrence
  ➔ Medium risk / medium priority bug
Most SW work is on existing code, not a clean slate
- “Clean slate” often works with COTS components

60/60 rule [Glass, IEEE Software May 2001]
- Maintenance can average 60% of lifecycle cost
- About 60% of maintenance is adding new features

Maintenance is harder than development
- Need to understand existing system
  - Motivation for keeping entire V document chain up to date
  - Optimized code is more painful to maintain
- Need to modify system without breaking things
  - Complete rewrite usually impractical – and might be worse

Maintenance Matters Most
Technical debt: messy code/design/architecture that hasn’t been cleaned up

- Some signs of debt:
  - Degraded code quality (spaghetti code, globals, warnings, ...)
  - Skipped process steps (missing peer reviews, unit tests, ...)
  - High fault reinjection ratio (new bugs when fixing old bugs)
- You incur debt by taking a shortcut
  - Short-term debt can be useful (e.g., meet a deadline)
- Repay debt by refactoring the system

Technical debt incurs interest

- Shortcuts often lead to bugs, fragility
- Accumulated debt becomes unsustainable

Use the right amount of debt

- It’s like using a credit card responsibly
- Devote part of each development cycle to repaying technical debt
Best Practices for Maintenance

**Most development is maintenance**
- Plan for and staff maintenance
  - Most development is on the next revision
  - Plan for high priority emergency fixes
- Keep up with technical debt payments

**Maintenance pitfalls**
- Not allocating time for bugs, maintenance & technical debt
  - For example, need perhaps 10% budget for technical debt repayment
  - Leave slack in deadlines for fixing urgent previous-version bugs
- Evaluating programmers only for clean-sheet development skills

https://goo.gl/DDZfCy
CHANGES IN VERSION 10.17:
THE CPU NO LONGER OVERHEATS WHEN YOU HOLD DOWN SPACEBAR.

COMMENTS:

**LONGTIMEUser4 writes:**
This update broke my workflow! My control key is hard to reach, so I hold spacebar instead, and I configured Emacs to interpret a rapid temperature rise as "control".

**ADMIN writes:**
That’s horrifying.

**LONGTIMEUser4 writes:**
Look, my setup works for me. Just add an option to reenable spacebar heating.

EVERY CHANGE BREAKS SOMONE'S WORKFLOW.

THINGS I ACTUALLY WANT TO USE MY COMPUTER FOR:

EVERY NOW AND THEN I REALIZE I'M MAINTAINING A HUGE CHAIN OF TECHNOLOGY SOLELY TO SUPPORT ITSELF.

https://xkcd.com/1172/

https://xkcd.com/1579/