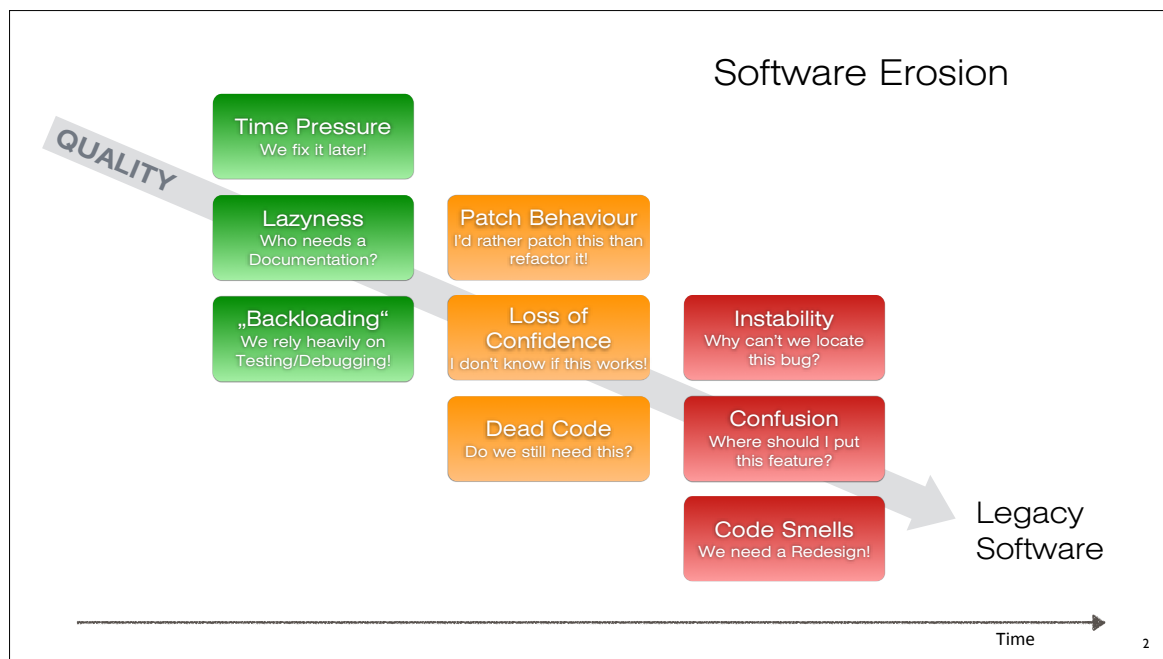


# Legacy Embedded Software

How to deal with existing product software

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## Challenges

**Insufficient architecture**  
**Outdated documentation**  
**No specification**

**Developers have left company**  
**Poor documentation**

**Incomplete test cases**  
**Discontinued hardware**

**Implicit architecture**

**New requirements**



## Consequences

- Lower Maintainability
- Higher development costs
- Test efforts increase
- Longer development cycles
- Rising project risks
- Decreasing product quality

## Strategies

	No Change	Refactoring	Redesign
Costs	○	○	-
Time	○	+	-
Risks	--	○	○
Flexibility	-	++	+
Maintainability	--	○	++

Re-Structuring      Redevelopment

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## Strategy Criteria

Software quality, esp.

- Modifiability
- Analyzability
- Testability

Software complexity

Quality of existing documentation

Knowledge about architecture

Product life cycle / new products

Management attention/support

Time & Budget



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## How to Proceed

### Analyze

- ▶ Architecture
- ▶ Code quality
- ▶ Documentation
- ▶ Requirements
- ▶ Test cases
- ▶ Product roadmap

### Plan

- ▶ Choose strategy
- ▶ Develop action plan
- ▶ Get management on board
- ▶ Allocate budget
- ▶ Allocate time

### Refactor

- ▶ Develop tests
- ▶ Design architecture
- ▶ Refactor code
- ▶ New requirement
  - Refactor first
  - Add feature

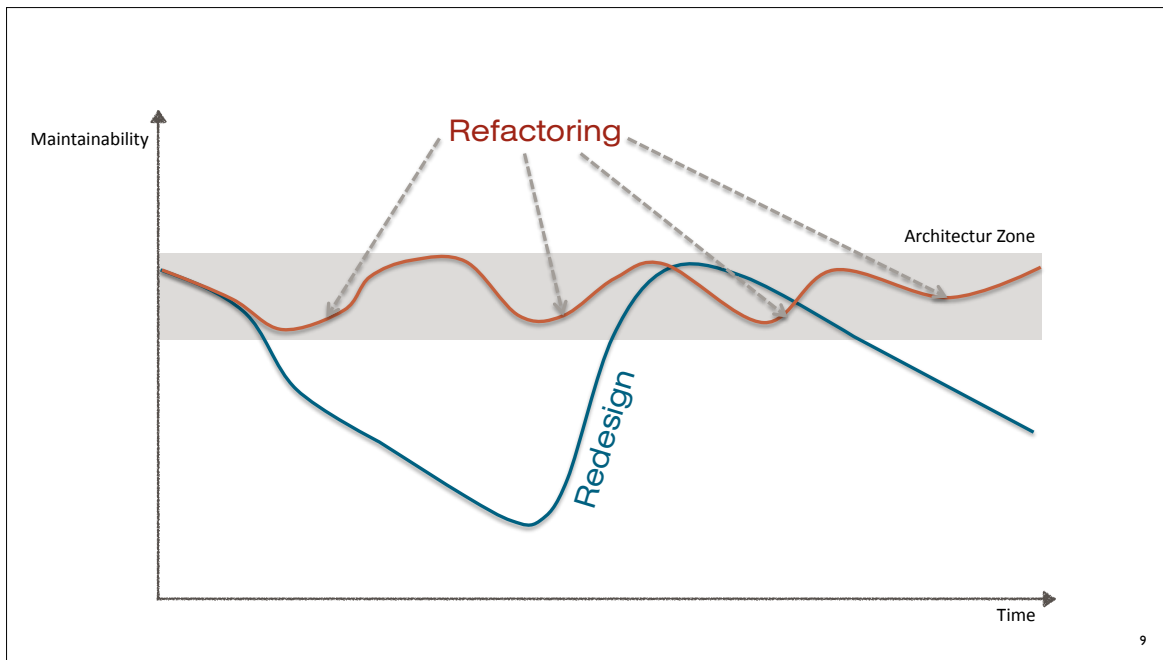
### Redesign

- ▶ Refine/rework requirements
- ▶ Design architecture
- ▶ Analyze existing code for reusability
- ▶ Develop & test

Optimized Software

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## Maintain Software Quality

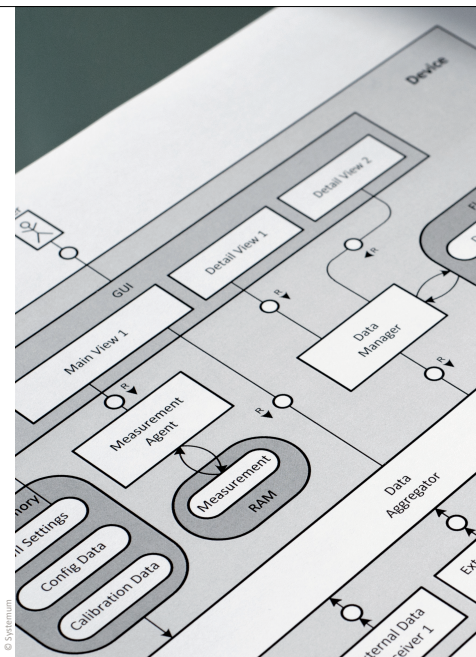
**Architecture:** Documented + Maintained

**Documentation:** Useful + Up-to-date

**Tooling:** Supporting + Easy-to-use

**QA:** Frequent Reviews + Early Testing

**Management Support:** Time & Budget for constant Refactoring and Improvement



## Summary

- ▶ Embedded Software is different to business software.
- ▶ Software architecture tends to erode over time.
- ▶ Developers know when it is time to modernize.
- ▶ Strategy selection has to be done wisely.
- ▶ Modernization needs proper planning, time and budget.
- ▶ Full management support is mandatory.
- ▶ Improve software engineering procedures.
- ▶ Refactor constantly.
- ▶ Avoid software erosion in the future. **Don't let your software become legacy again.**

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