



eXtreme Programming (XP)

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Changes and SW development

Among the agile principles:

- **Welcome changing requirements**, even late in development. Agile processes harness change for the **customer's competitive advantage**

Easy to say, but ...

Developers hate changes

They know that making changes can cause the introduction of bugs. The more changes you make the more **brittle the codebase gets**. Imagine what can happen with **frequent changes**.

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Supporting changes in XP

XP practices

To support changes XP proposes the adoption of a set of practices for SW development, that are organized in 4 disjoint groups:

- Programming
- Integration
- Planning
- Team

Programming Practices

Test first programming

- Tests are written **before the code**
- Code is **built to pass the tests**
- **Automated testing frameworks** are adopted (JUnit)
- Tests are run **every time** the code is built
- Tests are **part of the codebase**

Pair programming

- Two programmers sits together at the workstation
- One of the programmer writes the code, and the other observes. Nevertheless **they constantly discuss what to write.**
- Effects:
 - reduced risks of **shortcuts**
 - **more innovative code**
 - continuous review of code

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Programming Practices

Incremental design

- cost of large-scale design changes rise dramatically over time
- most economical cost design strategy is to **make big design decisions early** and defer all small-scale decisions until later

XP teams are confident in their **ability to adapt the design** to future requirements. The advice to XP teams is not to minimize design investment over the short run, but to **keep the design investment in proportion to the needs of the system** so far. Incremental design suggests that **the most effective time to design is in the light of experience**

Eliminate duplication. If you have the same login in two places you must work with design to understand how you can have only one copy.

Integration Practices

10-minute build

- under 10 minutes build for the whole codebase
 - The build includes all the unit tests and generates a **report with pass/fail results**

continuous integration

- use a server to permit to people to share the codebase and to work in parallel
- use check-out to create local copies and make commits for working copies
- check-out often and run tests before committing
- a **build token** can be used to pass the right to integrate and reduce the risks known as “integration hell”

Planning Practices

Only software in *status done done* is delivered

Weekly cycle

- **one-week iterations**
 - start with a planning meeting where **together with the customers** the team selects the stories for the iteration, and **split them in tasks**
 - each developer then select a story and develop tests for the story and tasks
 - then the developer write the code

Stories

- **Stories** are the main tool to **identify needs** and to consequently drive the work

Planning Practices

Quarterly cycle

XP teams use quarterly cycle practice to do **long-term planning**.

- the team **discuss themes** to put together stories and to identify missing ones
- the team **reflects on the progress made** and on how the project is going overall

Slack

- Add **minor lower-priority stories** to each weekly cycle

Team Practices

Sit together

Face to face interactions are fundamental for the health of the project. **Programming is a highly social activity**. Organize the workspace to suite private reflection and joint work.

Informative workspace

- team working environment is set up **to automatically communicate important project information to anyone** in the project
- **information radiators** and **osmotic communication**

Team Practices

Energized work

- establish an environment where every team member is given **enough time and freedom to do the job**
- **avoid continuous distraction, and avoid unjustified pressure**
- work only as many hours as you can be productive
- work only as many hours as you can sustain

Whole team

- All the contributors to an XP project sit together, **members of one team**
- Everyone on an XP team contributes in **any way that they can**. The best teams have **no specialists**, only general contributors with special skills.

XP values

XP additional values

- **Communication:** each team member is aware of the work everyone else is doing
- **Simplicity:** developers focus on writing the most simple and direct solutions possible
- **Feedback:** constant tests and feedback loops keep the quality of the product in check
- **Courage:** each team member is focused on making the best choice for the project, even if it means having to discard failing solutions or approach things differently
- **Respect:** each team member is important and valuable for the project

Embracing changes

Gap between the practices and the values. Principles help to guide you in applying the practices. Still to permit to embrace changes.

- **Humanity:** projects are built by people - balance project and people needs
- **Economics:** somebody is paying - everybody has to keep the budget in mind
- **Mutual Benefit:** practices that benefit individual, team, customer together
- **Self similarity:** when you find a practice that works stick with it at different levels
- **Improvement:** do your best today and try to improve for tomorrow
- **Diversity:** different opinions and perspectives lead to better solutions
- **Reflection:** good teams stay aware of what's working and what isn't in their proc.
- **Flow:** constant delivery means a continuous flow of development work
- **Opportunity:** problems are opportunities to learn something new
- **Redundancy:** it can seem wasteful but often can avoid big quality problems
- **Failure:** It's OK to try things that don't work. You can learn from failing
- **Quality:** You can't deliver faster by accepting a lower quality product
- **Accepted responsibility:** resp. of something means authority to get it done
- **Baby steps:** take small steps in the right direction rather than making big changes when adopting new practices

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- XP teams reject separation of roles, this reduces the capability of doing the maximum, the opportunities for improving and learning, and finally it reduces the possibility to get help
- Pairs generally rotate to foster diversity and learning
- Pair programming generally enable reflection and feedbacks
- teams write hours they think are needed to implement a story
- the use of stories fits with the principles
- you accept critics and are not afraid of making critics to your teammate

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Corollary practices

- **Real customer involvement:** involve customers in planning and actually listen to them
- Incremental deployment: deploy small pieces of the system individually than one “big shot”
- Team continuity: keep effective teams together
- Shrinking teams: use people from teams to spread competences and XP culture
- route-cause analysis: figure out a problem if something went wrong, and why the problem occurred, and what caused the occurrence
- Shared code: everyone collectively owns the code
- Code and tests: write code and test and generate the rest (people do not read dusty binders)
- Single codebase: don't manage multiple versions
- Daily deployment: push a new version of the software into production every day
- Negotiated scope contract: fix the time and have an ongoing negotiation of the scope, instead than viceversa
- Pay-per-use: charge not for the development but for the usage. Improve feedbacks and relevance of functionality

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- **Daily deployment:** push a new version of the software into production every day
- **Negotiated scope contract:** fix the time and have an ongoing negotiation of the scope, instead than viceversa
- **Pay-per-use:** charge not for the development but for the usage. Improve feedbacks and relevance of functionality

Practices are natural when the mindset absorbed the values and the principles

Corollary practices

- **Real customer involvement:** involve customers in planning and actually listen to them
- **Incremental deployment:** deploy small pieces of the system individually than one “big shot”
- **Team continuity:** keep effective teams together
- **Shrinking teams:** use people from teams to spread competences and XP culture
- **route-cause analysis:** figure out a problem if something went wrong, and why the problem occurred, and what caused the occurrence
- **Shared code:** everyone collectively owns the code
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Simplicity and Incremental design

Build software that can be extended and changed easily. Clever solutions can be dangerous. **Prefer simplicity!**

- Rookies are not more “dangerous” than experienced developers
- Complexity often comes from **guessing future needs**.

code smells/antipatterns

there are recurring situations in coding that indicate that you are “violating” some property

Typical Code smells

They can be statically or dynamically identified

- **shotgun surgery** – simple changes lead to cascading changes
- half-baked code – strong hard-coded dependencies
- very large classes
- duplicated code
- spaghetti code
- lasagna code

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Problems with “cleverness”

Typical problems in the code:

- **hooks** – use of placeholders
- **edge case** – obsession for rare and exceptional scenarios
- **framework trap**

The framework trap

Generally developers like to **overgeneralize**. A simple problem often can lead to a framework that intend to solve the same problem in many different contexts

- e.g. need for a web page overgeneralized in a framework to define pages

Libraries vs Frameworks

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Libraries vs Frameworks

Technical debt

When you release software with poor design and code you are taking a debt (**technical debt**)

- An effective XP team fix technical debt by refactoring mercilessly
- slack are good candidates for repaying the debt
- reflection and refactoring are needed to capture smells
- **fail fast** strategy reduce risks of accumulating debts

Continuous integration – at least once per day the whole codebase should be integrated

TDD

Now we'll walk through a custom List implementation using the Test-Driven Development (TDD) process.

ATTENTION

TDD is a design tool, enabling us to drive our implementation with the help of tests

```
public class CustomList<E> implements List<E> {  
    private Object[] internal = {};  
    // empty implementation methods  
}
```

First Cycle

```
@Test
public void givenEmptyList_TrueIsReturned() {
    List<Object> list = new CustomList<>();

    assertTrue(list.isEmpty());
}
```

Given the test which is a simple correct implementation?

```
@Override
public boolean isEmpty() {
    return true;
}
```

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```

2nd Cycle

```
@Test
public void givenNonEmptyList_thenFalseIsReturned() {
    List<Object> list = new CustomList<>();
    list.add(null);

    assertFalse(list.isEmpty());
}

@Override
public boolean isEmpty() {
    if (internal.length != 0) {
        return false;
    } else {
        return true;
    }
}
```

2nd Cycle

```
@Test
public void givenNonEmptyList_thenFalseIsReturned() {
    List<Object> list = new CustomList<>();
    list.add(null);

    assertFalse(list.isEmpty());
}

@Override
public boolean isEmpty() {
    if (internal.length != 0) {
        return false;
    } else {
        return true;
    }
}
```

Slack and Refactoring

```
@Override
public boolean isEmpty() {
    return internal.length == 0;
}
```

FAQs

- Writing tests is an activity generally left to QA teams and to lower profiles. Is it worthy to engage senior and skilled programmers in such an activity?
- I'm a programmer and how do I know what to do next?
- Isn't better to assign tasks on the base of expertise?