The Scrum Framework and DevOps

The Most Popular Agile Process

Agile vs Scrum

Scrum: Modern Agile Framework

1. Agile = Philosophy

What and Why

- Respond to change
- Customer collaboration
- Working software
- Individuals over processes

Abstract principles - no specific "how"

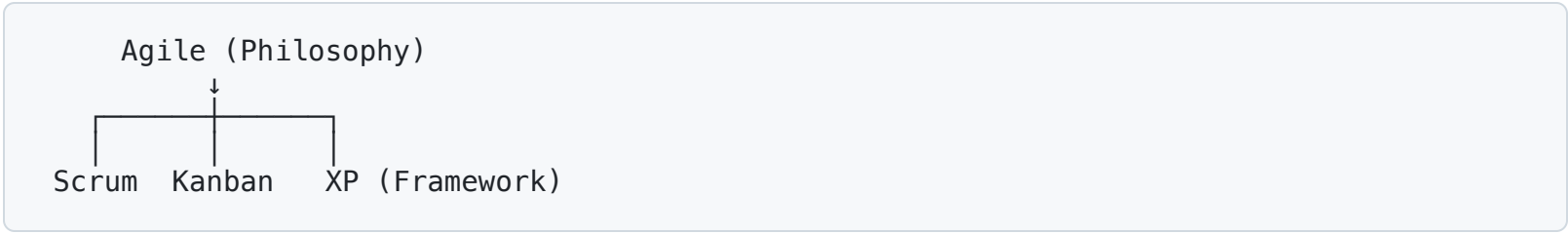
3. Scrum = Framework

How to do it

- 2-week sprints
- Daily standup (15 min)
- Sprint planning/review/retro
- Roles: PO, SM, Team

Concrete practices - specific "how"

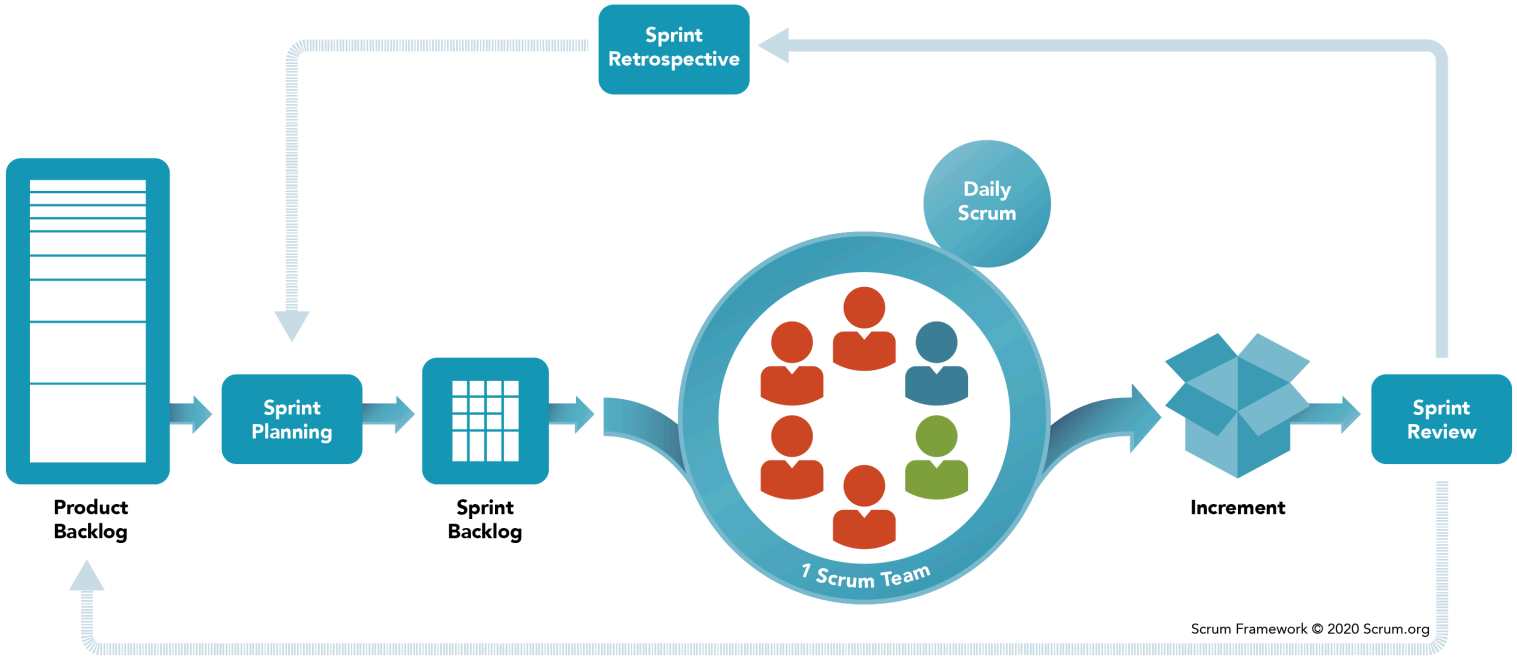
3. The Relationship



You do Scrum to be Agile

(Like you write Java to practice OOP)

Scrum: Most Popular Agile Framework (2024: 87% of agile teams)



Scrum Roles

Product Owner

- Represents customer/business
- Manages product backlog
- Prioritizes features

Scrum Master

- Facilitates process
- Removes obstacles
- Protects team from interruptions

Development Team

- Self-organizing
- Cross-functional
- 5-9 members typically

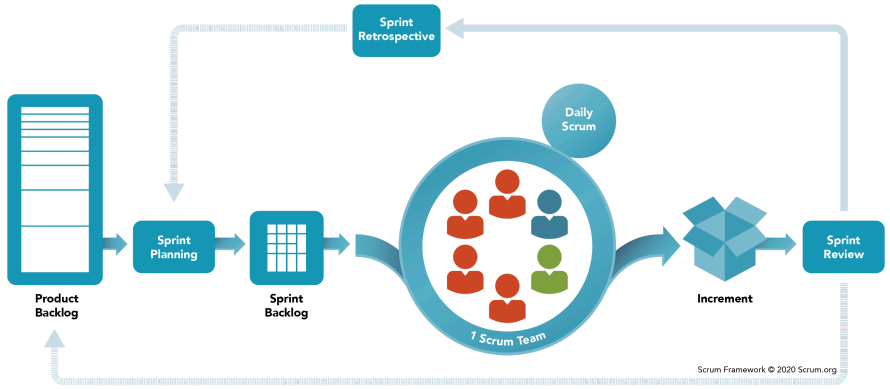
Stakeholders

- Any people, including users or clients, who are involved in any of the Scrum activities.

Scrum Terminology

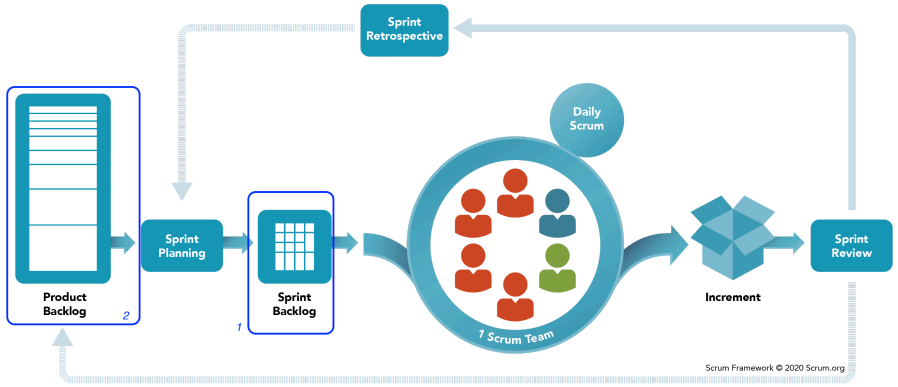
1. Scrum Value

- Value is what Scrum teams aim to deliver.
- It's often a software product or artifact, but can be anything meaningful in the given context.



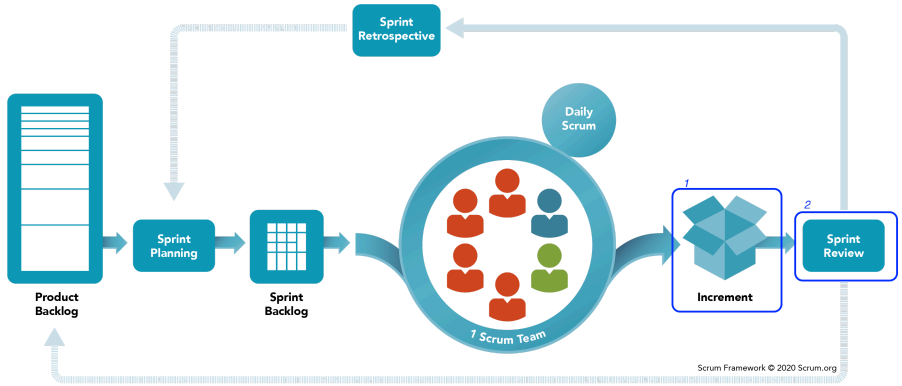
2. Scrum Backlogs

- Product Backlog: A prioritized list of work or "to-do list" for the **Project**, with top items delivered first.
- Sprint Backlog: The Developers' plan or "to-do list" for the **Sprint**.
- Items in the Product Backlog is selected into the Spring Backlog through **Project Planning**.

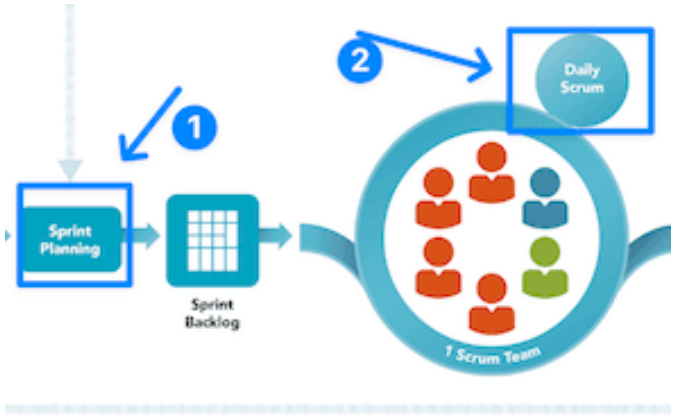


3. Scrum Increment

- Increment: The total of all Product Backlog items completed in the current and previous Sprints.
- Teams refine the **Product Backlog** based on the **Increment** during the **Sprint Review**.

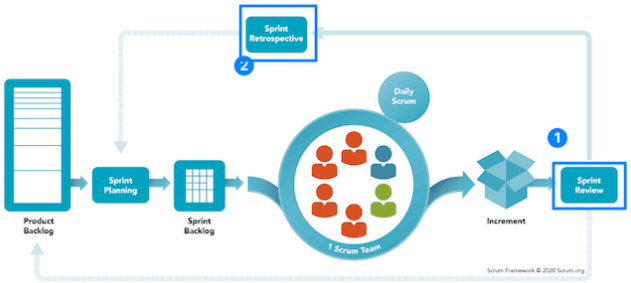


4. Scrum Planning & Daily Scrum



1. **Sprint Planning** (Start of sprint)
    - What will we build?
    - How will we build it?
2. **Daily Scrum** (Every day, 15 minutes)
    - What did I do yesterday?
    - What will I do today?
    - Any blockers?

3. Sprint Review & Retrospective at the end of the Sprint



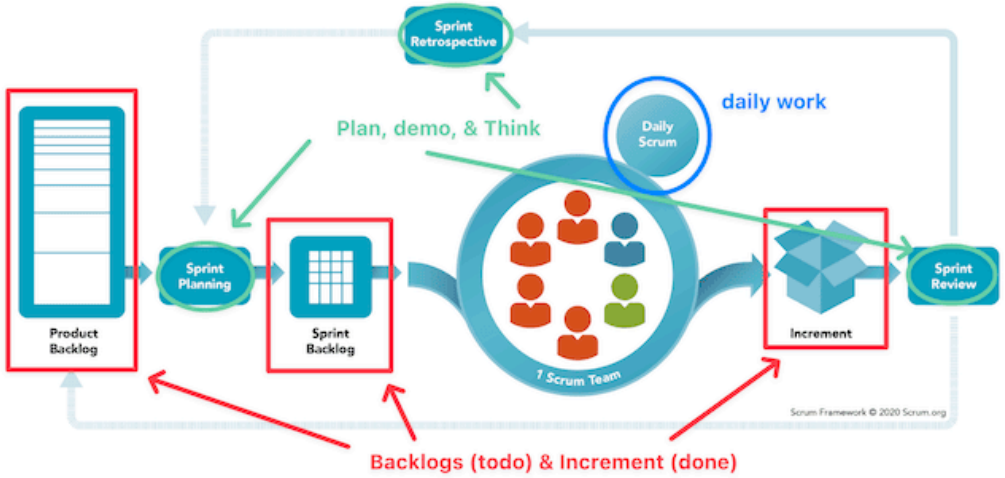
Sprint Review

- Demo to stakeholders
- Get feedback

Sprint Retrospective

- What went well?
- What can improve?

Overall Perspective of Scrum



- We plan, demo (Review), and think (Retrospective) per Sprint
- We make todo (for the whole Product & Sprint) and done (Increment) list.
- At the end of the Semester, we update todo lists through demo & think.

Sprints from Software Engineers Perspective

- We are given Sprint Backlog (todo).
- We keep making Increment through define, design, develop (test), and deploy.
- We demo (review) and think (retrospective) what we accomplished in this Sprint.
- We update Product backlog from the review and Sprint backlog from the retrospective.

Real-World Success

1. Spotify

2008: Small startup using Scrum

- 2-week sprints
- Cross-functional teams

2010: Scaled to "Spotify Model"

- Squads (small teams), Tribes (groups of squads), Chapters (communities of practice), Guilds (knowledge sharing)

Result:

- 300+ teams releasing features daily through continuous innovation

2. Real-World Success: Amazon

Before Agile (1990s):

- Monolithic application
- Quarterly releases
- High failure rate

After Agile (2000s):

- Microservices
- Two-pizza teams (5-9 people)
- Deploy every 11.7 seconds (2015)

Quote: "You build it, you run it" - Werner Vogels, CTO

The Comparisons: Agile vs Traditional (Waterfall/Spiral)

2024 Industry Statistics:

Metric	Traditional	Agile
Success Rate	29%	64%
On-time Delivery	44%	71%
Within Budget	56%	78%
Customer Satisfaction	61%	87%
Team Morale	Low	High

Source: Project Management Institute, 2024

What Spiral Taught Us, What Agile Added

1. From Spiral Model:

✅ Iterative development
✅ Risk awareness
✅ Prototyping
✅ Customer involvement

2. What Agile Added:

➕ Shorter iterations (weeks, not months)
➕ Self-organizing teams
➕ Technical excellence practices
➕ Embrace change as normal
➕ Continuous delivery (CD)
➕ People over process

Why Both Still Matter

1. When to Use Spiral-like (Waterfall/Spiral) Approaches:

- High-risk projects (aerospace, medical devices)
- Regulatory requirements
- Hardware-software integration
- When upfront risk analysis is critical

2. When to Use Agile:

- Software products
- Uncertain requirements
- Need for fast feedback
- Innovation and experimentation
- Most modern software projects

The Hybrid Approach: Scaled Agile

Many organizations use "Agile at scale":

- **SAFe** (Scaled Agile Framework)
  - Agile teams + enterprise planning
  - Program Increments (PI) ~ modern spirals!
- **LeSS** (Large-Scale Scrum)
  - Multiple Scrum teams
  - Coordinated sprints

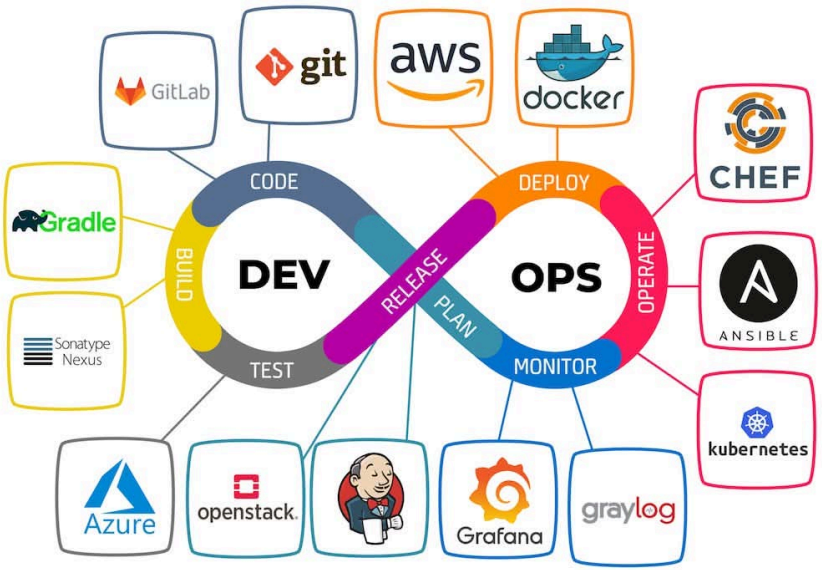
Key Insight: Modern approaches combine best of both worlds

Modern Evolution: DevOps (2009+)

Agile focused on development, but...

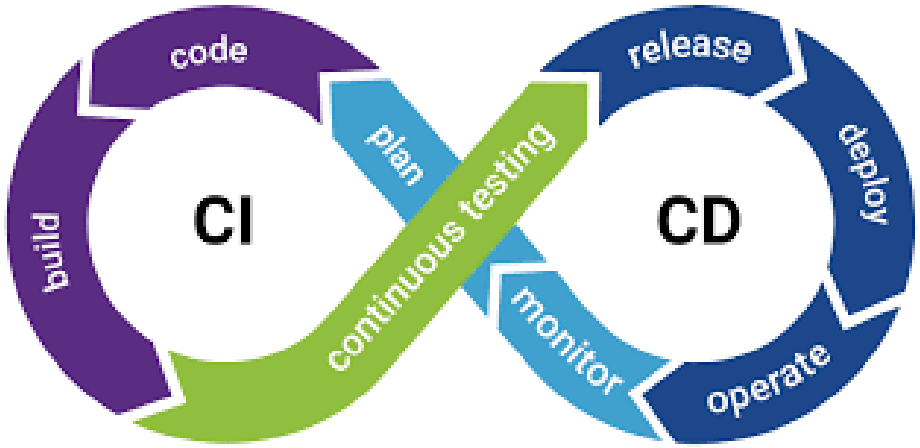
- Operations still separate
- Deployment still manual
- "Throw it over the wall" mentality

DevOps: Extend agile to operations



- Continuous Integration → Continuous Deployment (CI/CD Pipeline)
- Infrastructure as Code
- Automated testing and deployment
- Development and Operations collaborate

DevOps Key Concept 1: CI/CD Pipeline



Continuous Integration → Continuous Deployment

```
Developer → Git Push → CI → Tests → CD → Production
   ↓          ↓        ↓      ↓      ↓       ↓
 Write     Commit   Build  Auto   Deploy  Live!
 Code               Test   Test

Minutes, not months!
```

CI: Merge code frequently, test automatically

CD: Deploy to production automatically

Example: Push code at 9 AM → Live in production by 9:05 AM

DevOps Key Concept 2: Infrastructure as Code

Treat servers like code

Traditional Way (Manual): ❌ Hard to reproduce, error-prone

```
1. Click AWS console
2. Create server manually
3. Install software by hand
4. Configure settings
```

DevOps Way (Code): ✅ Run script → Infrastructure created!

Infrastructure as Code (Write & Run):

- Write a config file
- Run one command
- Server created automatically
- Takes minutes, repeatable

Real Example 1: Terraform for AWS

```
# main.tf
resource "aws_instance" "web" {
  ami           = "ami-12345"      # Ubuntu image
  instance_type = "t2.micro"       # Server size

  tags = {
    Name = "WebServer"
  }
}
```

Run: `terraform apply`

Result: AWS server created!

Real Example 2: Docker Compose

```yaml
# docker-compose.yml
services:
  web:
    image: nginx
    ports:
      - "80:80"

  app:
    image: node:18
    volumes:
      - ./code:/app
```

Run: `docker-compose up`

Result: Web server + Database + App running instantly!

What This Does

```
One Command:
  docker-compose up
       ↓
┌──────────────────┐
│  Nginx (web)     │ Port 80
├──────────────────┤
│  PostgreSQL (db) │
├──────────────────┤
│  Node.js (app)   │
└──────────────────┘
All Running!
```

Benefit: Share this file → Anyone can run your exact environment

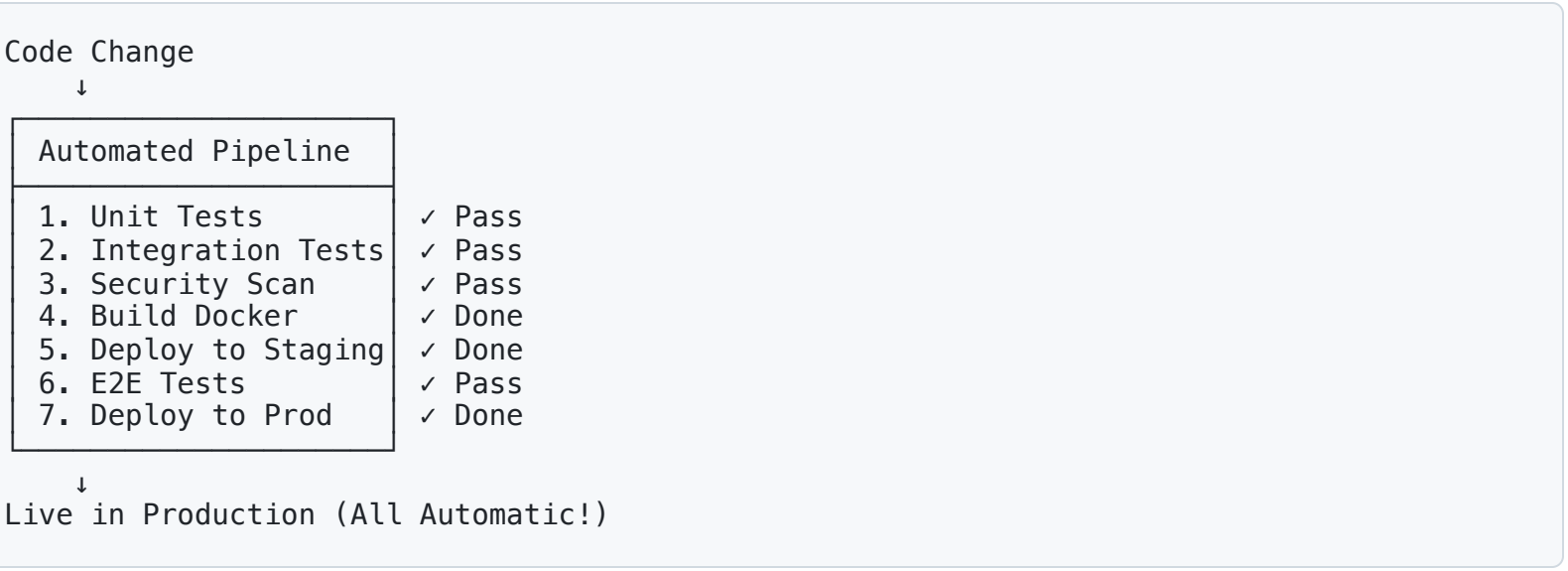
Docker vs Traditional

Traditional	Docker
Install Nginx manually	`image: nginx`
Install PostgreSQL manually	`image: postgres`
Configure ports manually	`ports: "80:80"`
Takes hours to setup	Takes 30 seconds

Docker = Infrastructure as Code for applications

DevOps Key Concept 3: Automated Testing & Deployment

No manual steps in DevOps!



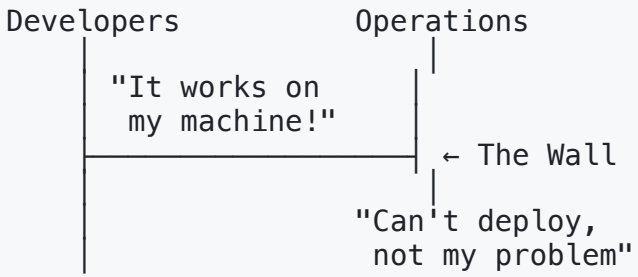
Traditional: Days of manual work

DevOps: 10 minutes, zero human intervention

DevOps Key Concept 4: Dev & Ops Collaborate

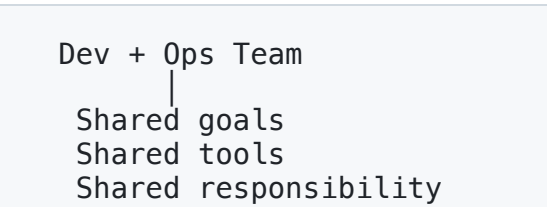
Breaking down the wall

Before DevOps:



❌ Conflict, delays, finger-pointing

With DevOps:



✅ Collaboration, fast delivery

The Software Process Evolution Timeline

```
1970: Waterfall
       ↓ (Too rigid, late feedback)
1986: Spiral Model
       ↓ (Too heavy, still slow)
1991-1999: Various Agile Methods
       ↓ (Fragmented approaches)
2001: Agile Manifesto
       ↓ (Unified principles)
2009: DevOps
       ↓ (Operations integration)
2020s: AI-Assisted Development
       (Next evolution?)
```

Lessons We Learned in Software Process

1. Processes Evolve for Reasons

- Each model solved real problems
- Each created new problems
- Understanding history helps choose right approach

2. No Silver Bullet

- Waterfall: Great for construction
- Spiral: Great for high-risk projects
- Agile: Great for software products
- Choose based on context!

3. People > Process

- Best process with wrong team = failure
- Simple process with great team = success
- Agile recognized this first

4. Technical Practices Matter

- Can't be agile without automation
- Testing, CI/CD, refactoring enable speed
- Process + practices = success

Key Principles to Remember

From Spiral Model:

- Manage risk systematically
- Build prototypes to validate
- Get feedback early and often

From Agile:

- Deliver working software frequently
- Welcome changing requirements
- Empower self-organizing teams
- Reflect and adjust regularly