**🔁 1. Types of Testing to Automate**

| **Testing Type** | **Use in SRE** | **Use in PE** |
| --- | --- | --- |
| ✅ **Unit Testing** | Ensures small components work | Validate modules or infra code logic |
| ✅ **Integration Testing** | Detects issues across systems | Validates pipelines, services integration |
| ✅ **End-to-End Testing** | Ensures service behavior | Runs pre-deploy tests for environments |
| ✅ **Load/Stress Testing** | Evaluates scalability & resilience | Helps size infrastructure |
| ✅ **Chaos Testing** | Test failure response mechanisms | Validate autoscaling & DR strategies |
| ✅ **Security Testing** | Checks vulnerability exposure | CI/CD security scanning (IaC/code) |
| ✅ **Infrastructure Testing** | Terraform/CloudFormation validation | Ensure infra deployments are stable |
| ✅ **Canary & Smoke Testing** | Pre-deploy SLI validation | Validate releases before full rollout |

**🛠️ 2. Tools to Use**

| **Phase** | **Tools for SRE** | **Tools for PE** |
| --- | --- | --- |
| Unit/Integration | JUnit, pytest, Go test | Terratest, Kitchen-Terraform, InSpec |
| Load/Chaos | k6, Gatling, ChaosMesh, Gremlin | Locust, LitmusChaos |
| Security | OWASP ZAP, Trivy, Checkov | tfsec, Snyk, Aqua Security |
| Infra Testing | Terraform validate, InSpec, Terratest | Pulumi Testing, CloudFormation Guard |
| Canary Testing | Argo Rollouts, Flagger, LaunchDarkly | Custom health checks via GitOps pipelines |
| E2E/UI | Cypress, Selenium, TestCafe | BrowserStack, SauceLabs (CI integration) |

**⚙️ 3. Automation Strategy**

**✅ For Platform Engineering:**

* **Embed testing in CI/CD pipelines**: Run infrastructure unit tests, linters, and drift checks on every pull request.
* **Provision test environments** using IaC and validate them using integration tests.
* **Use policy-as-code** (OPA, Sentinel) to enforce security/compliance at plan/apply stage.

**✅ For SRE:**

* **Pre-deployment validation**: Include chaos and load testing in staging environments.
* **Monitor error budgets** using SLOs before promoting builds.
* **Automated rollback triggers**: If post-deploy SLIs degrade, auto-revert via ArgoCD/Spinnaker.

**📊 4. KPIs Improved Through Test Automation**

| **KPI** | **How Automation Helps** |
| --- | --- |
| 🧪 Deployment Frequency | Speeds up validation → faster releases |
| 📉 Change Failure Rate | Catches bugs before production |
| ⏱️ MTTR | Reduces debugging via pre-validated code |
| 🔄 Rollback Time | Canary + tests enable quick reversions |
| 🧠 Incident Volume | Proactive issue detection |
| 🔍 Infra Drift Rate | Prevents misconfigurations |