AWS re:Invent

NOV. 29 – DEC. 3, 2021 | LAS VEGAS, NV

DOP208-R1

DevOps revolution

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Principal, DevOps Solutions
Amazon Web Services

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Emily Freeman

TECHNOLOGIST AND STORYTELLER



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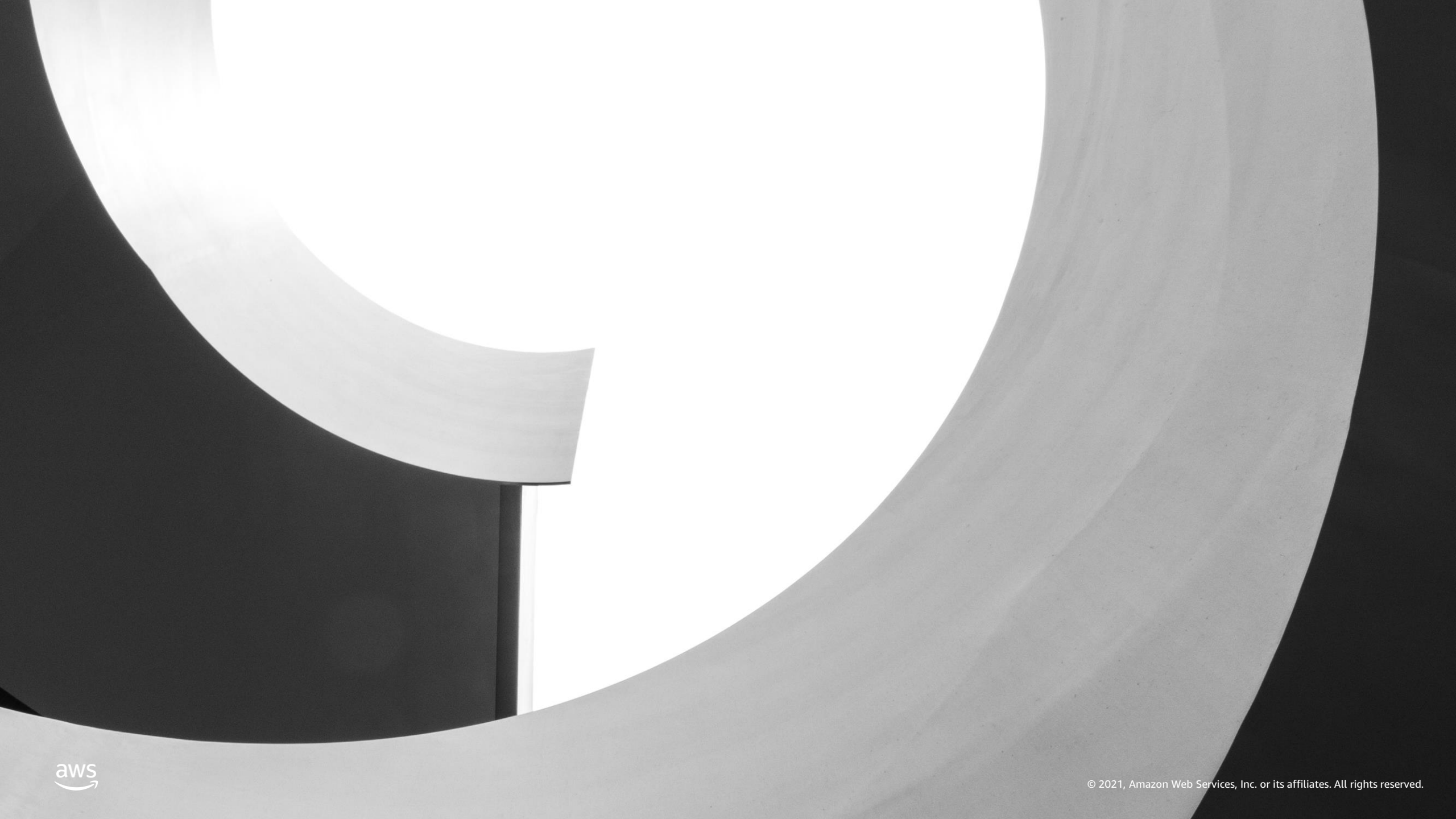
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Big Change Is Difficult

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Software Development Lifecycle

OLDER THAN COLOR TELEVISION



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Constructs

HAVE AN UNSPOKEN PERMANENCE

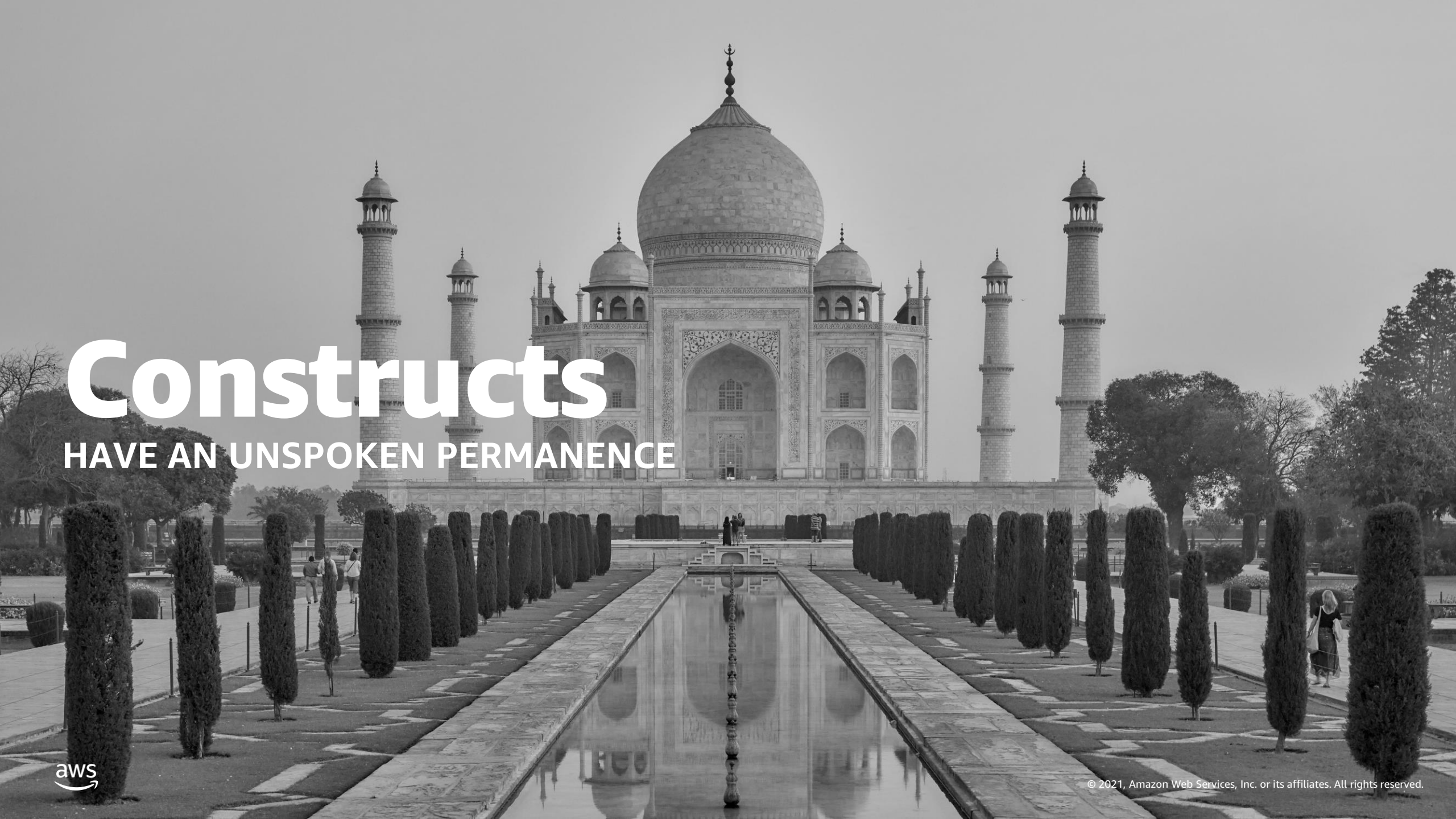
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Constructs

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Śūnyatā

SANSKRIT FOR “EMPTINESS”

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Culture

IS THE ENVIRONMENT IN WHICH INNOVATION OCCURS

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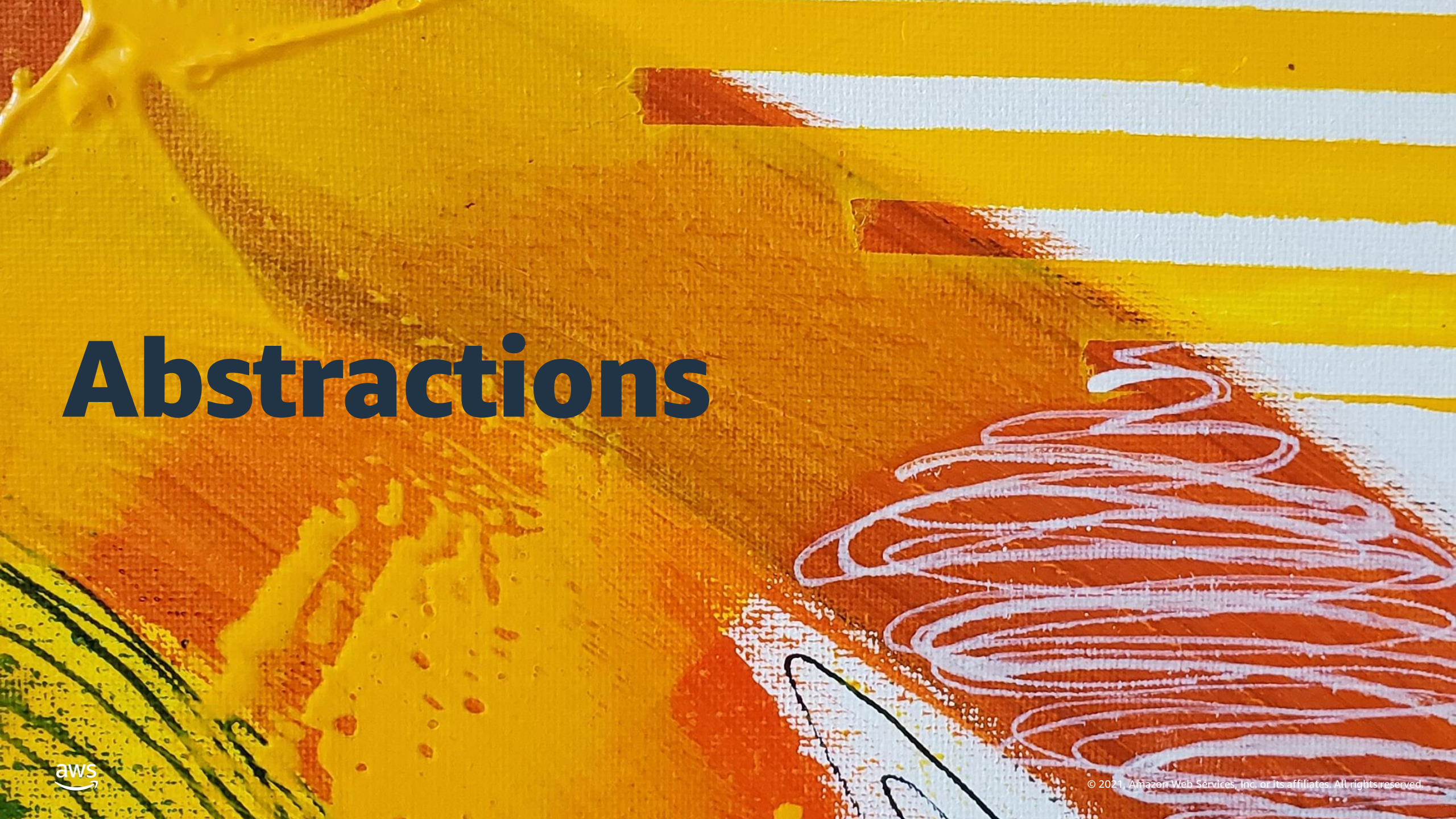
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Abstractions

HOW DO YOU VISUALIZE AN IDEA?

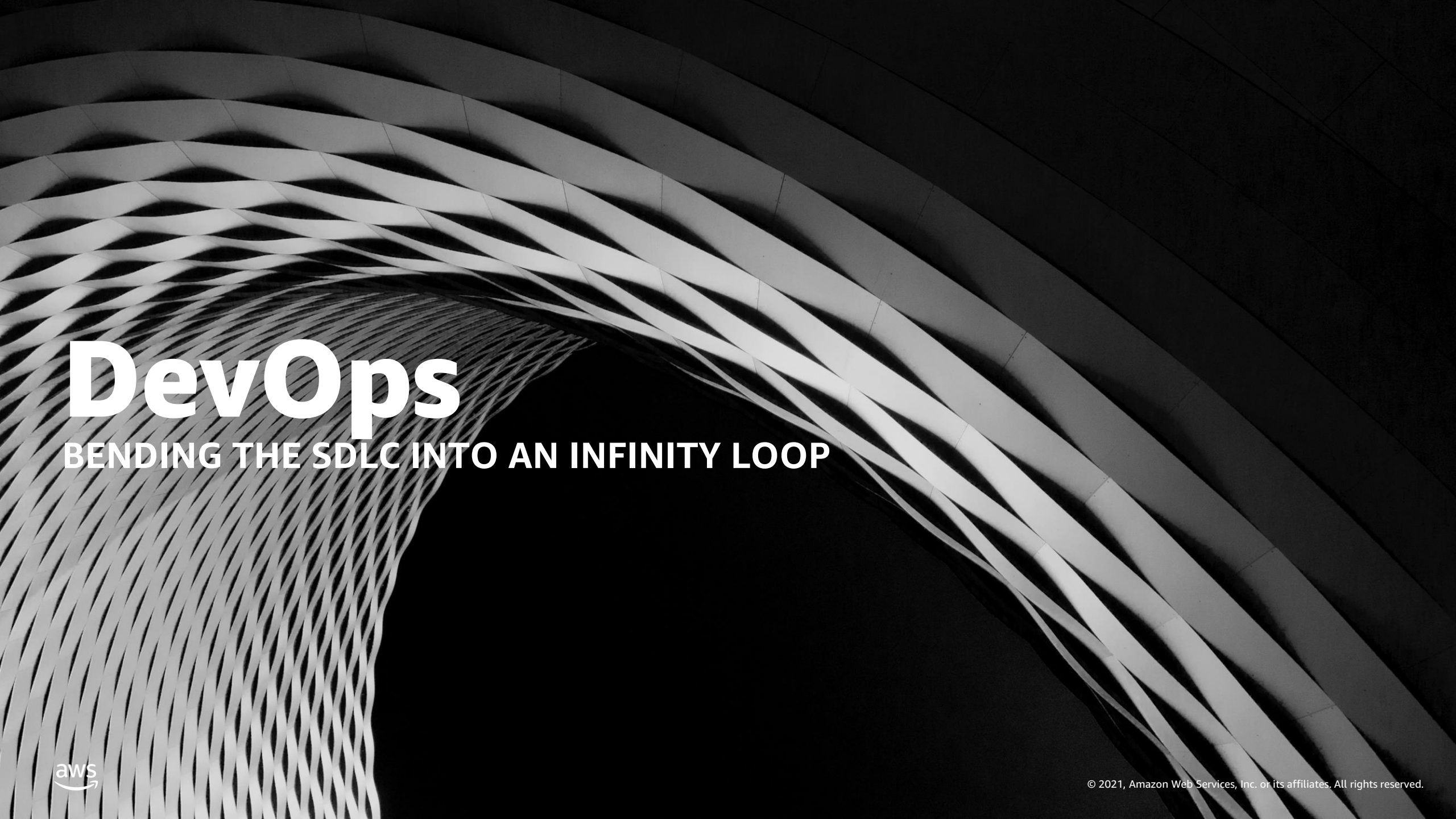
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Abstractions

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DevOps

BENDING THE SDLC INTO AN INFINITY LOOP

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What's Next?

A MODEL OF MODERN SOFTWARE DEVELOPMENT

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A New Model

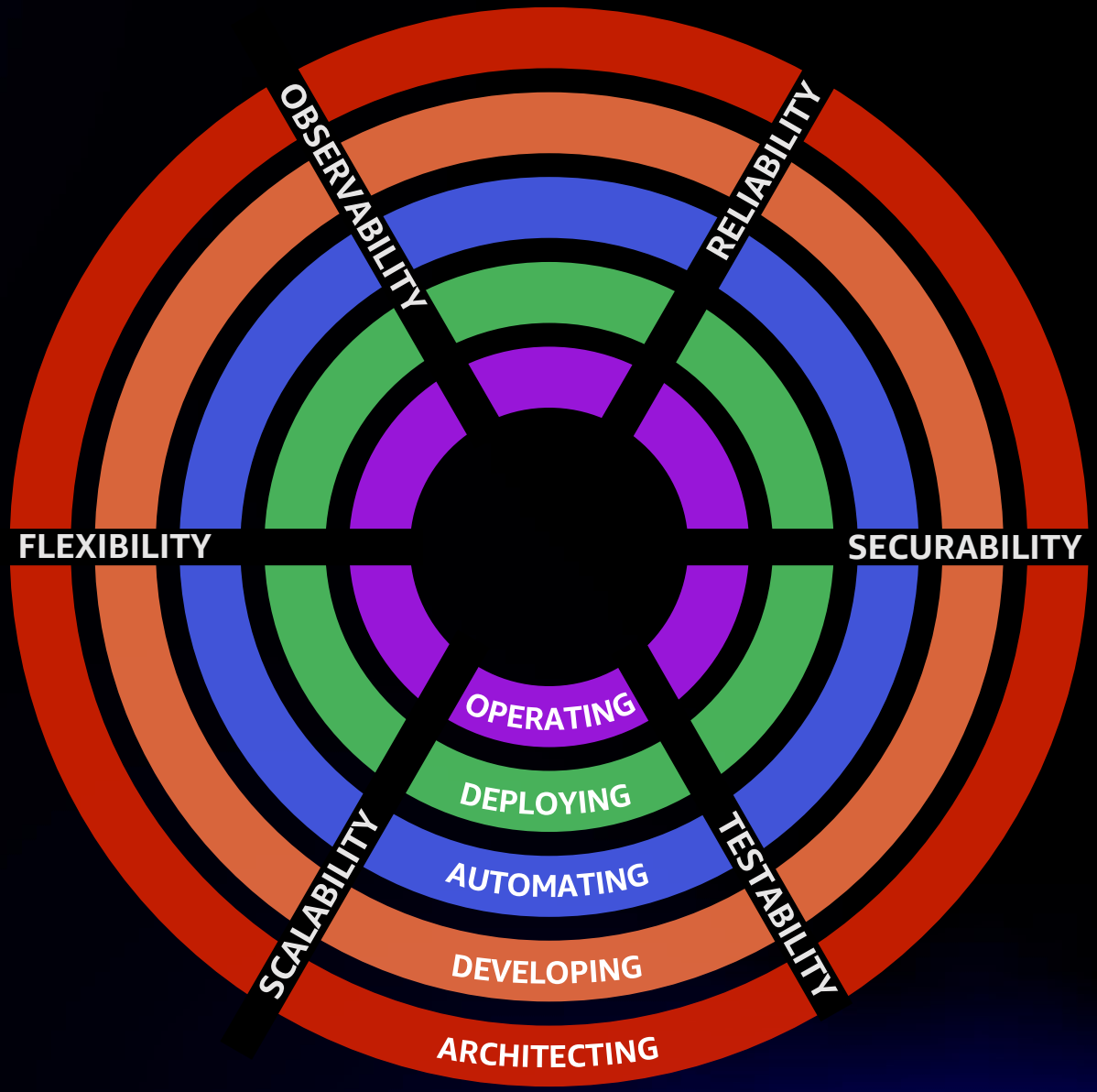
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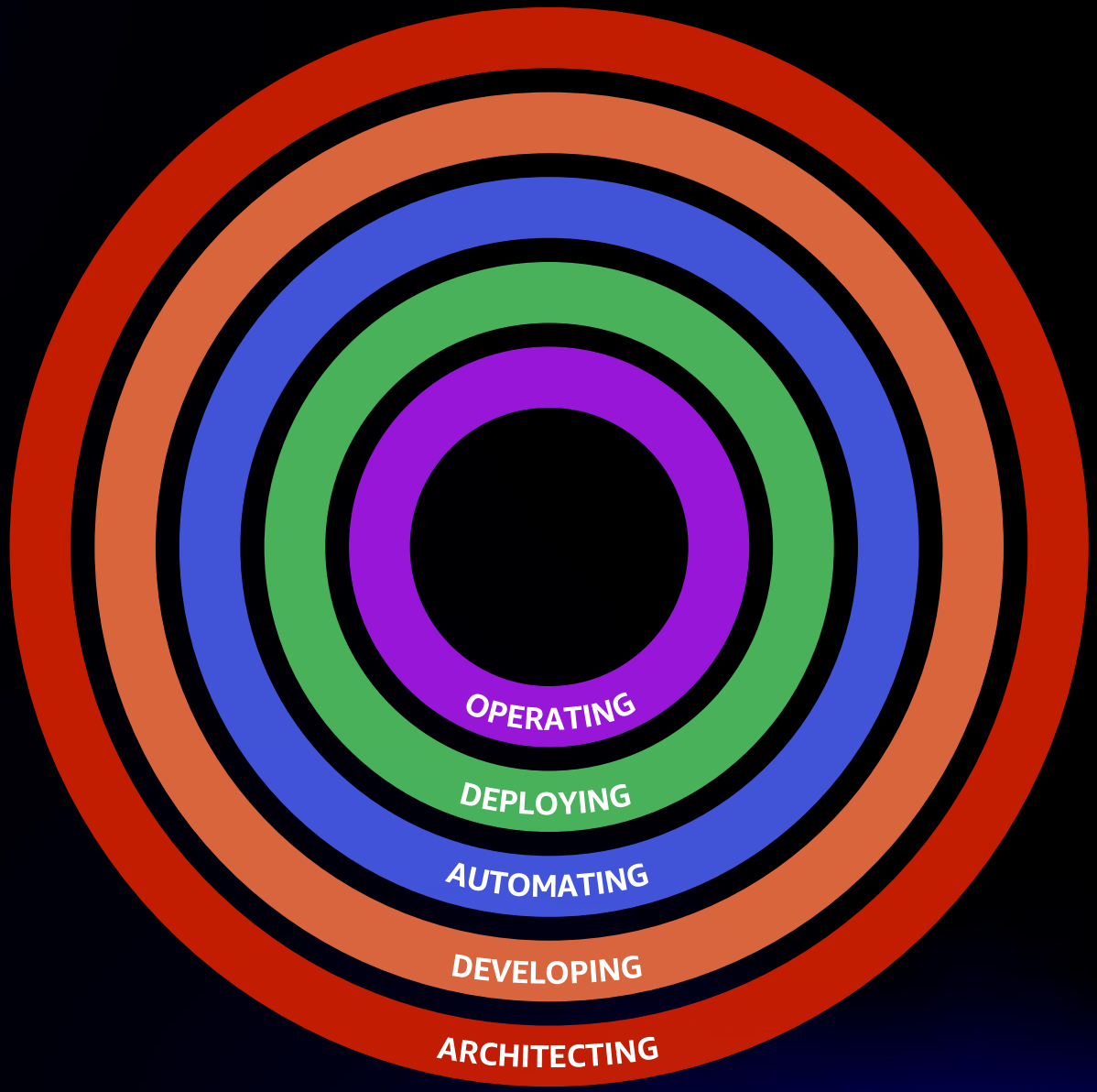
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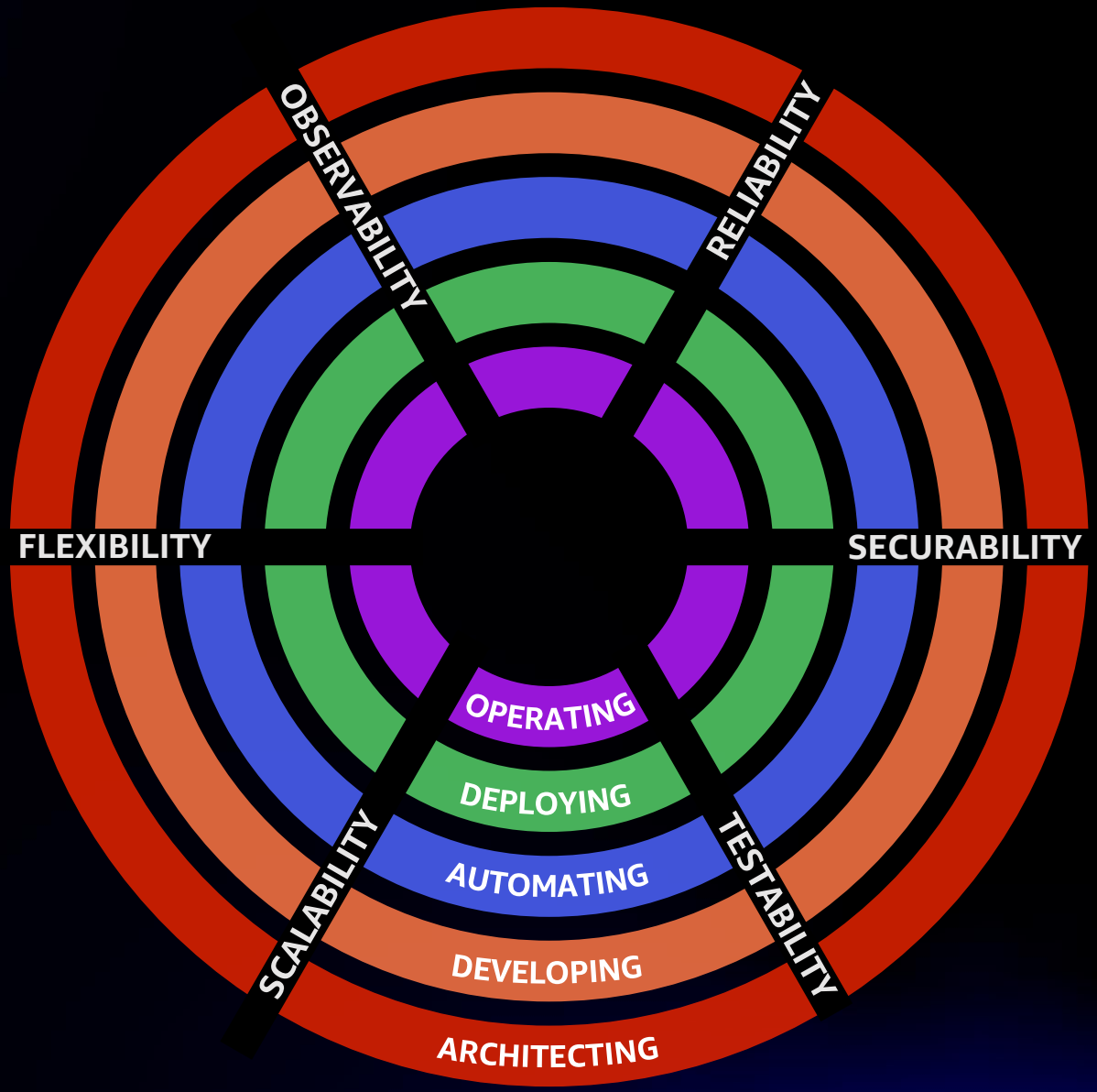
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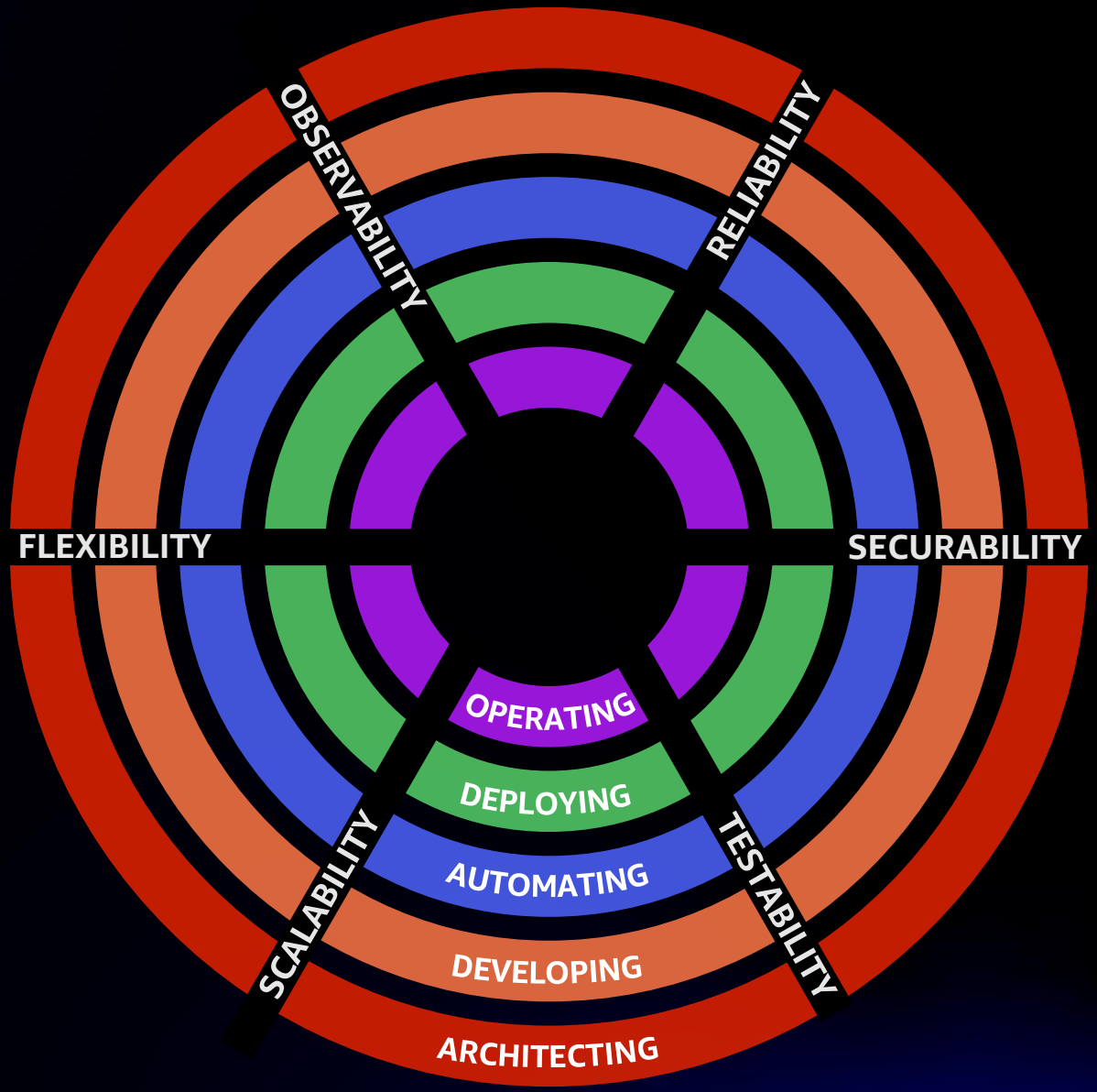
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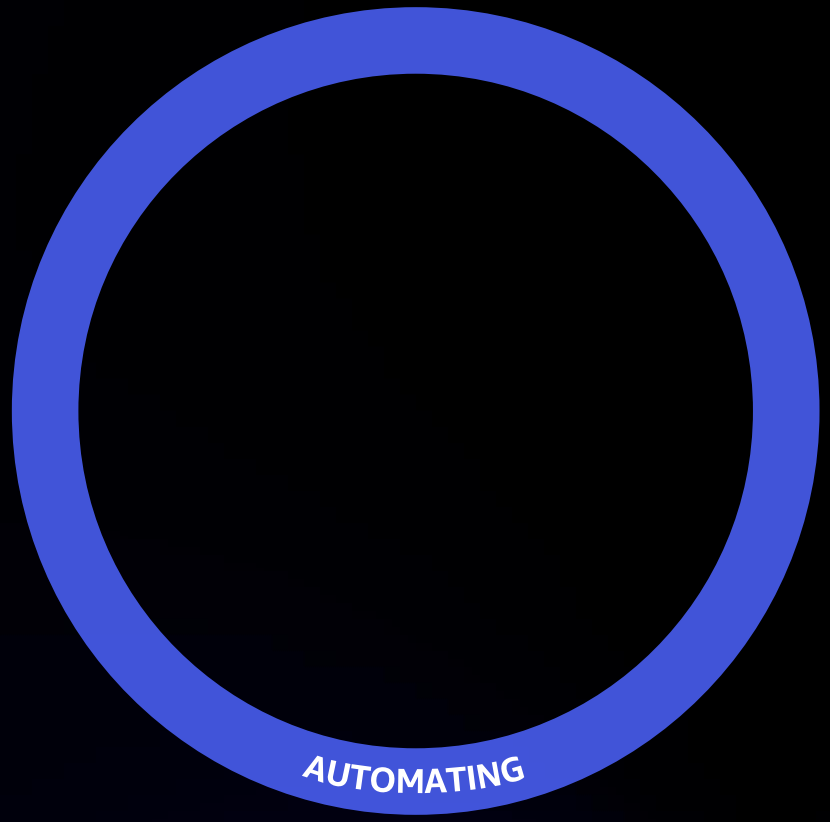
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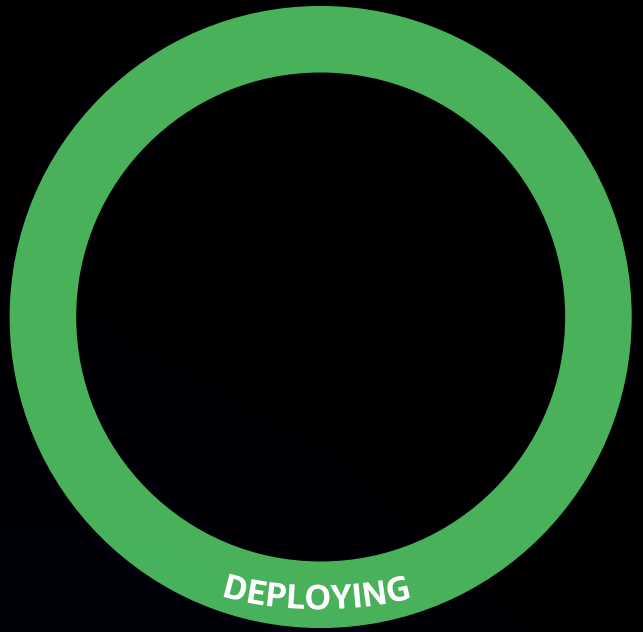
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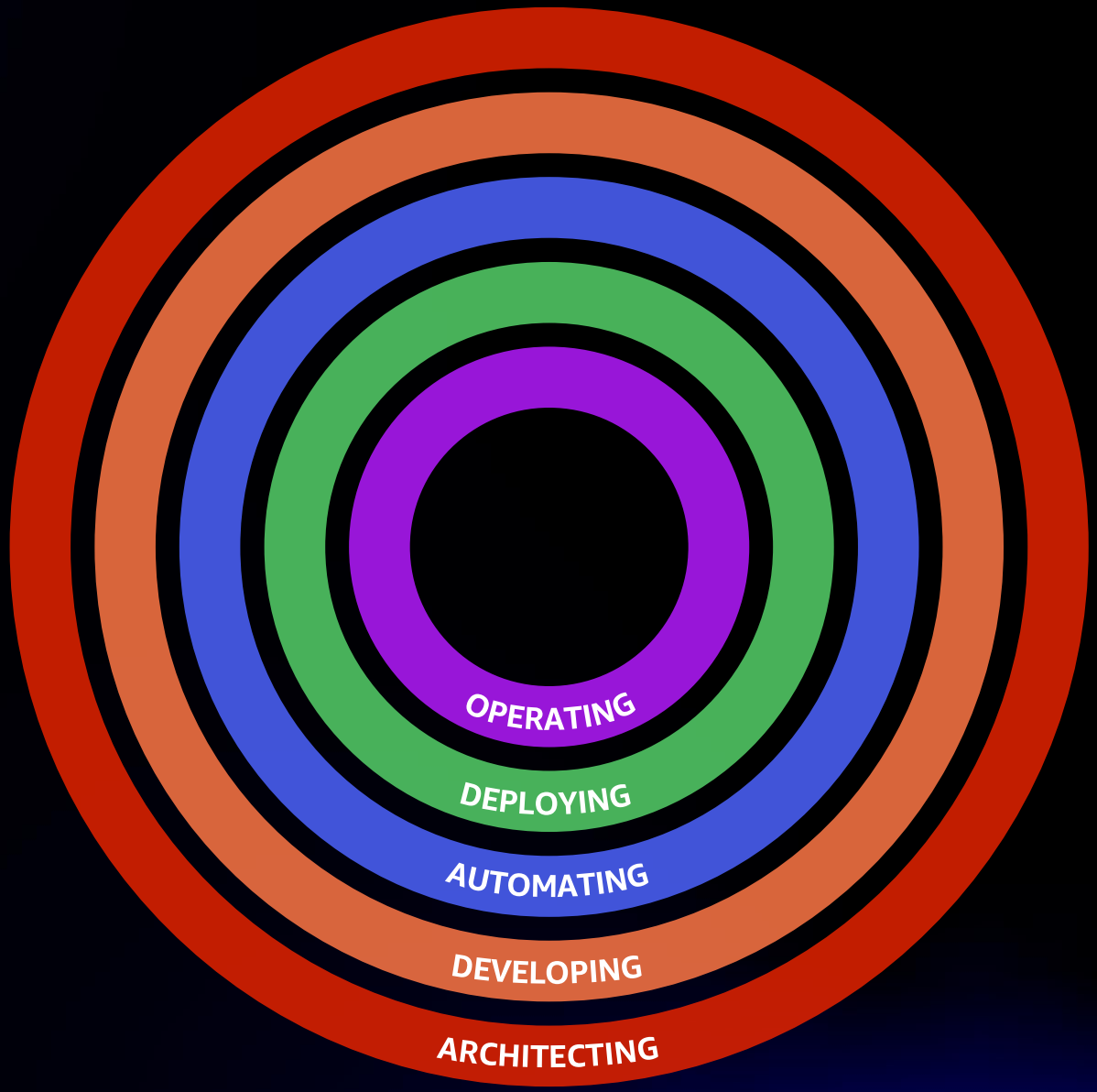
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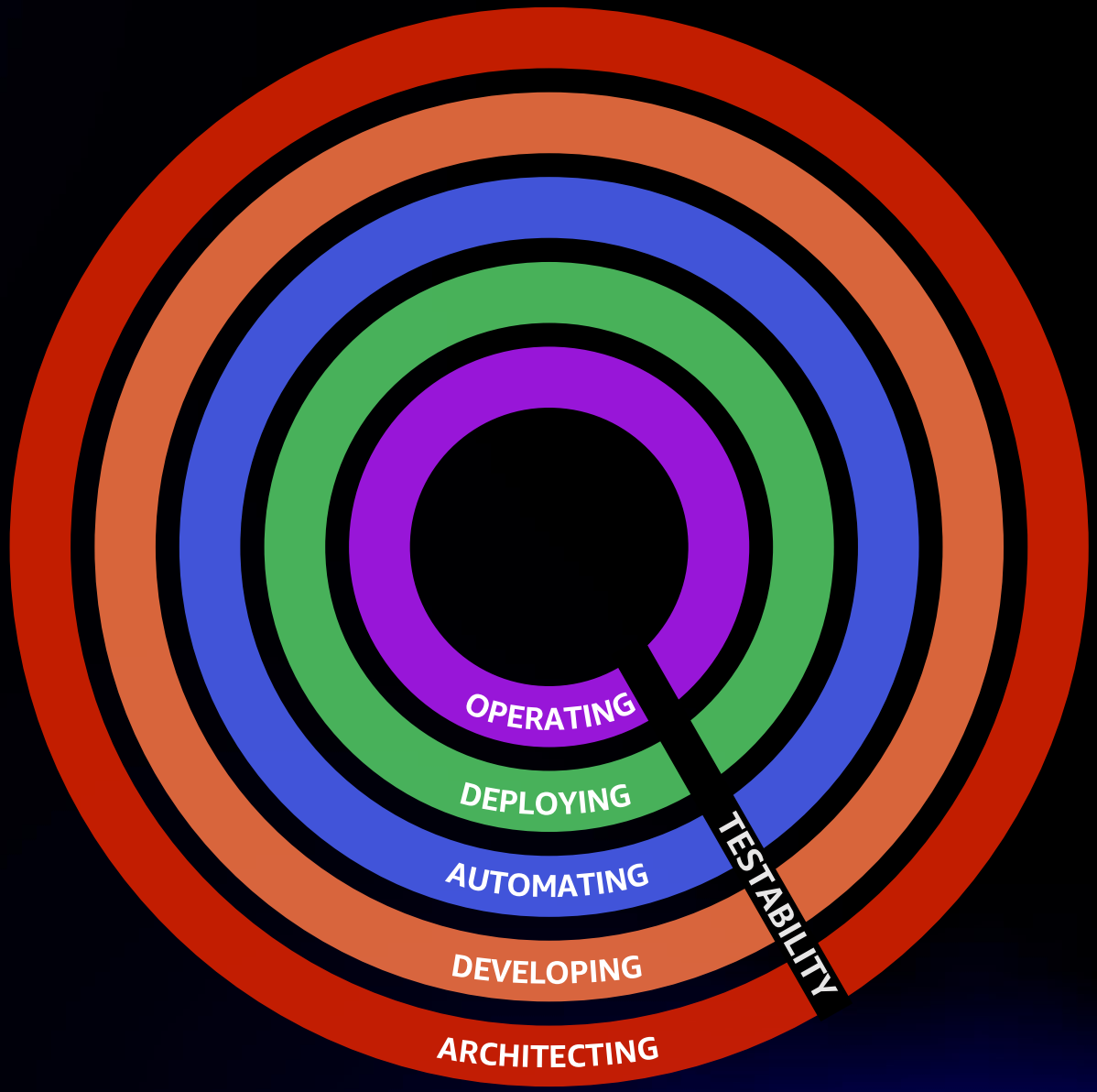
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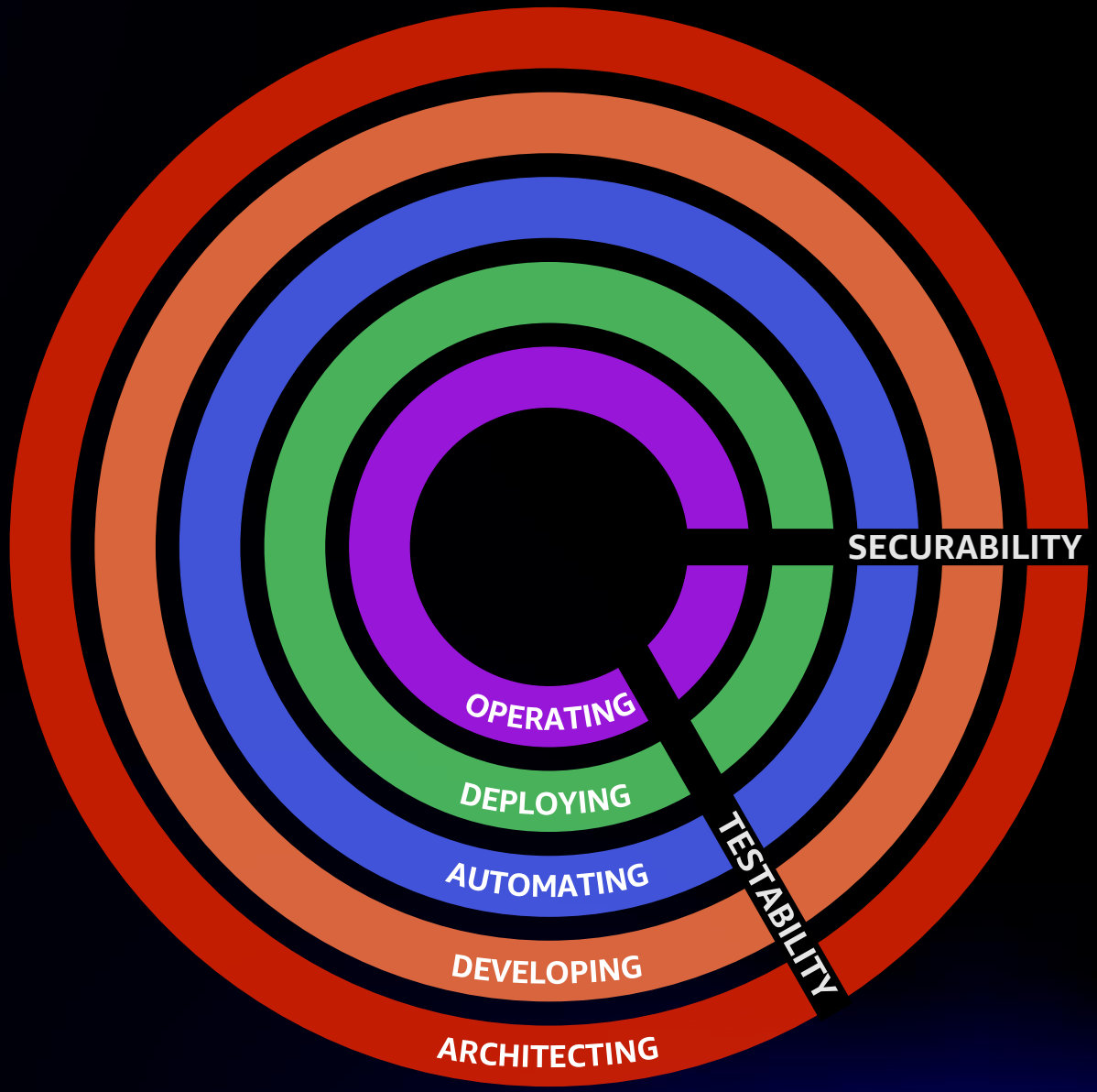
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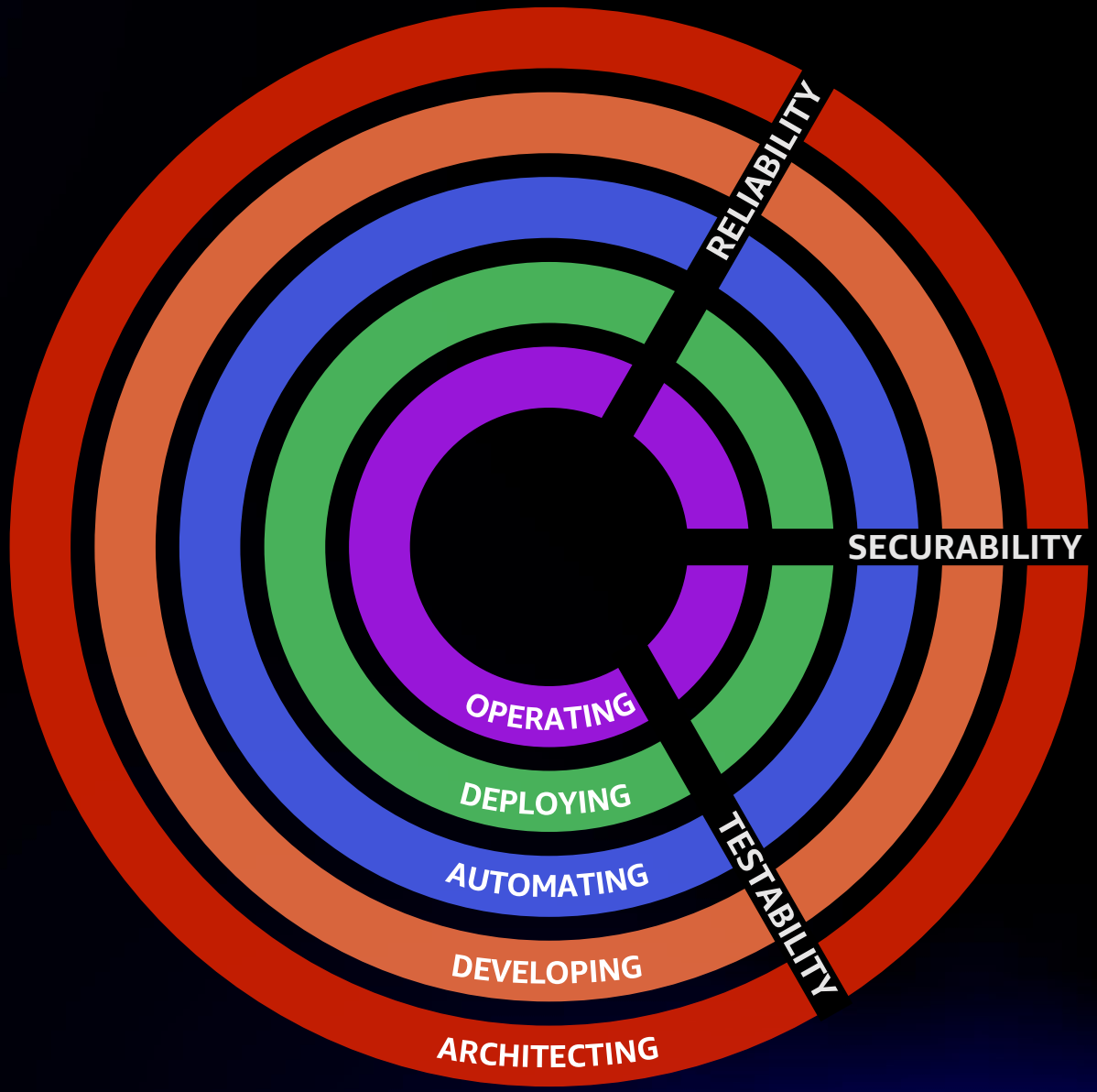
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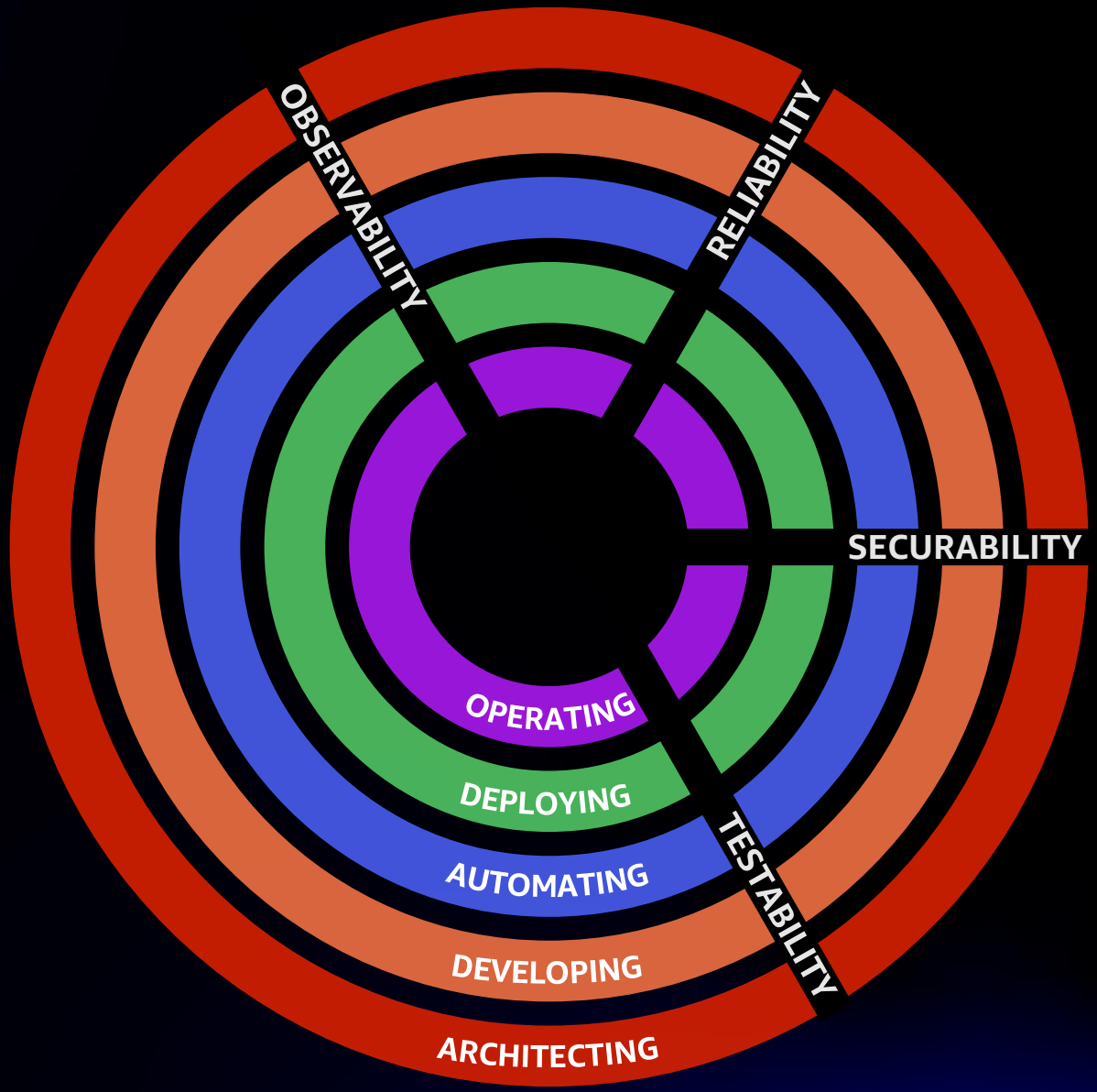
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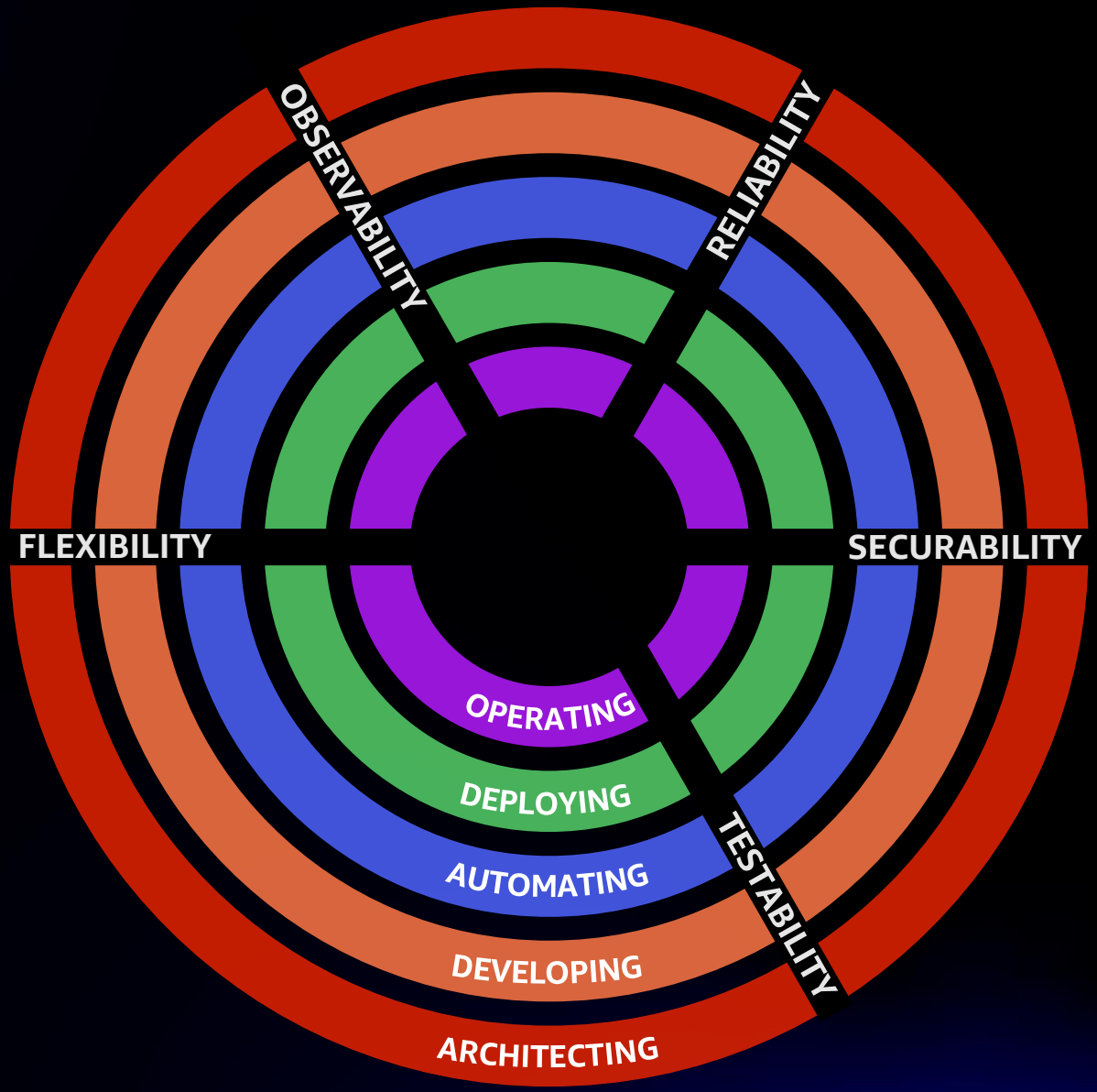
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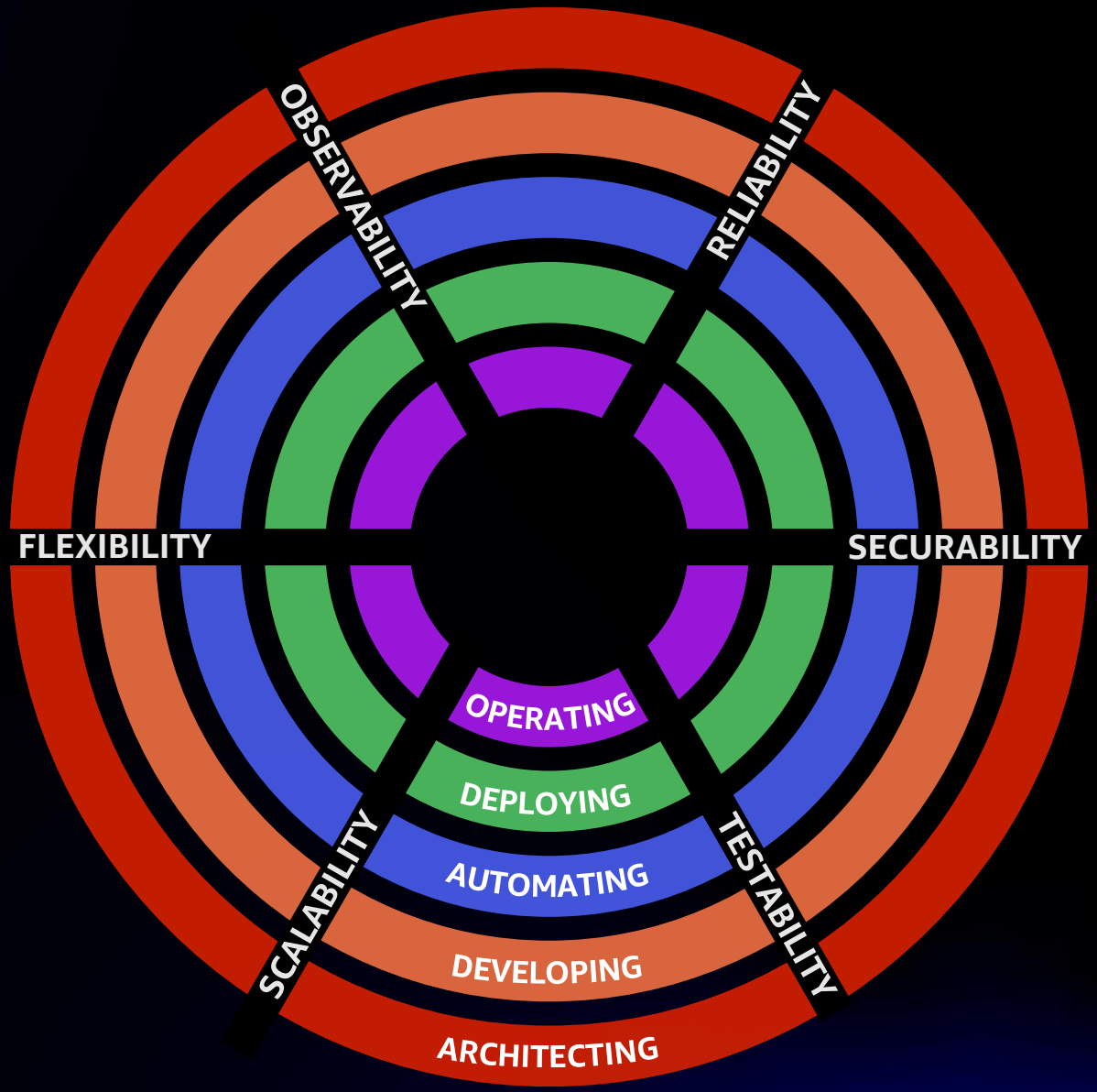
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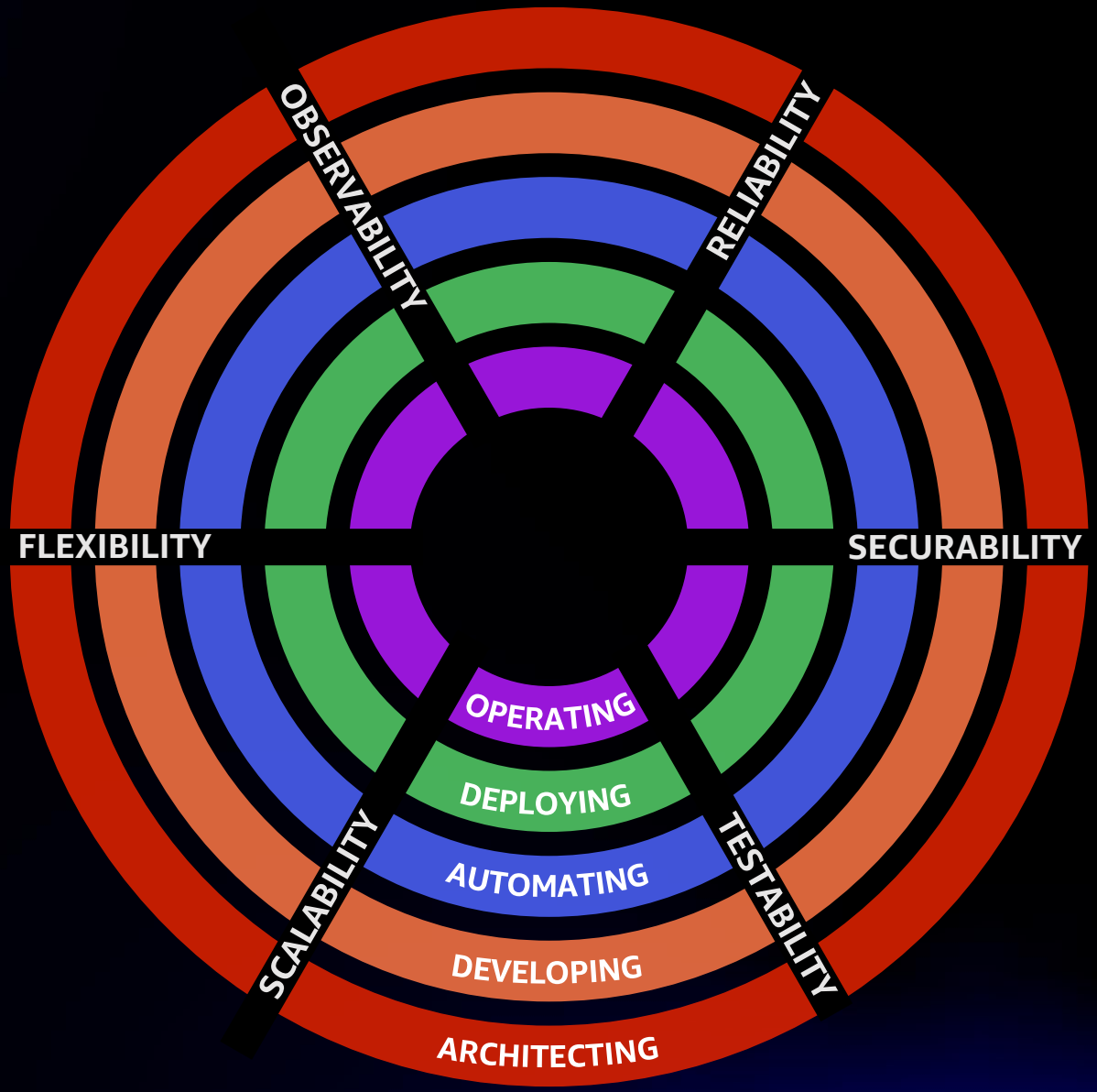
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Software is Magic

YOU ARE A MAGICIAN



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Software is Magic

YOU ARE A MAGICIAN



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Software is Magic

DOESN’T FEEL LIKE MAGIC



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Software is Magic

BUT IT DOESN'T FEEL LIKE MAGIC



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Software is Magic

DOESN'T FEEL LIKE MAGIC



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There Are No Straight Lines

THE REVOLUTION MODEL IN PRACTICE



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There Are No Straight Lines

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There Are No Straight Lines

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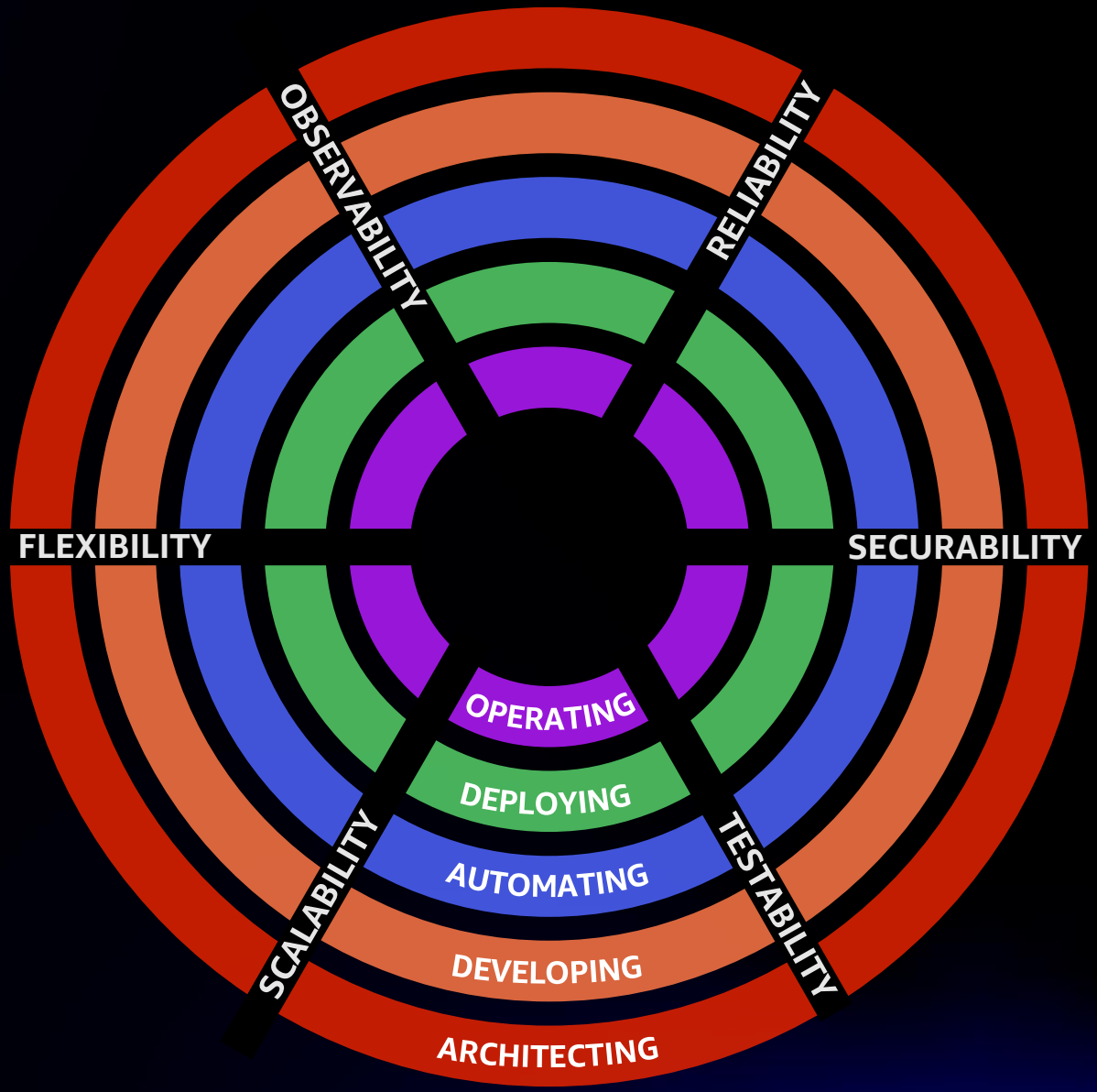
We Are Not Making Cars



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A New Model

REVOLUTIONARY SOFTWARE DEVELOPMENT



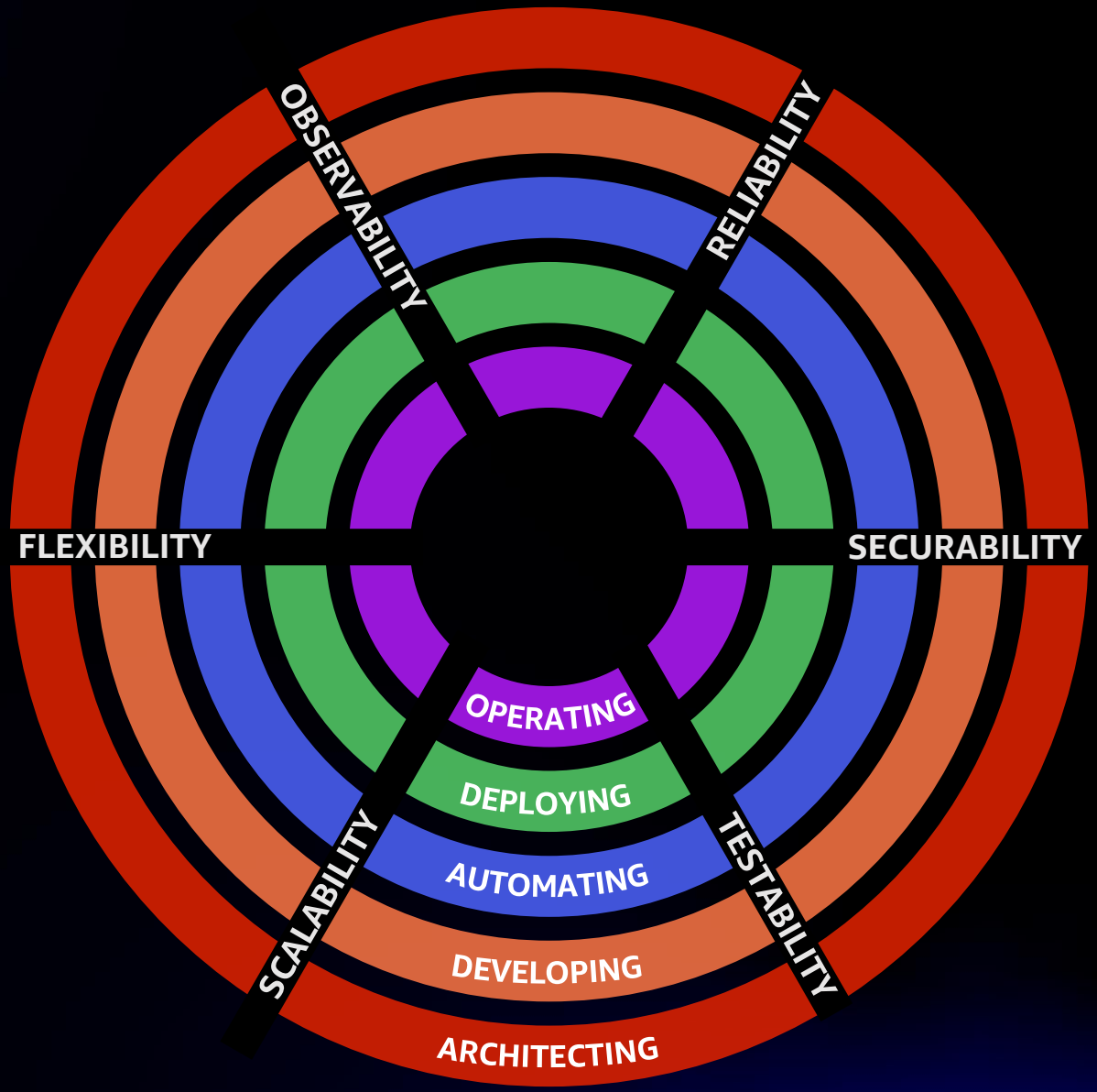
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Operationalizing Revolution

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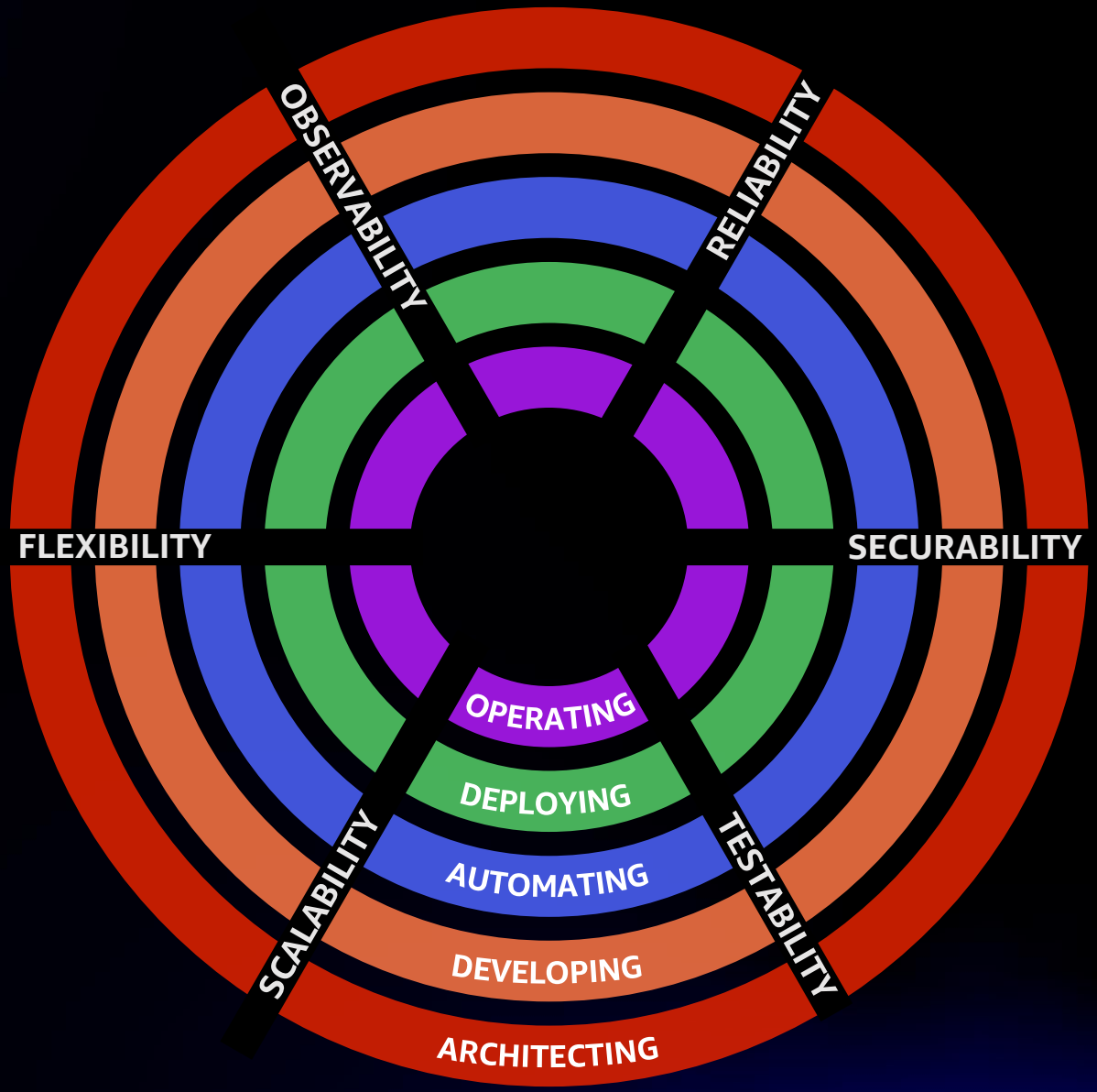
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A New Model

THE REVOLUTION MODEL IN PRACTICE

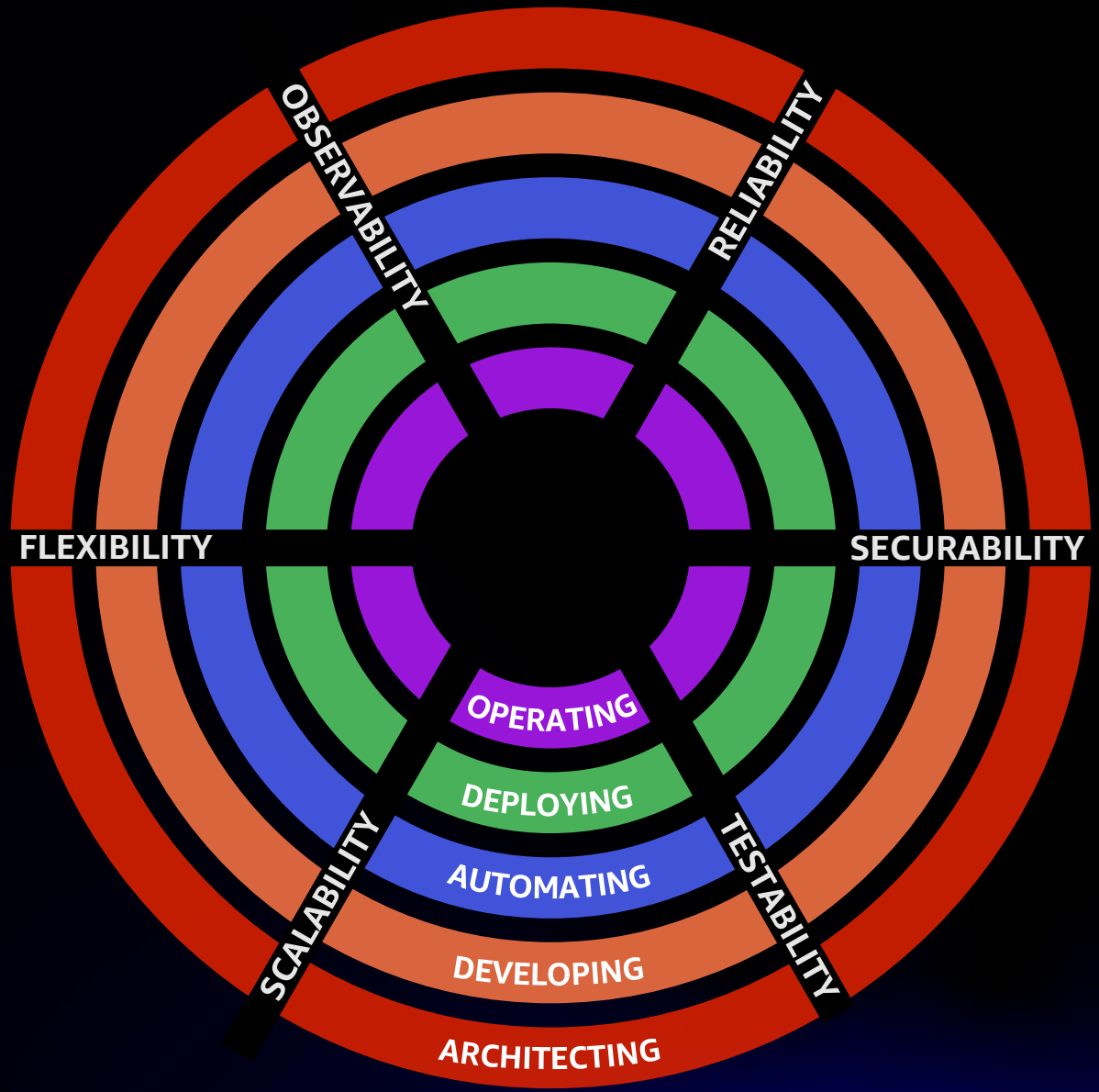


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Development Scenario

THE REVOLUTION MODEL IN PRACTICE

A developer, Ahmed, was tasked with implementing a new sign-up form for visitors of the application to become users; Ahmed utilized a front-end library to design the form and create a service in the user class to validate the form inputs; using test-driven development, he wrote tests first to meet expected behavior, wrote code implementing that behavior, and verified the code worked by running the unit tests



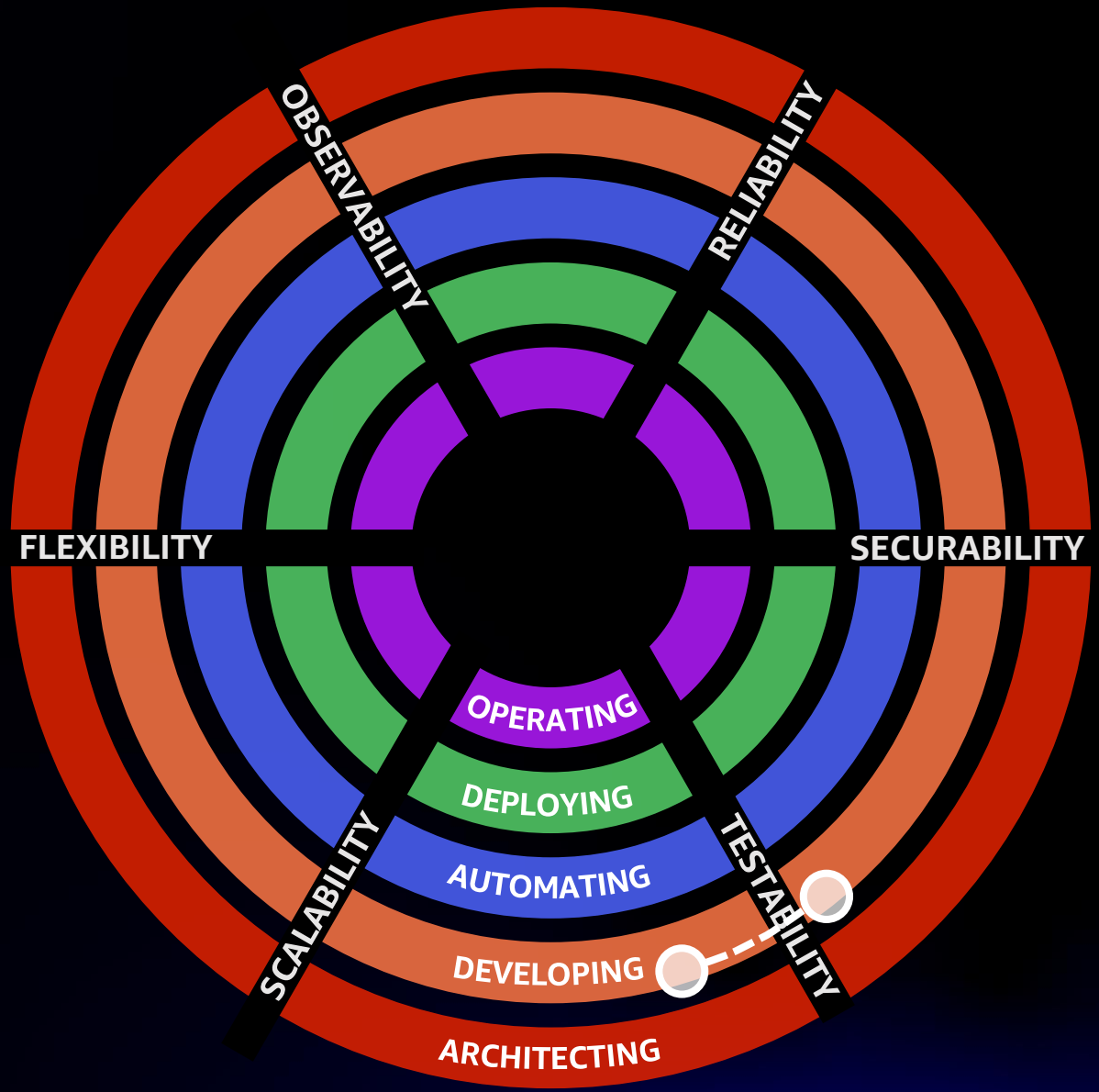
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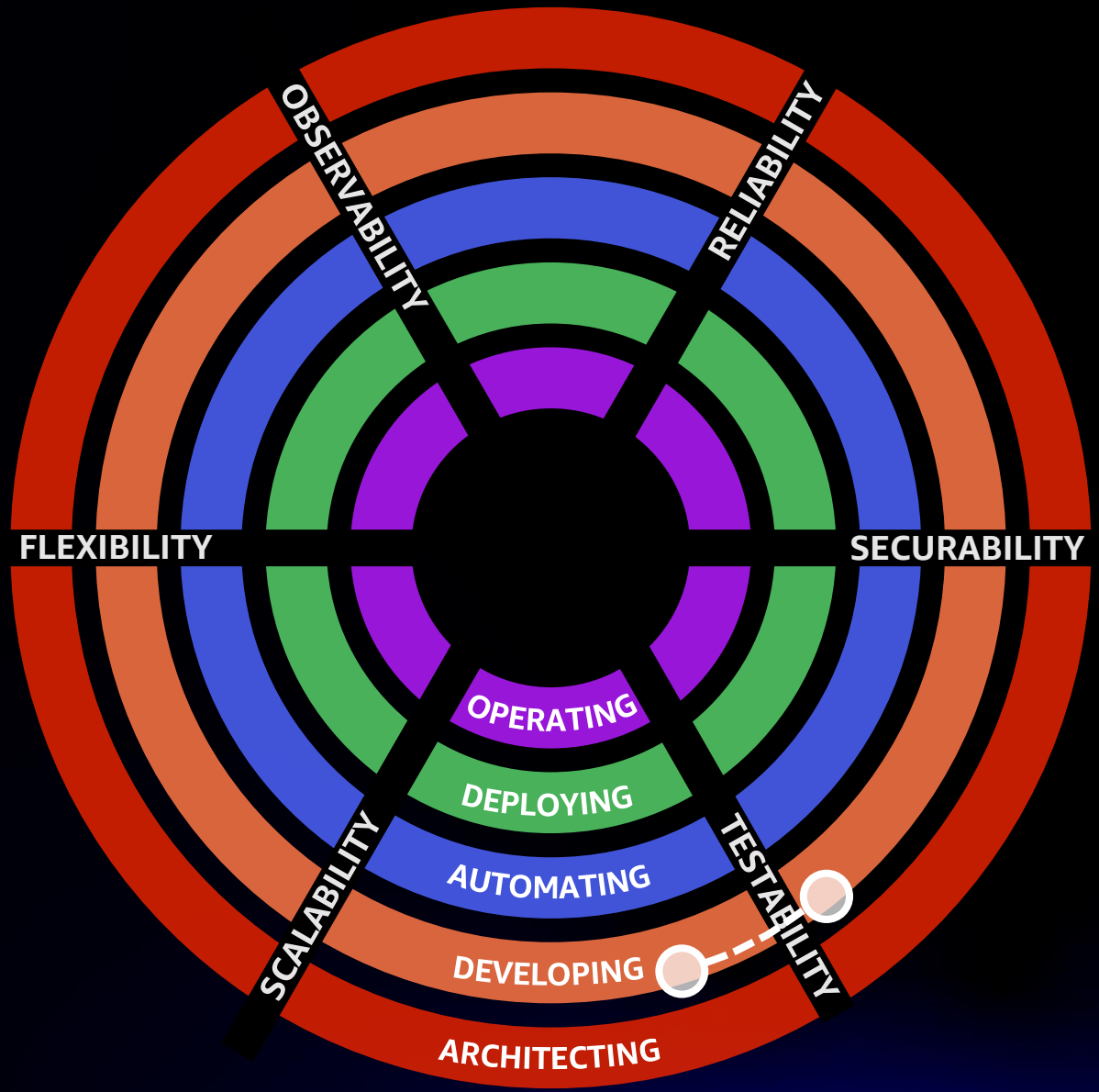
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Development Scenario

THE REVOLUTION MODEL IN PRACTICE

In two days, Ahmed created the logic that would allow users to sign up with a first name, last name, email, and date of birth; Ahmed compiled his code and kicked off the build process before he merged his feature branch into the main branch; the build was deployed to QA, where testers verified the behavior and approved the deployment; a DevOps engineer released the build to production after security and end-to-end tests passed

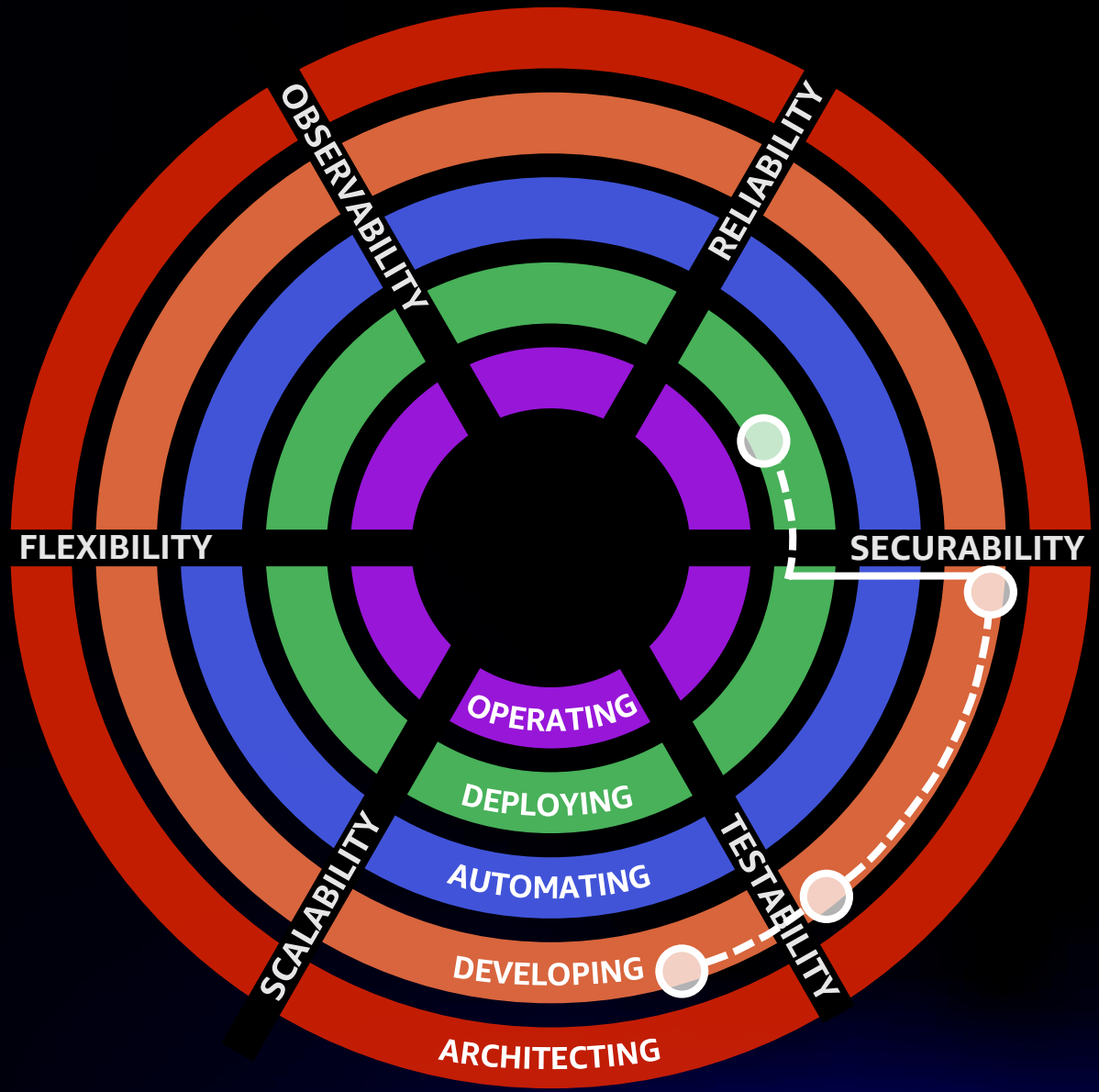


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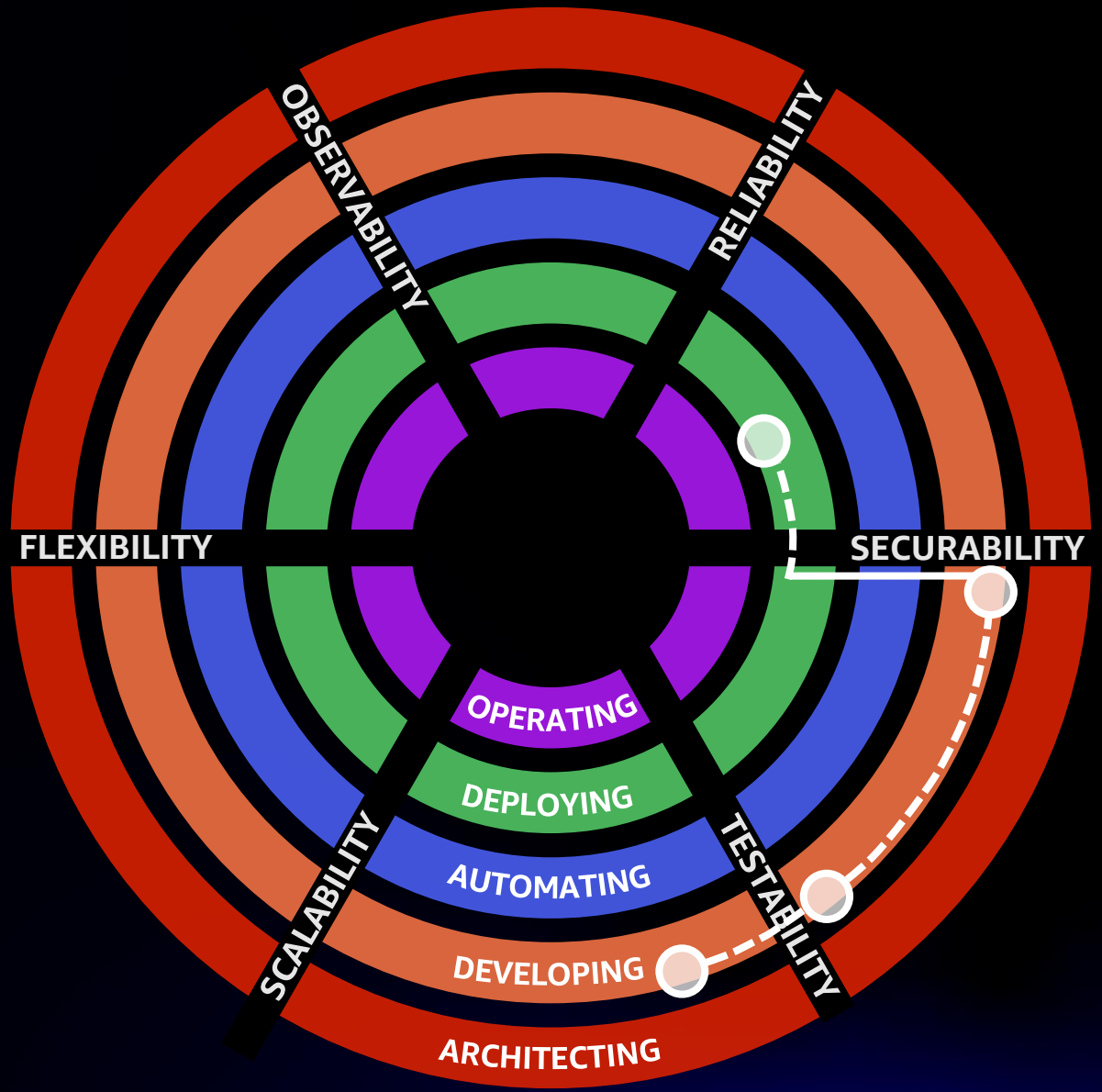
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Development Scenario

THE REVOLUTION MODEL IN PRACTICE

Later that afternoon, a customer named Li Juan opened a support ticket because the form wouldn’t let them sign up; in the original design, Ahmed had required three characters in each name field; the validation failed, and Li couldn’t register an account

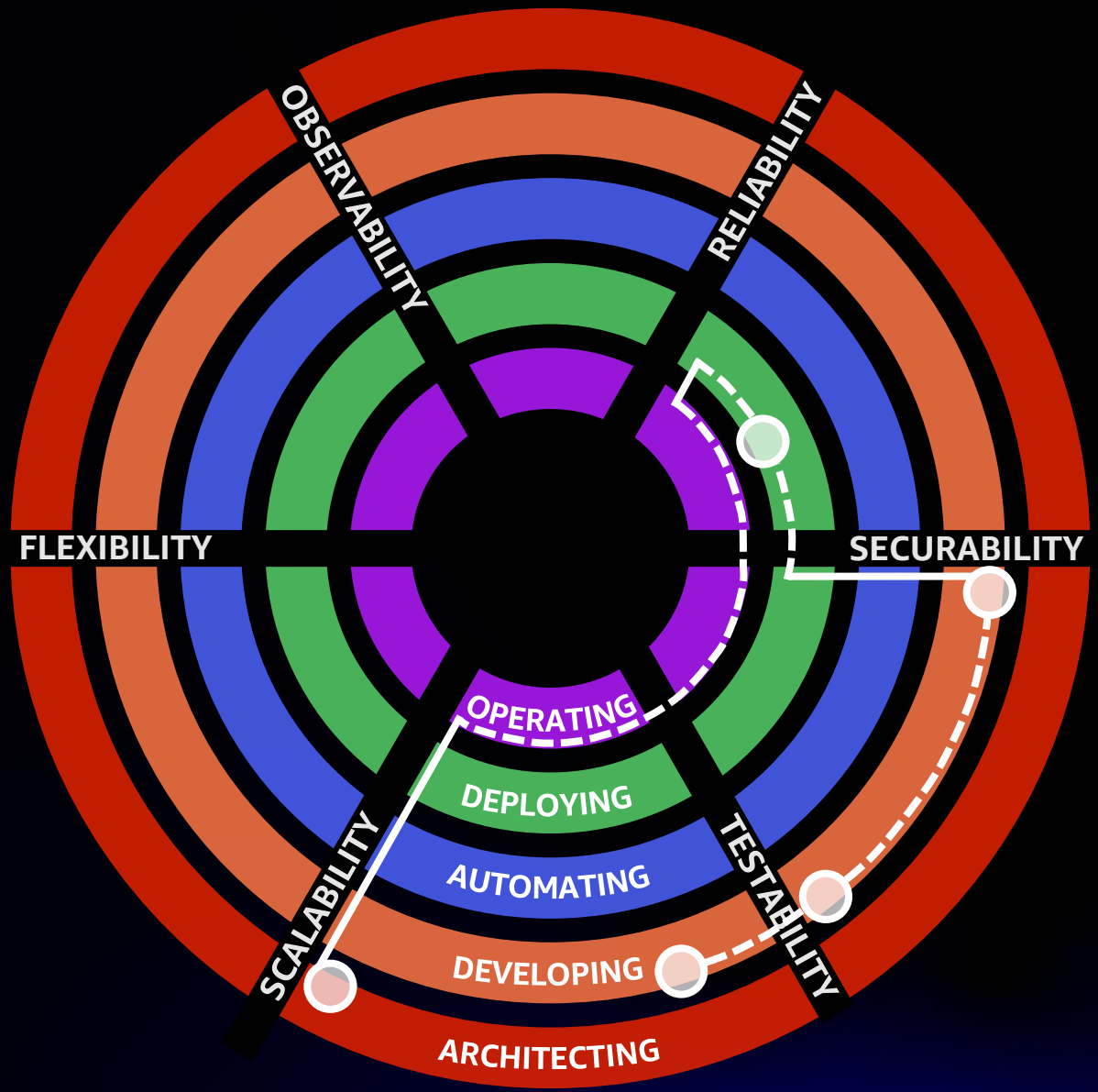


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Development Scenario

THE REVOLUTION MODEL IN PRACTICE

Amy, another developer, was assigned the bug in Jira; she updated the field requirements and added additional tests; an integration test failed when the wrong function with the same name was inadvertently called from within another service

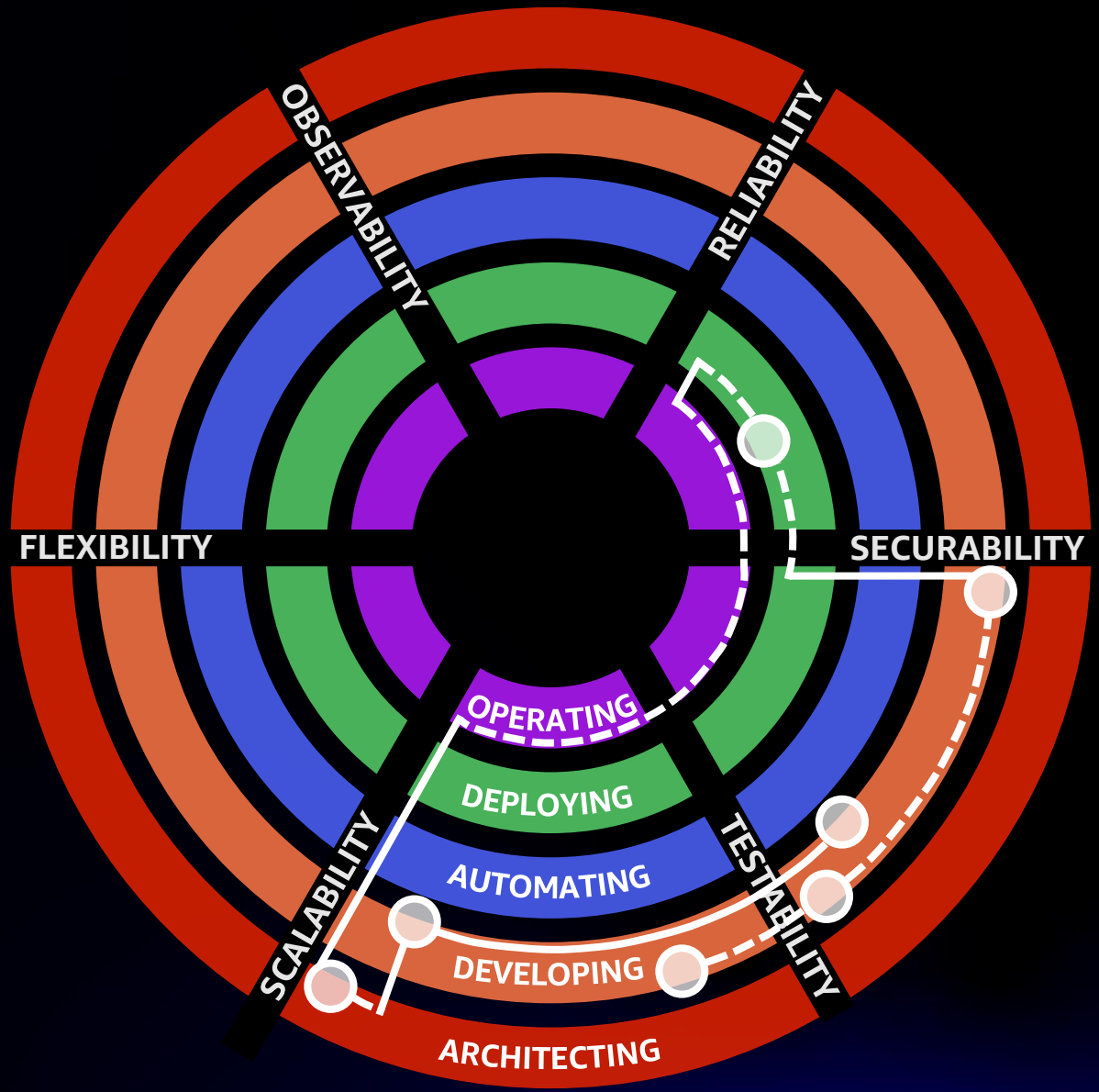


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Development Scenario

THE REVOLUTION MODEL IN PRACTICE

Amy realized there was overlapping logic in the application code and worked to combine the logic into one `form_verification` method, which created a more maintainable application; she documented the decision for other developers and shipped the fix

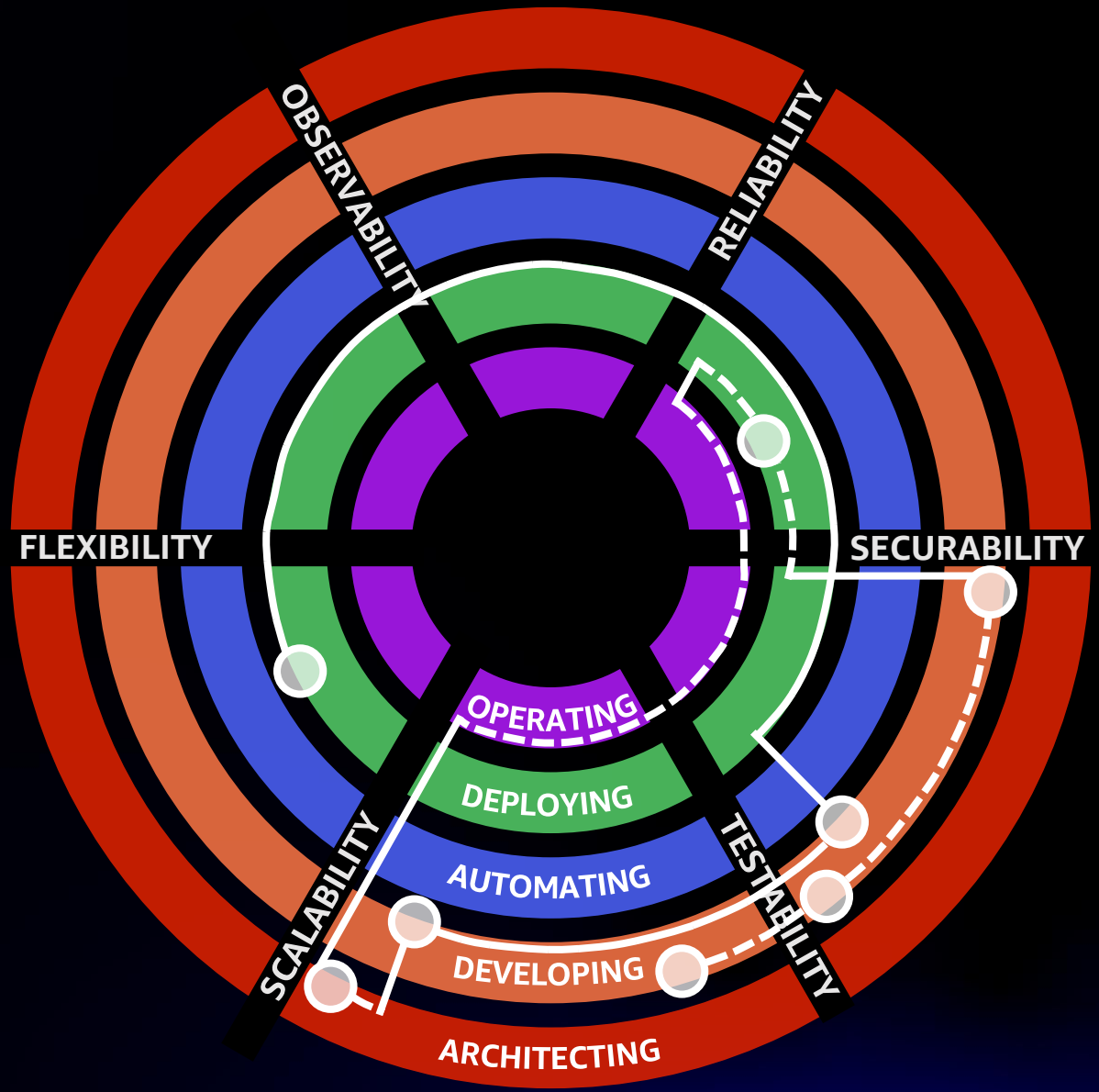


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Development Scenario

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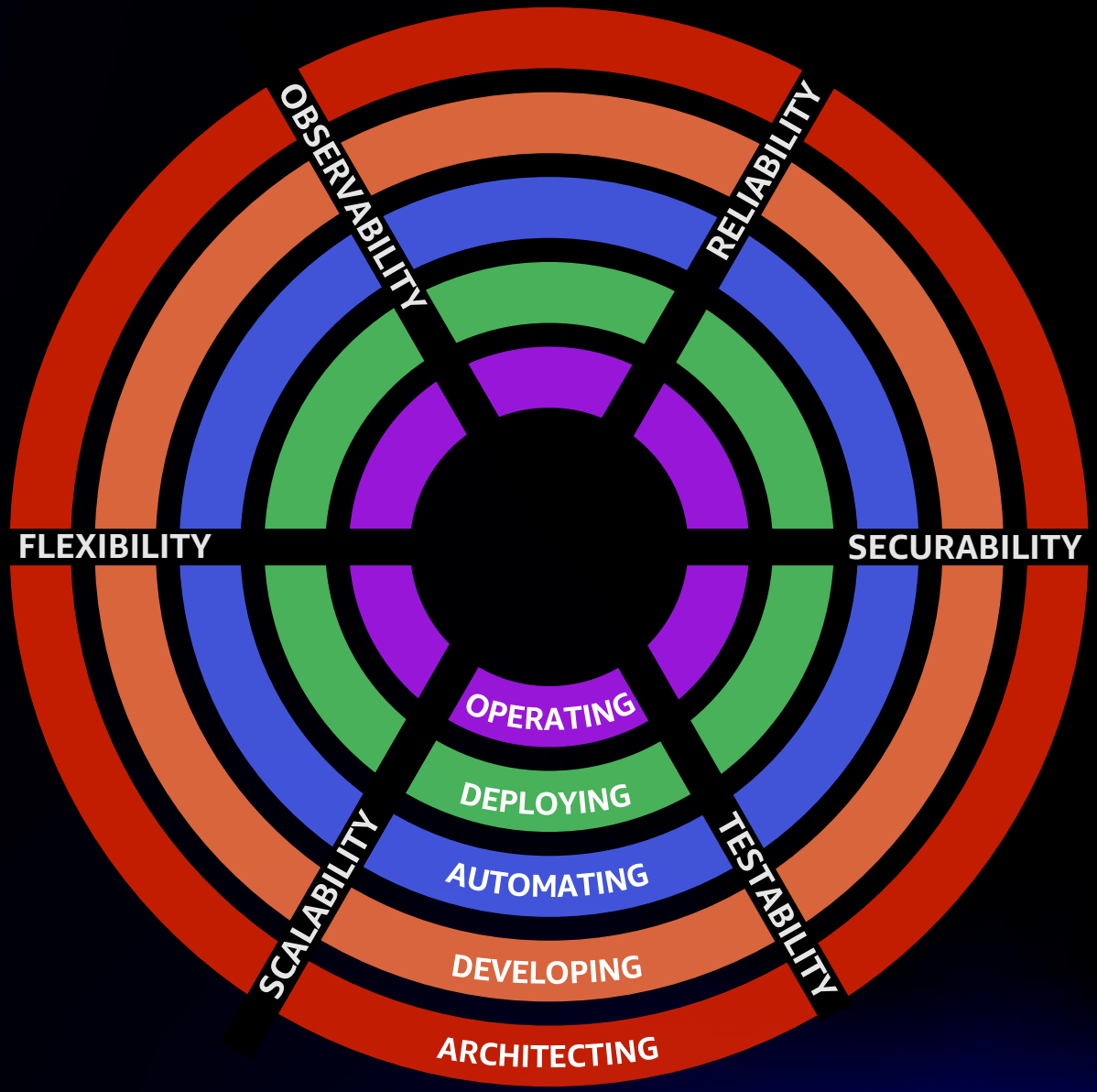
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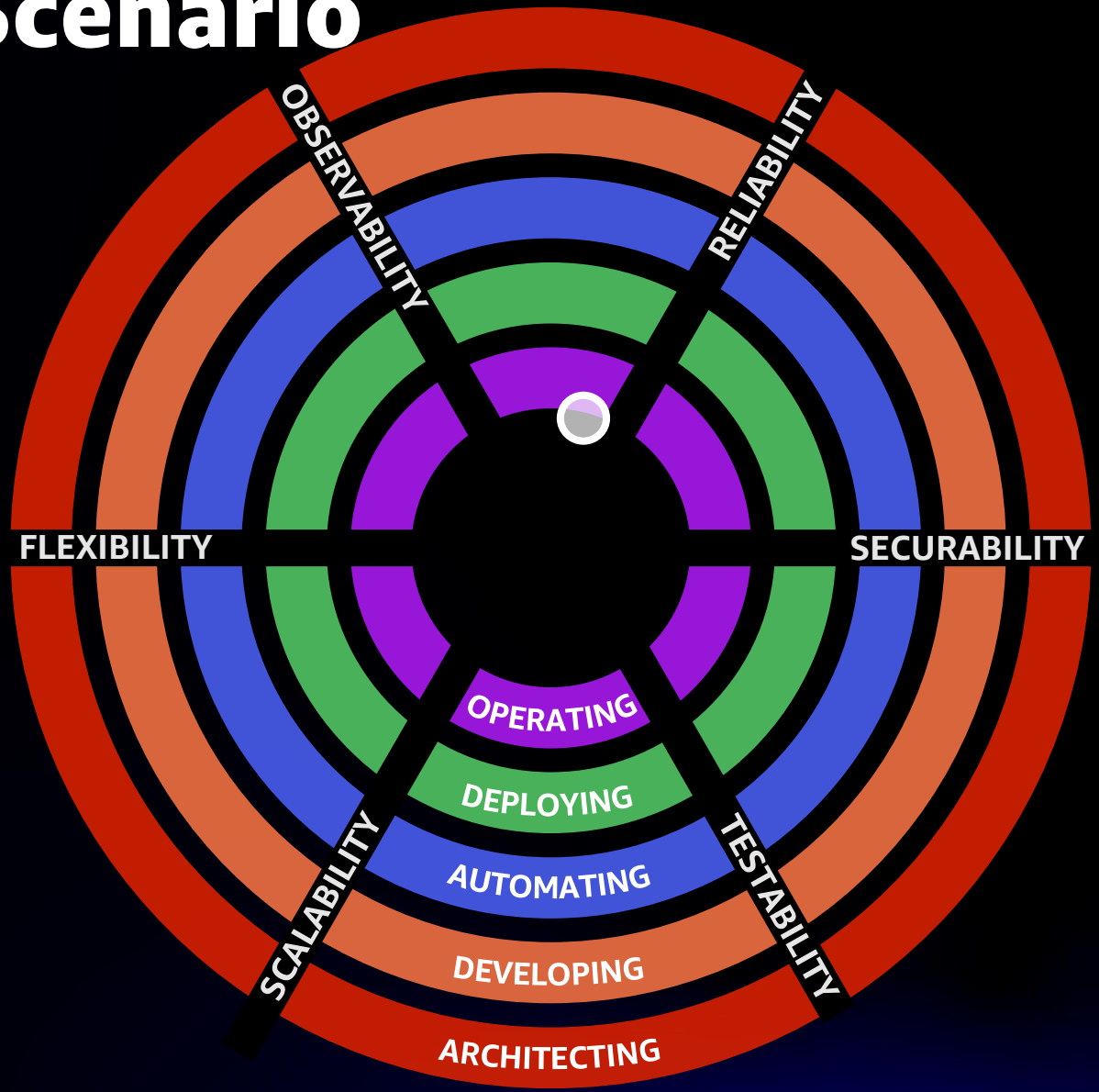


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Incident Management Scenario

THE REVOLUTION MODEL IN PRACTICE

At 2:00 AM EST, Mike, an operations engineer at a popular political blog, slept through an alert from PagerDuty regarding a SEV2 incident; José, a developer, was secondary on-call that night and woke up to the page; seven minutes later, he logged on to the monitoring dashboard in Amazon CloudWatch and saw Amazon DynamoDB had thrown hundreds of exceptions called `ProvisionedThroughput ExceededException`



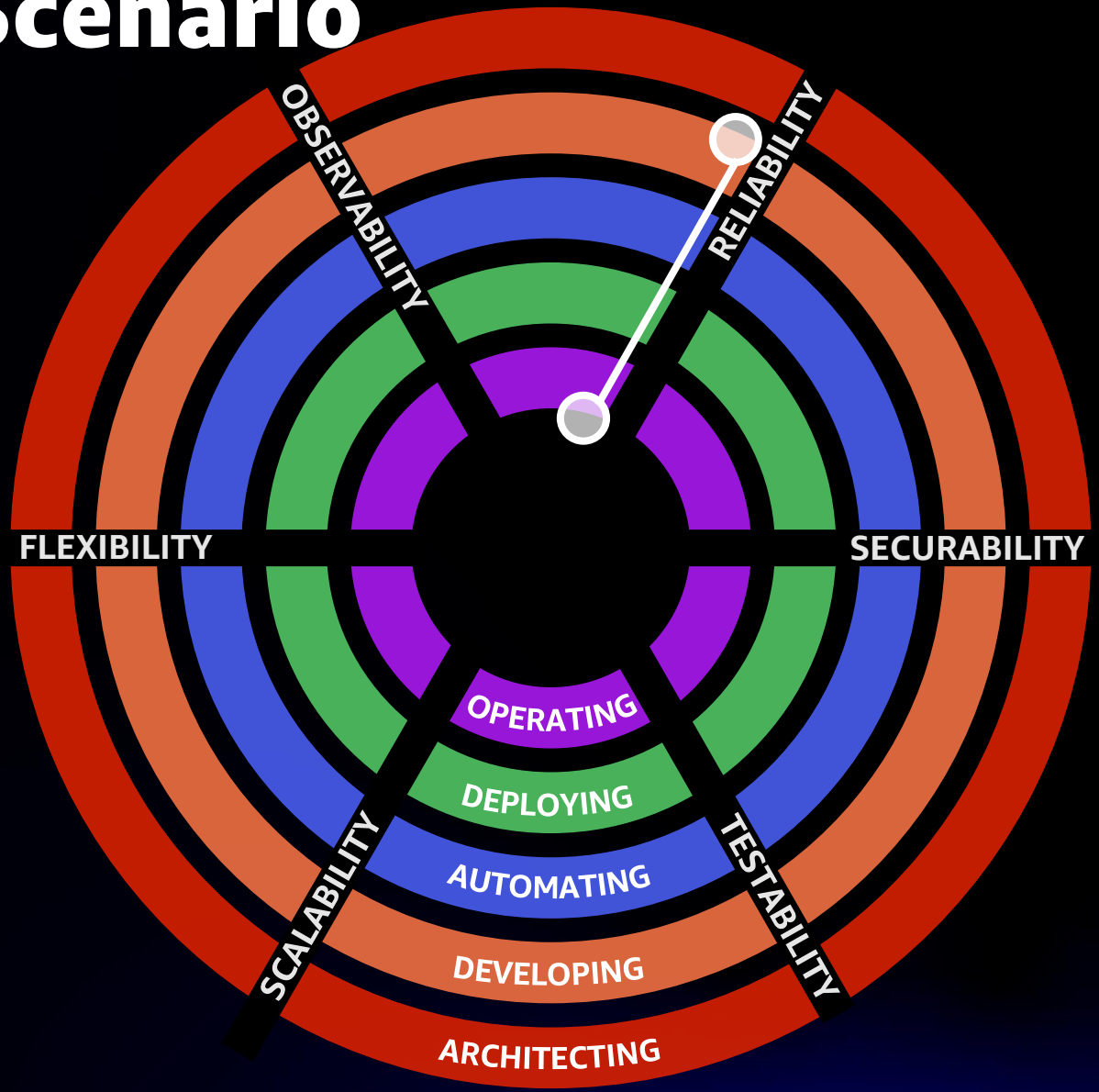
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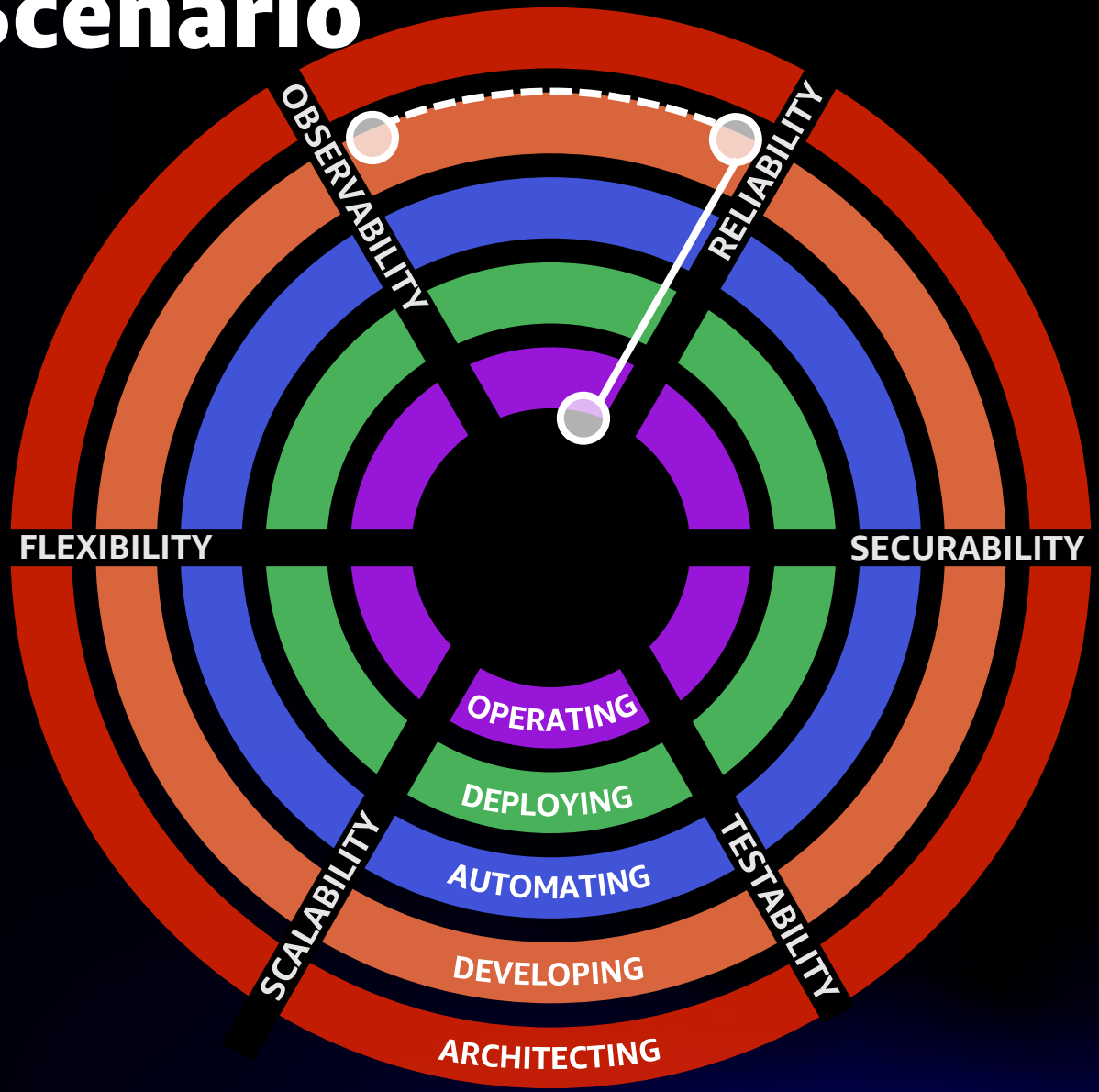


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THE REVOLUTION MODEL IN PRACTICE

At 2:00 AM EST, Mike, an operations engineer at a popular political blog, slept through an alert from PagerDuty regarding a SEV2 incident; José, a developer, was secondary on-call that night and woke up to the page; seven minutes later, he logged on to the monitoring dashboard in Amazon CloudWatch and saw Amazon DynamoDB had thrown hundreds of exceptions called `ProvisionedThroughput ExceededException`

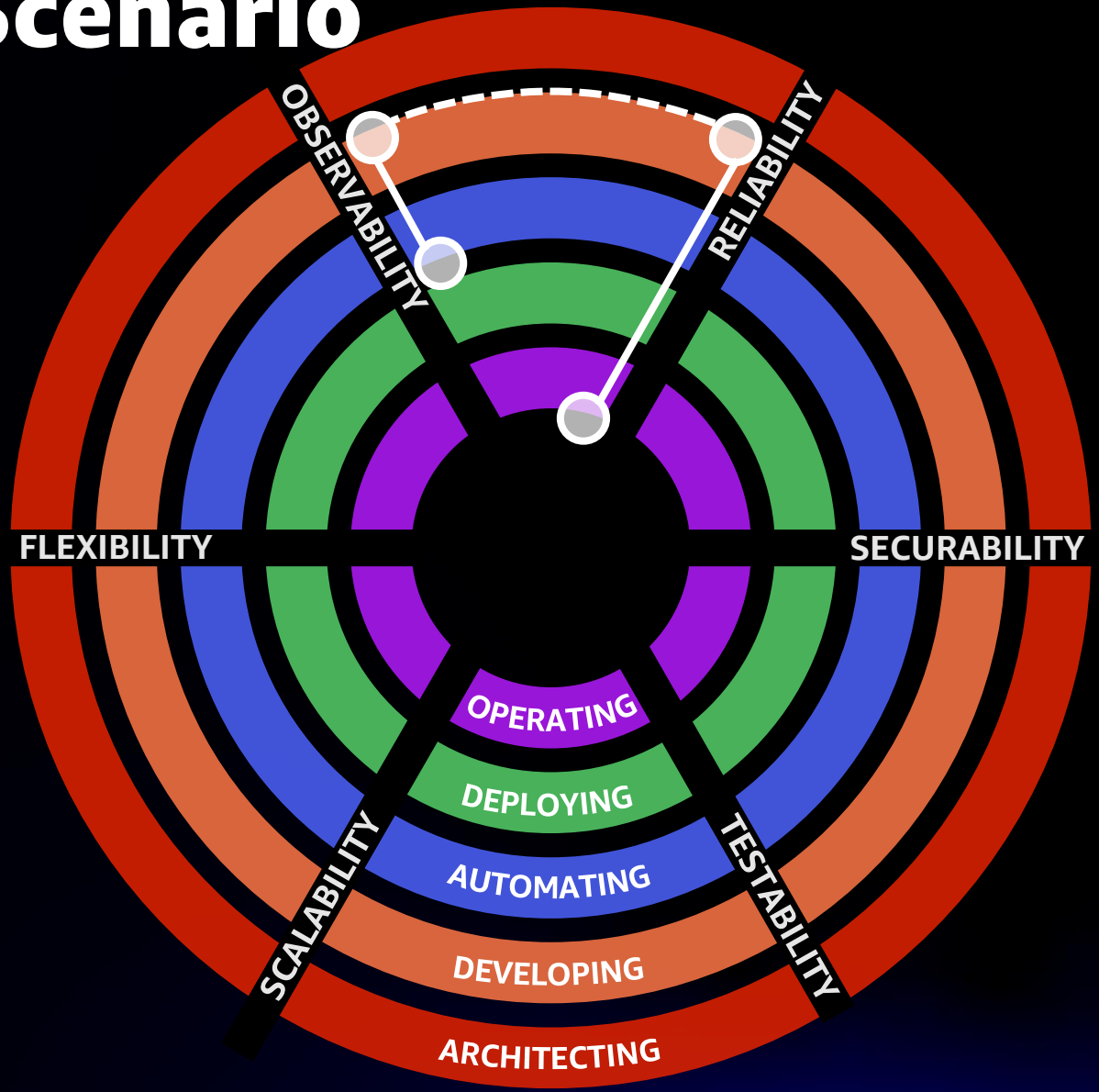


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Incident Management Scenario

THE REVOLUTION MODEL IN PRACTICE

José initially thought the error meant something in the infrastructure had been configured incorrectly, causing a provisioning issue; he investigated the state of infrastructure resources in AWS Systems Manager but couldn't find the issue; José escalated the incident and called additional engineers to help

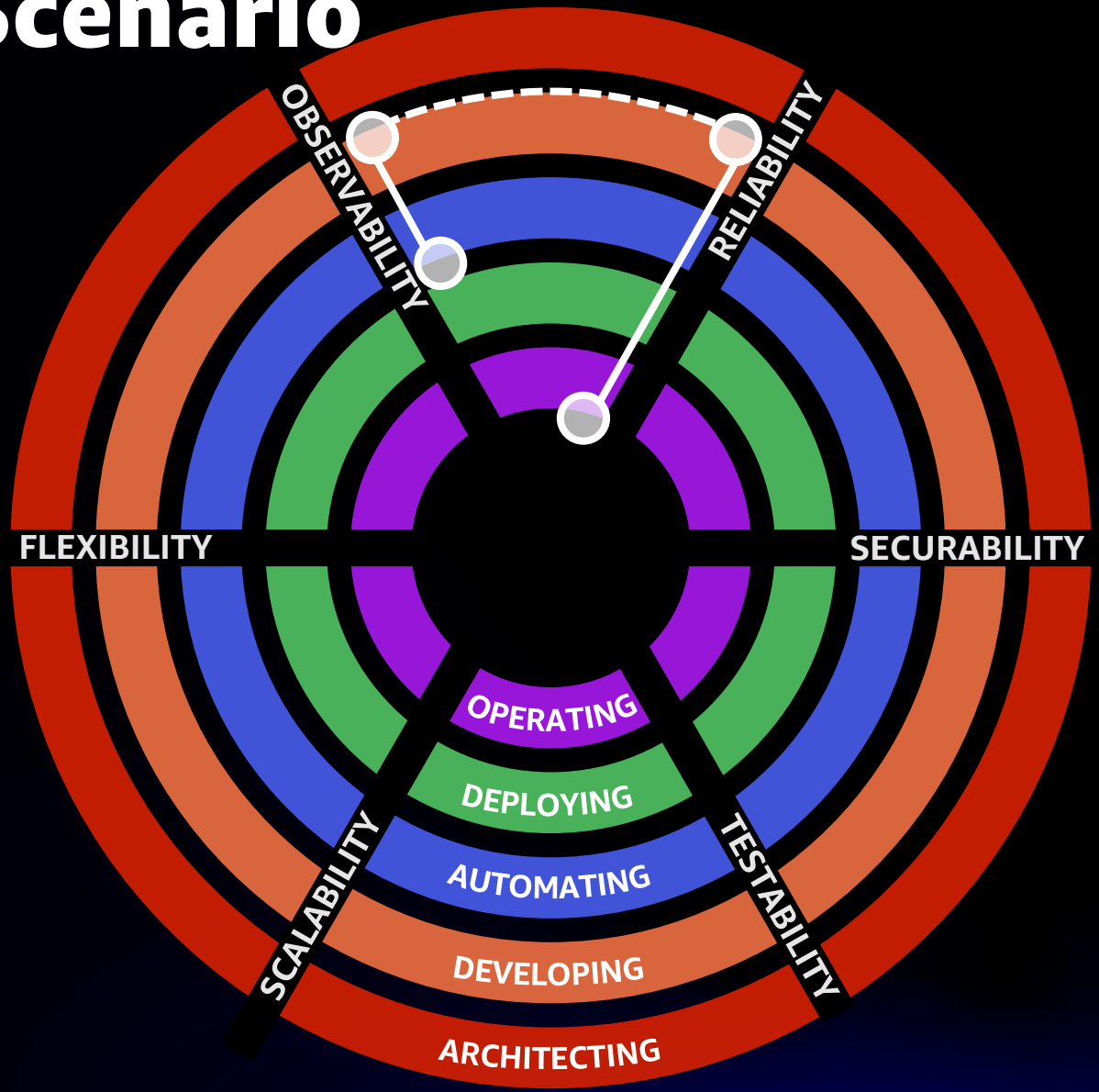


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Incident Management Scenario

THE REVOLUTION MODEL IN PRACTICE

In the meantime, he found an Amazon DevOps Guru graph available in Amazon CloudWatch and was able to locate the spike in database activity; he checked for changes to the application or infrastructure made around that time but found none; next, he queried the database to determine what queries had been made over the last few hours; each transaction shared the same `article_id`

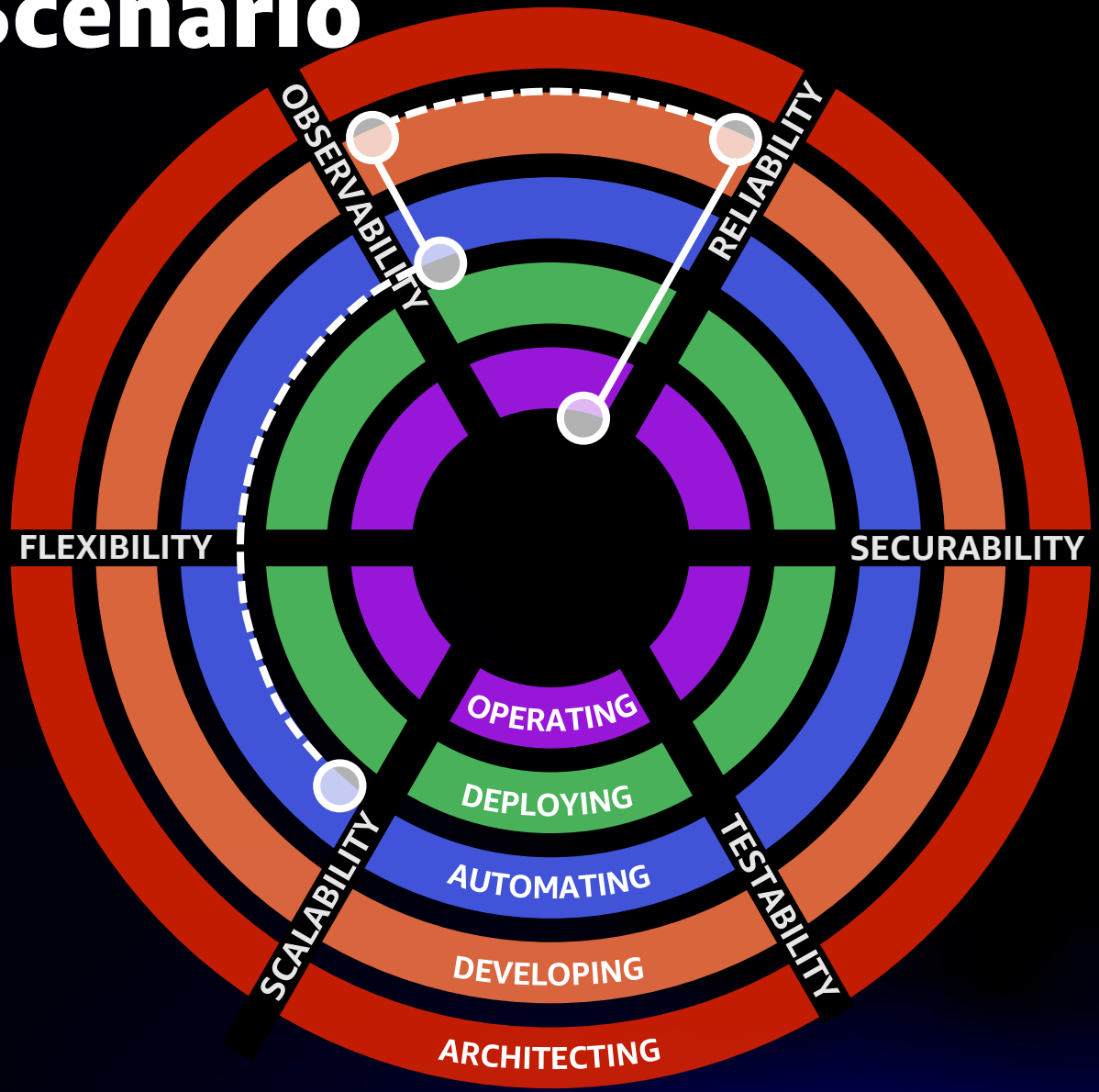


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Incident Management Scenario

THE REVOLUTION MODEL IN PRACTICE

From there, and with the help of his colleagues, José discovered that the number of comments left on a particularly polarizing article had exceeded the limits originally provisioned for DynamoDB; the throughput limit was scaled up temporarily until morning, when operations engineers could enable more flexible auto scaling

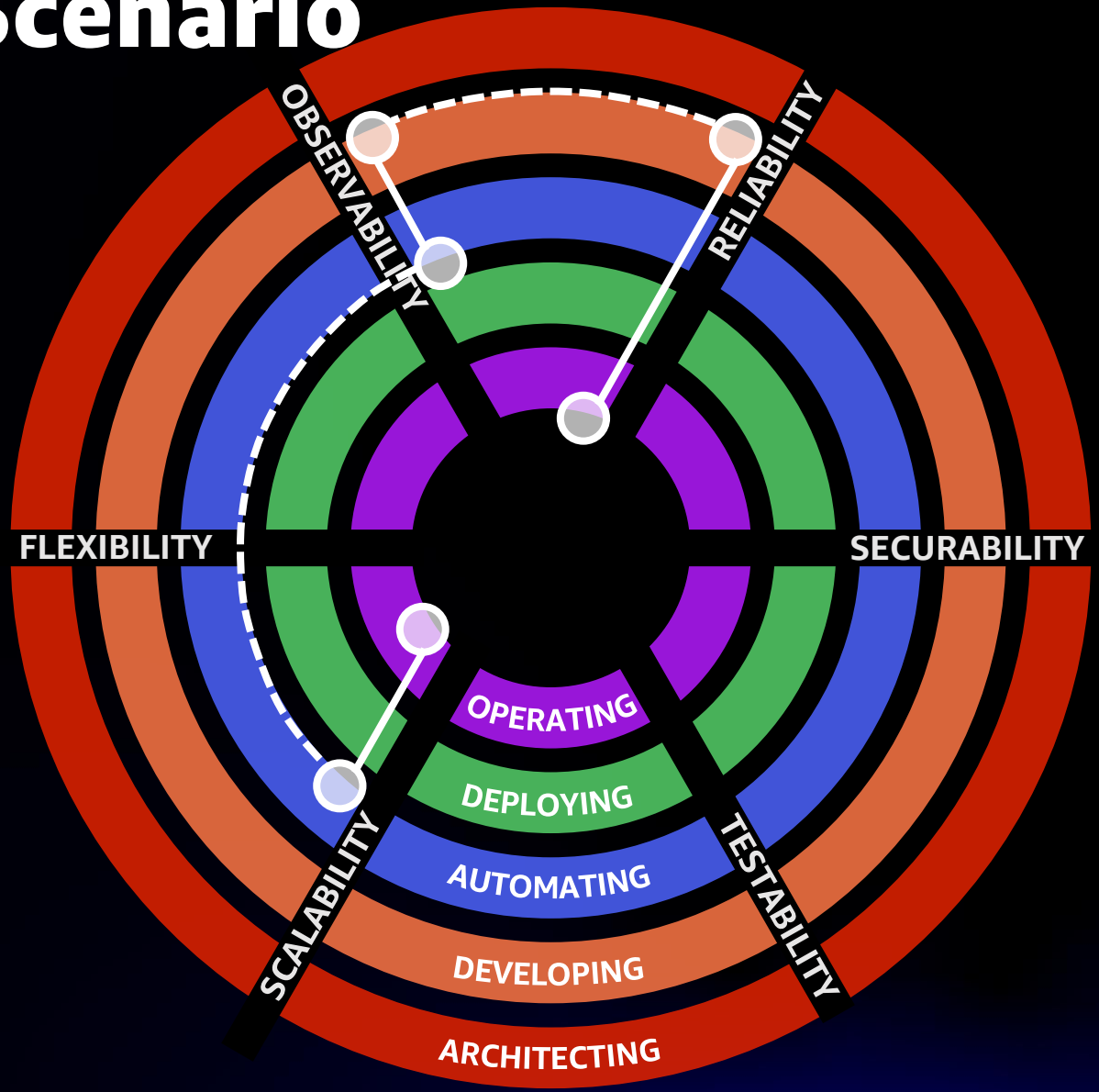


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Incident Management Scenario

THE REVOLUTION MODEL IN PRACTICE

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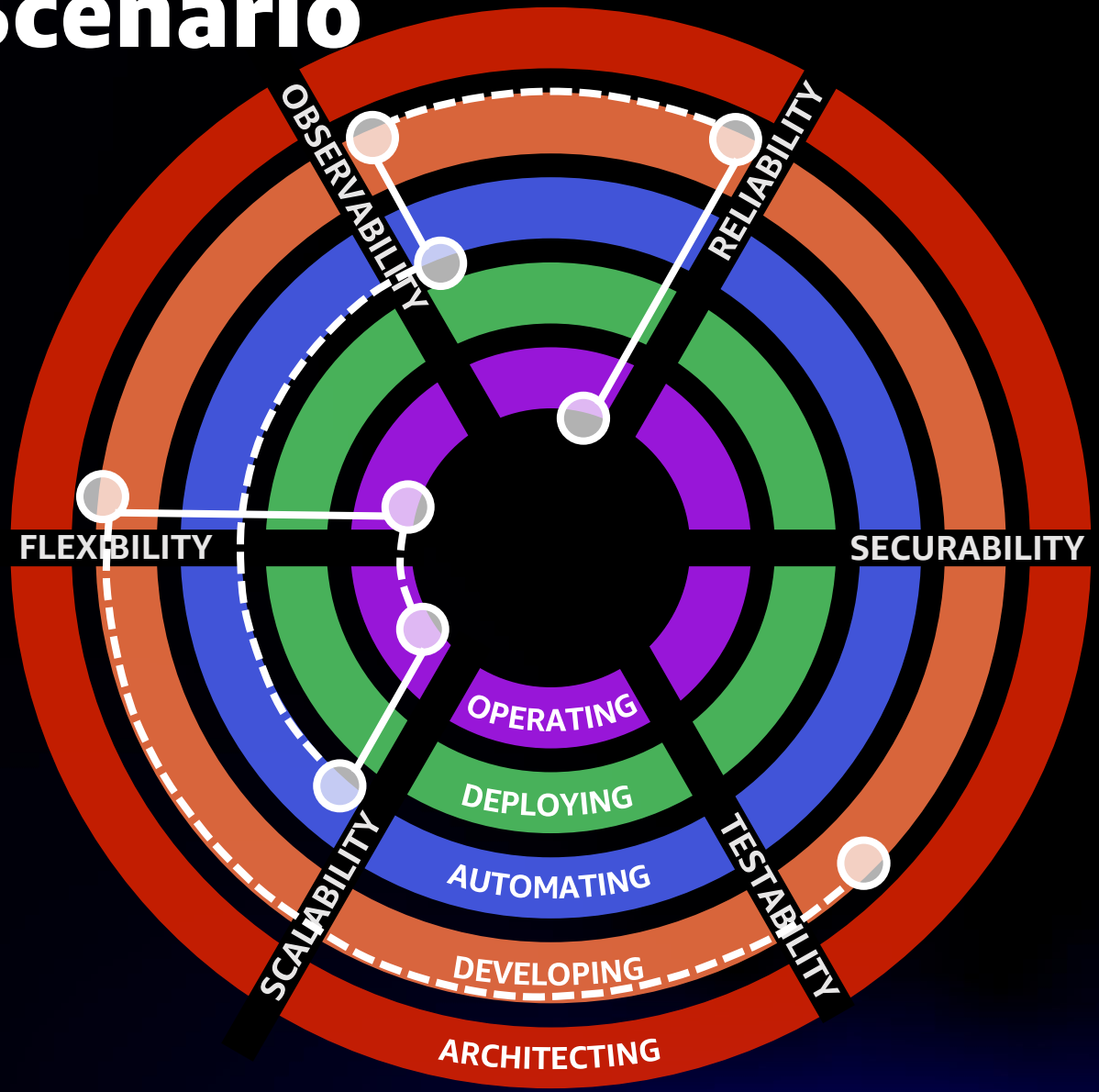


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Incident Management Scenario

THE REVOLUTION MODEL IN PRACTICE

In the post-incident review, several developers suggested that there might be multiple processes initiating database updates; additionally, at the time, there were no uniqueness constraints stored in the database, allowing duplicate writes; a committee of three engineers was assigned to investigate the issue and determine necessary next steps



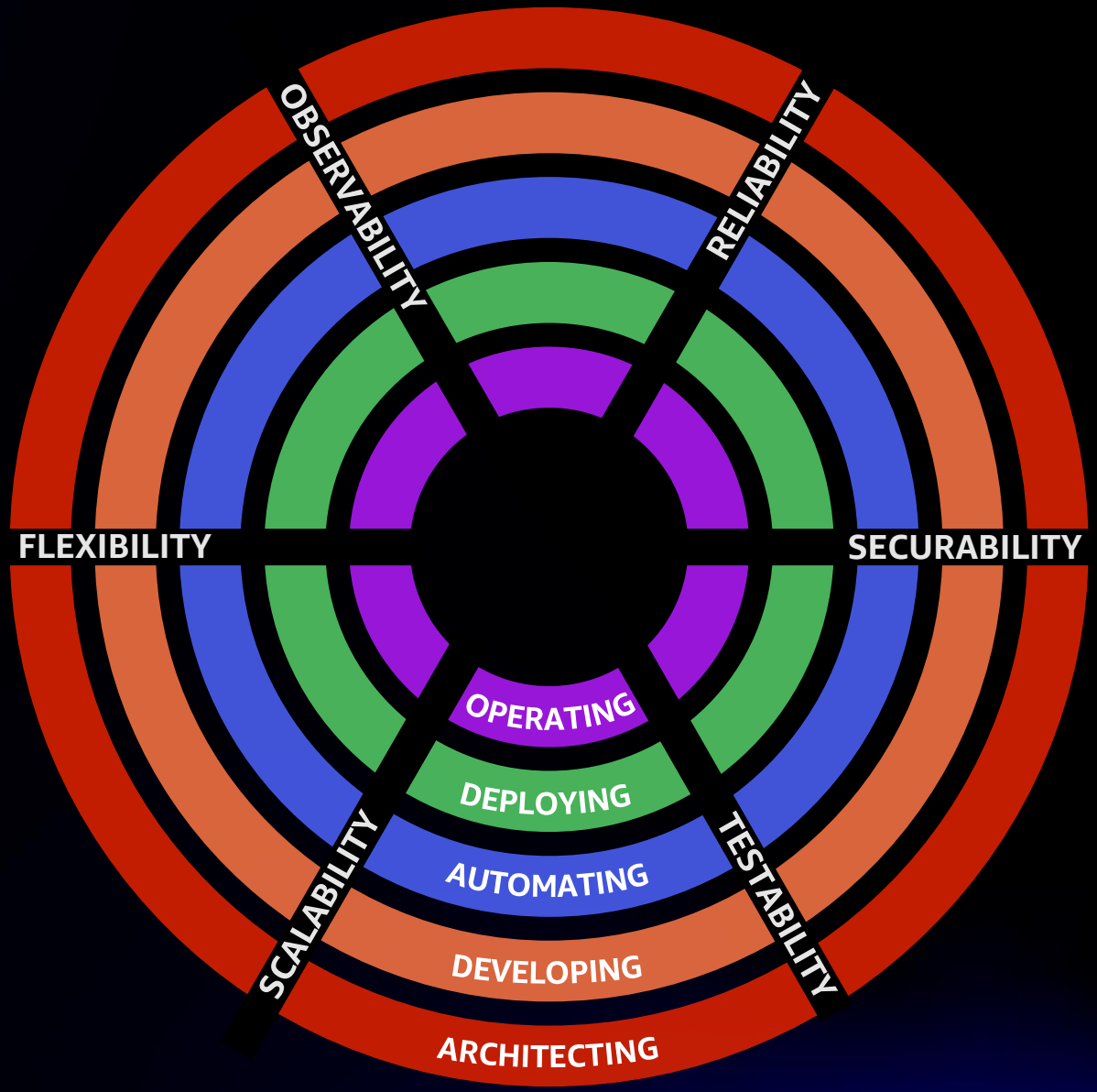
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Measuring Success

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Measuring Success

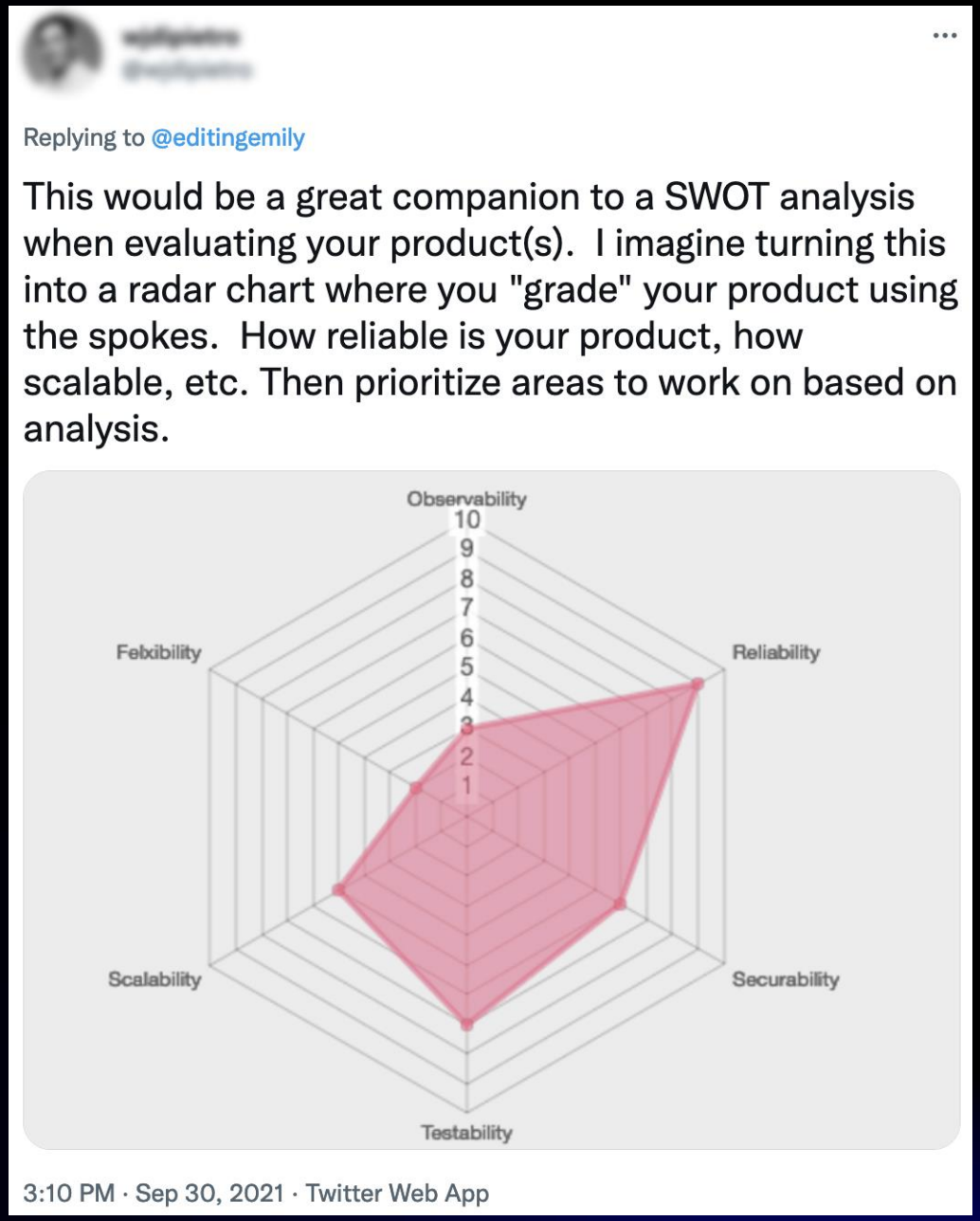
THE REVOLUTION MODEL IN PRACTICE



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Measuring Success

THE REVOLUTION MODEL IN PRACTICE



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Measuring Success

PERSUASION

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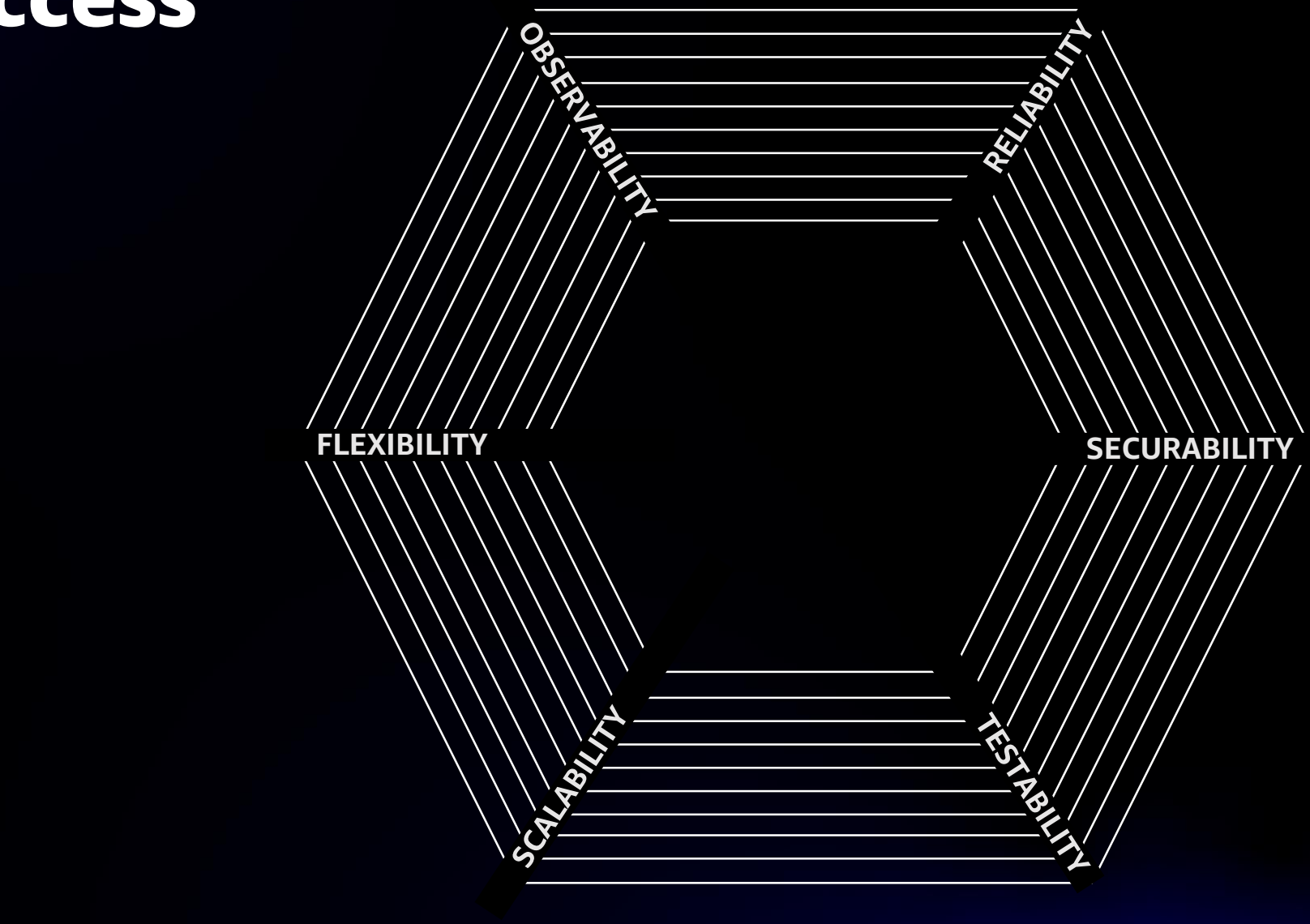


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Measuring Success

INITIAL BASELINE

Testability -
Securability -
Reliability -
Observability -
Flexibility -
Scalability -

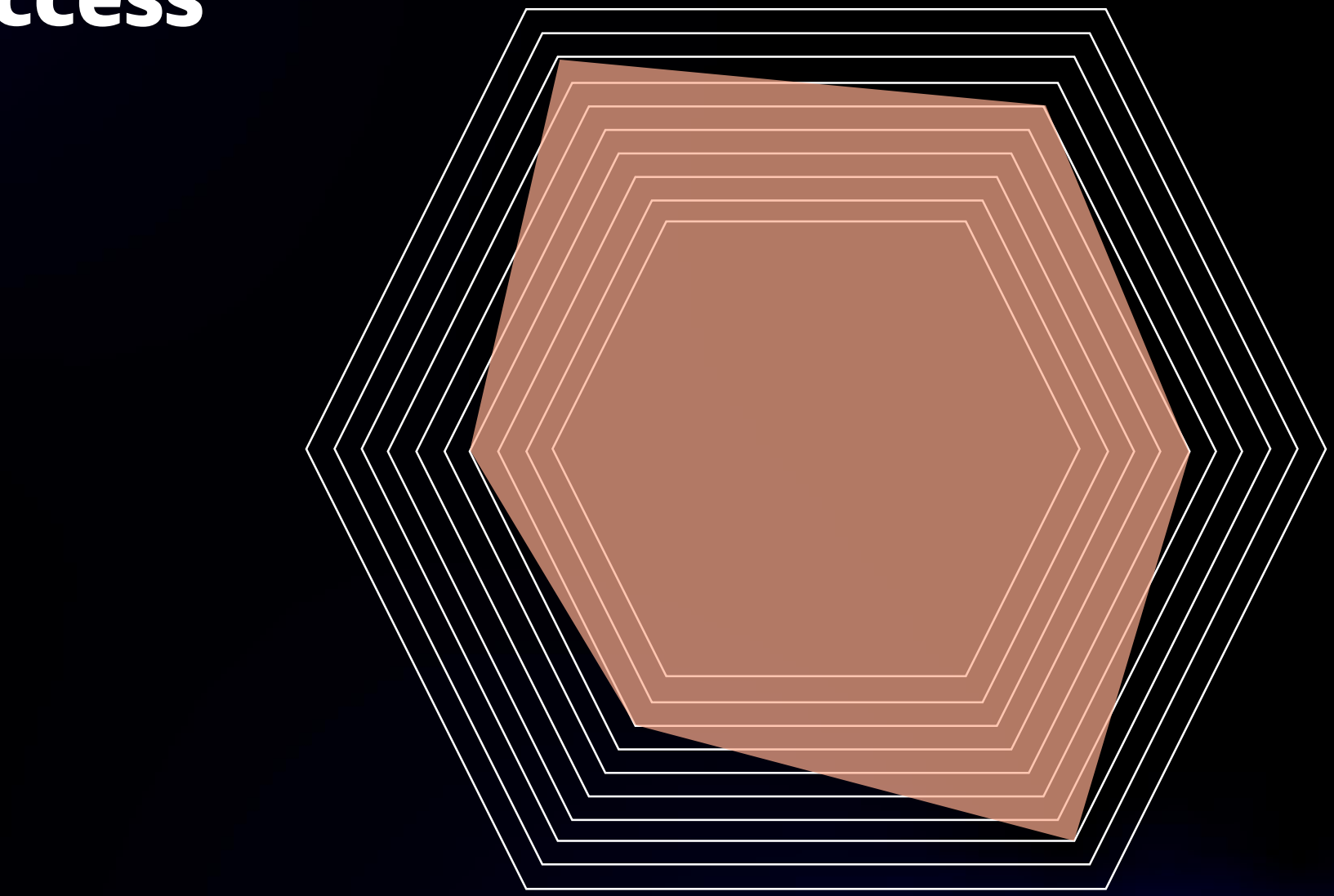


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Measuring Success

INITIAL BASELINE

Testability	8
Securability	5
Reliability	6
Observability	8
Flexibility	4
Scalability	3

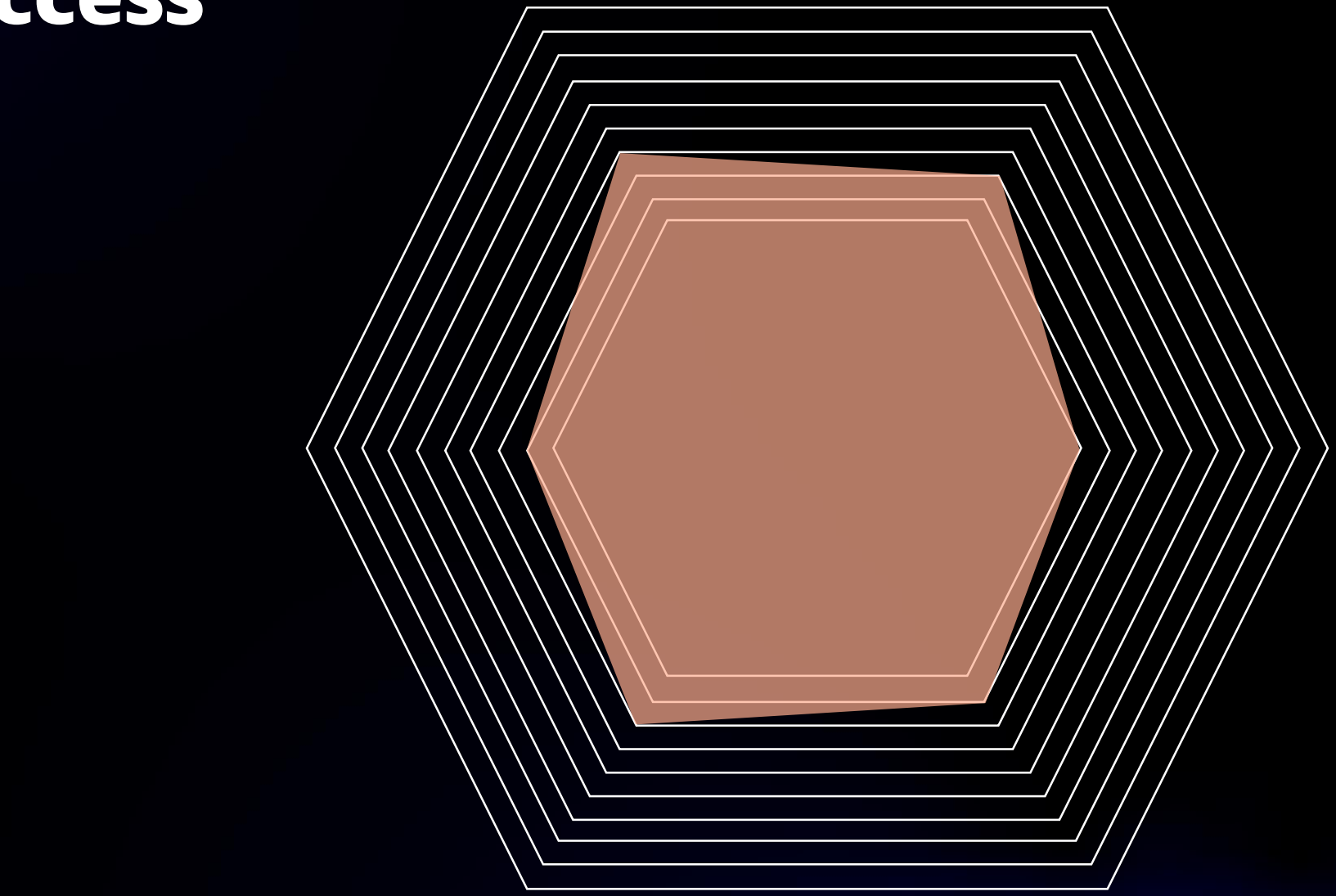


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Measuring Success

INITIAL BASELINE

Testability	2
Securability	1
Reliability	3
Observability	4
Flexibility	2
Scalability	3

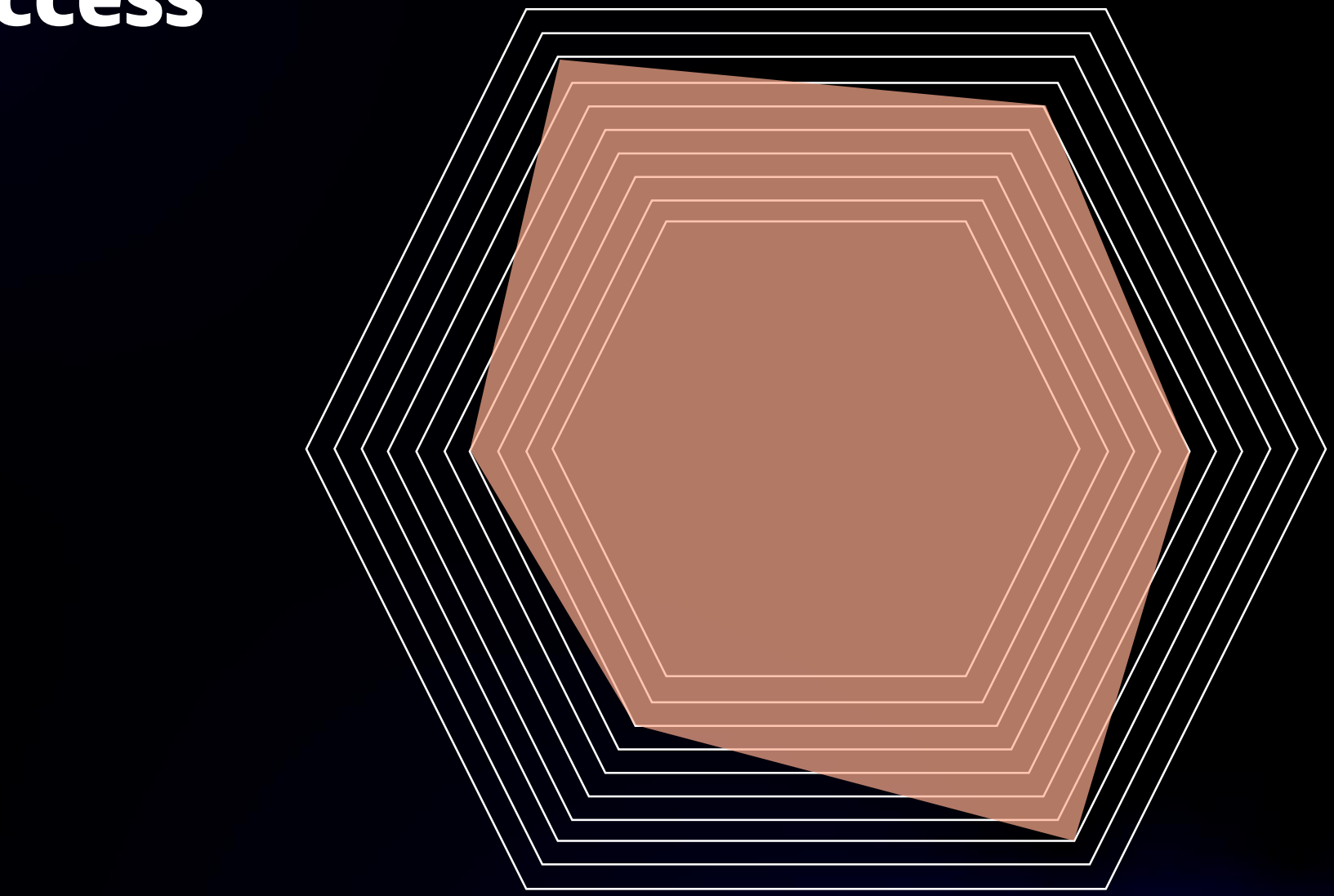


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Measuring Success

INITIAL BASELINE

Testability	8
Securability	5
Reliability	6
Observability	8
Flexibility	4
Scalability	3

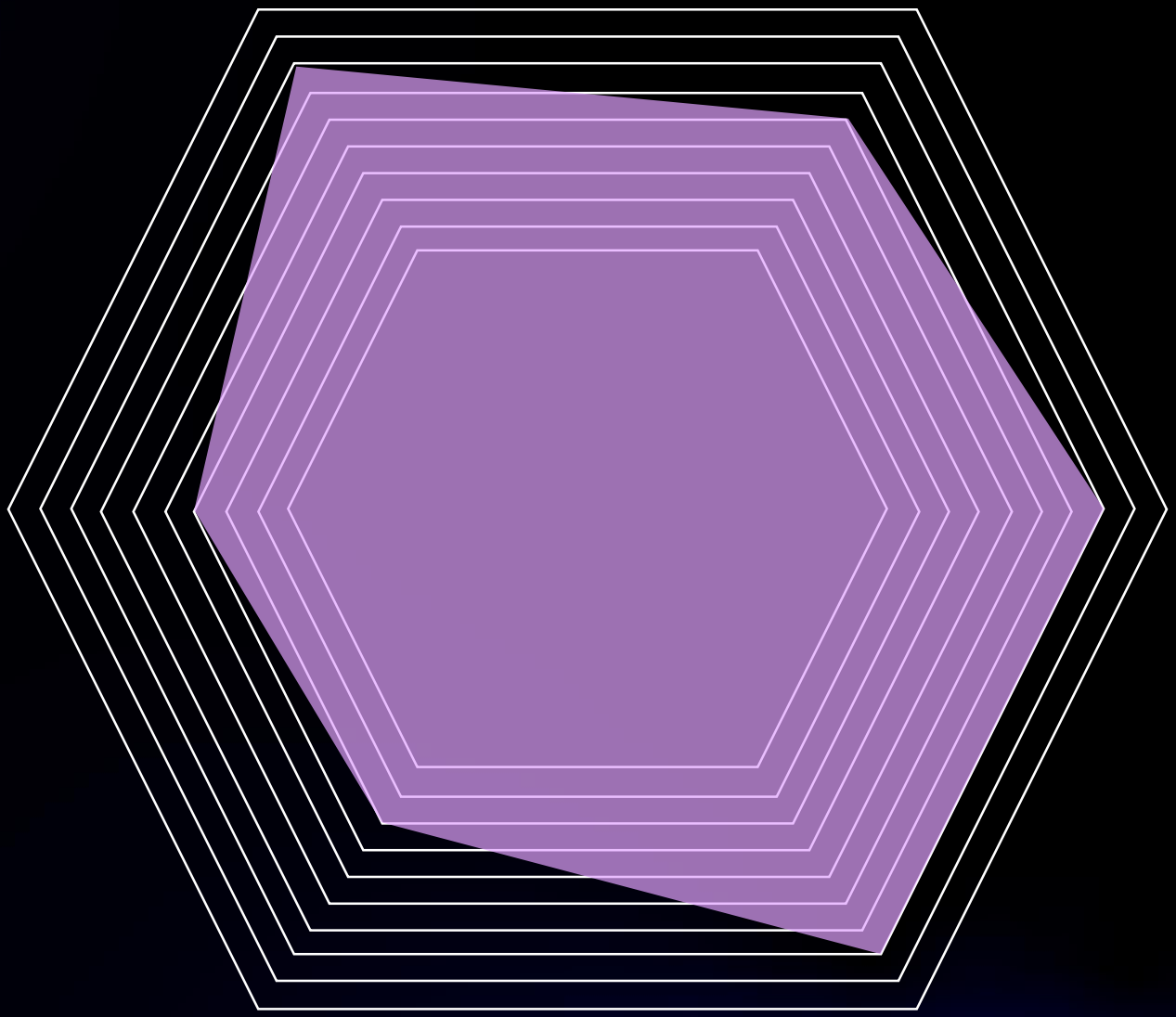


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Measuring Success

SIX-MONTH PROGRESS CHECK-IN

Testability	8
Securability	8
Reliability	6
Observability	8
Flexibility	4
Scalability	3

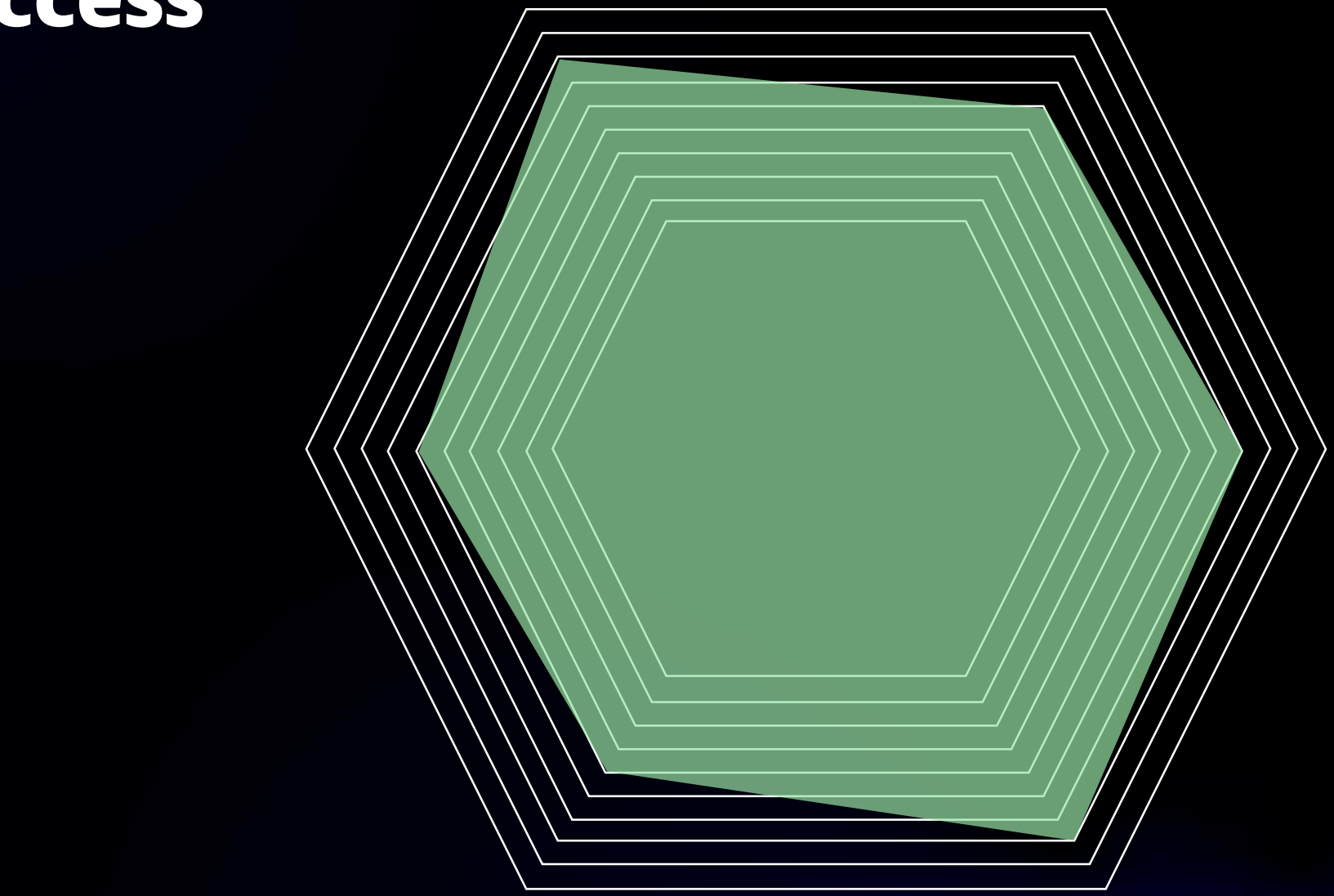


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Measuring Success

A YEAR OF WORK

Testability	8
Securability	7
Reliability	6
Observability	8
Flexibility	6
Scalability	5



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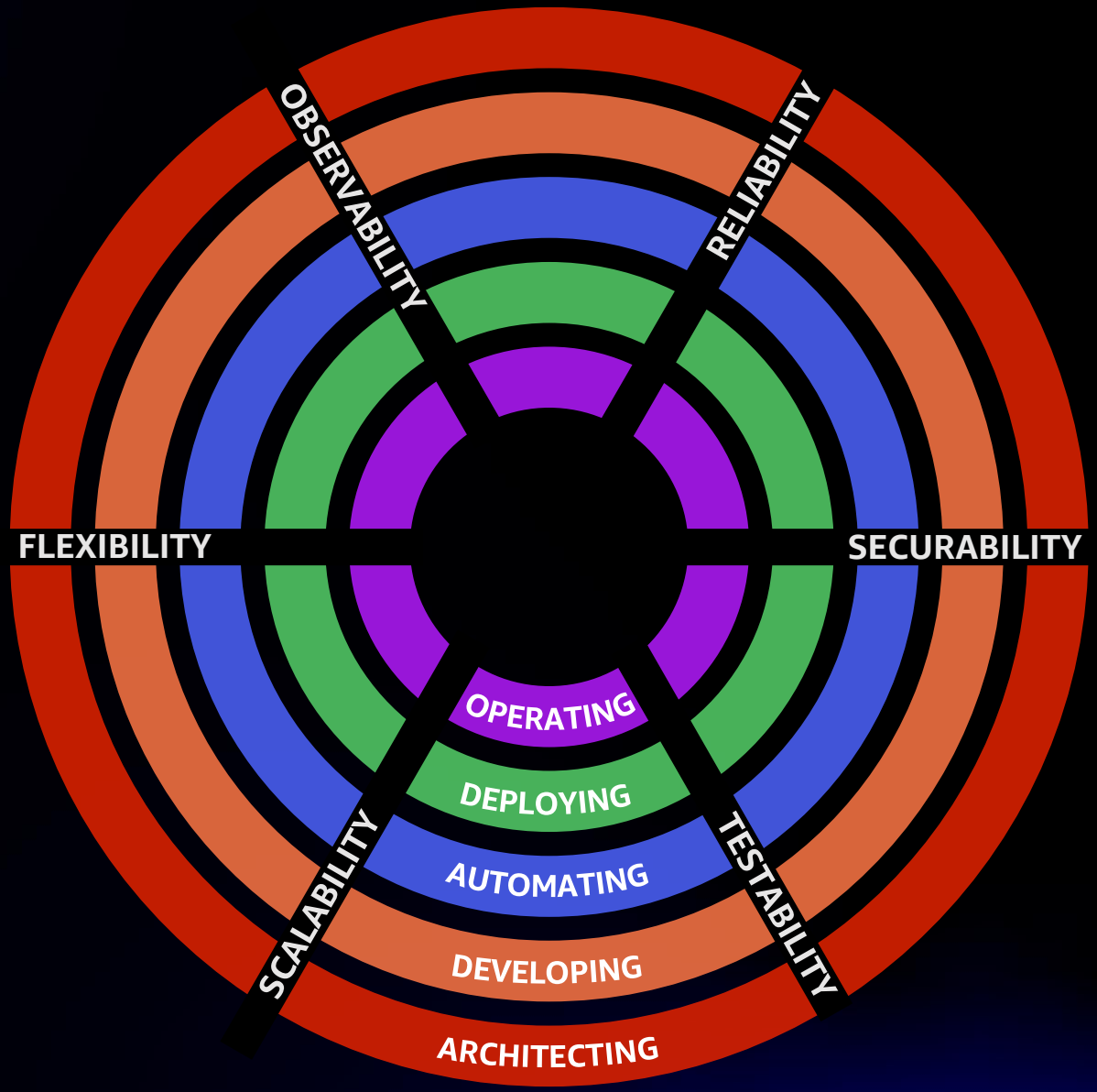
Improving Developer Experience



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A New Model

REVOLUTIONARY SOFTWARE DEVELOPMENT



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Thank you!

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