Building a DevOps Organization

Zinnov New York Round Table

July 2015

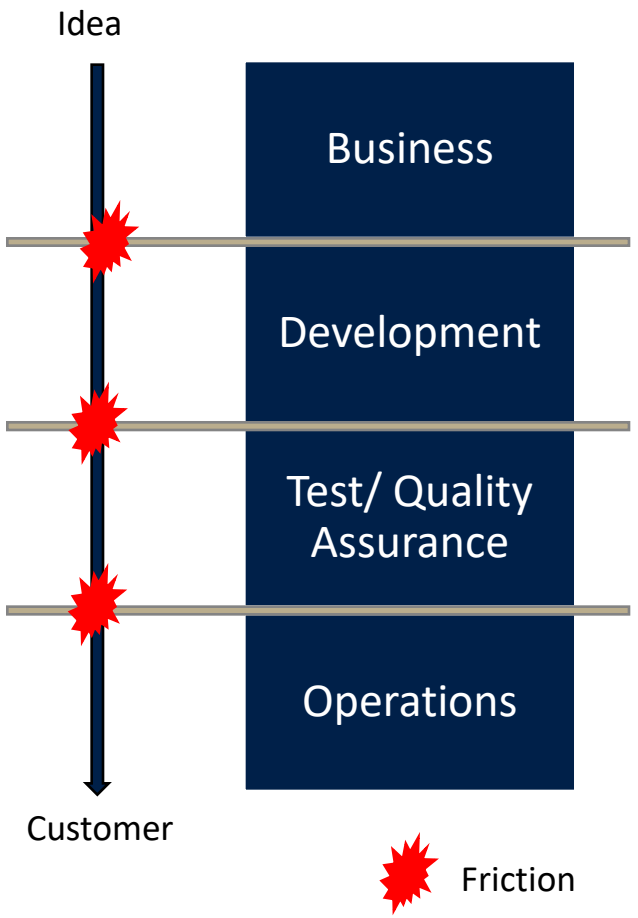
Agenda

TABLE OF CONTENTS

DevOps provides competitive advantage to businesses through faster time to market by breaking down silos between business, development, testing and operations

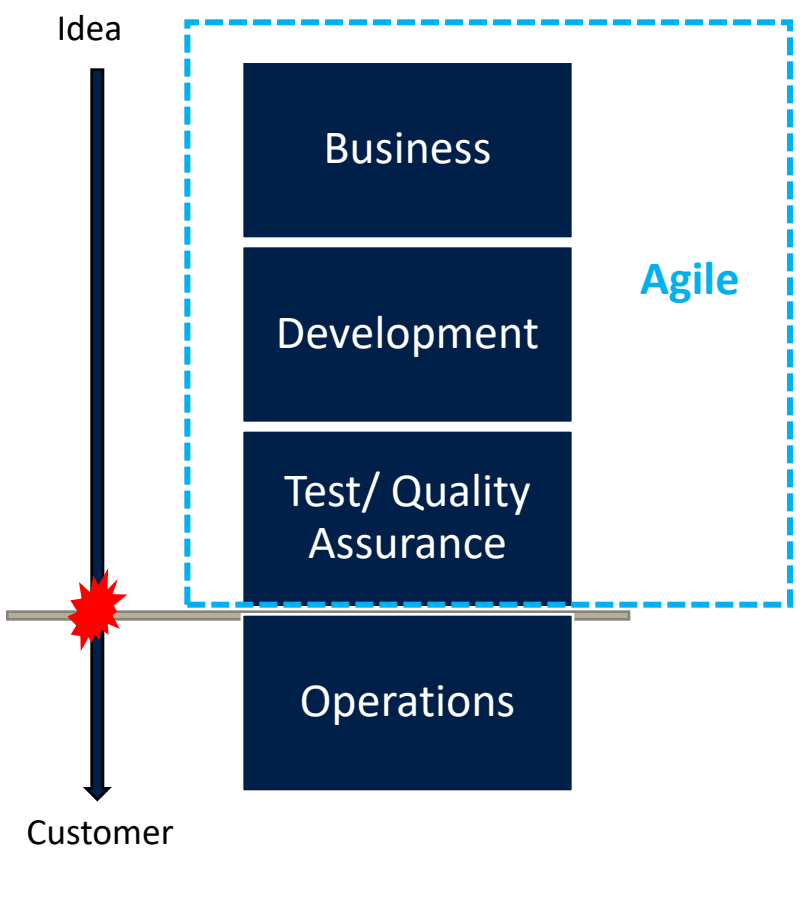
Pre 2000's
Waterfall Development

Cycle time: Months or Years



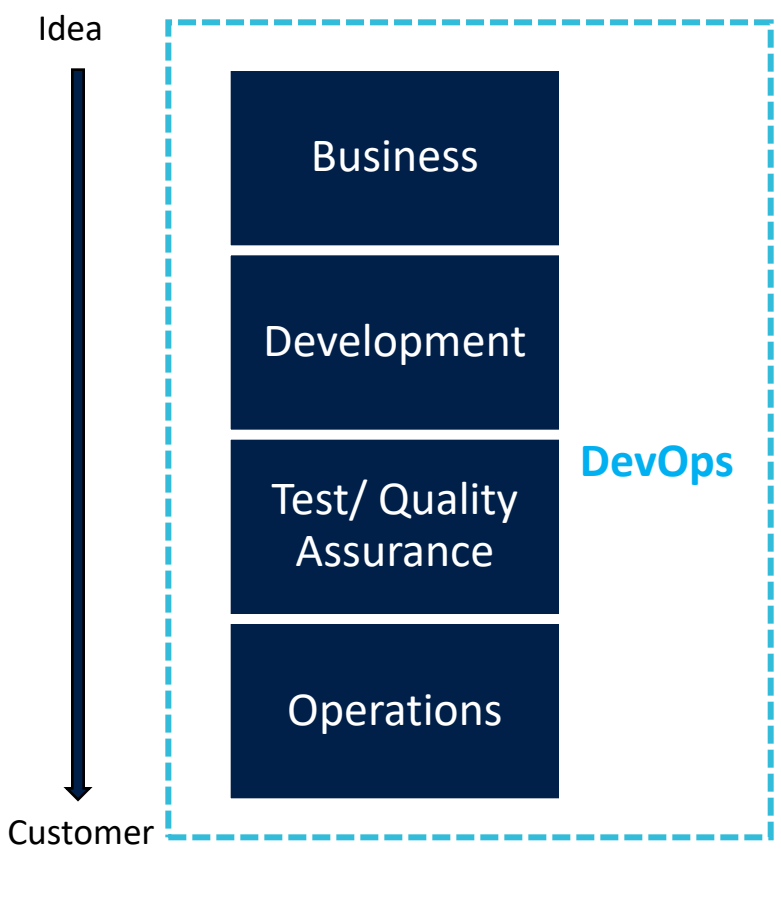
2000's
Iterative Agile Development

Cycle time: Weeks or Months



2010's
Lean with DevOps

Cycle time: Hours or Days



DevOps combines the Development and Operations teams leveraging automation of processes to enable rapid release cycles

DevOps (development and operations) is a software development method

that stresses communication, collaboration and integration

between software developers and IT operations professionals

DevOps Purpose

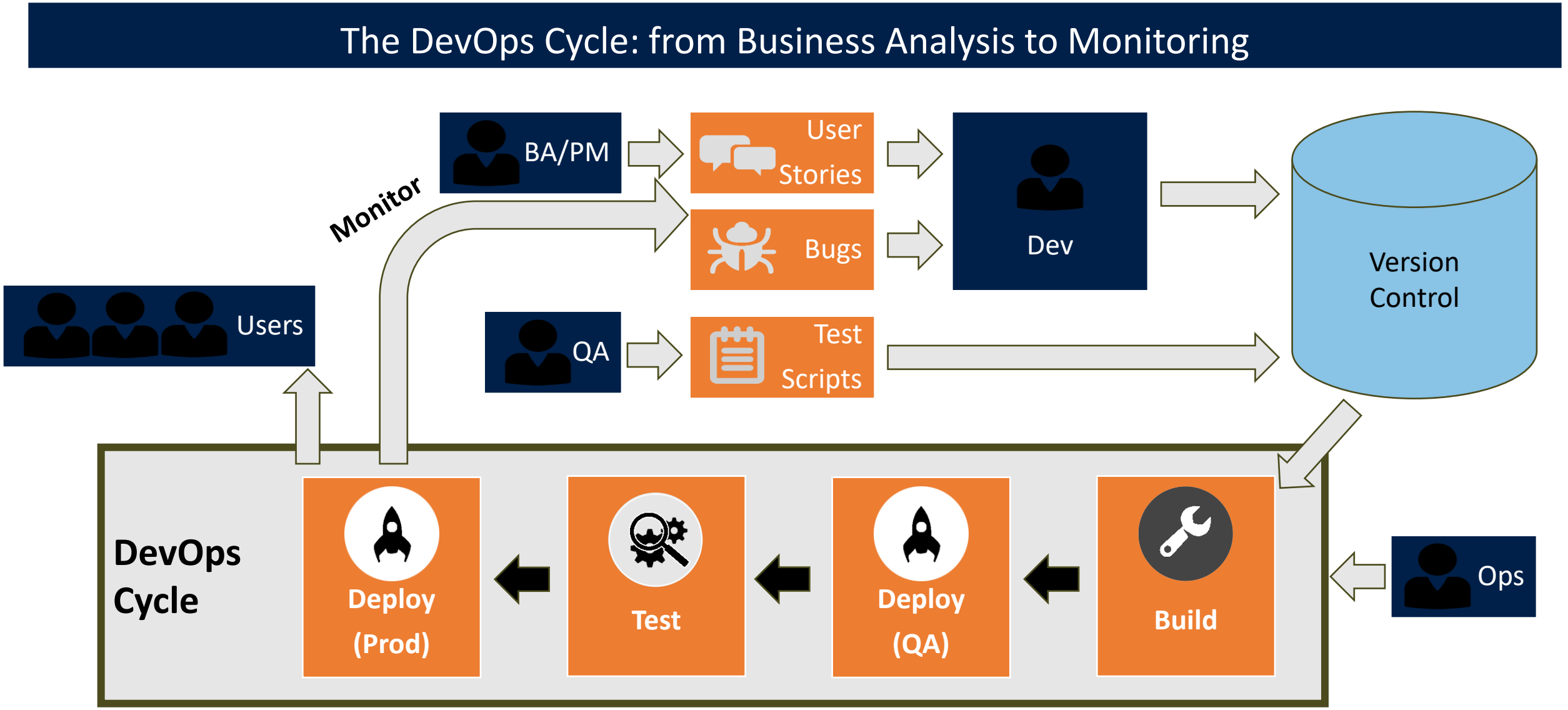
- To bridge the divide between Development and IT Operations team through:

Communication Integration Collaboration

DevOps Responsibilities

- Collaboration between Dev and Ops
- Automation and Infrastructure as Code
- Continuous Integration/Testing
- Continuous Delivery/Deployment
- Continuous Monitoring

The DevOps cycle encompasses all aspects of software production and delivery



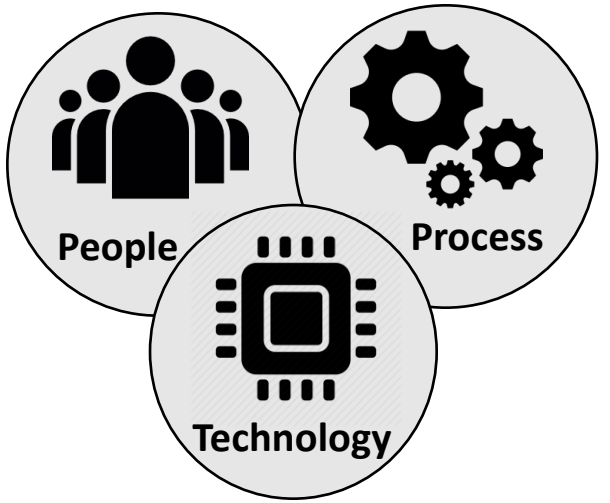
Agenda

TABLE OF CONTENTS

Building a DevOps Organization involves completely rethinking the way software development and IT operations work together

DevOps: Myths and Reality

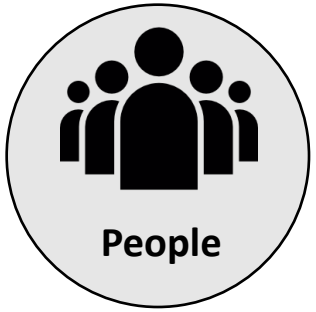
1. **Myth: DevOps is useful only for companies with cloud products**
   - **Reality: DevOps can be adopted for any software product - on-premise or cloud**
2. **Myth: DevOps is all about implementing a set of tools and technologies**
   - **Reality: DevOps is about continuously delivering software to the customer and everything that affects the development process**
3. **Myth: DevOps is all about creating a new team placed between the traditional Dev and Ops teams**
   - **Reality: DevOps is about breaking down silos between Dev and Ops – not creation of new silos. A DevOps transition team is required for change management, but its true measure of success is how soon this team can be dissolved**
4. **Myth: DevOps requires a sudden overhaul of the entire Ops tools and technology stack**
   - **Reality: DevOps can be implemented in a phased manner, starting with a few components without requiring a sudden complete overhaul of existing infrastructure**
5. **Myth: DevOps requires co-location of the Dev and Ops teams**
   - **Reality: DevOps, while benefited with a co-located Dev and Ops team in the initial phases, does not mandate co-location. In fact, mature DevOps organizations can benefit from the round-the-clock support provided by distributed teams across global locations**



Implementing DevOps requires changes across the organization but it can be managed in a stable gradual manner suited to traditional organizations

A shift in organization culture and skill-sets is required successfully adopt DevOps

DevOps: People and Process Enablers



- Full Stack Engineers
- Small 2-Pizza Teams
- Integrated Teams & Joint Meetings
- Autonomous and Empowered
- Collective Responsibility

- *Culture is the most important aspect of DevOps*
- *Organizations need to create a culture that is all about communication and collaboration among the developers, testers, and the IT Ops team*
- *A DevOps Evangelizer within the organization is needed for driving the cultural transformation initiative across the company*
- *DevOps is nothing without the discipline and the culture, as a set of tools won't help people embrace change*

- *Every organization, and departments within organizations, will have a unique way of writing code, testing it, and releasing it*
- *DevOps stands on the pillar of well-defined processes*
- *The process clearly defines everything that takes place from the time a developer checks his code into version control until it surfaces on the production system ready to be consumed by the end users*

- Automated Build, Test and Release
- Data-driven Product Development
- Common Metrics for Dev, Test and Ops
- Experiment and Fail Fast
- Quality and Security-First

DevOps technology choices are innumerous – Taking the right decisions with people and processes ensures the right technology decisions

DevOps: Technology Selection

- *Every organization that is moving toward DevOps should document the inventory of disparate tools used by the various stakeholders. These include:*
  - *Version control systems like Git and Subversion*
  - *Build tools like Ant and Maven*
  - *Testing tools like LoadRunner, JMeter, and Selenium*
  - *Provisioning tools like Vagrant*
  - *Configuration management tools like Chef and Puppet*
  - *Monitoring tools like Nagios and Ganglia*
  - *Trouble-ticketing tools like Jira*
- *These tools are designed to work together, as they target different groups with different outcomes. Based on the defined process of DevOps as identified by management, these tools need to be connected*
  - *This is where orchestration engines such as Jenkins play a critical role*
- *By creating a well-defined orchestration aligned with the process, these disparate tools will work together to enable continuous delivery of software*
- *Organizations shouldn't be tempted to buy tools that help only a few teams. A complete process and flow needs to be formulated, and then tools should be brought in wherever necessary*

Agenda

TABLE OF CONTENTS

Global locations such as India are being increasingly leveraged by mature DevOps organizations

	India	USA
Talent Pool Size & Growth	• Significant DevOps talent pool of ~30,000 professionals • Rapidly growing talent pool	• Largest DevOps talent pool in the world of ~250,000 professionals • Slow growth of talent pool
Talent Pool Cost	• Low Talent Pool Cost of ~$20-25k p.a. for median experience of 5 years	• High cost of DevOps talent of ~$120k p.a. for median experience of 5 years
Talent Pool Quality	• Good quality talent pool with experience in MNCs and technology start-ups such as Flipkart, Ola etc.	• Best quality DevOps talent available
Operations	• Time difference with USA ensures continuous 24 hr support	• Single country operations requires shift-based operations for 24 hr support
Globalization Advantage	• Significant & rapidly growing talent pool of good quality DevOps engineers • Low cost of good quality DevOps talent • Continuous 24 hour support	

Agenda

TABLE OF CONTENTS

Multiple service providers have been managing DevOps installation and delivery for clients, particularly in the ISV vertical

- *Many service providers have been providing DevOps services to ISV clients*
  - *Intuit (with Persistent): Automated Testing*
  - *Autodesk (with Cognizant): Automated Testing*
  - *Baazarvoice (with Valtech): Monitoring*

Agenda

TABLE OF CONTENTS

Zinnov is a 13 year of management consulting firm ranked among the Top 20 Outsourcing Advisors by IAOP for 7 years in a row

Zinnov Offerings

Engineering & IT Excellence

- Global Technology Center Setup
- Charter Definition/ Planning
- Product / Market Definition

Globalization Accelerator Platform

- Industry Benchmarks & Frameworks
- Networking opportunity with peers
- Thought leadership and on demand insights
- Branding opportunities

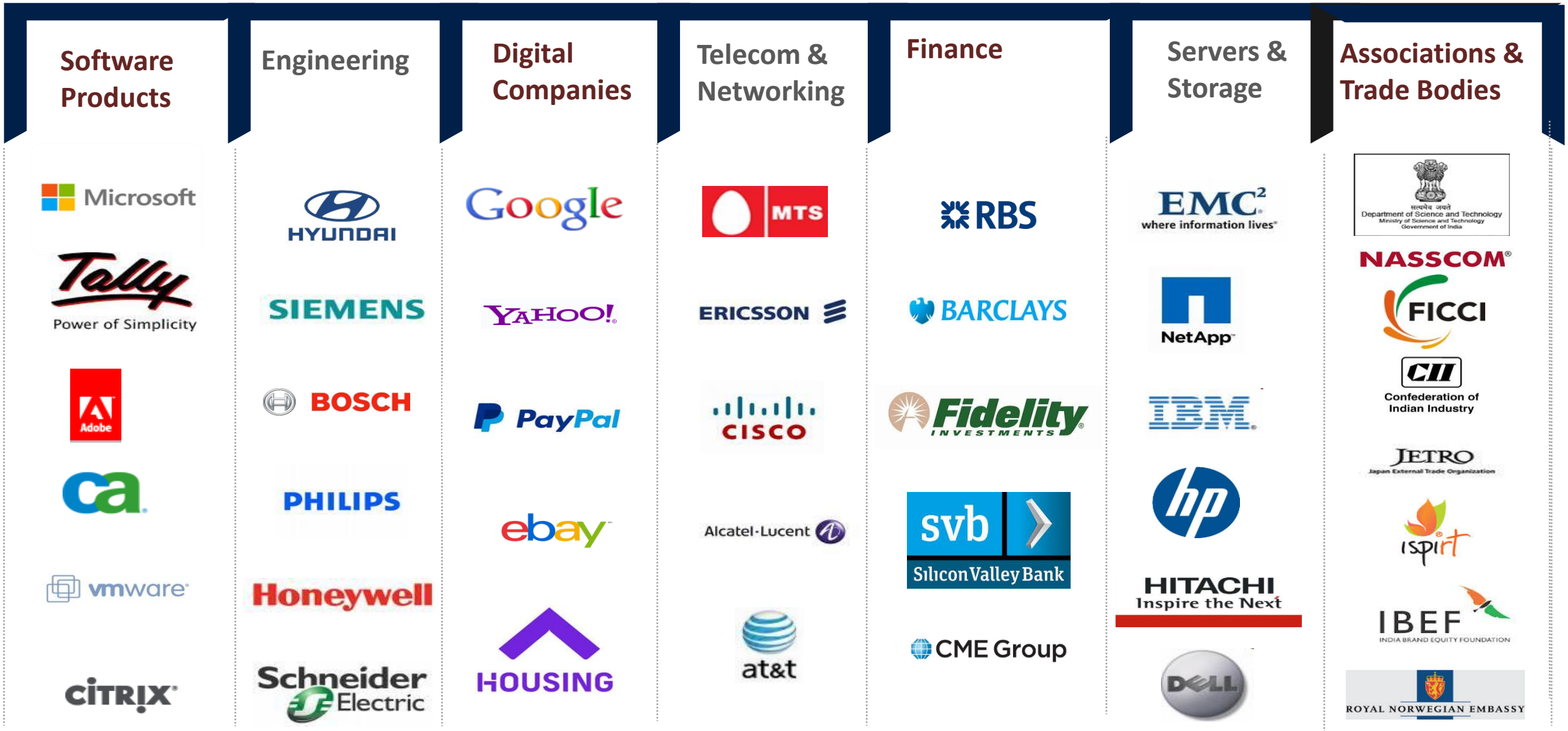
Business Strategy & Expansion

- Business Strategy
- Account Management
- M&A/Operations Optimization
- Customer Connect

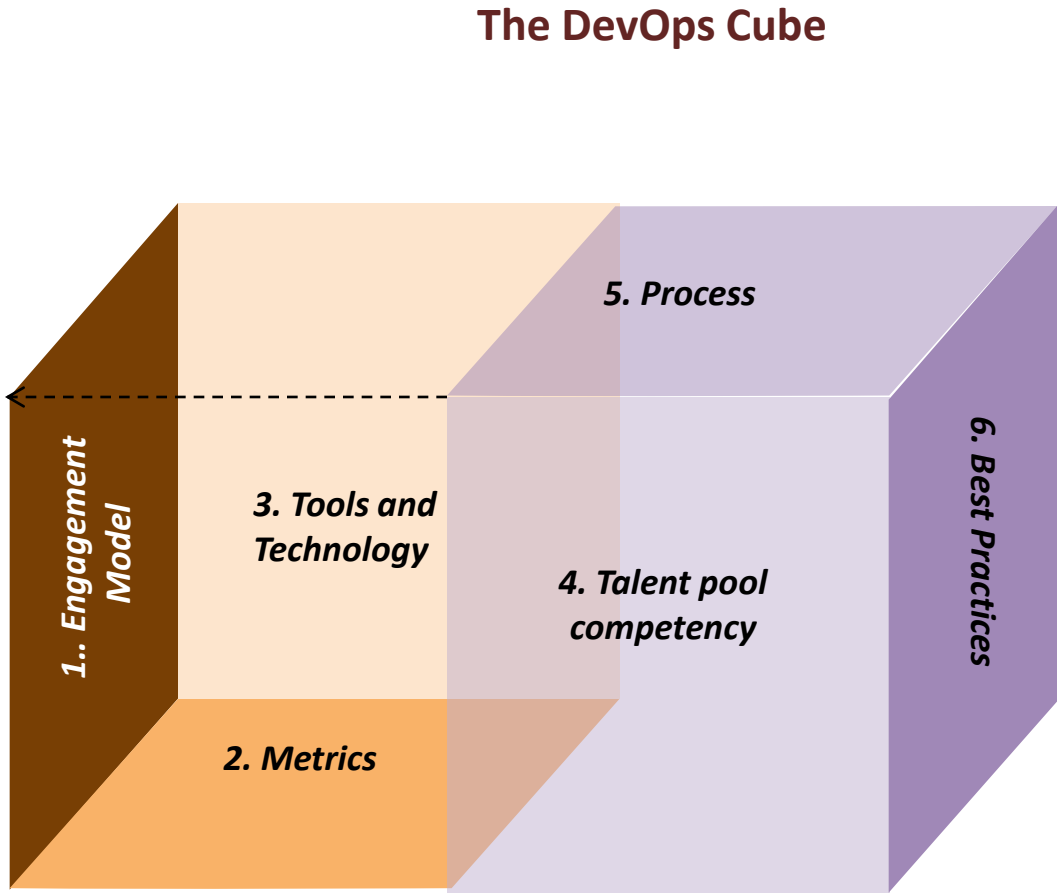
Emerging Markets

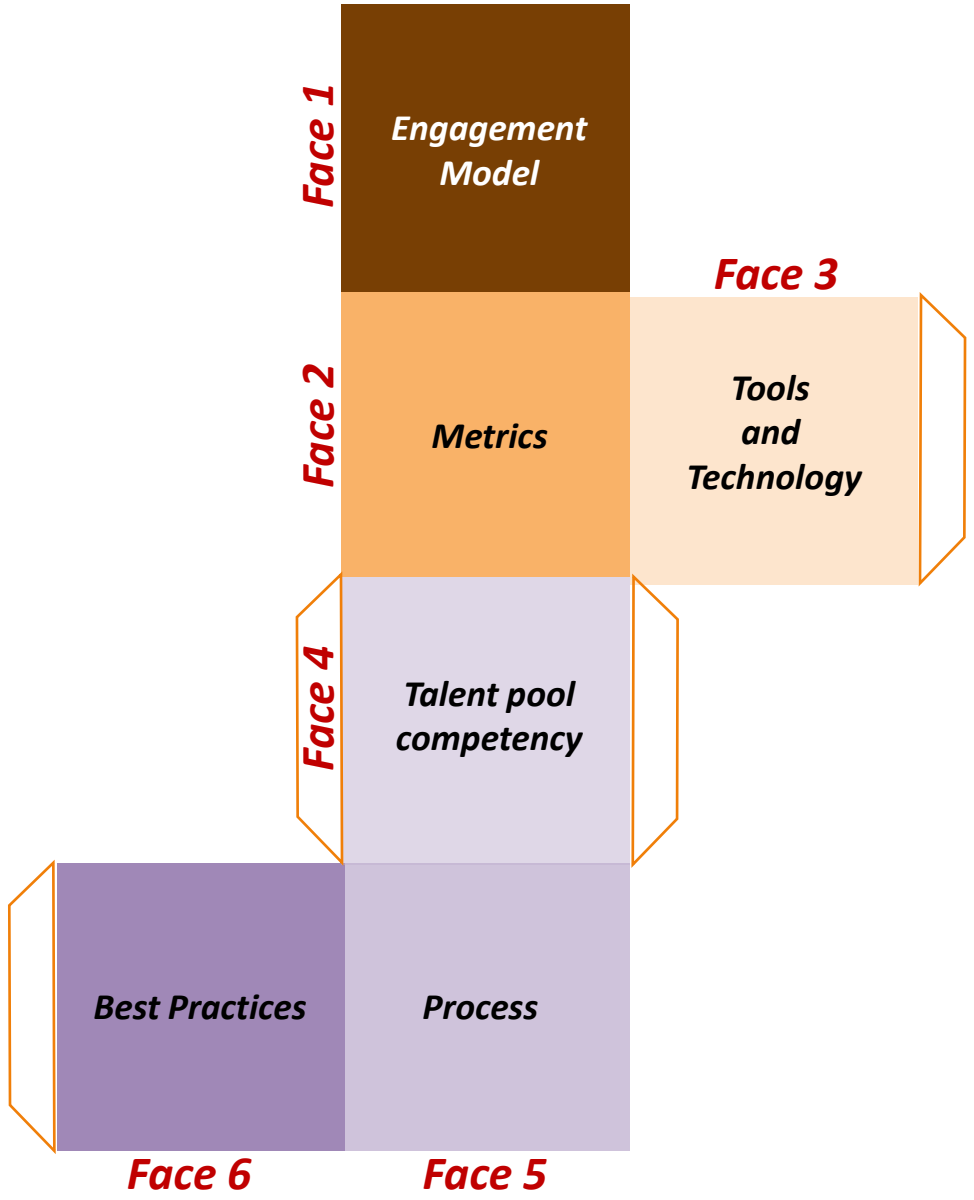
- Direct Sales Maximization
- Channel Design and Monitoring
- Solution Ideation
- Opportunity Assessment & Go to Market

Zinnov's customers spans the full breath of the industry, with a focus on technology



Zinnov is conducting an industry-wide benchmarking using the DevOps Cube Model





The DevOps Cube encompasses a comprehensive range of metrics to thoroughly map DevOps adoption across companies

1	2	3	4	5	6
Engagement Model	Metrics	Tools and Technology	Talent Pool Competency	Process	Best Practices
Defines the DevOps delivery mechanism	***Performance and cost metrics for measuring DevOps success***	***Tools and their seamless integration for DevOps***	***Organization structure and culture for DevOps***	***Process definition for DevOps adoption***	***Innovations across dimensions of the cube***

• Org structure
• Co-located teams
• Distributed teams
• Service Provider involvement
	• Performance Metrics
	  • Release Cycle
	  • Quality
	  • Downtime
	• Cost Metrics
	  • Tools Investments
	  • Talent Costs
		• Tool-set Integration
		  • Version Control
		  • Build
		  • Testing
		  • Provisioning
		  • Configuration
		  • Monitoring
		  • Ticketing
		  • Orchestration
		• Open Source Tools Management
			• Key DevOps Roles
			• DevOps Talent Profile
			• Team Size
			• % of Full Stack Engineers
			• Measures for
			  • Collaboration
			  • Collective Responsibility
			  • Autonomy
			  • Training etc.
				• Time period since DevOps adoption
				• % of DevOps driven products
				• Degree of automation
				  • Build
				  • Test
				  • Deploy
				• Common metrics adopted for Dev, Test and Ops
					• Cultural integration
					• Metrics alignment
					• Tools selection
					• Talent retention
					• Process adherence etc.

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Appendix

TABLE OF CONTENTS

DevOps combines the Development and Operations teams through automation of processes to enable rapid release cycles

DevOps (development and operations) is a software development method that stresses communication, collaboration and integration between software developers and IT operations professionals

DevOps Responsibilities

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- Automation and Infrastructure as Code
- Continuous Integration/Testing
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DevOps Purpose

- To bridge the divide between Development and IT Operations team through:

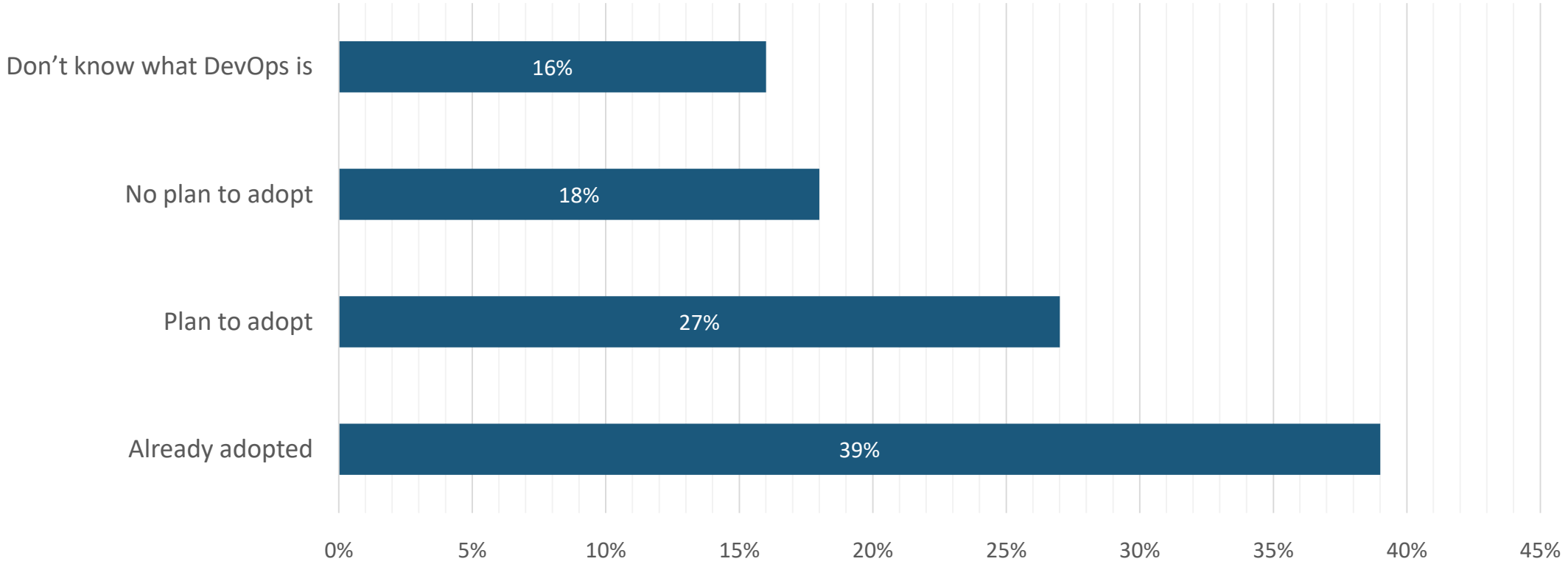
Communication Integration Collaboration

Appendix

TABLE OF CONTENTS

DevOps Adoption Rates

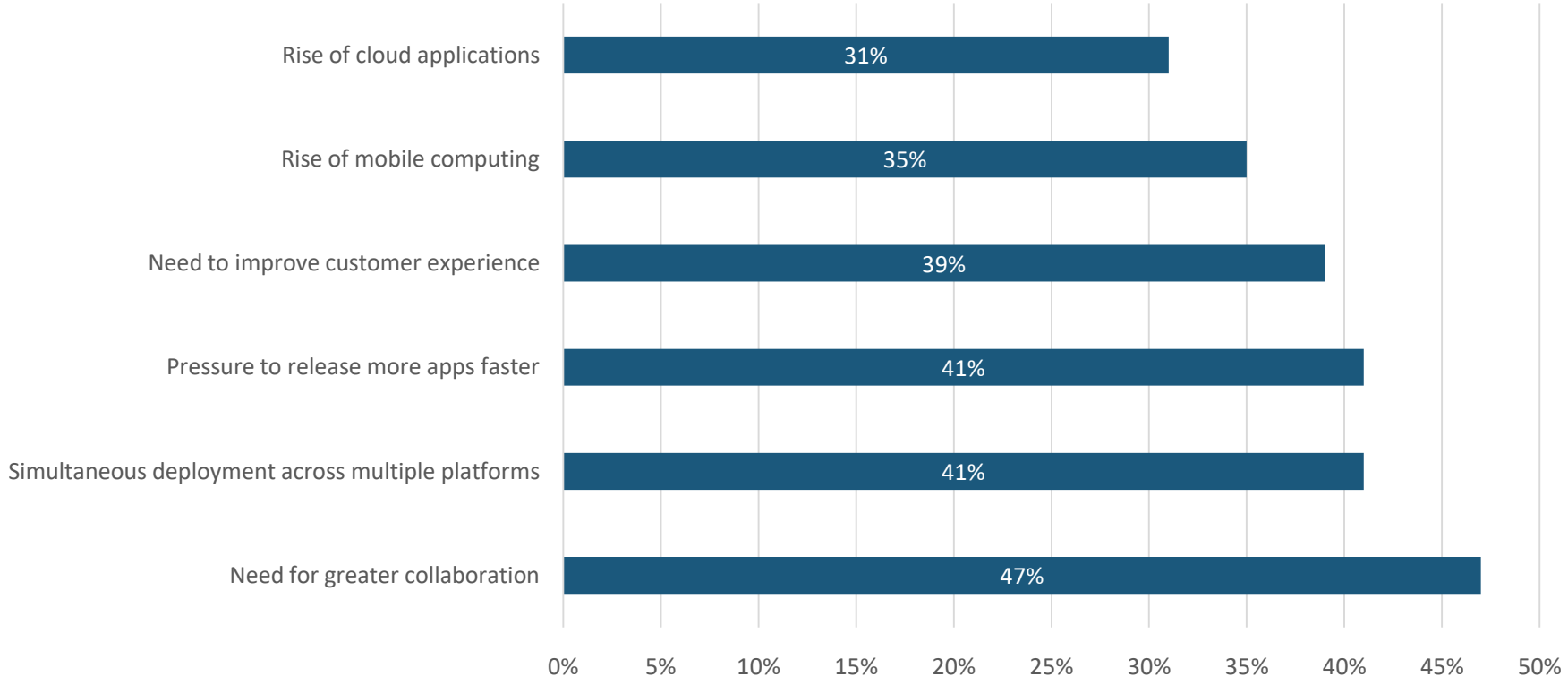
Enterprise IT organizations are further along on DevOps than most might think



Source: “Survey of 1300 IT Decision Makers on DevOps” by Vanson Bourne on behalf of CA Technologies – 2014

What Drives the Need for DevOps?

Multiple forces are converging to drive DevOps



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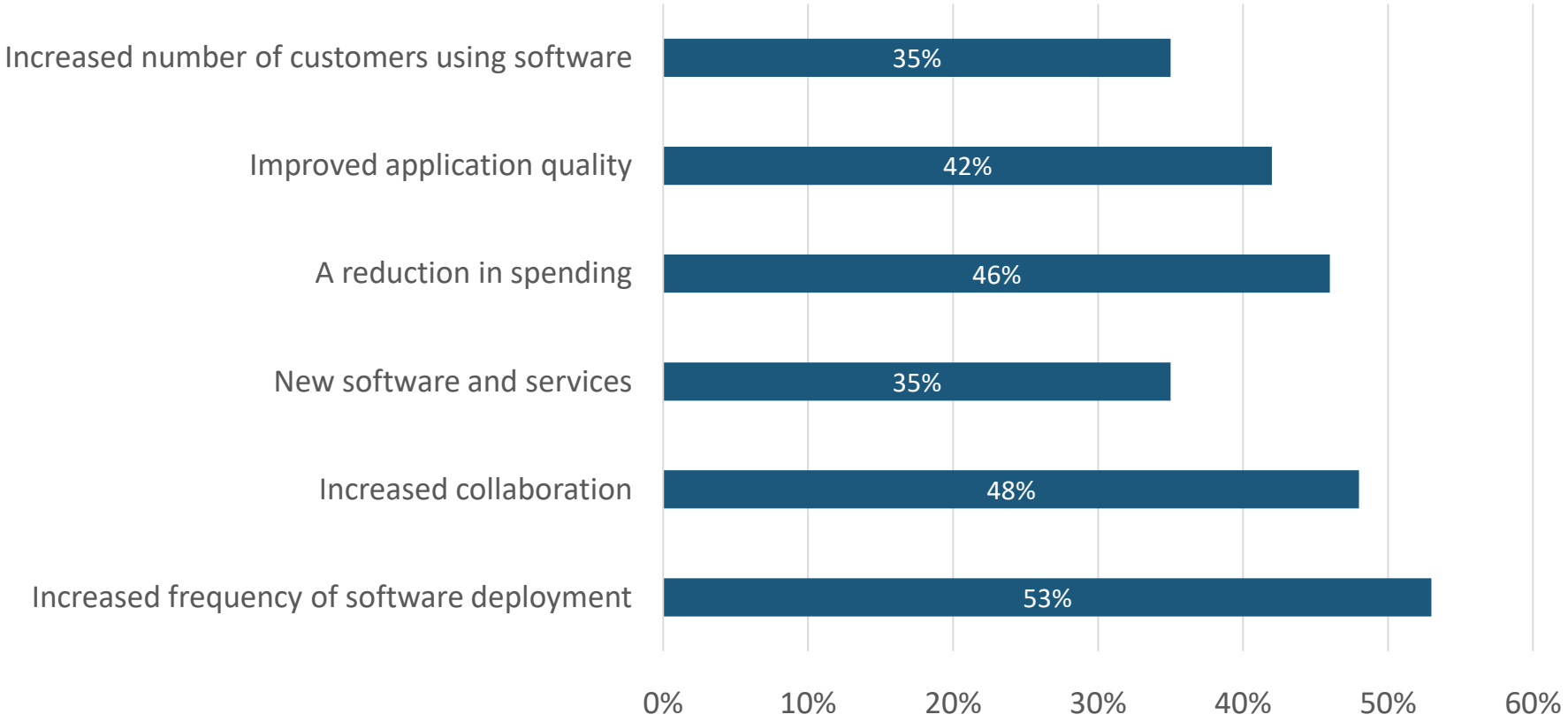
Perceived DevOps Benefits

Expected benefits include better software, increased collaboration and cost savings



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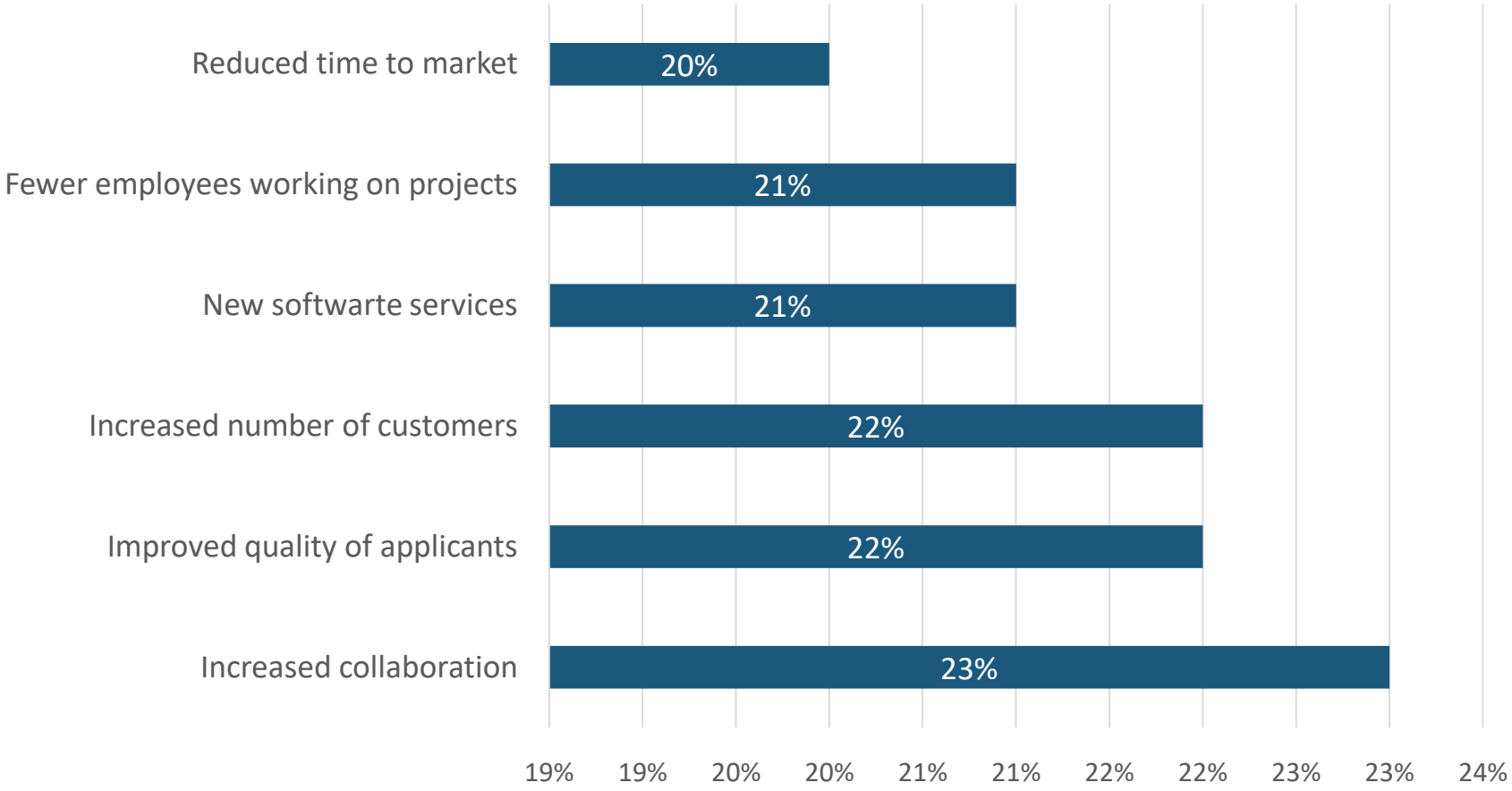
DevOps-driven Improvement Results

Those that have embraced DevOps have, on average, witnessed major gains



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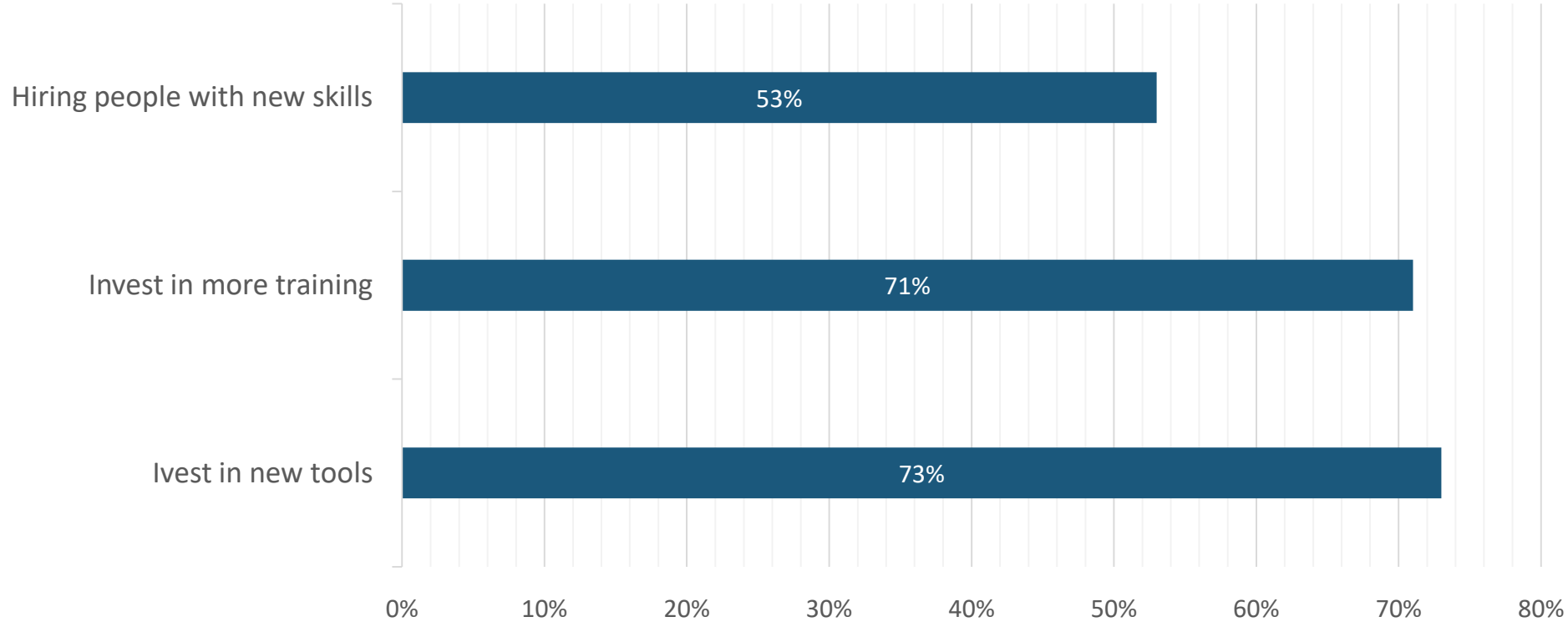
Expected DevOps Investments

DevOps processes require new tools, training and skill sets



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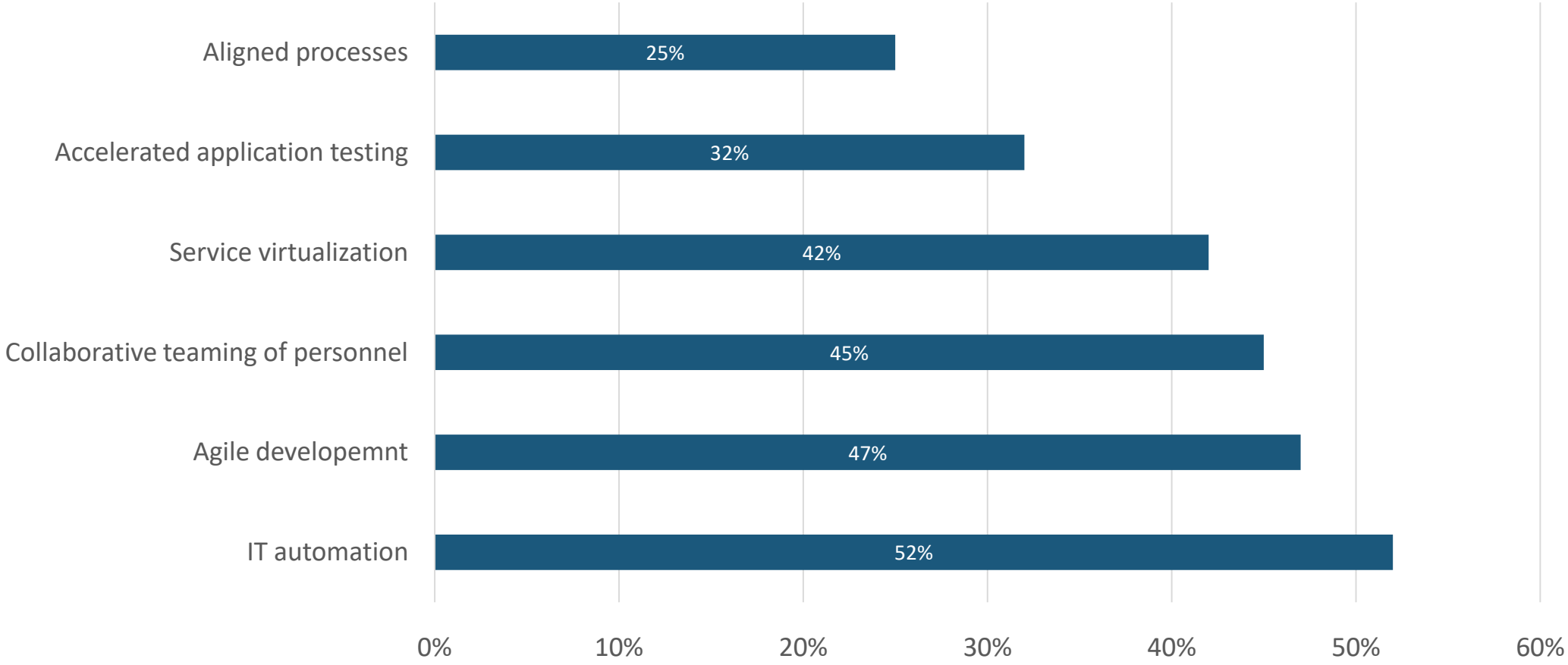
Most Important DevOps Components

Getting the right tools in place to drive processes is critical



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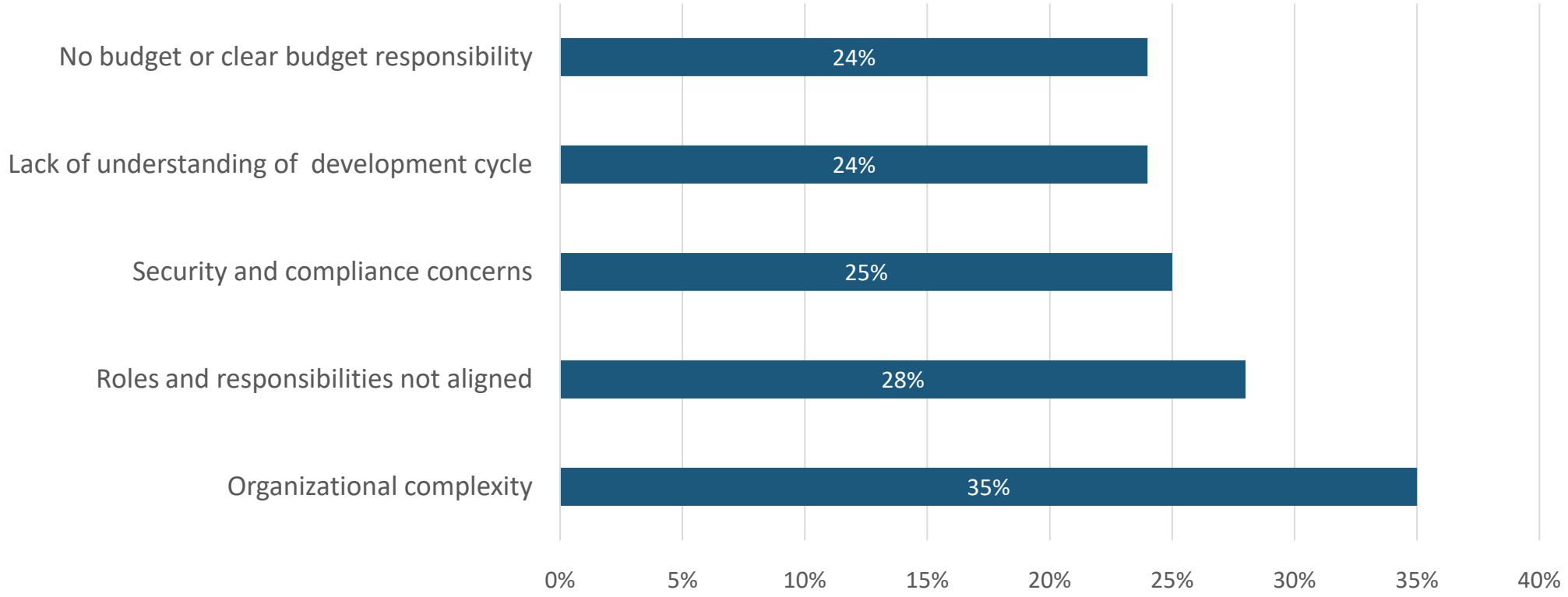
Top 5 DevOps Obstacles

DevOps represents a major exercise in organizational change management



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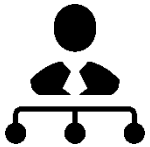
Appendix

TABLE OF CONTENTS

As DevOps increasingly is becoming a necessity, the impact is felt by all organizational functions across the technology sector

1



Business

"How does DevOps impact business strategy?"

2

Engineering

"How does DevOps impact product development?"

3

IT/Operations

"How does DevOps impact IT infrastructure and operations?"

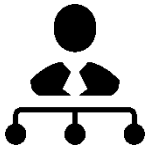
4

Human Resources

"How does DevOps impact organization structure and talent pipelines?"

DevOps can provide a competitive advantage when leveraged successfully and is on its way to becoming a hygiene factor within the next 5 years

1



Business

"How does DevOps impact business strategy?"

- **DevOps positively impacts the scalability, cost and quality of the software product. However, these factors do not lead to a sustained competitive advantage**
- **DevOps speeds up the time to market tremendously, which allows companies to try out more innovations in the market – this continuous innovation allows technology companies to gain a competitive advantage**

Impact of DevOps on Business Strategy

Sustainable Competitive Advantage	✓ Speed	**Sustained Innovation**
Hygiene Factors	✓ Scale	Unlimited Users, Data and Transactions
	✓ Cost	Lean Operations
	✓ Quality	Zero Downtime

DevOps redistributes the responsibility of the product development and release pipeline between Dev and Ops teams

2

Engineering

"How does DevOps impact product development?"

- **DevOps positively impacts the product development by removing bottlenecks through automation, providing full-stack testing and increasing collaboration with the operations team**

Dev	Ops
Development Architecture	IT Architecture
Code Development	Environment Development
Testing/QA	Deployment

- ✓ **Architects need to think holistically and work with Dev and Ops teams as they design and enhance the application**
- ✓ **Environments need to be architected in a manner to allow for the evolution of the applications, both as they are developed and projected to evolve**
- ✓ **It requires Ops to allow Developers to take more responsibility of the operational characteristics of the applications they are building**
- ✓ **Deploying at each instance the full stack that includes the environment, middleware and the application being deployed is essential for improving quality**
- ✓ **All teams should start using the same Change Management and Work Item Management tools**

Development and IT Architecture stop existing as silos and work towards building a common ‘Deployment Architecture’

2

Engineering

“How does DevOps impact product development?”

Development Architecture + **IT Architecture** = **Deployment Architecture**

Impact of DevOps on Architecture

✓ Architecting for Deployment	Simplify and streamline the design. This includes standardization of infrastructure components, but also removing architectural elements which were originally intended to ensure other quality attributes, now overruled by the higher priority of deployment
✓ Architecting for Resilience	The system as a whole needs to be as available as possible
✓ Consolidated Development Architecture	With DevOps, from an architectural point of view, the development and target environments form one system with three main categories of users: developers, operators and end-users

Development teams focus on creating easily configurable applications for automation and removing hardcoded application resourcing

2

Engineering

"How does DevOps impact product development?"

- **DevOps requires the Development team to collaborate closely with the Ops team**
- **The application code needs to be written with requirements for DevOps in mind**

Impact of DevOps on Development

✓ Coding for Configurability	It should be possible to configure all aspects of the application, while making it ready for deployment. Applications should not depend on specific machine configurations but should be able to detect machine capabilities and change accordingly
✓ No Hardcoding of Application Resources	An application should not depend on hard-coded machine paths for additional information or on specific IP addresses for connectivity. It should be possible to specific such information while packaging the application or while deploying the application to the target platform

QA teams are highly automated and aligned to Continuous Integration

2

Engineering

"How does DevOps impact product development?"

- **QA teams need to align their testing to DevOps through a focus on automation and standardization**
- **QA needs requires skill-sets of automated testing environments such as Selenium and Watir**

Impact of DevOps on Testing/QA

Traditional QA

Receive build deployed on environment designated by QA

Perform functional and regression testing

Sign-off on build after keeping build under observation

Focus of DevOps QA

All pre-testing tasks, clean-ups, post-testing tasks, etc. are automated and aligned with the Continuous Integration cycle

All test cases are automated and achieve near 100% code coverage

Environments are standardized and deployment on QA boxes is automated

DevOps needs to be integrated into existing IT Infrastructure with new tools and skillsets required for DevOps-driven operations

3

IT/Operations

"How does DevOps impact IT infrastructure and operations?"

- **DevOps requires a new set of tools which seamlessly integrates the development through to deployment**
- **The IT operations for DevOps needs to have knowledge of operating DevOps tools across 3 functional areas: Continuous Integration and Continuous Deployment and Monitoring/Logging**

Impact of DevOps on IT Infrastructure & Operations

DevOps Area	Popular Tools
Continuous Integration	git, CHEF, puppet labs
Continuous Deployment	Capistrano, ANSIBLE, Fabric
Monitoring & Logging	New Relic., Nagios, splunk>

DevOps creates changes in the organization structure and a requirement for sourcing DevOps talent through fresh hiring and re-training

4

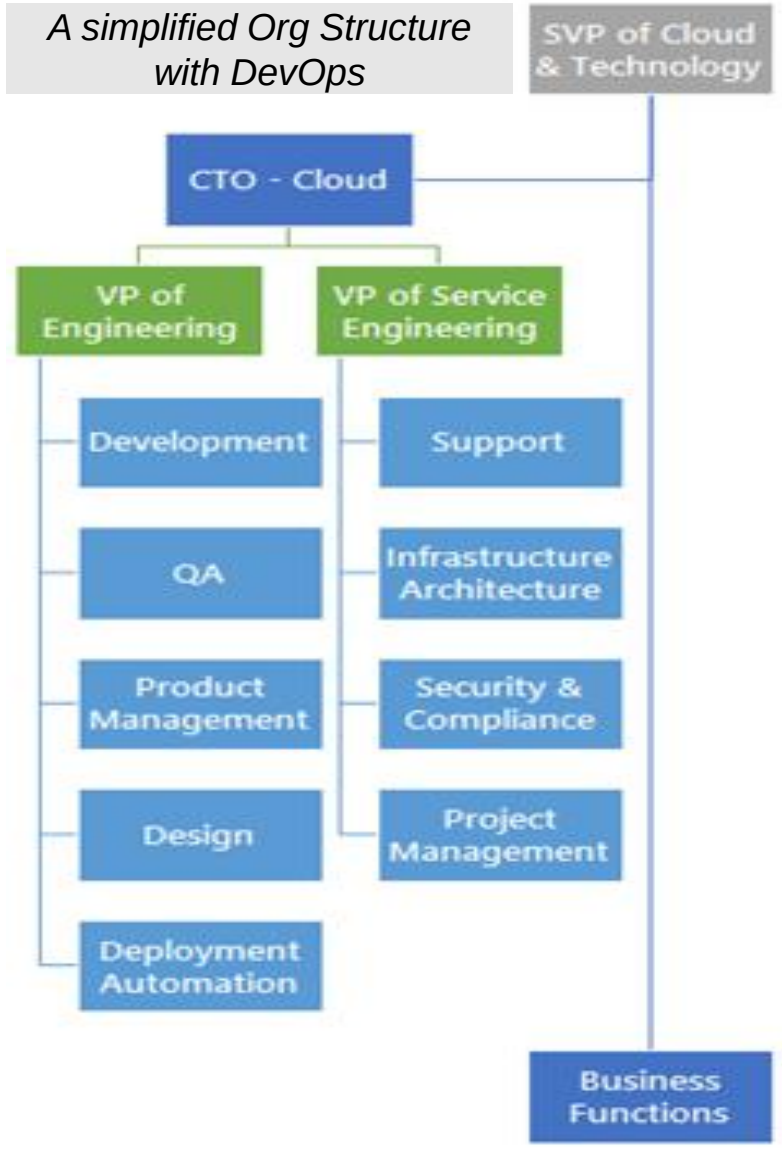
Human Resources

"How does DevOps impact organization structure and talent pipelines?"

Impact of DevOps on HR

- ✓ Organization Structure designed for collaboration between Development & Operations
- ✓ Talent pipeline designed to attract fresh DevOps talent as well as re-training of existing operations teams

A simplified Org Structure with DevOps



DevOps talent currently resides predominantly in Internet & Cloud cos. – both established cos. such as Google and Facebook as well as start-ups

4

Human Resources

"How does DevOps impact organization structure and talent pipelines?"

Evolution of DevOps & Potential Talent Pipeline

- ✓ Internet cos. such as Google and Facebook are the birthplace of DevOps – Pioneers of rapid release cycles

- ✓ Cloud cos. with SaaS/PaaS offerings, especially start-ups were the early followers – Driven by time to market needs

Appendix

TABLE OF CONTENTS

LinkedIn Case Study (1/4)

2006

ENGINEERING DEV

- Write Codes
- Build Features &Apps

OPERATIONS

- Build & Deploy Apps
- Run the website

RELEASES

Monolithic Weekly Releases

Manual Builds, Configuration and Deployment

- Engineers had no access to the production systems as focus was more on building features and products
- Escalation of issues identified by operations team involved dance of transferring log files between the ops and engineering teams to rectify the issue
- Mean Time To Repair (MTTR) of issues was below expectations
- Essentially, the engineers had no idea as to what the production environment looked like
- The process laid out was to mainly focussed on building features and not on efficiency

PROBLEM: THIS APPROACH DOES NOT SCALE UP

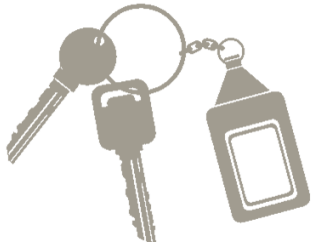
LinkedIn Case Study (2/4)

CHANGES IN ORGANIZATION

Engineering Teams Grew

Systems, Processes, People in centralized orgs had to scale

More code, more features, higher throughput was required resulting in release capacity being a bottleneck



Production Service Ownership Shifted from ‘Just’ SiteOps to DevOps

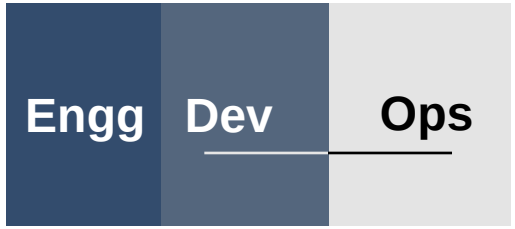
Increased DevOps gap resulting in adoption of tools to bridge it i.e. Zenoss, Splunk, Healthcheck

Assignment of SiteOps Engineering to Dev Tracks

Implicitly directionally correct making deployment faster and more streamlined

LinkedIn Case Study (3/4)

2014



Vision built on Three Cornerstones:

- Embedded Site Reliability Engineering
- inGraphs
- glu

Migrating towards vision of DevOps

- Self provisioning capabilities for Engineering
- Manage configurations and deploy code continuously
- For services that adhere to specific area

Ops becomes an enabler and support organization

Focused on managing critical hardware and horizontal software infrastructure services

LinkedIn Case Study (4/4)

Embedded SRE

- Rebranded SiteOps to SRE
- Fully decentralized approach to scale with Dev org
- Physically co-located with engineering partners
- Assist with capacity and deployment planning
- Ensure operational aspects are considered
- Ongoing KT between Ops and Dev

inGraphs

- Developed by SRE Team
- Encourage Devs to instrument their own code
- Development of “autometrics”
- System to automatically visualize any metrics as soon as the code exposing them was deployed
- Self service dashboards and alerting (Next Steps)

glu

- Open sourced agent based provisioning framework that models current vs desired states
- Used for all application deployments and configuration management at LinkedIn
- Generates/ executes a deployment sequence according to delta of states and glu scripts
- Has become the central tool for all deployment / release activities

Appendix

TABLE OF CONTENTS

India is being increasingly leveraged by MNCs for DevOps driven by a confluence of advantages – talent pool size, quality and cost

	India	USA
Talent Pool Size & Growth	• Significant DevOps talent pool of ~30,000 professionals • Rapidly growing talent pool	• Largest DevOps talent pool in the world of ~250,000 professionals • Slow growth of talent pool
Talent Pool Cost	• Low Talent Pool Cost of ~$20-25k p.a. for median experience of 5 years	• High cost of DevOps talent of ~$120k p.a. for median experience of 5 years
Talent Pool Quality	• Good quality talent pool with experience in MNCs and technology start-ups such as Flipkart, Ola etc.	• Best quality DevOps talent available
The India Advantage	• Significant & Rapidly growing talent pool – of Good Quality DevOps Engineers • Low cost of good quality DevOps talent	

Zinnov has created a DevOps Adoption Maturity Framework to assess the success of companies in adopting DevOps