Innovate like a startup, scale like an enterprise

IBM Bluemix Garage Method
Welcome to the age of digital disruption
Across nearly every industry, innovative entrants are disrupting traditional markets and displacing long-established players. For example, Alibaba, an online retailer in China, now has a greater market valuation than Wal-Mart, despite holding no inventory. These fierce challengers are streamlined, born-on-the-web businesses. They deliver new business models and customer value at high speed and high quality, and continuously iterate and experiment to achieve their business objectives. Moreover, startups are in constant dialogue with their clients—helping them identify gaps in existing markets and their product. When startups recognize an opportunity, they are equipped with the mindset, processes and tools to pounce on it before enterprises even realize it is there. And even if the character of the opportunity changes, startups can pivot rapidly by redirecting and reshaping their product—and the market along with it.

The world has changed, and companies must act radically to compete in this age of digital disruption. Agility is the key to achieving this goal, and many enterprise executives are now seeking ways to foster a culture of startup innovation in their business. The aim is to bring compelling products and services to market with the speed and flexibility of a digital native, while bringing to bear the vast reach and resources of the enterprise.

Why is innovation at scale so difficult?
The rewards of digital transformation are vast, but effectively implementing a startup approach to business and development at enterprise scale is a big challenge. Whereas new entrants work in lean teams in which constant communication is straightforward, enterprises generally have culture, processes, organizational structure, and technology bases that have built up over many years. Moreover, organizational silos significantly impede decision-making, experimentation, collaboration, and time-to-market.

Enterprises are typically risk-averse and adopt a “go slowly and prudently” mindset—batching requirements and changes into multi-month or multi-quarter application releases. However, by the time of the actual release, the original requirement may have changed. And although the approach is intended to ensure the quality of deliverables, it fails to recognize that the bigger the batch, the greater the chances that interdependencies will cause unforeseen issues.\(^1\)

Operational complexity is not the only challenge that enterprises may face. Established businesses often rely on static systems of record that were designed with a more limited scope than the business now demands. This poses the technological challenge of integrating new systems of engagement—such as mobile apps and user experiences—without compromising existing systems or impeding continuous delivery capabilities. Enterprises that adopt hybrid cloud architectures and embrace techniques for variable speed IT can significantly accelerate their agile transformation.

“The most important benefit of DevOps is its ability to drive innovation at scale. Instead of taking months to develop and release a new capability, the target should be to introduce innovations in weeks or even days.”
—Jeff Smith, CIO, IBM
Agile innovation with DevOps changes everything

High-performing organizations are redefining everything from the way industries operate to how we do business. As a result, expectations around development, operations, and customer experience are changing, and digital disruptors continue to find new ways to apply lean, continuous delivery practices to give clients what they want—faster.

Examples are easy to find. Etsy pioneered a process to prototype and test enhancements to its peer-to-peer e-commerce services. Apple has shown the power of design in delivering great customer experience. And Netflix—a paradigm of the competitive advantages of embracing a DevOps methodology—is nurturing a new culture of end-to-end testing to enhance the quality of its offering.

Players in traditional industries such as banking are also moving quickly to embrace the new approach. Citi is now collaborating with virtual developer communities to build the next generation of financial solutions, and Manulife is pioneering an innovation called LOFT, which fuses a developer code academy and startup incubator with rapid innovation techniques to bring innovations to the insurance market.

IBM’s DevOps Transformation Journey

Recently, IBM has undergone a massive business and technology transformation to become a cloud and cognitive services provider. This transformation reaches into all areas of the business—moving from a development-led culture to a design- and offering-management led culture focused on client experiences and frequent releases.

"DevOps enables clients to deliver business outcomes in an agile, iterative, and incremental fashion: applications are delivered in days or weeks, rather than the typical months or years.”

—Dr. Angel Diaz, Vice President Cloud Technology and Architecture, IBM

Figure 1. Diagram showing the stages of a continuous delivery model
The transformation draws from best practices that IBM has learned over many years of establishing methods (e.g. remote pairing) and tool chains (e.g. Open Stack Continuous Integration/Continuous Delivery (CI/CD)) in open communities – practices that have been tested by thousands of open source developers worldwide. The transformation also builds on IBM’s own Agile development practices, Lean Startup and IBM Design Thinking.

From this foundation, IBM developed a transformation program that engaged various development organizations at IBM, along with a set of CI/CD tools delivered as a service. The program comprises a leadership bootcamp, followed by a developer bootcamp that immerses development squads in the practices, helping to on-board their teams onto a cloud-based, centrally hosted CI/CD toolchain.

Gaining leadership support and understanding is a crucial first step, as it helps to remove any lingering doubts about the efficacy of: pairwise development; minimizing distraction; eliminating data-driven deliverables in favor of a clearly prioritized backlog; or transitioning from a culture that left testing to some other group to one in which all development is fully test-driven. After the bootcamps are finished, IBM assigns coaches to stay with the teams as they begin to apply the practices, to help them and their leadership through the cultural aspects of the transformation.

This new approach is enabling IBM to innovate with new business models and products, including IBM® Watson™ Ecosystem, IBM Bluemix™, IBM Interactive Design Studios, and most recently the formation of the Cognitive Business Solutions group.

The secret to these success stories goes beyond initiatives to streamline operations and remove siloes between development and operations teams. It is the commitment to developing a culture of collaboration with all stakeholders in the lifecycle—including line of business and customers—in a feedback loop that maximizes value and reduces time to market.

Scale innovation in the enterprise
Based on IBM’s transformation experience and success in applying these methodologies during client engagements, IBM created the IBM Bluemix Garage—a consultancy with startup DNA that helps businesses of all sizes to define, design, develop, test, and deploy solutions which delight end-users and rapidly deliver business value. The Bluemix Garage guides clients through the entire innovation cycle: from the initial idea through the first pilot project, and to scaling the project to meet enterprise requirements.

Figure 2. IBM Bluemix Garage in London, England.
The Bluemix Garage fosters collaboration and innovation, and brings together a team of highly skilled, diverse consultants at physical locations in tech incubators within some of the world’s largest startup communities. The Bluemix Garage offers a prescriptive, end-to-end, and repeatable approach to build innovation capacity and delivery. By augmenting the expertise of in-house teams with experts from IBM and industry, the Bluemix Garage delivers the right space, methodology, platform, and people to drive an effective digital transformation.

The Bluemix Garage accelerates the development and deployment of applications by using the IBM Bluemix Platform-as-a-Service (PaaS) offering. IBM Bluemix provides a rich set of runtimes, DevOps tools, and a wide variety of services from IBM, third parties, and open-source projects. IBM Bluemix also supports a variety of hybrid-cloud deployment options.

Combining the best aspects of open communities, Design Thinking, DevOps practices and cultural insights, along with IBM’s experience helping clients to innovate in the Bluemix Garage and in other engagements, IBM has introduced the IBM Bluemix Garage Method—an open, repeatable method that combines best practices, tool chains and services partners.

The benefits of innovation, improvements in development practices, and cultural change are not limited to new “greenfield” applications. The Garage Method also provides prescriptive tracks for innovation, migration and enhancement of existing applications, and mobile-specific recommendations.

IBM Bluemix Garage Method in action
Let’s look at an example of how the Bluemix Garage Method can provide benefits through the eyes of an adopter. Meet Emma, an executive at a large bank. Emma’s bank needs to expand its client base to remain competitive, and she has been tasked with delivering innovative new services to acquire and delight smart, savvy millennials. She has seen other banks in her space successfully launch mobile apps to capture millennials, and she knows that her bank must react quickly with its own innovative services and apps or risk losing out to competitors.

Generating innovative ideas can be difficult in the day-to-day enterprise environment in which business leaders, product managers, and developers can find themselves. To get a fresh perspective on the challenges that her company is facing—and to create space to think through the issues properly—Emma decides to engage a Bluemix Garage to accelerate use of the Method.

Core principles
The Bluemix Garage team meets with Emma and her team and discusses the core principles, methods, and practices for the project. At the Garage, the starting point for innovation and transformation is always culture—a set of core principles that encompass and expand the Agile Manifesto. The Agile Manifesto provides guidelines for creating great software based on customer collaboration and responsiveness to change.

In the Garage Method, IBM applies these principles broadly to define, design, develop and deliver innovative solutions. IBM also focuses on applying great design-craft alongside great engineering-craft—actively seeking feedback on all aspects of a project and making changes based on validated learning.
Ideas are the seeds of innovation. Companies like Emma’s might come to the Bluemix Garage with a general topic they want to brainstorm, specific problems or opportunities they want to explore, or even fully formed innovation ideas they want to refine, design, develop, and deploy.

In the startup environment of the Bluemix Garage, Emma’s business experts and developers work side-by-side with millennial full-stack developers, user-experience designers and data scientists to get new, disruptive ideas flowing. Through ideation workshops, hackathons, crowd-sourced ideation challenges and even predictive analytics tools, the team helps Emma narrow down the possible ideas. She decides to provide a new savings app targeted at millennials. Her aim is to provide such a highly engaging experience that the app goes viral like Johnson & Johnson’s 7 Minute Workout App.4

Once an idea or specific problem area is selected, the next step is to identify riskiest assumptions behind this big product idea. Validating these assumptions before proceeding reduces the risk to the business—and at a two-day IBM Design Thinking workshop, Emma can develop key hypotheses to test she is on the right track. The key to the success of the workshop is bringing together the client stakeholders—including the business sponsor, the senior business and IT executives, the user experience designer and a senior technologist.

“IBM has created a space where you can test concepts in a constraint-free environment—so you don’t have to worry about things like connectivity, the network, or the infrastructure.”

—Charaka Kithulegoda, CIO, Tangerine Bank
Emma’s key hypothesis is:

If we provide Alice, a millennial, with a fun way to start saving she will internalize the benefits of small savings and we will observe:

1) Alice making four small changes to her spending a week to save money;
2) Alice using the tool to track her spending at least four times a week;
3) Alice sharing the app with at least five friends via social media within two weeks.

Once the hypothesis is defined, Emma needs to develop a minimum viable product (MVP) definition. The MVP defines the smallest product that will give Alice value and allow Emma to validate her assumptions. This is the point at which Emma will make important decisions about the product. For example, will it take the form of a web app or native mobile app? Will it be single- or multi-platform? Does it need to be tied into the bank’s back-end systems, or should it be a standalone app? Answering all these questions helps Emma to scope what “minimum” really means.

Next, the user-experience designer quickly develops a set of initial wireframes, which the team reviews in playback sessions with sponsor users that match Alice’s persona. Emma’s business and IT sponsors are excited and approve the development of a pilot version of the millennial savings app.

The entire team holds a project kick-off in which Emma reviews the MVP definition and wireframes, establishes the success criteria for the pilot, and describes the initial set of user stories. The technical team then provides input and validation of the project sizing.

Once this work is complete, the product manager writes more detail for the most immediate user stories and prioritizes them. Using this as a guide, the design team is ready to create more detailed wireframes and graphics, and the technical team can start coding. Everyone on the team is co-located and continuously collaborating, and weekly playbacks are established to connect feedback from sponsor users and key stakeholders on the project.
Code

Throughout each coding iteration, the product manager continuously writes and prioritizes stories—providing direction to the development team on what to code. Emma’s Garage team does not write any code without a failing test. Instead, the team only writes code to implement the user story they are working on—and the cost of change is kept low by continuously refactoring.

Pair programming is the default approach, and the team adopts cloud-native best practices and microservices to keep the cycle times short and the commits small enough to push continuously to a central repository. As soon as the product manager accepts them, stories are marked complete and removed from the workflow. In particular, the coding cycle relies on:

- **Daily stand-ups** to share progress and highlight roadblocks;
- **Iteration planning** to review project backlogs and ensure that all team members have a shared understanding of what each user story means, and to provide estimates for each story, so that the product manager can rank order and prioritize the stories;
- **Pair-programming** to increase software quality, peer review, adherence to the practices, and train new developers without impacting time to delivery;
- **Test-driven development** and **behavior-driven development** to build the right product and improve quality by requiring a focus on code functionality and user behavior;
- **Automation to accelerate deployment** and ensure continuous delivery;
- **Keep it simple and refactor** to maximize delivery of the highest-priority stories and minimize technical debt;
- **Cloud-native architectures** and best practices to maximize reuse, and to optimize compute resources, ease of scaling, and division of teams.

Deliver

The best way to avoid code failure is to fail constantly through successive cycles of continuous delivery. Emma and her Garage team create an automated build and delivery pipeline to push development code commits directly into testing and staging. Feedback loops are included throughout the development and delivery process in pair programming, test-driven development, automated integration tests, product manager acceptance and more. The team quickly learns what is working and what needs to change as the code moves through the continuous delivery pipeline.

The Bluemix Garage team has a wide range of tools and best practices to help Emma to consistently deliver working software of the highest quality. Through chaotic testing—which introduces the concept of randomly and intentionally trying to terminate parts of the software system, such as database services or the hardware it runs on—the team can determine the robustness of their systems early and often.
Emma’s pilot involves personalized customer data, so security and compliance requirements must be met. The Bluemix Garage security experts work with Emma’s security team to help them adopt recent industry standards for security, such as OAuth, and ensure the application design and environment meet critical enterprise requirements. The team also helps Emma to determine which corporate requirements are important to uphold, and to incorporate compliance testing into the delivery process.

Run
The Bluemix Garage team guides Emma in choosing the appropriate cloud environment to meet her app’s requirements. IBM offers enterprises the choice of building and running applications on IBM Bluemix on public cloud on IBM Softlayer®, dedicated cloud on IBM Softlayer, or local clouds running in customer data centers.

IBM Bluemix enables Emma’s team to create, deploy, and manage applications in the cloud using powerful open-source technologies—with an IBM team operating and managing the cloud environment. She can rapidly enhance app functionality through a catalog of IBM, third-party, and community services. In Emma’s industry, rock-solid security is essential, and IBM offers the solutions she needs to meet the bank’s robust standards.

Emma decides to develop her app using IBM Bluemix on public cloud, and later deploy into a dedicated IBM Bluemix environment on the team’s own SoftLayer private cloud. Emma can securely connect and extend her environment with the power and flexibility of Bluemix services running on the public cloud. This means Emma and her team can focus on building new apps without the cost and complexity of managing the underlying infrastructure.

“Bluemix is the core of our innovation platform. We can rapidly deploy and test applications both with our partners and with our consumers to deliver the best innovation experience possible.”

—Charlie Larkin, Senior Director, GameStop Technology Institute

Manage
After just eight weeks, Emma is ready to go live with her new savings app in a dedicated IBM Bluemix environment. Because it is a pilot application, the bank requires resilient operations and high availability, but decides not to invest in continuous availability—and Emma’s Bluemix Garage team makes deployment and management decisions based on these requirements.

The team runs multiple instances of each app component, and uses the IBM Bluemix autoscaling service, production-level service plans and automated monitoring to ensure the optimal levels of availability and performance for the app.

Learn
Throughout each stage of the cycle, Emma’s team actively seeks feedback and makes changes to the value proposition, hypothesis and assumptions, user stories, user experience, tests and code, delivery and management, as well as the overall method, process, tools and culture. The goal is to succeed rapidly; whenever things fail, the aim is to fail fast, learn, adapt and improve.
To help achieve this goal, the product manager and designers design and execute a set of experiments focused on testing key hypotheses—for example, Alice’s willingness to recommend the app to friends—and use this feedback to improve the user experience in future iterations. Whenever possible, the team collects data and applies analytics tools to extract actionable insights from the feedback process. As the app moves beyond the initial pilot phase, the team can use techniques such as A/B testing to try out new features with small subsets of the app’s total user base.

**Transform the corporate culture to scale innovation**

Emma’s team learned first-hand that an organization’s culture is critical in determining the speed of an Agile and DevOps transformation. By transforming into a design- and offering-led team, implementing DevOps practices, and utilizing cloud software, Emma has experienced first-hand the key cultural characteristics of high-performing organizations.

“By integrating with Bluemix and SoftLayer, we can cut development times significantly, and we no longer need to worry about issues like scaling.”

—Robin Hrassnigg, CEO, Diabetizer Ltd. & Co. KG.

IBM sees that successful enterprises are those that can use process innovation to unite the business and technology—a transformation that includes the whole organization, including sales, business owners, developers and more. As we have seen, this engagement is vital—not just because it enables continuous learning, but because it enables continuous feedback from all stakeholders. This virtuous cycle is one of the keys to realizing new ideas with disruptive potential.

Recognizing talent and leadership is important—as is creating the kinds of flexible team structures that encourage people to work effectively and creatively. Creating autonomous, cross-functional and self-organizing teams frees designers, product managers, and developers to develop without the distractions of traditional working environments. The highest-performing enterprises will go further still, and empower teams to select the right tools and technology to achieve their goals.

Enterprises that can achieve some or all of these characteristics will build something that is far more valuable than the sum of its parts: an enjoyable work environment that nurtures innovation, productivity, and satisfaction. The targeted benefits—continuous improvement, agility and disruptive innovation—will flow naturally as a consequence.
Emma and her stakeholders now want to start applying the Bluemix Garage Method to take their in-house projects to a new level of breakthrough innovation. The key ingredients for success are:

- **Securing** senior executive sponsorship;
- **Developing** a roadmap of transformation and projects with focused objectives and measurements;
- **Establishing** a core set of DevOps methodology experts;
- **Running** boot camps on the Bluemix Garage Method for all team members, technology boot camps for developers and product management boot camps for business leaders;
- **Ensuring** the optimal ratio of designers, empowered product managers and developers—making new hires, if needed;
- **Creating** new, collaborative work environments and co-locating teams wherever possible;
- **Demonstrating**, celebrating, and loudly recognizing initial successes to inspire adoption.

**Why choose IBM?**

Competing with startups means moving as fast as a startup. IBM offers the expertise, resources and industry relationships that businesses need to go from vision to prototype to production application in just eight weeks. IBM can help instantiate a rapid innovation system, prove its value to the business quickly, and scale it throughout the enterprise.

The IBM Bluemix Garage Method combines industry-leading cloud and PaaS services—including IBM SoftLayer and IBM Bluemix—with a thriving services ecosystem. IBM's cloud architecture is based solidly on a composition of open source components and, where possible, implements open-standard formats, APIs, and protocols that deliver high levels of interoperability. This means businesses can leverage existing API backed services—in Emma’s case, secure, atomic operations such as deposit and withdrawal from retail bank accounts.

The Bluemix Garage and the Bluemix Garage Method support an open tool chain, allowing teams to discover, compose, and manage tools to form best-of-breed tool chains to achieve rapid innovation. Within minutes, teams can provision tool chains encoded with Bluemix Garage Method best practices. In addition to an extensive catalog of IBM and third-party tools, IBM provides advanced tool-chain analytics—enabling developers to gain critical insights into service health, client usage, and other key metrics.

IBM has accumulated decades of experience and expertise from its own adoption of Design Thinking and DevOps approaches, and continues to apply those learnings to hone cutting-edge software and services. We continue to open new Bluemix Garages around the world to share our experience with clients.

If your enterprise is ready to take the next step on its digital transformation, you can get started straight away. To learn more, visit [ibm.com/devops/method].