TOP 15 TRENDS STARTUP CTOS SHOULD FOLLOW

EXPLORING WHAT TRENDS HAVE THE MOST SIGNIFICANT BUSINESS IMPACT

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Intro

The one thing that startup founders can learn from the last two years is that the future is unpredictable. Unexpected factors and events can affect business plans at any time, the key takeaway is to stay agile by building a company that can easily adapt to most circumstances.

As the echo of COVID-19 in 2021, we saw a surge in digitalization and tech. And the trends were really promising, as much work needed to be done to improve connectivity and allow people to do many operations remotely. New technologies have arrived that are designed to help businesses navigate their way through all the latest intricacies created by this necessity to be agile.

But 2022 brought a lot of surprises. The tech industry has been hit hard by layoffs, with a shocking 200,000 employees losing their jobs since the start of 2022. The biggest players, including Alphabet, Amazon, Meta, and Microsoft, have contributed to more than 50,000 of those job cuts. This is a major setback for the industry and a tough reality for those affected.

But software development trends never stop evolving, and the growth of such technologies as AI and machine learning has only added fuel to this flame. What seems to be a top solution in the software development industry today can turn out to be yesterday's oatmeal tomorrow. CTOs need to be well-informed of startup trends in 2023 as well as in the loop on where the software development industry is heading.

Glorium Technologies is at the forefront of app development for various business domains and clients, and we know where the software development industry is heading. With our finger on the pulse of the latest software industry trends, we can choose the best direction and strategy when building a custom app from scratch.

Here are the top 15 trends a startup CTO should keep in mind when planning a new app in 2023:

Top 15 trends startup CTOs need to know about

Cloud computing



Cloud computing is a significant trend that shows no signs of slowing down. Since the COVID-19 crisis, cloud computing trends have been on the rise. Many startups, businesses, institutions, and governmental agencies have already shifted to cloud-based apps and services. With remote work leading the way, the cloud has become the key to more secure and accessible applications.

According to **McKinsey research,** by 2025, companies expect to move approximately 60 percent of their IT inventory to the cloud. More than 50% of companies say they have adopted AI in at least one role in their organization. While boardrooms may be busy smoothing or reducing IT budgets, they must focus on these major changes' risks and opportunities.

However, there is another trend linked with cloud computing — the distributed cloud. This is when services are run on different cloud providers and at various geographical locations instead of hosting backend services on a single cloud server. The primary benefit of applying distributed cloud technology is felt when some technical issue arises in one of the servers. In this case, the app will remain operational, preventing service disruption and data loss.

Undying Python

Python is the world's most widely used programming language, accounting for nearly one-third of all lines of written code, according to the **TIOBE and PYPL Indices**. It's used for creating a wide range of software products, including complex and enterprise-grade applications. According to the latest data, the demand for Python has bypassed Java and C.

Initially developed in the late 80s, Python has been around for decades. It's an open-source programming language with an easy syntax modeled after English. Its growing popularity can be attributed to its use in data science, data mining, machine learning, artificial intelligence, web development, testing, etc. It's a highly versatile coding language that can be used for various needs.

Thanks to Python, developers can conduct complex mathematical processes, manage and analyze vast amounts of data, develop ML and AI-based applications, and much more.

Artificial Intelligence has taken the world by storm with its potential to mimic human abilities like calculations, natural language processing, and emotions. Python libraries such as Microsoft Cognitive Toolkit, Keras, OpenCV, and NLTK can be used to build intelligent systems.

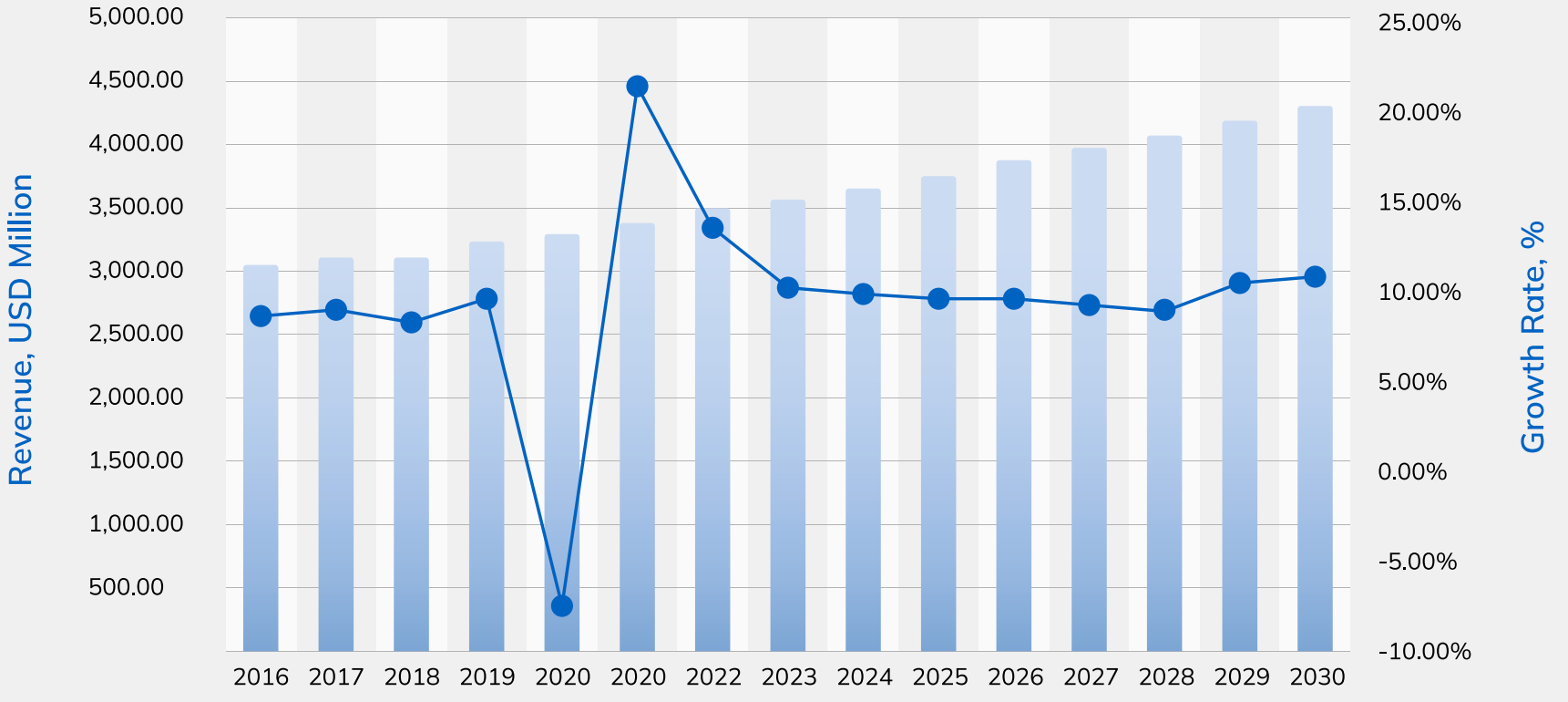
It can also automate a range of tasks, such as software development, web scraping, and repetitive office tasks. Python frameworks such as PyUnit, Selenium Python, PyTest, and Robot Framework can be utilized for automation. The continuous framework upgrades, particularly in Django, TurboGears, and Pyramid, have made coding shorter and services smoother. As a result, these frameworks are expected to receive better plug-ins and libraries in the future. Overall, Python is likely to persist in the ever-changing and evolving IT industry.

Quantum computing

The global quantum computing market size was valued at around $457.9 million in 2021 and is predicted to grow at a CAGR of roughly 31.21% to reach around USD 5.28 billion by 2030, according to Zion Market Research. Quantum computing is a technology that works on the principles of quantum mechanics, such as entanglement, interference, and superposition, and quantum computers are devices that provide solutions for quantum calculations.

These systems are considered a step ahead of supercomputers and are able to solve complicated concepts in quantum mechanics. The potential of quantum computers to solve complex problems drives market demand, with the pharmaceutical industry offering the most growth opportunities. However, quantum computers are difficult to build, and current versions are full of external errors like faults or loss in quantum coherence and loud noise.

Global quantum computing market revenue, 2017-2022, USD Million



Source: Primary Interviews, Zion Market Research, 2023

Digital transformation for anywhere operations

Tech leaders in 2023 will face significant pressures as layoffs and initial cost-cutting measures take effect in most enterprises. To overcome these challenges, it will be critical for CTOs to do more with less without overburdening their tech personnel. Instead of simply asking engineers to do more, CTOs can improve productivity by reducing administrative, bureaucratic, and manual workloads.

For instance, engineers in large organizations may spend as little as 50 percent of their time on actual development, but reducing these non-development activities can significantly increase productivity. CIOs can achieve this by being more scientific and methodical in their engineering approach, carefully selecting team members, minimizing distractions, and automating manual tasks such as testing and compliance. Such measures can lead to a tenfold increase in engineer productivity and help companies attract and retain top talent that drives business success.

DevOps



DevOps is a modern approach combining software development with other IT operations to ease workflows and boost efficiency. DevOps also describes adopting agile software development, automation, and programmable infrastructure deployment and maintenance. In other words, DevOps isn't a tool or technology. Rather, it's a methodology that includes the following:

- Continuous integration or continuous delivery that focuses on task automation
- Collaboration platforms, configurational management, incident management, and other tools that support DevOps adoption
- Cloud computing and microservices

DevOps was designed to solve communication and priority problems between IT departments. Hence, its primary goal is to reduce the time it takes to release a fully-functioning app. It promotes shorter and more controllable iterations.

DevOps trends fuel upcoming business transformation and digital transformation trends. It goes far beyond the IT sector. DevOps trends force businesses to optimize for an entire system and become more adaptive and data-driven. Automation will continue playing a leading role in DevOps transformation. Coupled with artificial intelligence (AIOps) helps an organization achieve all its DevOps goals. Here is what's happening to DevOps now.

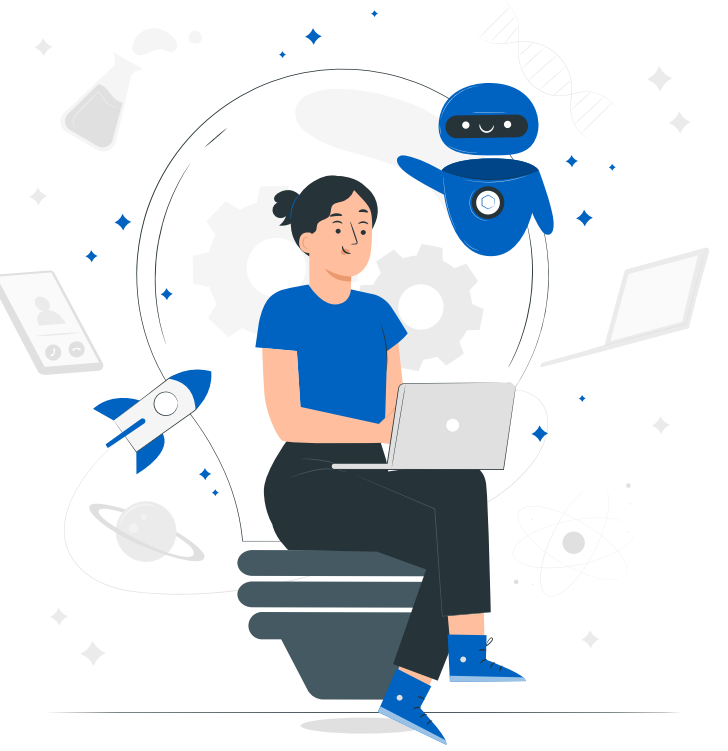
DevSecOps is worth attention as it emphasizes the shift-left approach to security, making it an integral part of the development process. Enterprises for governance and observability purposes have adopted it. Serverless computing, a way of developing and running services and applications without considering servers, has greatly benefited the DevOps process, bridging the gap between development and operations.

Microservice architecture has broken down large applications into more manageable pieces, simplifying development, testing, and deployment while also streamlining the delivery of software and applications. The fourth trend is AIOps, which automates IT processes and operations and identifies the leading cause of operational productivity problems. This trend is estimated to be worth $40.91 billion by 2026. The other three DevOps trends discussed are chatbots and voice assistance, Kubernetes and containers, and continuous testing.

Artificial intelligence decentralization

Artificial intelligence, or AI, is one of the fastest-growing trends in the software development industry. It's used for developing highly innovative technologies. With the evolution of AI, there has been a dramatic rise in deep learning, machine learning, and artificial intelligence neural networks.

In 2022 AI made a shift from being interesting to making an impact on business. Many business leaders consider it essential for further company growth. According to McKinsey, 50 percent of companies report they've adopted AI in at least one function in their business.



The overhyped OpenAI's ChatGPT has already made much noise in marketing. The model can generate ideas for content and texts and translate them into different languages. The latest ChatGPT-4 version is even able to create a simple webpage out of a picture deploying HTML, CSS, JavaScript, and PHP. This will result in reimagining some functions inside the marketing and tech teams.

Apart from marketing, technology is helping physicians in diagnostics and treatment. AI in health is going commercial beyond the earlier-adopting areas such as radiology and pathology. In the fertility field, AI is no longer considered a "future" technology with great promise but rather a legitimate, evidence-based, and maturing technology that may help healthcare professionals (HCPs) provide better care and improve their business performance. 2022 was when this change of heart started in practice for AI in fertility, and 2023 will be a scale-up year.

However, there is a downside, and it's called security. The models are often taught in a very friendly testing environment and tend to react poorly to cyberattacks. So, tech experts should focus more on training their models to operate in a hostile commercial environment.

Also, McKinsey projects the first steps to be made towards "AI decentralization" in 2023. This means players with access to massive, centralized, proprietary data sets will no longer monopolize AI technologies. In just a few years, we could see significant changes in different sectors, starting with entertainment, gaming, and media.

Data due diligence

According to McKinsey, in 2022, companies focused on creating AI use cases but quickly discovered that good AI required good data. Many small-scale, promising MVPs failed to scale due to inadequate data management practices and architecture. Therefore, in 2023, companies need to invest in developing their data foundations, including their operating model, data products, DataOps, and architecture and technology. However, they need to balance this with two critical factors.

The first is scalability for the business. Companies should develop a few data products in 2023 that meet the most high-value use cases for the business and have scalability built in from the start. When well-developed and supported, data products can deliver new business use cases faster and at a lower total cost of ownership. Companies should consider adding 10 to 20 percent to data development costs to build scalability capabilities such as APIs and standardized coding.

Given the current economic situation, the second factor is to sequence initiatives and use cases to generate value quickly. If companies are generating value from their data initiatives in less than six months, something needs to be fixed. Companies should focus on initiatives that create near-term value while establishing a robust foundation for future development.

Data security

As organizations become increasingly data-driven, data security and privacy challenges are at an all-time high. Many organizations have reported missing business opportunities due to data access bottlenecks caused by data security, privacy, and access challenges. Furthermore, there is a clear disconnect between data security and access that hurts an organization's data-driven initiatives and business outcomes and increases the risk of data leaks and breaches.

In 2023, CISOs will need to shift their approach to effectively balance data access with maintaining security posture and privacy compliance. This includes implementing anomaly detection capabilities, continuously monitoring data access and use, refining security policies with transparency and automation, and putting the necessary controls and processes in place to meet the demands of the modern data stack.

Superapps

Gartner focuses attention on the apps that combine many functions inside and remove friction between different sides of customer experience. A simple example is pizza order, when a customer wants to choose a product, pay, and track delivery in one app.

Super apps combine the functionality of apps, platforms, and ecosystems into one app, providing a platform for third parties to develop and publish their mini-programs. Gartner projects that by 2027, over 50% of the world's population will be superapps active users. The superapp industries will include finance, retail, and healthcare.

JavaScript frameworks are still on the rise

JavaScript has proven to be the perfect language for building complex and innovative software development products. JS frameworks are often used for web development. They add dynamism to a site and web apps. But they can also be used for writing the backend. JS can handle lots of backend operations at once without requiring too much load.

JavaScript frameworks are highly versatile and can be used to create different projects in different business domains. So, React, Vue.js, Angular, Ember JS, Node.js, Svelte, Preact, and BackBone JS are widely used for various purposes.

Microservices architecture

Microservices are replacing monolithic architectures to provide a better development experience. This has been a hot topic in the top software development trends for a while. Microservices architecture consists of independent segments that operate collectively.

Each segment is separately developed and maintained, which provides the perks of scalability, self-sufficiency, and lifecycle automation to such apps. Taking advantage of microservices architecture can help businesses achieve more remarkable results thanks to software solutions' improved scalability and flexibility.

If we take the healthcare industry, for instance, the microservices market is projected to grow at a CAGR of over 21.3% to exceed 543.4 million by 2028 end.

Low code or no-code development for cost efficiency

Low code development allows for building software solutions with minimal or no coding. Drag-and-drop tools, flow charts, and visual interfaces simplify the tedious process of creating a custom mobile or web application. Anyone with no coding experience can create a simple app using a low-code editor. Enterprises can integrate business logic into apps by taking advantage of low-code development tools and platforms.

In recent years, the concept of low-code development has gained traction. Low-code platforms are growing in popularity across different markets. The global market of low-code platforms is expected to generate a revenue of $187 billion by 2030. More and more SMBs, as well as enterprises, are taking advantage of low-code development platforms as they reduce dependency on skilled developers.

Low-code development is second to none when it comes to startups. As a rule, startups need to quickly turn ideas into fully-functioning apps to test them out with real users and on a shoestring budget. Any development changes or requirements can be easily implemented inexpensively and in short order with low-code tools.

Note that while low-code development can be used to develop relatively simple software solutions, it cannot currently cope with enterprise-scale solutions that require third-party integrations and handle massive amounts of data.

According to Gartner, Inc.'s most recent forecast, the global market for low-code development technologies is **expected to reach $26.9 billion by 2023**, a growth of 19.6% from the previous year. The increase in business technologists and the rise of enterprise-wide hyper-automation and composable business initiatives will be the primary catalysts driving the acceptance of low-code technologies through 2026.

Internet of Things

The Internet of Things, or IoT is another popular trend in the software development industry. The IoT began its journey in 2015 and continues to evolve. It drives the ongoing trend of digitalization and datafication. Self-driving cars, automated manufacturing, and remote medical devices are only a few examples of how the IoT is changing the current world.

According to **Statista**, the number of IoT devices globally reached 13 billion in 2022 and is projected to increase to 29 billion in 2030. Around 34 percent of North American and European organizations currently use IoT technology within their business operations.

North America is home to one of the world's largest markets, with prominent companies such as Google, Cisco, and IBM leading the way. The region is expected to see an estimated 5.4 billion IoT connections by 2025. The North American IoT market can double in value in a short time span due to the broad range of industries and applications that can profit from improved device connectivity. The IoT trend has evolved significantly since the first IoT device, a «smart» vending machine at Carnegie Mellon University, to encompass a range of smart devices, including smart homes, smart buildings, and smart cities.

The IoT is a versatile technology that can be used across various applications like healthcare, internet security, environmental protection, e-commerce, and others. The IoT continues to expand. The global pandemic has spurred the adoption of the Internet of Medical Things (IoMT).

When speaking about IoT, the worldwide autonomous vehicle market is also worth mentioning. IoT and connected infrastructure are facilitating the sustained growth in the popularity of self-driving cars.

Internet of Behavior (IoB) is a new dimension of the Internet of Things (IoT). It's a combination of three fields:

- Behavioral psychology
- Data analytics
- Technology

Like its bigger brother, The IoB also collects and analyzes data. The technology can also track and analyze user behavior as they interact with devices and apps. As it turns out, a few companies have already implemented a sort of IoB into their products. For example, YouTube uses IoB to show personalized video feeds based on user interactions.

Facebook utilizes the same approach to display ads that are more likely to get engagement from the user. It's expected to be vital in healthcare, e-commerce, customer experience management, and even search engine optimization.

Machine learning to power tech advancements

A wide range of companies has already adopted machine learning. Each year, the number of ML-enabled tools and models is increasing in prominence and usage. By staying on top of machine learning trends, you're putting yourself in a position to capitalize on the benefits of ML before anyone else.

ML-powered solutions coupled with Data Science allow models to mimic human tasks and outperform them in terms of efficiency and accuracy. ML can help businesses gain insights from raw data and understand patterns and behaviors that can help them better adapt to the needs of their users. At an industrial manufacturing level, machine learning can be used to improve and automate processes. With the rise of web-based services, there has also been a rise in cyberattacks. ML can offload some monitoring and vulnerability assessment tasks to an automated algorithm to guard a business against data breaches or ransomware.

ML is quickly becoming the go-to technology for solving complex business problems and improving the effectiveness and scalability of a company.

Reinforcement learning is a recent development in ML technologies that operates on the same principles. To optimize its processes, RL is constantly gathering feedback on its actions. It can also be used to interact with customers and reduce workforce demands in customer service departments and call centers. Utilizing reinforcement learning algorithms can help improve customer satisfaction rates and eliminate the need for a physical workforce.

The best way to remain a step ahead in this business climate is to stay competitive in production and incorporate modern technologies into business workflows. Enterprise and medium-sized businesses can benefit from utilizing ML and RL-based processes. However, even small businesses can benefit from the latest tech advancements in some ways.

Augmented reality for the next-gen experience



The extended global reality (XR) market, which includes augmented reality (AR), virtual reality (VR), and mixed reality (MR), is forecasted to exceed $100 billion by 2026, according to Statista. The demand for new and innovative shopping experiences has risen since the global pandemic shifted customer behavior towards e-commerce. Online shoppers want to interact with products digitally even before visiting the store.

AR and VR have already proven their ability to improve customer satisfaction. For example, IKEA offers an AR-powered app that allows customers to measure a furniture item to see how it would look once placed in their home. But there are far greater uses for how AR and VR can benefit businesses and customers in 2023. These include virtual try-on apps, AR NFTs, 3D search results on Google, virtual tours for real estate buyers, and so much more.

AR-connected fitness devices are also popular. Nowadays, you can combine playing video games with a full-body workout. Anyone can access the variety of popular VR and AR tech available to help them get their body moving and get a workout.

For example, the Oculus Rift headset can assist your workout with trainers. And the Oculus Move app can keep track of your movement, heart rate, and burning calories while playing video games. The market of AR-based fitness apps is still growing, and right now may be the best time to jump onto the last bandwagon before it goes mainstream.

Conclusion

Software development is a highly dynamic industry influenced by technologies, market trends and needs, consumer behaviors, and other factors. Before entering the software industry, you need to understand what direction it’s moving in order to anticipate the upcoming trends. This way, you’ll be prepared to turn your ideas into apps when the market is ready.

Digital transformations, IoT, IoB, ML, AI, and Python, are just a few of the trends to look out for in 2022. The world is highly fluid, and things can change quickly, so staying flexible and agile is a must for modern startups. The ability to make a pivot and move in the opposite direction can help you ride the crests of this ever-changing landscape.

Having a proven tech partner by your side can ease your software development journey. While partnering with Glorium Technologies, you don’t need to think about every single technical aspect all the time. Leave that to us. Contact us to get started on your next-gen app idea today!

Thanks for reading!

Want to bring your dreams to life but need a savvy squad to make it happen?

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As a Microsoft Silver Partner, we are recognized for our expertise in delivering solutions on Microsoft's technology stack. Additionally, our ISO certifications, including ISO 9001 for Quality Management, ISO 13485 for Quality Management for Medical Devices, and ISO 27001 for Information Security Management System, demonstrate our commitment to delivering secure and high-quality products.

We are grateful for top industry awards and recognitions that inspire us to continue providing exceptional services to our clients:

- Inc.5000 (2020, 2021, 2022)
- Inc. Regionals (2021, 2022) fastest-growing private companies in America
- The 2023 Global Outsourcing 100 by IAOP
- Real Leaders Impact Awards (2023)
- Top B2B Service Providers for Sustained & Fast Growth in Clutch (2021)
- Top 1000 Global Service Providers in Clutch (2022)
- TechBehemoths's Top Custom Software Development Companies in the US (2022)

Glorium Technologies professionals deliver projects in the shortest timelines without losing quality in the process as they utilize some of the techniques and strategies for effective team collaboration described in this book.