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→ # Teaming with technology:
Accelerating software delivery with Generative AI

As Generative AI (GenAI) transforms the software development landscape, it offers unprecedented opportunities for innovation, creativity, and problem-solving. For example, GenAI has the potential to accelerate work across the entire software development lifecycle (SDLC), improving efficiency from the requirements gathering stage through to code generation and testing. GenAI can improve all aspects of the process, from strategy and planning all the way through execution. The key to unlocking GenAI's full potential is using it to amplify human expertise: pairing people and computing power together effectively.
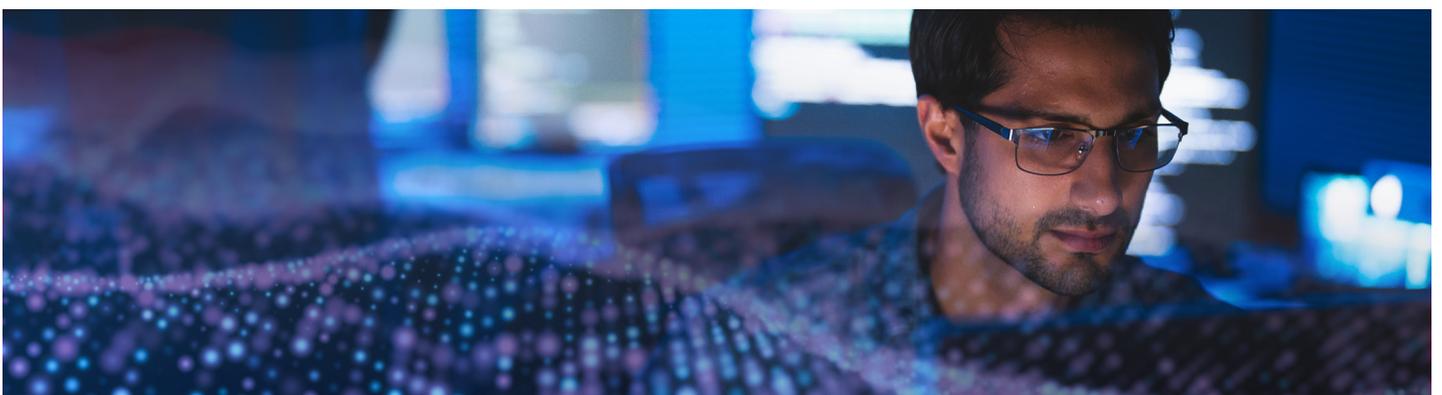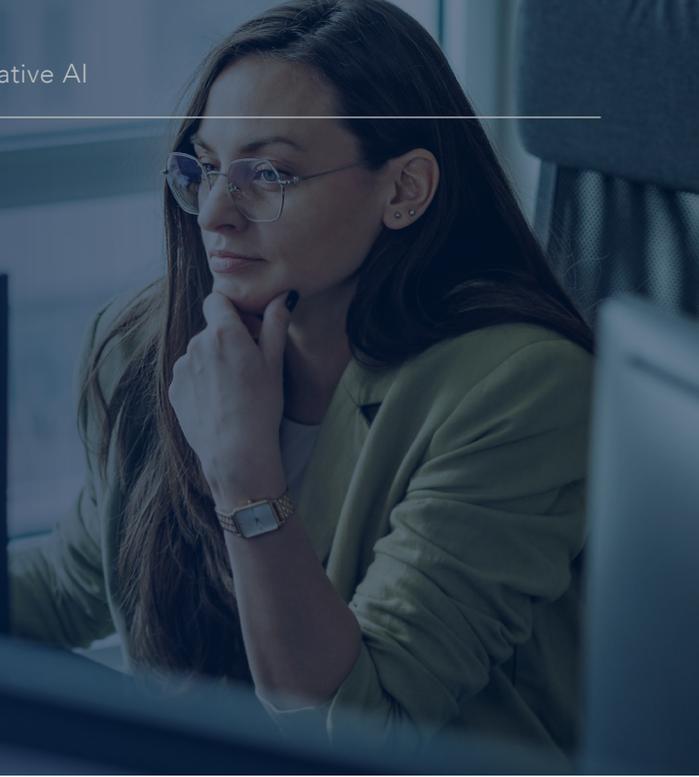
GenAI should be seen as a tool that works best in harmony with software developers and designers, not as a replacement for them.

Like all technological advancements, the draw of GenAI is that it can amplify human potential, making human lives easier – redirecting us from mundane or routine tasks so we can focus on higher-level problem-solving. This goes for everyone from developers and designers to individual users. But that can't happen if tech isn't used the right way – which, in this case, requires expertise in understanding how to apply it to achieve desired ends.

That's why we take a human-centric approach. We focus on the mission – the outcomes we need to achieve – and we bake that into all our work, especially when it comes to GenAI in software development. We believe that gains in efficiency, speed, and cost savings empower people and make it possible for organizations to achieve more and better results.

"The goal is for Generative AI to help us innovate faster, freeing software development teams for higher-level, conceptual work."

-Trent Hone, Vice President of Technology and Product Innovation

So at ICF, that's why we always leverage both: people and technology. The result? Software that is technically robust, user-friendly, and aligned with human values and needs. Never forget: **GenAI should serve as a support** to your overall mission.

This guide outlines four essential practices to successfully integrate GenAI into the SDLC, while ensuring that human skill, creativity, decision-making, and oversight remain at the forefront.

Apply principled AI practices focused on transparency, ethics, and human collaboration.

Understand the specific use cases where GenAI can optimize the SDLC.

Maintain human oversight to ensure meaningful, secure, and contextually relevant outcomes.

Empower your teams by rethinking staffing and operational models for the AI-driven future.

Who can benefit from using GenAI?

Everyone on your software development team, including:

Business analysts	Product owners	Data scientists
Software designers	Program managers	Scrum masters

**All types of engineers -** developers, platform engineers, DevSecOps engineers, etc.

"When built on a strong data foundation, AI has the power to transform organizations and drive dramatic differentiation, but it requires a robust governance framework and a commitment to transparency and fairness."

-ICF Responsible AI Use Principles

Apply principled AI practices

From the earliest planning stages, set up high-level principles for where GenAI does (and doesn't) belong in your software development cycle. These principles become the foundation for how your organization will integrate GenAI into software development. We've developed our own Responsible AI Use Principles to guide every engagement. Once those principles are established, then you can determine how to enact them in specific circumstances, giving "guardrails" to your entire cycle.

Figure 1

Plan

Create

Verify

The software development lifecycle

Monitor

Configure

Release
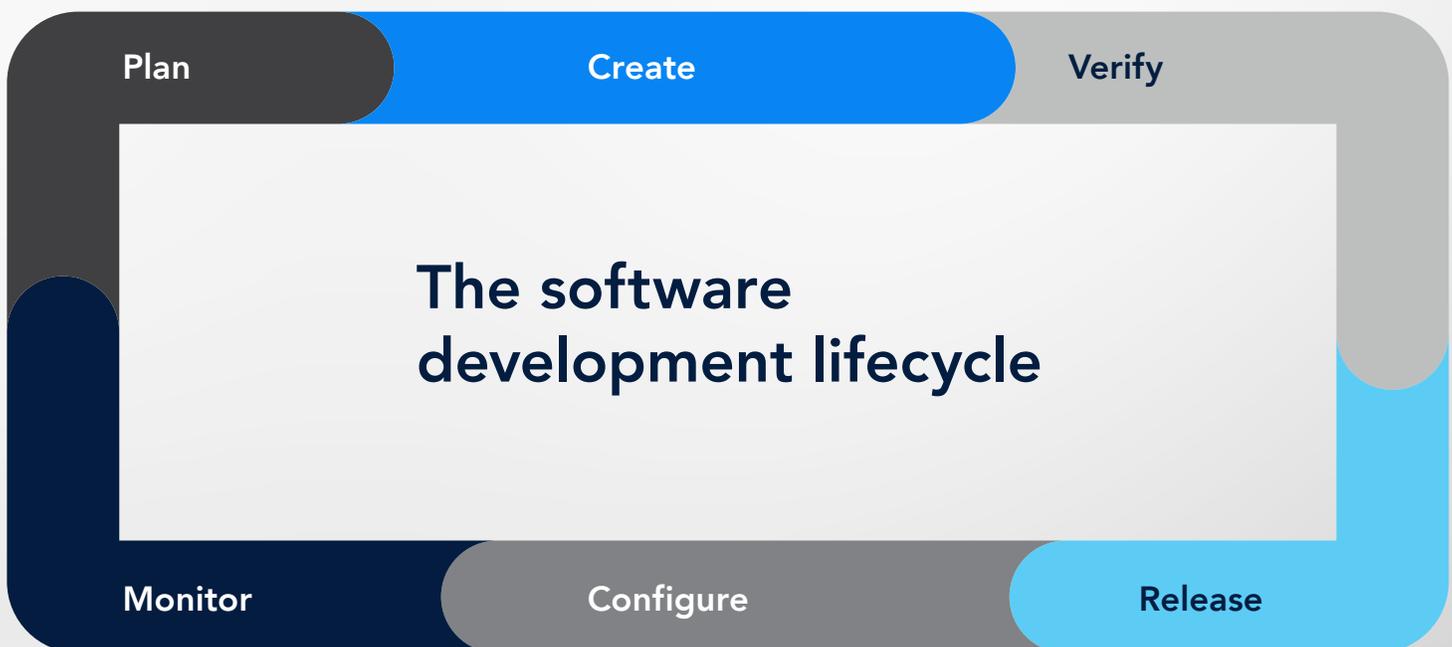
Focus on business value

Commit to using GenAI where feasibility is high and returns can be realized. If that can't yet be quantified, identify what information you need, or experience you will gain, through experimentation. Document and share to shape the path ahead.

Apply governance

Use clear policies to maintain alignment with your organizational/software development goals. Continuously evaluate the efficacy of your GenAI tools to understand their strengths and limitations.

Be transparent

Ensure GenAI-driven decisions are explainable, understandable, and transparent. This builds trust and aligns with responsible use guidelines and industry frameworks, like the National Institute of Standards and Technology (NIST) AI Risk Management Framework (AI RMF).

Use AI responsibly

Institute controls and processes to avoid harm and mitigate bias. This involves best practices like inclusive design, continual audits, and data anonymization. Ensuring broad stakeholder representation can foster innovation and mitigate undesirable outcomes.

Prioritize user experience (UX)

Be intentional about using GenAI to enhance usability and accessibility. For example, GenAI can rapidly iterate through alternative UX designs to identify those that will work better for users.

Build in quality control

Refuse to use GenAI-generated code "as-is." Incorporate static and dynamic analysis for security and quality assurance. Require developers to review and test code to ensure it conforms to standards and delivers the desired functionality.
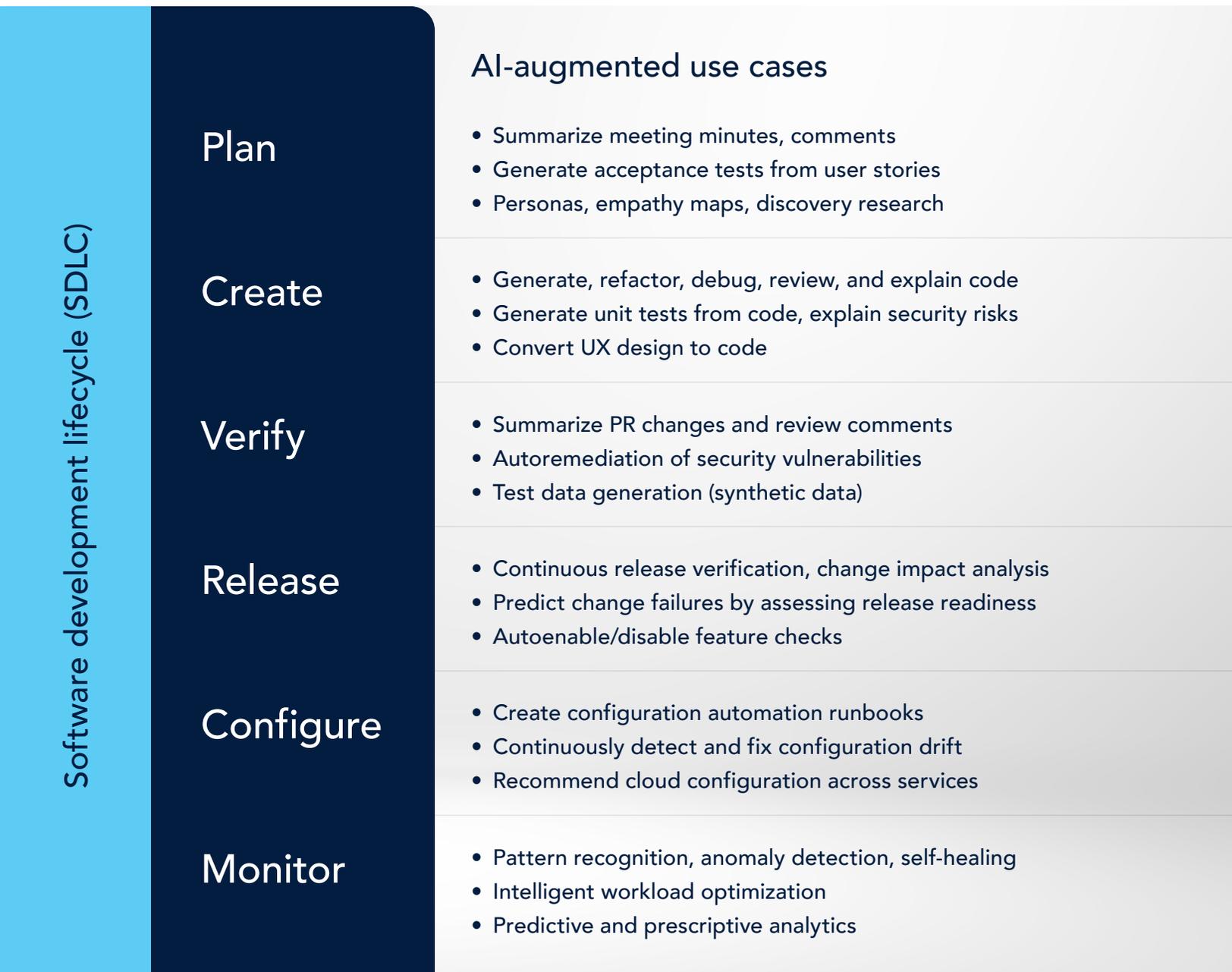
Practice continuous learning and improvement

Afford continuous learning opportunities to ensure your organization uses GenAI effectively and doesn't get caught playing catch-up. Periodically review and reassess the field and your organization's specific AI deployments to stay relevant.

Understand where GenAI can optimize the SDLC

It's tempting to jump on the latest technology for technology's sake, throwing GenAI at every challenge just because you can. As the old saying goes, "everything looks like a nail when you're holding a hammer." But it pays to be thoughtful in your approach, taking the time and effort to understand what GenAI can actually do for your organization, and more specifically, for your software development efforts. Setting realistic expectations for how GenAI will impact the software development lifecycle puts you in a much better position for achieving your goals. For example:

Figure 2

Software development lifecycle (SDLC)

AI-augmented use cases

Plan
- Summarize meeting minutes, comments
- Generate acceptance tests from user stories
- Personas, empathy maps, discovery research

Create
- Generate, refactor, debug, review, and explain code
- Generate unit tests from code, explain security risks
- Convert UX design to code

Verify
- Summarize PR changes and review comments
- Autoremediation of security vulnerabilities
- Test data generation (synthetic data)

Release
- Continuous release verification, change impact analysis
- Predict change failures by assessing release readiness
- Autoenable/disable feature checks

Configure
- Create configuration automation runbooks
- Continuously detect and fix configuration drift
- Recommend cloud configuration across services

Monitor
- Pattern recognition, anomaly detection, self-healing
- Intelligent workload optimization
- Predictive and prescriptive analytics

"AI can streamline development, but it only heightens the need for developer expertise. Remaining diligent with quality control helps avoid future issues that could otherwise offset initial gains."

-Kristyn Plunkett, Vice President, Digital Modernization Strategy

Maintain human oversight to optimize business value

While GenAI is a powerful tool, it still has limitations:

- GenAI models lack deep contextual understanding and can sometimes produce solutions that are technically correct, but misaligned with business goals or user needs. (For the record, sometimes, they're not even technically correct.)
- GenAI models can inherit biases from their training data, potentially leading to undesirable or harmful outputs.
- GenAI-generated code may not account for all edge cases or security flaws, making security vulnerabilities another concern.
- GenAI doesn't possess the intuition, creativity, or mission-specific knowledge that experienced developers bring to complex problem-solving.

Thus, while GenAI can accelerate progress, it must be seen as a complement to human expertise, not a substitute. By keeping humans in the loop, you retain control over critical evaluations, security checks, and creative decision-making. Human developers can guide AI outputs, generate multiple optimized solutions, and apply deep mission insights for contextually relevant outcomes. Your people and GenAI make a winning team!

Empower your teams for the AI-driven future

As GenAI tools become integral to development workflows, organizations must rethink how they staff, mentor, and structure their teams. Junior developers entering the workforce will see GenAI as a given, but they need to gain the experience to recognize and correct GenAI's mistakes. That requires mentoring by senior staff, robust QA processes, and careful consideration of team composition.

GenAI is much more than a new tool in the software development toolkit – it is a powerful game-changer. So while using GenAI tools fosters innovation, human-machine pairing is crucial. Organizations should:

Empower technical staff with GenAI tools, sandbox environments, and development opportunities that allow them to hone skills related to prompt engineering, retrieval augmented generation (RAG) architectures, and even model fine-tuning.

Implement fusion teams to ensure software meets the business need. In addition to technical expertise, fusion teams must include legal, security, human centered design, and change management professionals, as well as the voice of the business.

Cultivate expertise and introduce team practices to discern when GenAI is "right" and when it's incorrect. Automate tasks in ways that enhance human decision-making, insight, and creativity.

Solicit feedback from the bottom up. Your development team members are your early adopters and champions of new tech; they will give you a sense for how and when to get started with AI across the SDLC.

Only **33%** of federal IT leaders say they have a sufficient supply of workers with the right skills for AI implementation.

Source: ICF Digital Modernization Survey Wakefield Research December 2023

In conclusion

GenAI isn't going away. Like the automobile and the internet, it's a generational technology that will leave its mark on the world for decades to come. You're already taking the right steps by trying to get in front of – or at least keep pace with – it. This guide scratches the surface. The state of Generative AI in software development is rapidly evolving, and the future holds even more possibilities. However, it's crucial to stay informed and adapt continuously. While our future will be powered by AI, it's important that we always have one hand on the wheel.

At ICF, we bring expertise in GenAI, the SDLC, and the domains in which we work to ensure every solution is both technically correct and aligned with mission goals. This way, GenAI becomes a catalyst for real transformation and innovation.

We believe that the future of software development is rapid, innovative, and powered by pairing GenAI and human expertise. Let's explore how we can integrate these technologies to elevate your team and create world-class software. Reach out today to learn more.

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ICF is a global consulting services company, but we are not your typical consultants. We help clients navigate change and better prepare for the future.

Our team provides digital, cyber, and cloud–based platform services that drive transformational solutions across business and government. From cloud platforms and automation to machine learning and AI, we provide the foundation to meet dynamic end–user requirements and stand up a modern enterprise. We combine the best of advanced analytics, industry expertise, and enterprise technologies to build agile solutions that evolve to meet your changing needs. Our extensive suite of proprietary software and other technology tools add value to your projects from the outset.