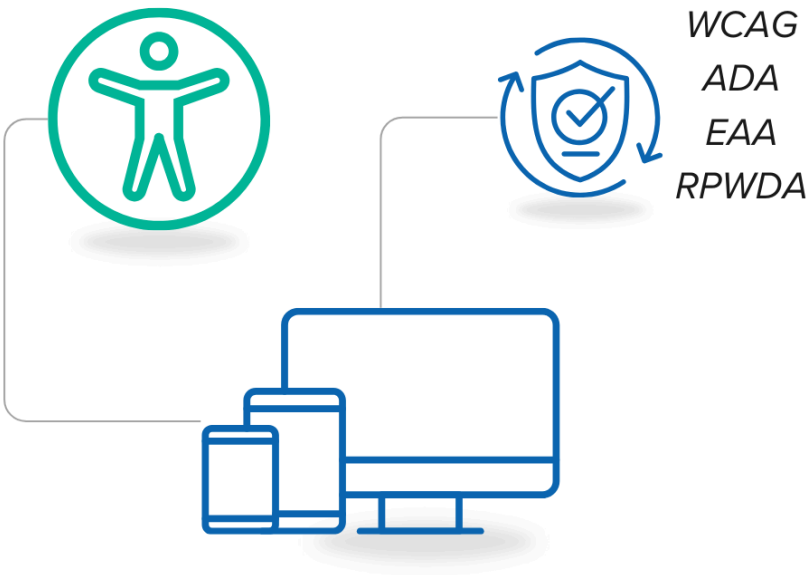
White Paper

Ensuring Digital Accessibility Compliance



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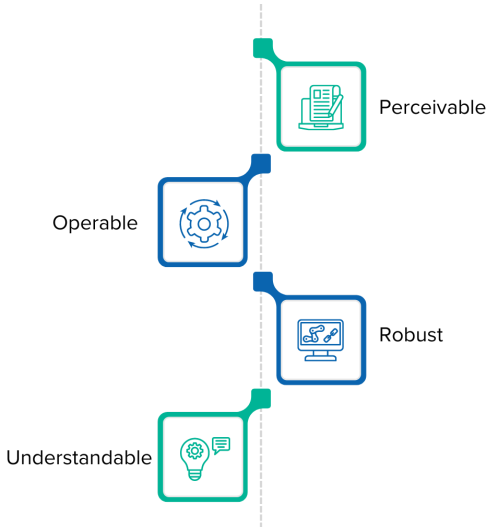
1. INTRODUCTION

Digital accessibility ensures everyone, including individuals with disabilities, can use websites and mobile applications effectively. According to the World Health Organization (WHO), over 1 billion people, about 15% of the world's population, live with some form of disability. As the demand for accessibility grows, numerous laws and regulations have been established worldwide to enforce compliance. This white paper explores these laws, outlines technical requirements for accessible interfaces, and demonstrates how Batoi technologies and solution approaches can help organizations achieve compliance and manage regulatory risks.

2. KEY STANDARDS

It's imperative to discuss the key standards for accessibility on the web and online usage. The **Web Content Accessibility Guidelines (WCAG)**, developed by the **World Wide Web Consortium (W3C)**, provides comprehensive guidelines to ensure web content is

accessible to everyone. The current version, WCAG 2.1, includes success criteria organized under four principles:



1. **Perceivable**: Information and user interface components must be presentable to users in ways they perceive.
2. **Operable**: User interface components and navigation must be operable by all users.
3. **Understandable**: Information and the operation of the user interface must be understandable.
4. **Robust**: Content must be robust enough to be interpreted by a wide variety of user agents, including assistive technologies.

WCAG 2.1 addresses a range of accessibility issues and provides criteria that websites and applications must meet to be considered accessible. The guidelines cover various aspects of web design, from text alternatives for non-text content to ensuring that screen readers can navigate and read content. Compliance with WCAG is often required by law and is considered a best practice for creating *inclusive digital experiences*.

On the other hand, a WebAIM study found that 95.9% of the top one million homepages had detectable WCAG 2.0 failures. Also, from the business perspective, the Return on Investment (ROI) for accessibility is significant. A study by Forrester Research indicates that by focusing on digital accessibility, companies can significantly expand their customer base to include individuals with disabilities, thereby increasing their potential market and revenue opportunities.

3. DIFFERENT ACCESSIBILITY LAWS AND REGULATORY REQUIREMENTS

First, let us discuss various accessibility regulations worldwide. In the USA, the **Americans with Disabilities Act (ADA)**, enacted in 1990, is a comprehensive civil rights law prohibiting discrimination against individuals with disabilities in all areas of public life, including digital spaces. Courts have interpreted **Title III of the ADA** to require that the

websites for businesses and organizations providing goods and services to the public be accessible. In other words, the websites must be navigable and usable by people with various disabilities, ensuring equal access to information and services. The other provision, **Section 508 of the Rehabilitation Act**, updated in 2017, requires federal agencies to make electronic and information technology (EIT) accessible to people with disabilities. It includes websites, software, electronic documents, and multimedia. Section 508 applies to all federal agencies and organizations receiving federal funding, promoting accessible technology to ensure equal participation by individuals with disabilities.

In Europe, the **European Accessibility Act (EAA)**, adopted in 2019, mandates that a wide range of products and services, including websites and mobile applications, be accessible to individuals with disabilities by 2025. The act harmonizes accessibility requirements across the EU, making it easier for businesses to comply with a single set of rules. The EAA aims to improve the functioning of the internal market for accessible products and services by removing barriers created by divergent regulations in Member States. The earlier effort, the **Web Accessibility Directive**, effective since 2016, requires public sector bodies to ensure their websites and mobile apps are accessible according to the Web Content Accessibility Guidelines (WCAG) 2.1 standards. It aims to make digital services more accessible by mandating regular accessibility reviews, providing feedback mechanisms, and publishing accessibility statements. This directive applies to government websites, public services, and any digital content that public bodies provide.

In India, the **Rights of Persons with Disabilities Act (RPWD Act)**, enacted in 2016, enforces accessibility standards in information and communication technology (ICT), aligning with global guidelines like WCAG. The act mandates that government websites comply with these standards and encourages private sector compliance through incentives and awareness campaigns. The RPWD Act ensures that individuals with disabilities have equal access to digital information and services, promoting inclusion and participation in the digital economy. The other notable regulations are:

- **Accessibility for Ontarians with Disabilities Act (AODA) in Canada**: Enacted in 2005, AODA sets accessibility standards for government, businesses, and non-profits in Ontario, including web accessibility. The goal is to make Ontario fully accessible by 2025 by implementing standards that address various barriers to accessibility.
- **Disability Discrimination Act (DDA) in Australia**: The DDA, enacted in 1992, prohibits discrimination against individuals with disabilities, including in the provision of web services. It requires that websites be accessible to people with disabilities, ensuring they have the same access to information and services as everyone else.

- **Equality Act 2010 in the United Kingdom**: The Equality Act requires service providers to make reasonable adjustments to ensure their websites are accessible to people with disabilities. This legislation consolidates previous anti-discrimination laws and mandates that digital services are usable by all, promoting equality and inclusivity.

4. TECHNICAL REQUIREMENTS AND PROVISIONS FOR WEB AND MOBILE-BASED INTERFACE

Let us discuss the technical provisions for web and mobile-based interfaces, covering perceivable, operable, understandable, and robust design principles.

4.1 Perceivable

Making content accessible involves presenting it in formats that users can effectively perceive. Here are some guidelines to ensure accessibility for things to be perceivable:

- **Text Alternatives**: Provide text alternatives for all non-text content. This includes using alt attributes for images, aria-label for form controls (*ARIA* stands for Accessible Rich Internet Applications), and text descriptions for icons and other graphical elements. This ensures that screen readers and other assistive technologies can convey the content to users who are blind or visually impaired.
- **Captions and Transcripts**: Offer captions for all multimedia content, including videos and live audio streams. Transcripts should be provided for audio-only content. Captions and transcripts make multimedia accessible to users who are deaf or hard of hearing and also help those who prefer reading over listening.
- **Adaptable Content**: Ensure content can be adapted for different presentations without losing meaning. This includes supporting text resizing without breaking the layout, ensuring content reflows in a responsive design, and using flexible grids and layouts. Techniques like using relative units (em, rem) instead of fixed units (px) help achieve adaptability.

4.2 Operable

Interface components must be operable by all users, regardless of their abilities or disabilities. There are several ways to make interfaces operable:

- **Keyboard Accessibility**: All functionality should be accessible using a keyboard. Users should be able to navigate through the interface using the Tab key, activate controls using the Enter or Space keys, and interact with drop-down menus, modal dialogs, and other interactive components without a mouse. ARIA roles, properties, and states should be used to enhance keyboard navigation.
- **Enough Time**: Provide users with sufficient time to read and use content. This includes offering adjustable time limits, pause buttons for auto-rotating carousels, and mechanisms to request more time when forms or other timed interactions are present.
- **Seizure Avoidance**: Ensure content does not cause seizures or physical reactions. Avoid using content that flashes more than three times per second, and provide warnings if such content cannot be avoided. Techniques like reducing the intensity and frequency of flashing elements can help.

4.3 Understandable

Users must understand the information and operation of the user interface:

- **Readable Text**: Make text readable and understandable. This includes using clear and simple language, avoiding jargon, and providing definitions for unusual terms. Use sufficient font size, line height, and letter spacing to improve readability.
- **Predictable Navigation**: Ensure web pages operate in predictable ways. This includes maintaining consistent navigation across pages, using clear and descriptive labels for links and buttons, and ensuring that elements behave in expected ways. For example, ensure that form controls are logically ordered and clearly labeled.
- **Error Prevention**: Help users avoid and correct mistakes. Implement form validation with clear error messages and suggestions for correction. For critical actions (like submitting a form), provide a confirmation step to prevent accidental submissions.

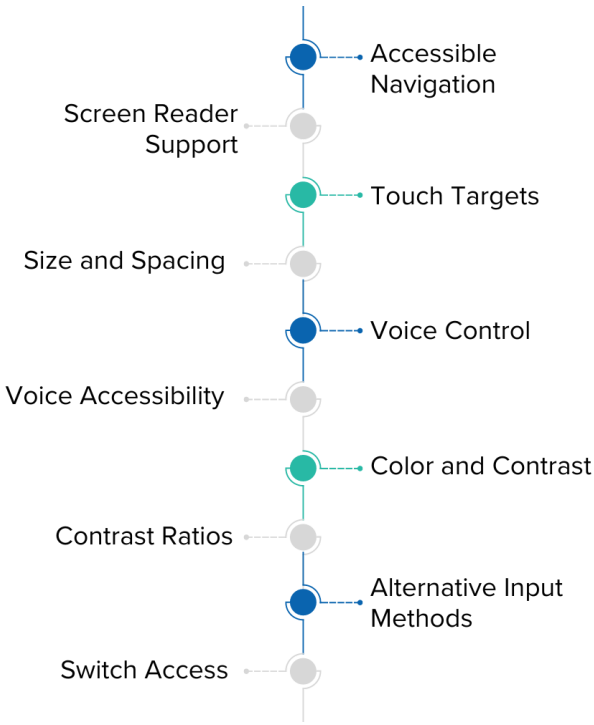
4.4 Robust

Content must be robust enough to be interpreted by a wide variety of user agents, including assistive technologies. Use standard HTML elements and attributes to ensure *compatibility* with current and future user agents, including browsers and assistive technologies. Use semantic HTML for structure (e.g., headings, lists, tables) and ARIA attributes to enhance accessibility where needed. Regularly validate the code to ensure it adheres to accessibility standards.

4.5 Mobile Interfaces

Now, let us discuss the technical approaches for ensuring accessibility with the mobile interfaces:

- **Accessible Navigation**: Ensure users can navigate the app using assistive technologies like screen readers. Provide accessible labels and descriptions for all interactive elements.
- **Screen Reader Support**: Using ARIA attributes or native properties, ensure all interactive elements (buttons, links, form controls) have accessible labels. Test with popular screen readers like VoiceOver (iOS) and TalkBack (Android) to ensure compatibility.
- **Touch Targets**: Make touch targets large enough to be used by people with motor impairments.
- **Size and Spacing**: The recommended minimum size for touch targets is 44x44 pixels. Ensure sufficient spacing between interactive elements to prevent accidental activation.
- **Voice Control**: Ensure apps can be controlled using voice commands.
- **Voice Accessibility**: To facilitate voice control, provide clear and concise labels for all interactive elements. Avoid complex gestures that are difficult to describe or execute using voice commands.
- **Color and Contrast**: Maintain sufficient color contrast for readability.
- **Contrast Ratios**: The recommended contrast ratio is 4.5:1 for normal text and 3:1 for large text. Use tools to check color contrast and ensure text and interactive elements are readable in various lighting conditions.
- **Alternative Input Methods**: Support alternative input methods like switch devices for users with severe motor disabilities.
- **Switch Access**: Ensure compatibility with switch devices and other alternative input methods. This involves supporting sequential navigation and activation through a single switch or a combination of switches. Design interfaces that are navigable and operable without relying on precise touch interactions.



By incorporating these mobile accessibility best practices, inclusive and user-friendly apps can be developed.

5. HOW BATOI CAN SOLVE THESE CHALLENGES

Batoi's approach to accessibility extends from software engineering to compliance management.

5.1 Developing Software Applications with the Batoi RAD Platform

The Batoi RAD Platform offers tools to develop accessible web and mobile applications by integrating accessibility features from scratch. The platform ensures compliance with WCAG and other standards through:

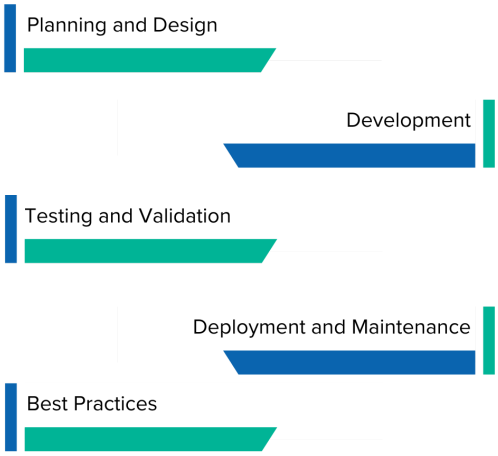
- **Pre-built Accessible Components:** Widgets and templates designed with accessibility in mind. These components include appropriate ARIA roles, keyboard navigation support, and sufficient color contrast.
- **Real-time Accessibility Checks:** Tools to verify accessibility during development. The platform provides automated checks and highlights issues that need to be addressed.
- **Customizable Themes:** Ensuring color contrast and font sizes meet accessibility standards. Developers can customize themes to enhance readability and usability.

5.2 Batoi GovernEngine and BCube RegStacker for Regulatory Risk and Compliance Management

Govern helps organizations perform the regulatory risk assessment and analysis associated with accessibility compliance through surveys and data analysis.

BCube RegStacker facilitates regulatory audits by providing a comprehensive suite of tools for audit workflows, findings management, proactive alerts, and reporting. It also helps manage policies and procedures.

6. IMPLEMENTATION GUIDELINES AND STEPS



6.1 Planning and Design

6.1.1 Understand Regulatory Requirements

- **Familiarize Your Team**: Ensure your team understands relevant accessibility laws and guidelines, as outlined in Section 3. Conduct thorough reviews of these requirements and hold training sessions to inform all stakeholders about their responsibilities.
- **Conduct Regular Reviews**: Keep up with changes in accessibility regulations and standards, ensuring that your team remains compliant and up-to-date with current best practices.

6.1.2 User Research

- **Engage Users with Disabilities**: Conduct research to understand the needs of users with disabilities. Involve these individuals in user research to gain firsthand insights into their challenges and preferences.
- **Diverse User Testing**: Ensure your user research includes a diverse group of participants with varying types of disabilities to understand different needs better.

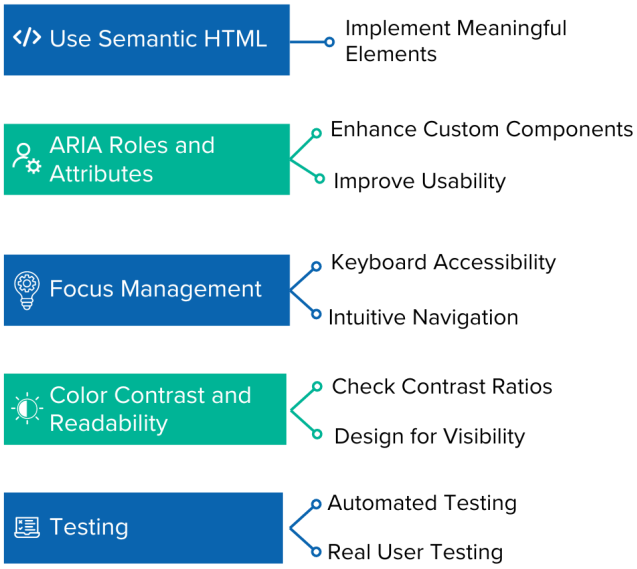
6.1.3 Inclusive Design

- **Incorporate Accessibility Early:** Integrate accessibility considerations from the design phase. Use tools like personas and user stories that include individuals with disabilities to guide the design process.
- **Accessibility-First Mindset:** Adopt an accessibility-first mindset to avoid costly and time-consuming retrofits later in the project. Plan for accessibility in all aspects of the design and development process.

6.2 Development

6.2.1 Use Semantic HTML

- **Implement Meaningful Elements:** Use semantic HTML elements such as <header>, <nav>, <main>, <footer>, and <article> to provide a clear and meaningful structure to your web pages. This helps assistive technologies better understand the content.



6.2.2 ARIA Roles and Attributes

- **Enhance Custom Components**: Use ARIA roles (e.g., role="button", role="dialog") to define the purpose of custom elements and ARIA attributes (e.g., aria-label, aria-controls) to provide additional properties.
- **Improve Usability**: Ensure ARIA roles and attributes are used correctly to avoid confusing users relying on assistive technologies.

6.2.3 Focus Management

- **Keyboard Accessibility**: Make sure all interactive elements are keyboard accessible. Manage focus appropriately using the tabindex attribute to control focus order and ensure custom components can receive focus.
- **Intuitive Navigation**: Provide clear and logical focus indicators and sequences to help users navigate the interface efficiently.

6.2.4 Color Contrast and Readability

- **Check Contrast Ratios**: Use tools like the Color Contrast Checker to ensure that text has sufficient contrast against its background (minimum 4.5:1 for normal text and 3:1 for large text).
- **Design for Visibility**: Choose color schemes and font styles that enhance readability for users with visual impairments, including those with color blindness.

6.2.5 Testing

- **Automated Testing**: Regularly test the application using automation tools like Axe, Lighthouse, and WAVE to identify common accessibility issues.
- **Real User Testing**: Complement automated testing with manual testing using assistive technologies like screen readers (e.g., NVDA, JAWS, VoiceOver). Involve users with disabilities to test the application and provide feedback on usability.

6.3 Testing and Validation

6.3.1 Automated Testing

- **Identify Common Issues**: Use automated testing tools to identify and fix common accessibility issues quickly. Regular scans can help maintain compliance with WCAG standards.

6.3.2 Manual Testing

- **Assistive Technology Testing**: Conduct manual testing with assistive technologies to catch issues that automated tools might miss. This includes testing with screen readers, keyboard navigation, and voice control systems.
- **Detailed Audits**: Perform detailed accessibility audits, including reviewing code and user flows to ensure all aspects of accessibility are covered.

6.3.3 User Testing

- **Engage Users with Disabilities**: Involve real users with disabilities in testing to uncover practical accessibility issues. Gather feedback on how they interact with the application and make necessary improvements.
- **Iterative Feedback Loops**: Use feedback from users with disabilities to iterate and enhance the accessibility features continually.

6.4 Deployment and Maintenance

6.4.1 Documentation

- **Comprehensive Guides**: Provide detailed documentation on accessibility features and compliance. Include instructions on using accessible components, best practices for maintaining accessibility, and troubleshooting common issues.
- **Accessibility Statements**: Publish accessibility statements outlining your commitment to accessibility and how users can report issues.

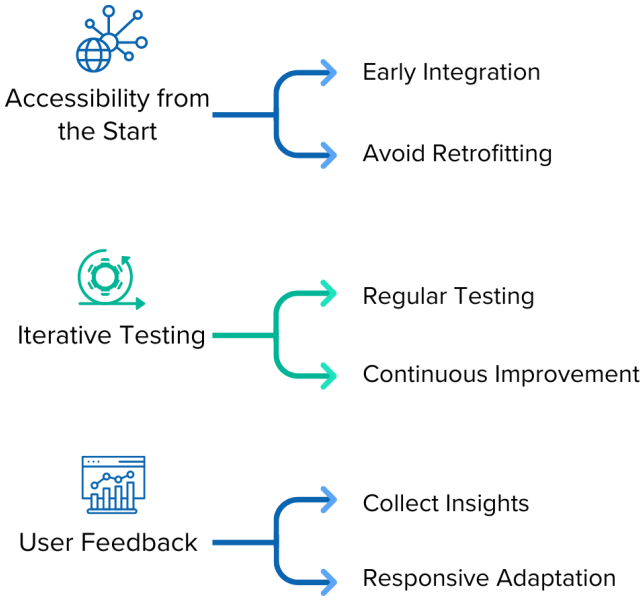
6.4.2 Training

- **Team Training:** Train your team on accessibility best practices and tools. Ensure that all team members, from designers to developers, understand the importance of accessibility and how to implement it effectively.
- **Ongoing Education:** Keep your team updated on the latest accessibility standards and technologies through regular training sessions and workshops.

6.4.3 Ongoing Monitoring

- **Regular Reviews**: Continuously monitor and update the application to maintain compliance with evolving standards. Regularly review and test the application to ensure it remains accessible.
- **Proactive Updates**: Stay proactive in updating your application in response to new accessibility guidelines and user feedback.

6.5 Deployment and Maintenance



6.5.1 Accessibility from the Start

- **Early Integration**: Integrate accessibility into the initial stages of design and development. Considering accessibility at every step of the process, from planning to deployment, ensures a more inclusive product.
- **Avoid Retrofitting**: Design with accessibility in mind from the outset to avoid needing costly and complex retrofits later.

6.5.2 Iterative Testing

- **Regular Testing:** Test accessibility iteratively throughout the development process. Regular testing helps catch issues early and reduces the effort required to fix them.
- **Continuous Improvement:** Use an iterative approach to continuously improve accessibility features based on testing results and user feedback.

6.5.3 User Feedback

- **Collect Insights:** Gather and act on feedback from users with disabilities. User feedback provides valuable insights into real-world usability and helps prioritize accessibility improvements.
- **Responsive Adaptation:** Adapt your application based on user feedback to ensure it effectively meets all users' needs.

By following these implementation guidelines and steps, organizations can create web and mobile applications that are accessible to all users, ensuring compliance with regulatory requirements and enhancing the overall user experience.

7. CONCLUSION

As digital accessibility regulations become more stringent globally, organizations must ensure their digital assets are compliant. Batoi's RAD Platform, InsightEngine, and BCube RegStacker provide comprehensive solutions to achieve and maintain accessibility compliance. By following the guidelines and best practices outlined in this white paper, organizations can create inclusive digital experiences that meet regulatory requirements and enhance the user experience for everyone.

8. CONTACT INFORMATION AND NEXT STEPS

Reach Out to Us

Our team is readily available to assist you if you have any questions, need further clarification, or wish to schedule a demonstration. Reach out to us at:

- Email: support@batoi.com
- Phone: +91 (674) 350 0200 / 201
- Website: www.batoi.com

Demo and Pilot Programs

We offer tailored demo sessions and pilot programs designed to showcase the effectiveness and adaptability of our solutions. Contact us to arrange a demo that aligns with your needs and use cases.

Documentation and Resources

Comprehensive documentation, white papers, and case studies are available on our website. These resources provide in-depth insights into our technology stack, implementation guidelines, and customer testimonials.

Stay Connected

Follow us on social media platforms like LinkedIn, X (formerly Twitter), and Facebook to stay updated on our latest features, announcements, and thought leadership articles.

Next Steps

- Contact our team for an initial consultation.
- Schedule a personalized demo tailored to your organization's needs.
- Discuss contractual terms and any customization requirements.
- Embark on your journey toward a more robust, scalable, and efficient digital ecosystem with Batoi's solutions.

9. ACKNOWLEDGEMENTS AND DISCLAIMERS

Acknowledgments

We thank our dedicated team of engineers, developers, and consultants whose relentless effort and innovative thinking have made our solutions possible. We are also grateful to our valued customers and partners who have trusted us with their security needs and have played a pivotal role in shaping our products.

Technology Partners

We acknowledge the contributions of our technology and marketplace partners that have been integral to developing and seamlessly operating our solutions.

Intellectual Property

Disclaimers

- **Information Accuracy**: The information in this white paper is intended for general understanding and is not to be construed as legal, financial, or technical advice.
- **Forward-Looking Statements**: This white paper may contain forward-looking statements based on current expectations and projections. We cannot guarantee that these projections will be realized.
- **Updates and Revisions**: Given the ever-evolving landscape of technology and regulations, this white paper's content may be updated or revised.
- **Privacy and Data Protection**: We adhere to the highest privacy and data protection standards, as outlined in our Privacy Policy, available on our website.

10. ABOUT BATOI

Software Development Automation Company.

Batoi Systems is a trailblazing software development automation company specializing in accelerating application creation and deployment. Since 2010, we have been serving clients worldwide with our advanced Batoi Rapid Application Development (RAD) Platform, which offers a comprehensive suite of tools for designing, building, and deploying applications while ensuring robust codebase management and security. Our platform also seamlessly integrates cutting-edge technologies such as blockchain, AI, AR/VR, and IoT, enabling businesses to stay ahead in the competitive landscape. With Batoi Systems at your side, you can effectively manage your software projects and harness the power of modern innovations to drive growth and success.

batoi.com/research/publications