



Ministry of Information Technology and Telecommunication

National Information Technology Board

GUIDELINES FOR GOVERNMENT WEBSITES

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Definitions and Acronyms

TERM	DEFINITION
Continuous Delivery	Continuous delivery is a software development practice where code changes are automatically prepared for a release to production.
Continuous Integration	Continuous integration is a DevOps software development practice where developers regularly merge their code changes into a central repository, after which automated builds and tests are run.
e-Government Development Index	The EGDI is a composite measure of three important dimensions of e-government, namely: provision of online services, telecommunication connectivity and human capacity.
Federal Government	All federal government ministries, departments, organizations and regulatory bodies
Hypertext Transfer Protocol Secure	Hypertext transfer protocol secure (HTTPS) is the secure version of HTTP, which is the primary protocol used to send data between a web browser and a website.
Online Service Index	The online service index measures a government's capability and willingness to provide services and communicate with its citizens electronically.
OWASP	The Open Worldwide Application Security Project is an online community that produces freely-available articles, methodologies, documentation, tools, and technologies in the field of web application security.
Public Sector Entity (PSE)	The Government of Pakistan (GOP) including all its Ministries, Departments, Agencies, Dependencies, and Institutions at the Federal level; and corporations fully or partially owned by the Federal Government of Pakistan.
Search Engine Optimization	Search engine optimization is the process of improving the quality and quantity of website traffic to a website or a web page from search engines
Secure Sockets Layer	Secure Sockets Layer (SSL) is a security protocol that provides privacy, authentication, and integrity to Internet communications.

Software development lifecycle

The cost-effective and time-efficient process that development teams use to design and build high-quality software

Transport Layer Security (TLS)

Transport Layer Protocol is a security protocol designed to facilitate privacy and data security for communications over the Internet.

Draft

Selected acronyms and abbreviations used in the publication are defined below.

ABBREVIATION	MEANING
API	Application Programming Interface
ASVS	Application Security Verification Standard
CD	Continuous Delivery/Deployment
CI	Continuous Integration
DNS	Domain Name System
DR	Disaster Recovery
EGDI	e-Government Development Index
FAQ	Frequently Asked Questions
GOP	Government of Pakistan
HSP	Web Hosting Service Provider
HTTP	Hyper Text Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
MoITT	Ministry of Information Technology and Telecommunication
OSI	Online Service Index
OWASP	Open Worldwide Application Security Project
PSE	Public Sector Entity
SDLC	Software Development Lifecycle
SEO	Search Engine Optimization
SSL	Secure Socket Layer
TLS	Transport Layer Security
URL	Uniform Resource Locator
W3C	World Wide Web Consortium
WCAG	Web Content Accessibility Guidelines

1. Introduction

Websites have become an essential component of digital presence for all organizations, providing a global platform for connecting, exchanging information, and public engagement. The growth of websites globally has been remarkable, with increasing numbers, richness, and complexity. Their emergence has transformed the way people interact with information and each other, and it is essential that these digital channels are developed and managed effectively to maximize their potential benefits. Users have come to expect seamless navigation, responsive design, and up-to-date content. Therefore, it is crucial for businesses and organizations to develop and maintain websites that are user-friendly, visually appealing, and accessible on various devices. Additionally, websites must also adhere to security standards to protect sensitive information from potential cyber threats.

Websites have also become crucial for governments and organizations in disseminating information, providing services, and connecting with citizens and stakeholders. Pakistan has emerged as a significant contributor to the digital ecosystem, with technological advancements happening at an unprecedented pace, transforming lives in fundamental ways. Digital platforms are being used extensively to facilitate users in providing innovative and reliable solutions of higher quality. Websites and web applications are becoming the norm for information related to Public Sector Entities (PSEs) and citizen-centric services.

The Government of Pakistan is focusing on providing its services through digital platforms. The government's websites and applications are the web-gateway to its e-services, making it crucial to follow necessary guidelines to ensure they meet global benchmarks and public expectations.

With the increasing importance of websites, it has become imperative to create guidelines to ensure that they are developed in a way that meets the needs of public/users, while also ensuring security, accessibility, and compliance with legal and ethical standards.

The website development guideline document will consider the user interface/experience, development, testing, deployment and maintenance of websites, with the current trends and technologies to provide guidance on how to create effective and user-friendly websites.

2. Vision

The guidelines for websites aim to facilitate digital transformation by promoting standardization, quality of service, uniformity, security, and citizen-centric approaches. The inclusion of accessibility tools in websites is crucial for ensuring that people with disabilities can access government services independently. This is an important aspect of promoting inclusivity and ensuring that everyone has equal right and access to information and services. Furthermore, the guidelines emphasize providing appropriate information and a seamless user experience to enhance e-governance efforts.

3. Scope

The guidelines aim to ensure that all websites developed by Public Sector Entities (PSEs) under the federal government are developed in a standardized and consistent manner, in line with global best practices and industry standards.

The guidelines are designed to be applicable to all types of websites, whether they are new web-based platforms being considered for implementation or updated versions of legacy and existing web-based platforms.

4. Objective

The website development guideline document aims to provide a comprehensive set of guidelines that cover all major areas of website development, including design, content creation, user experience, accessibility, security, and maintenance. By following these guidelines, web developers can ensure that their web-based platforms, including websites and web applications, are user-friendly, high-quality, and secure.

The guidelines also recognize the importance of protecting public data, which is essential for maintaining the trust and confidence of citizens in government services. Therefore, the guidelines include measures to ensure the security of web-based platforms, including the use of encryption, strong passwords, and multi-factor authentication.

Furthermore, compliance with these guidelines can help the government improve its rankings in digital indices such as the e-Government Development Index (EGDI). This can help demonstrate the government's commitment to digital transformation and improve its reputation among citizens, businesses, and other stakeholders.

5. Guidelines

Website guidelines provide a blueprint for creation of websites according to standards. These will encompass all the different web platforms like websites and web applications etc. These guidelines will not only help the government create a modern well-functioning online presence, but they also guarantee that this presence thrives on the global digital stage. By adhering to these guidelines, the government aligns itself with the highest global standards that are internationally adopted. Consequently, websites will naturally score well in international evaluations, contributing to an enhanced ranking in the Online Service Index (OSI), a key component of the EGDI and, in turn, improving Pakistan's position in this index.

As the website development landscape evolved, there's a noticeable shift in approach, emphasizing previously overlooked elements and adopting more effective methodologies. Selecting the most suitable methodology often involves considering project size, team dynamics, client requirements, and the project's adaptability to change. Globally recognized organizations embrace Agile or DevOps methodologies due to their adaptability and collaborative nature. In line with modern practices, DevOps emerges as an end-to-end solution, streamlining application delivery with continuous improvement during the development and operations. Unlike the step-by-step processes, DevOps leverages a modular and microservices-driven method, enabling development, testing, and deployment of independent microservices. This continuous streamlined approach ensures easier updates and bug fixes, maintaining a seamless, uninterrupted and continuous cycle. The emphasis on automated testing, continuous integration, and monitoring directly enhances the quality of applications. Therefore, DevOps methodology may be adopted in accordance with application requirements.

The key aspects of website development are covered in this document, which are mentioned below:

- a) Requirements Gathering Phase
- b) Design Phase
- c) Development Phase
- d) Deployment Phase
- e) Maintenance Phase

5.1. Requirement Gathering Phase

The requirement gathering phase is a critical component of the website development process that outlines the specifications and requirements for a website. It is typically created before the design and development phases begin and serves as a blueprint for the development of website, fostering collaboration between stakeholders and ensuring a unified understanding of project goals and needs.

The requirement gathering document should contain a detailed list of functional and non-functional requirements that the website needs to meet. This includes requirements related to the website's functionality, user interface, security, performance, scalability, accessibility, and other key areas, considering the collaboration of stakeholders to ensure an inclusive, comprehensive approach to these requirements.

It is important to involve stakeholders in the requirement gathering process to ensure that all relevant requirements are captured. Promote collaboration among different teams (development, operations, business stakeholders) to gather comprehensive and clear requirements. Encourage regular communication to ensure a shared understanding of requirements. The requirements should be documented clearly and precisely, using standard terminology and format, so that they can be easily understood by involved stakeholders. It is recommended to implement continuous review and refinement processes for requirements throughout the website lifecycle.

5.2. Design Phase

The design phase is a critical component of the software development lifecycle and lays the foundation for the development of a successful website. The purpose of this phase is to translate the requirements into a detailed website design that can be used to guide the development process.

During the design phase, the website's overall layout, color scheme, typography, and other design elements are defined. The design should be aligned with the PSE's branding and should be aesthetically pleasing, functional, and user-friendly. The website design should also consider accessibility standards, ensuring that persons with disabilities can access and use the website.

5.2.1. Government Identity

Provide a PSE's official identity. Through the use of state emblem, the Government of Pakistan must show its ownership of the website. Footer of the website should include information of the owner PSE.

5.2.1.1. Place the name and logo of the PSE on the top left side of the header.

5.2.1.2. Ensure that a good quality logo, i.e., readable and not pixelated, is available on the website.

5.2.1.3. Ensure that the complete logo is a clickable element, redirecting user to the website's homepage when clicked.

5.2.1.4. This official identity should be consistent across all website pages.

5.2.2. User Interface & User Experience

A. Element Design

Element design covers the use of common elements like logo, icons, header and footer etc. They will mainly help make the website easier to use by bringing uniformity to the website.

5.2.2.1. Provide common elements on the website to enhance usability, such as on the website header and footer – The elements of the website:

- a) Should be well-defined & placed at the appropriate location.
- b) Should be available throughout all the website pages.

These common elements should be placed on a website to make it easy for the user to access common links or important information present on the website. Here is a minimum list of common elements that are recommended for websites:

1. Official government identity i.e., PSE's official name and logo
2. Weblink to the official government portal of Pakistan¹
3. Searching the website content facility
4. Information regarding contacting the PSE
5. Way to easily reach the homepage of the website through single click from any other website page.
6. Way to browse through the whole content of the website such as, navigation bar or sitemap.

¹ <https://pakistan.gov.pk>

5.2.2.2.**Create reusable design elements** – For efficient and consistent usage across the website, it is recommended to develop common and reusable design elements. This practice encourages uniformity and enhances overall efficiency throughout the website, especially when integrating new features.

B. Home Page

5.2.2.3.**Provide a user-focused homepage with well-made design** – The design of a website's homepage should prioritize a well-structured layout to provide user with a favorable first impression.

5.2.2.4. User visit the website to either find a service or some information. Thus, the homepage should be optimized to ensure a reasonable file size, allowing the website to load quickly, minimizing waiting times for users.

5.2.2.5. Services provided by the PSE should be easily accessible on the homepage and should be categorized by need or usage frequency (e.g., “renew my license” or “pay my fines”) or by any other related criteria.

5.2.2.6. Important information should be available on the homepage from the user's perspective and should look unique from other content on any other page within the website. It should be ensured that criticality of the information is kept in mind while structuring and organizing the homepage.

5.2.2.7. Homepage should have minimum content with major elements highlighted that will subject the public to further explore the site according to their need. Certain design decisions that are best avoided for the homepage are:

- Horizontal and vertical scrolling should be avoided whenever possible.
- The homepage should be optimized to ensure a reasonable file size, allowing the website to load quickly, minimizing waiting times for user. This can be achieved by limiting flash and heavy media content such as photos and videos etc. If such content needs to be included, it can be achieved by optimizing these files.

C. Navigation

5.2.2.8.**Provide well-categorized, evident, predictable and intuitive to follow navigation** - It is important to design an intuitive information architecture for a website. The user should make the navigation structure predictable and accessing each functionality should be made easy. Information should be provided on the basis of priority and relevancy. Most relevant content is well-placed and easiest to access.

The purpose is to ensure that the user finds the needed information or service in a few steps.

- a. Navigation bar should be accessible on every page of the website.
- b. Navigation hierarchy should be intuitive in structure so that it ensures that the website content is logically ordered.
- c. Navigation bar should be unique from the rest of the website content so that a user should be able to easily distinguish the main navigation bar.
- d. Titles in the navigation bar should be specific and short.
- e. Navigation bar should make it easy for the user to navigate through the website content.

D. Content

5.2.2.9.Ensure that the content is readable, organized and scannable - It should be ensured that all the content of the website should be readable on major device sizes with default and variable standard font settings if needed. Content should be organized so that it is scannable on screen. The readability of the headers and the working of the links must be ensured, as user relies on their availability when scanning the page. The content should always have an all-inclusive and positive language.

5.2.2.10. Provide up-to-date, easily understandable and relevant content – Most users visit government sites to find important information that is most accurate, current and reliable, hence will enhance the user experience.

- The PSE should update the website content whenever required.
- The PSE should keep up-to-date information on their website. If the information or service is not available anymore, it should be archived.
- Websites should not have or spelling errors as this builds user trust.
- The available information regarding date and time should be correct. Some of the important information available on the website is:
 - a. Site last modified or updated date on the homepage, which should indicate the date the information is updated on the homepage.
 - b. Display the visitor counter on the website.

5.2.2.11. Use of links – It should be ensured that the hyperlink text is readable and hyperlink must be displayed properly. Use hyperlinks to connect related material.

Do not duplicate information on other web pages instead use links to the existing information.

5.2.2.12. **Use of original, authentic, high-quality and royalty-free content** — It is recommended that all the content on websites should be original, authentic and copyright-free, including textual information, pdfs, images, and any other kind of media. In case of need for adoption and reuse, royalty free alternatives should be considered. If the use of copyrighted content is unavoidable, the proper procedure regarding its incorporation policy should be followed.

5.2.2.13. **Images**

- a. It is recommended to maintain the image's original aspect ratio, avoiding any distortion through stretching or compressing.
- b. Ensure use of alt text for every image. The descriptive 'alternative-text' for images (and other non-text elements on the website). This text displays when you hover over an image, or when an image doesn't load correctly.
- c. For alt text keep in mind that it describes the content of your image for people who use screen readers, such as those who are blind or are vision impaired. It will also benefit people who use the web without images—for example, users with text-only browsers and people who turn off images to increase download speed or reduce charges on mobile connections.
- d. Image should not violate the copyrights. In case of copyrighted images, copyright policy should be considered accordingly.

5.2.2.14. **Provide user with the ability to put feedback, suggestions, queries, complaints and recommendations on the website** - The user should be presented with a simple and easy-to-use facility to provide optional feedback, suggestions and complaints. PSE are encouraged to track the results of these questions and to enhance the results through continuous improvement of services.

5.2.2.15. **Provide a way for user to connect with the PSE social network** - The website should enable user to connect with the PSE social networks if available. This entails simple features such as links to latest post, tweets, media on different platforms by the PSE.

5.2.2.16. **Provide social media icons/reference** - The website should display social media icons of respective PSE which should redirect to social media platforms.

5.2.2.17. **Provide a section with information regarding the PSE-** All websites should have a section page where the PSE may provide the user with information of the PSE which may include:

- a) Vision statement
- b) Mission statement
- c) Mandate
- d) Objectives
- e) Organizational structure

5.2.2.18. **Provide PSE contact information** - The 'Contact Us' page link must be visible on the Website's home page. It is important to provide the contact information in case the user wants to contact the PSE. This information must include at least:

- a) A contact number and an email address along with the subsequent operational timings, that are active / functional during those hours of operations
- b) A postal address
- c) Physical location through text or visual map
- d) Response time for any query or questions
- e) Furthermore, the contact details of the support PSE should be available on the website for contact in case any support

5.2.3. User Accessibility, Guidance & General Responsiveness

A. Language

5.2.3.1.**Choose appropriate language which the user can understand** – Websites should be written in plain language using simple vocabulary from the user's perspective. Avoid using technical jargon, outdated and overly formal words and expressions, and express ideas in simple day-to-day language.

5.2.3.2.**Selection of multi-language options** - The user should be able to select preferred language on the website. Once selected, the website should persistently remember the user selection.

5.2.3.3.**Provide a functional bilingual (Urdu and English) website** - Bilingual websites enhance accessibility especially in a diverse, multicultural, and multilingual environment such as Pakistan. The commonly used languages in Pakistan are Urdu

and English. Therefore, it is mandatory for all websites to be bilingual (Urdu and English).

5.2.3.4.Cross-check for use of regional languages - When using regional languages, their fonts on the page should be tested on major devices for consistency.

5.2.3.5.Use simple words - Websites should be written in plain language using simple vocabulary from the user's perspective. Avoid using technical jargon, outdated and overly formal words and expressions, and express ideas in simple day-to-day language.

B. Responsiveness

5.2.3.6.The website is recommended to be responsive for frequently used devices such as tablets, laptops, desktops, mobiles and any other smart device. Website responsiveness can be tested through official testing service provided by google ².

C. Search Engine Optimization (SEO)

5.2.3.7.Provide efficient website access through search engine - PSE should aim to:

- a) Web engines generate greater portion size of website traffic so, websites should be listed on commonly used search engines.
- b) Improve the visibility of a website in search engine results pages.
- c) Websites can increase their search optimization by:
 - Keywords/metadata provided should be relevant and meaningful to the content of the page. For example, a user may search for “Paying traffic fines Pakistan”; if proper and relevant metadata is defined, the page responsible for this service should appear on top in search results.
 - A meaningful but short website description should be provided to explain the purpose of the website and its content.
 - Page title of the website should be relevant.
 - Search engine optimization should be used for better website optimization.

5.2.3.8.Provide well designed website titles and descriptions - A well-designed website title should be brief, short, and easy to read and clear. The page description viewed on search engines should summarize the page and briefly describe what the page is

² <https://search.google.com/test/mobile-friendly>

about, making sure the most important content areas are covered in the first two or three sentences.

Additionally, developers may refer to the official ranking guidelines provided by Google³ to improve the search engine visibility of their website.

D. Accessibility

5.2.3.9. **Provide website access through a clear, short and descriptive URL** - For the convenience of the user, the website URL should be:

- a) Easy to remember and concise
- b) refer to the PSE name or its abbreviation

5.2.3.10. **Provide websites that are consistent and similar in layout throughout a wide range of devices as well as browsers** – Catering to a range of web browsers and devices is a key component to provide user with consistent web design, as well as making them backward compatible for smooth usage on outdated systems. Websites can achieve this by:

- a) Designing website to produce a consistent view when displayed through different web browsers.
- b) Avoid designing it with preference to a particular web browser.
- c) Remain fully usable and provide consistent results for a variety of web browsers and their versions.
- d) Test website on different devices and most commonly used web browsers such as Mozilla Firefox, Google Chrome, Safari, Edge and Internet Explorer. This testing should be routinely carried out on major website updates.

5.2.3.11. **Ensure website access to disable group of individuals** – Websites are also accessed by people with different disabilities which may include:

- a) **Visual disabilities:** complete or partial loss of visual activity i.e., blindness or low vision.
- b) **Auditory disabilities:** partial loss of hearing or complete deafness.
- c) **Cognitive disabilities:** impairments in learning or language, such as dyslexia or speech dysfunction.
- d) **Physical disabilities:** partial or complete loss of motor control such as impaired mobility like Parkinson's disease, etc.

³ <https://developers.google.com/search/docs/advanced/guidelines/get-started-developers>

The World Wide Web Consortium (W3C) is an international organization that works exclusively to develop better ways to make the web accessible to our differently abled community. For this purpose, it has provided a set of guidelines that are easy to follow and implement known as Web Content Accessibility Guidelines⁴ (WCAG). The guidelines have multiple conformance levels such as A, AA, AAA, depicting least to most compliant websites.

According to the federal act passed by the National Assembly of Pakistan called “The ICT Rights of Persons with Disability Act.2020”⁵, it is categorically mentioned for websites to be made accessible to people with disabilities. Therefore, it is recommended that all websites should at least be implemented to a minimum of AA conformance level.

5.2.4. Website Policies

Websites are the PSE’s digital identity in the virtual world. Thus, to keep up the pace with the ever-evolving digital landscape, websites need to continually adapt to emerging technologies.

The expectation of the citizens regarding the website will continually increase as well, therefore setting down a foundational roadmap to operate, update, and manage the websites regularly is crucial for PSEs. The need and purpose of different policies related to website is stated as follows:

A. Terms and Conditions

5.2.4.1. For the websites which deal with user data, it is recommended that the website should include or link to general terms and conditions statements.

5.2.4.2. The statement should show the Terms and Conditions for using the website services of the PSE and how these will be used by the users.

5.2.4.3. In case the website has links to any other websites, it should mention any related issues and concerns like information accuracy, security, etc. terms and conditions related to the usage of the website should be outlined.

⁴ <https://www.w3.org/TR/WCAG21/>

⁵ https://na.gov.pk/uploads/documents/1578658292_632.pdf

B. Copyright

5.2.4.4. It is recommended to place at least one copyright notice on the Government website's home page. This copyright notice should at least include:

- a) The copyright symbol (©),
- b) The name of the copyright owner.

5.2.4.5. The website may also include a general copyright statement to provide the user with licensing terms for re-use of the content available on the website.

C. Privacy

Websites should clearly state how the user's privacy is handled. This policy should be available throughout the website at a consistent and visible location. Minimum clauses recommended for the website are:

5.2.4.6. **Usage and collection of information:** The information that is collected by the user should be mentioned. Furthermore, it should be addressed how this information is shared or used by the PSE.

5.2.4.7. **Cookies:** The purpose of cookie usage should be mentioned.

5.2.4.8. **Information protection:** It should be mentioned what user information is available for any PSE, and its term of sharing with third party/parties, if any.

5.2.4.9. **Information security:** It should be mentioned what measure the website takes for user's information security. The mandatory use of secure and encrypted methods for financial transactions and transmission of personal data over the internet.

5.3. Development Phase

5.3.1. Secure Coding

5.3.1.1. For markup languages, websites should comply with W3C standards as most browsers also comply with them. As languages are also constantly improving to be more powerful, thus the recent stable and officially released versions of the languages should be used in the development technology stack. Further details on the markup languages standard can be found on the website of W3C⁶.

5.3.1.2. It is recommended to implement continuous integration practices which streamlines the development workflow by dividing components into manageable microservices,

⁶ <http://www.w3c.org> – W3C

enabling independent development, testing, and integration. It is also recommended to automate build and testing processes of microservices which helps in the early detection and resolution of errors in the development process, ensuring a stable and reliable codebase.

5.3.1.3.It should be ensured that either licensed or trusted and tested open-source software are used for development of the website.

5.3.1.4.Website should be responsive enough to cater different screen sizes.

5.3.1.5.Website content should be structured in a logical and coherent manner to ensure that even in cases where styling components fail to load correctly, the website retains its functionality.

5.3.1.6.**Provide responsive websites in a timely manner** - Website pages should load in appropriate time to ensure responsiveness for user, such as:

- Websites should be designed to respond fast.
- Long and tedious processes should be divided into steps and status should be communicated frequently in case of long delays for the user, so that the user is able to understand what is causing the delay and wait accordingly.
- Externally linked resources should be kept to a minimum, so that frequent and separate network requests that may cause delays are avoided.

5.3.1.7.**Additional download or plugins are not required by the website** - The website should be supported by the device it runs on and the content to be presented in a format supported by the device without requiring additional plug-ins and software to be downloaded. The website should not rely on technology that is not universally supported by user's devices, including cookies, flash, frames, pop-ups and auto-refreshing.

5.3.1.8.**Provide functional and accurate search functionality in the website** - Websites should be providing an efficiently working search function. Search feature should be:

- a) Easy to use, accessible and provided at a consistent location throughout the website.
- b) a feature that allows the user to run custom search with specific text, word filters and date ranges, etc.
- c) Producing effective, relevant, meaningful and quality search results.

A good search result display ensures an effective search, it may have:

- i. The searched keyword at a highlighted location
- ii. Result sorting facility
- iii. Display of number of results per page
- iv. Scrolling and pagination facility to go back and forth among the search results
- v. Display of total number of search results
- vi. Numbered results with titles followed by relevant content and brief descriptions

5.3.1.9. Use clear, meaningful and up-to-date links - The weblinks are a key factor in the navigation process. The links available on the websites should be distinguished properly from the rest of the content. Font color and underline style are the most commonly used mechanisms.

Websites should:

- a) Have consistent link style throughout.
- b) Unclickable content to avoid using design similar to links.
- c) Distinction between visited and unvisited links to be visible.

Furthermore, the links available on the websites should be meaningful. In order to achieve this objective, websites should:

- Provide short & descriptive links with descriptive text on mouse hover. Embedded links should have self-explanatory titles, for example, if a PSE name is text in the link, the whole PSE name should be mentioned and clickable.
- Redirection to external link should be working properly.
- Ensure proper working of all the links (internal or external) available on a government website.
- External links on websites should:
 - a) Notify the user of redirection before leaving the page & opening the link in a new tab
 - b) Open the link in an understandable language for the user. If the website is not present in such language, inform the user beforehand.

Checking the status of all external links to be active is not an easy task. So, websites should have a proper process setup to verify and recheck all the linked sites regularly and remove non-working links as well. This will immensely improve user's experience as they will not have to deal with broken links and also prevent de-

indexing of the website due to the presence of a certain number of such links. Furthermore, downgraded links should be updated constantly with their new links to enhance the continuity, usability and satisfaction of the website for the user.

5.3.1.10. **Provide forms that are clear, simple and easy to use** - Forms are used on a website to submit information or utilize available online services, which in turn should be processed. It is important to ensure that online forms available on the website should be user-friendly, easy to use and simple.

- a) Minimize manual data entry by pre-fetching required data from user profile.
- b) Use default values wherever possible, such as today's date for some data entry fields.
- c) For minimal manual data entry use selectable pre-defined inputs where possible for example drop-downs, radio button, etc.
- d) Mandatory fields should be clearly labeled.
- e) Important missing fields should be alerted before submission.
- f) In case of errors during submission, the erroneous fields should be highlighted whereas the valid fields should be displayed again with pre-filled data.
- g) If a field is required in specific data format, then it should be mentioned within or adjacent to it with an example, and proper checks for the format should be placed for such data like dates, phone, id or passport numbers. This will also help in ensuring that all the data is obtained in a consistent format.
- h) Clearly mention the unit(s) adjacent to the field if there is numerical data that requires unit(s).
- i) Use prediction, suggestions, spellcheck, auto completion & capitalization to reduce error in input data and the effort required to input data.
- j) Attachment fields should clearly state acceptable format(s) and maximum acceptable size.
- k) Use of unfamiliar and complex terms or sentences should be avoided. Ensure use of understandable simple terminology in text-based communication or instructions.
- l) It is recommended to provide an authentication mechanism for the service of a given PSE.
- m) Secure channel must be used for transmission of confidential data such as authentication tokens (like passwords).

- n) A facility to recover forgotten or misplaced account credentials such as username and password should be available.
- o) Logout facility should be provided that will make the user access as unauthenticated for further interactions. Subsequently, user must only be able to access content appropriate for the level of authentication.

For further details regarding the standard format of forms please refer **W3C Recommendations**⁷

5.3.1.11. **Handling of technical errors** - From the user's point of view, performance is assessed partially based on the availability (or uptime) of the site, and the number of errors on it. Some of the website performance related items which may impact website efficiency and effectiveness include scripting errors, coding errors, etc. during website processing. In general, there should be no unintended technical errors during the website delivery process.

5.3.1.12. **Provide a section of help/FAQs** - A recognizable feature to go through general inquiries or questions for the user should be provided such as “Help” feature or “Frequently Asked Questions” (FAQs).

- a) This will include general website or PSE related questions.
- b) In case the PSE provides services, it may incorporate questions such as general issues regarding the service, service fees and payment options, support, dispute management, service stages, service cancelation or termination, or service tracking, etc.
- c) Layered FAQ design may be used to increase readability and clarity.
- d) To assist user, walk-through videos may be provided.
- e) FAQ links should be available at a consistent location throughout the website.
- f) The FAQ page should prioritize user-friendliness, and it is highly recommended to employ grouping or categorization, especially for extensive lists. This ensures that related questions are organized together, enhancing the user's experience in finding relevant information.
- g) It is also recommended to have a feature for user to ask a new question.

⁷ <https://www.w3.org/TR/2014/REC-html5-20141028/forms.html#forms> - W3C Recommendations - HTML5 Forms

5.3.1.13. **Provide “Live Chat” support functionality:** It is recommended that a live chat feature may be included for real-time user interaction, if required.

5.3.1.14. **Provide access to files with appropriate format –**

a) Website should have files with:

i.Name with description

ii.Size

iii.Format

iv.Date; should indicate the date the file was placed on the website, or the published date of the file

b) Ensure common formats for files which are easily accessible to all users of the website.

5.3.1.15. It is recommended to develop technical documentation for websites to assist relevant resources in gaining a clear and comprehensive understanding of the technical aspects, ensuring smooth operations. Moreover, it is recommended to create user manual documentation, if needed, to enhance user friendliness and usability.

5.3.2. Security

5.3.2.1.TLS and SSL are the standard protocols that provides authentication, privacy and data integrity with better encryption for communication over the internet. SSL is obsolete and is more prone to attacks whereas TLS is the latest secure protocol. Therefore, the website is recommended to have TLS certificate.

5.3.2.2.Websites are recommended to have a Web Application Firewall (WAF) as a critical security measure. By implementing a WAF, web applications are protected from various threats, including SQL injection, XSS, and CSRF, ensuring robust defense and safeguarding user data.

5.3.2.3.It is recommended to include dedicated security resources in the development team to oversee the secure design, development, testing, and deployment of the websites and web applications.

5.3.2.4.It is recommended to adopt a "shift left" approach for security in the website lifecycle. Encourage developers to consider security principles early in the development phase. This shift-left strategy ensures that security is an inherent part of the website development process.

5.3.2.5. It is recommended to implement an integrated security approach within the CI/CD pipeline, incorporating automated security scanning for continuous code vulnerability assessments. Additionally, establish continuous security monitoring tools to actively track the codebase and infrastructure.

5.3.2.6. It is recommended to develop an incident response plan that allows for prompt action upon detecting security. This integrated approach ensures that security measures are systematically evaluated and maintained throughout the development process, fostering a proactive and responsive security culture.

5.3.2.7. Websites should be secured for the public to use and interact with; thus, it is of utmost importance that the developers of these websites follow security practice foremost throughout the development lifecycle. Details on secure coding practices are provided by OWASP⁸.

5.3.2.8. For Web application security verification, OWASP's ASVS⁹ is recommended.

5.3.2.9. It is recommended that the developers use the OWASP's API Security¹⁰ for API integration.

5.3.3. Data Protection, Data Retention & Payment Security

5.3.3.1. Website should be developed keeping in view that only the required data is collected from the user.

5.3.3.2. It must be ensured that the user data is protected properly.

5.3.3.3. It is recommended to ensure the implementation of National Personal Data Protection Bill 2023 of MoITT¹¹ to safeguard public data and, ensure proper data collection, processing, storage, retention, erasure and backup practices.

5.3.3.4. For payment card integration guidelines, it is recommended to refer to 'Regulations for Payment Card Security' by State Bank of Pakistan¹².

⁸https://owasp.org/www-pdf-archive/OWASP_SCP_Quick_Reference_Guide_v2.pdf – OWASP – Secure Coding Practices Quick Reference Guide

⁹<https://github.com/OWASP/ASVS/raw/v4.0.3/4.0/OWASP%20Application%20Security%20Verification%20Standard%204.0.3-en.pdf> – OWASP – Application Security Verification Standard

¹⁰<https://github.com/OWASP/API-Security/raw/master/2019/en/dist/owasp-api-security-top-10.pdf> – OWASP – Ten Most Critical API Security Risks for secure API integration

¹¹

<https://moitt.gov.pk/SiteImage/Misc/files/Final%20Draft%20Personal%20Data%20Protection%20Bill%20May%202023.pdf>

¹² https://www.sbp.org.pk/psd/2016/C5_Annex.pdf

5.4. Deployment Phase

5.4.1. Testing

Website testing is a critical process that helps ensure the quality and functionality of a website. A website that does not work correctly can result in a variety of issues, including security vulnerabilities, data breaches, loss of money, and damage to an organization's reputation. By conducting website testing, developers can identify and address issues before the website is launched, reducing the risk of website failure in operation. Employ automated testing at various levels (unit, integration, and end-to-end) to maintain quality and detect issues early in the development cycle.

5.4.1.1. It is recommended that the website should comply with Markup Language Standard.

It may be verified by the Markup Validation Service provided by W3C¹³.

5.4.1.2. It is recommended to ensure access of websites to all by testing them for multiple browsers and their different versions, as well as other overriding constraints such as fluctuating connection speeds, and varied device/screen resolutions. Use of grammar and spelling checkers for website content is also recommended, as eliminating such errors increases user comprehension and trust.

5.4.1.3. To ensure comprehensive website security, testing should be conducted both manually and using automation tools.

5.4.1.4. Additionally, it is highly recommended for websites to undergo vulnerability assessment before deployment. This approach helps identify vulnerabilities, mitigate risks, and enhance the overall security posture, guaranteeing a safer online experience for public.

5.4.1.5. It is recommended to establish a robust quality assurance process. This involves thorough feature and functionality testing to ensure alignment with requirements. Assessing performance and compatibility across various devices and operating systems, and load times is crucial to ensure an exceptional user experience. Furthermore, verify content accuracy, test security measures and evaluate usability to maintain high-quality standards and ensure user satisfaction.

5.4.1.6. It is recommended to integrate automated testing into the continuous integration and continuous deployment pipeline. This approach ensures that both functional and

¹³ <https://validator.w3.org/> , <https://www.w3.org/developers/tools/>

non-functional aspects are consistently validated at multiple stages of the development process, right from the initial code commit to deployment.

5.4.1.7. OWASP Testing Guide¹⁴ is a comprehensive security testing guideline which must be followed for testing the security of a website.

5.4.2. Hosting

5.4.2.1. Hosting websites in a secure environment where loss or theft of data is minimal to zero is crucial, for example it should have proper network and gateway security as well as disaster recovery setup and backup policy in case of emergencies.

5.4.2.2. Hosting of the websites should be done at a zone with multi-tier security and after simulated testing/hardening.

5.4.2.3. Websites must be hosted on secure licensed servers supporting HTTPS, enabling encrypted communication to safeguard sensitive data and verify website authenticity.

5.4.2.4. It is recommended to include dedicated security resources to oversee the testing, deployment, hosting and infrastructure security.

5.4.2.5. Regular application of patches and updates to the hosting web servers' software is crucial to address security vulnerabilities and ensure the servers are equipped with the latest security measures.

5.4.2.6. To ensure hosting security, government website hosting servers should regularly update and renew licenses, stay informed about licensing agreements, and promptly apply patches and security updates.

5.4.2.7. The websites must be available to all the users around the clock in a secure yet fast way.

5.4.3. Maintenance

5.4.3.1. Websites should undergo regular monitoring and updates to ensure timely content updates, maintain up-to-date design, enhance security measures, and address necessary adjustments in themes and plugins.

¹⁴ https://owasp.org/www-project-web-security-testing-guide/assets/archive/OWASP_Testing_Guide_v4.pdf

5.4.3.2. In addition, regular checks should be conducted on websites to ensure that all information is accurate and up-to-date for the convenience of the public. Furthermore, the PSE should designate the appropriate person to update the website content on regular basis.

5.4.3.3. Website should be flexible to continuously add new features or modules when needed and have updates for the existing features to enhance the website functionality, usability, and user experience. The website guidelines cycle should be followed for the addition of new modules.

5.4.3.4. It is recommended for websites to have a system to periodically scan and check the expiration dates of digital certificates used on the government website, generate proactive notifications to relevant personnel, providing ample time for renewal or reissuance. Additionally, maintain a comprehensive record of all digital certificates, including expiration dates and associated actions, for efficient monitoring and management.

5.4.3.5. To maintain a robust security posture post-deployment, it is essential to conduct periodic vulnerability assessments and penetration testing, both internally and externally. Additionally, websites should perform regular internal and external security audits to help identify potential vulnerabilities and risks. It is crucial to ensure that comprehensive reports such as Vulnerability Assessment and Penetration Testing (VAPT) reports from these assessments are consistently forwarded to the appropriate regulatory bodies. Furthermore, maintenance of their report records is necessary to avoid any negligence and ensure accountability for security measures.

5.4.3.6. It is advised to implement a robust monitoring system for website uptime and performance, along with optimization measures. This setup allows continuous monitoring of the website's availability and performance metrics, enabling proactive identification of issues and opportunities for optimization to ensure an optimal user experience.

5.4.3.7. Now-a-days, one of the biggest threats to data privacy and breach of public trust in digital government platforms is the presence of fake websites and web applications created by attackers. It should be the responsibility of all PSEs to take care of their reputation and keep an eye on the fraudulent elements that are breaching the public

trust. In case of fraudulent activity report, immediate action should be taken and the incident should be report to the relevant authority.

5.4.3.8.Regular health checks, routine security and vulnerability scans, and prompt application of security patches and updates are recommended practices to safeguard websites from vulnerabilities and potential cyber threats.

5.4.3.9.It is recommended to schedule and execute regular website backups. Develop a comprehensive disaster recovery plan to mitigate potential disruptions or data loss, ensuring quick restoration and minimal downtime in case of unforeseen incidents.

6. Revision Policy

The ICT industry is evolving at a very rapid pace and change management is a very important part. The guidelines document will be modified as per the industry requirements, area expert consensus, open public stance and the needful international standards and policies compliance. In order to keep up with the modern demands, the outdated clauses may be removed on a continuous basis. We solely reserve all rights to change terms and conditions in this policy without prior notice.