

Technical Notes on Website Development and Maintenance

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1. Introduction

This document supplements the “Guidelines on Dissemination of Information through Government Websites”. It highlights some useful technical information and good practices in developing websites for reference by Government bureaux and departments (“B/Ds”) to enable effective, efficient, and user friendly dissemination of information through websites.

2. Registration of Domain Names

Domain names are Internet addresses of websites. When setting up websites, B/Ds are advised to register a bilingual pair of English and Chinese domain names under the “gov.hk” and “政府.香港” categories to facilitate public access. All Government domains should adopt Domain Name System Security Extension (DNSSEC) so as to facilitate the general public in verifying the authenticity of Government's Internet services and strengthen the public's confidence when using e-Government services.

Reference

Hong Kong Internet Registration Corporation Limited (HKIRC)
<https://www.hkirc.hk>

Domain Name Registration Policies, Procedures and Guidelines for .hk and
.香港 Domain Names
https://www.hkirc.hk/en/our_services/domain_services

Hong Kong Domain Name Registration Company Limited (HKDNR)
<https://www.hkdnr.hk>

3. Use of Portable Document Format

Use the Portable Document Format (“PDF”) only for very long documents or when the exact formatting must be preserved. We should avoid using PDF file solely for information that is of wide public interest because PDF file may not be readable on mobile devices or by users without the necessary reader. Whenever PDF file is used, provide a hyperlink to access the required reader software. PDF should be produced by proper PDF creation tools instead of scanning from a document, as scanned image of text is inherently inaccessible.

Image-based documents, such as TIF files produced by scanning, should be converted into a text-based document with Optical Character Recognition (“OCR”) software prior to producing the PDF file. Alternative text (alt text) should be provided for pictures (except for decorative purpose) in your document and all contents should be accessible by assistive tools such as screen readers in a correct reading order. B/Ds are advised to test the PDF file by using a screen reader in order to ensure accessibility features, such as appropriate alternative texts and correct reading order, are in place.

Use Password Protection in PDF

If password protection is required for a PDF file, relevant accessibility option permitting access by screen readers should be enabled, such as “Enable text access for screen reader devices for the visually impaired” option in the “Password Security Settings dialog” must be enabled when creating a PDF file. This feature allows screen readers to access the content of the PDF file while preventing users from copying, printing and editing the file.

Convert PDF files to Fast Web View PDF files

Convert the PDF files to Fast Web View PDF files before uploading to the websites to minimise file size and facilitate page-at-a-time downloading. To facilitate keyword searching, the document summary of the PDF file containing information on the author, document title, keywords, etc. should be properly completed.

Reference

PDF Techniques for WCAG 2.1
<https://www.w3.org/WAI/WCAG21/Techniques/#pdf>

4. Bilingual Pages

Use separate pages for the Chinese and English versions. This is to avoid upsetting English screen reader software which cannot handle Chinese encoding.

If the entry page is in Chinese, the link to the ‘English version’ should be placed at the top of the website to facilitate language switching. Limitation in English screen reader software is also the reason for placing the English version as a link of the website.

Government websites should include simplified Chinese version in addition to the English and traditional Chinese versions to enhance the accessibility of the websites to other Chinese communities. Web Content Hosting (WCH) Service of DPO provides Simplified Chinese Conversion Service (https://itginfo.ccgo.hksarg/content/wch/wh_newSC.asp) (for government internal access only) which provides conversion into simplified Chinese version in offline mode. Webmasters should verify and review the translated web content before publishing.

Online Translation

For websites that use their own online translation system to convert traditional Chinese character web pages to simplified Chinese character web pages, a disclaimer should be included in every government website to remind users that the content in the translated version are conversion from the traditional Chinese character version using a translation software, and users should verify the translated version by making reference to the published traditional Chinese character version.

ISO/IEC 10646 coding standard

The ISO/IEC 10646 coding standard should be adopted for newly established Chinese version websites or websites undergoing major revamp. The adoption of the ISO/IEC 10646 standard provides a unified coding standard that ensures compatibility.

Some HKSCS characters were assigned to Private Use Area (PUA) code points when the versions of the ISO/IEC 10646 did not include them. Since the release of the ISO/IEC 10646:2011, all HKSCS-2008 characters are included.

Webmasters are advised to check and convert the PUA characters to standard code points for better content searching and interchange. The following on-line tool can detect the PUA characters of a web page: <https://www.ccli.gov.hk/en/iicore>.

Charset Code

The "charset" code should be included in all web pages to facilitate web browsers to choose the character type. The "charset" code should be put before the <title> tag to avoid any potential display problem if the title has Chinese characters. The "charset" code should be added between <head> and </head>, or before <body> tags in the following way:

In the HTML5, the charset declaration should be:

```
<meta charset="UTF-8">
```

Reference

Common Chinese Language Interface

<https://www.ccli.gov.hk/en/index/>

ISO/IEC 10646 & Hong Kong Supplementary Character Set (HKSCS) (*for government internal access only*)

<https://itginfo.ccgo.hksarg/content/hkscs/index.htm>

5. Browser Requirements

To facilitate the public users in accessing government websites, web pages should be viewable and supported by the prevailing versions of popular browsers. Industry standard HTML should be followed and browser-specific features should be avoided for best compatibility with popular browsers.

With the advancement of web technologies, some aged multimedia and web application technologies once widely supported via browser plug-in might have been de-supported or planned to be de-supported. Using de-supported browser plug-ins will expose users to the risks of cyberattacks. B/Ds should phase out those browser plug-ins from government websites and web applications before they reach the end-of-support.

B/Ds should test their web pages with all popular browsers prior to production launch, and re-test as soon as possible upon launch of new browser versions.

6. Mobile Friendly Design

In addition to desktop devices, it is now a major trend for the public users to access government websites through mobile devices.

It is imperative to implement “mobile friendly design” to provide good user experience for website access across different devices (including desktop, notebook computers, tablets & smartphones). By automatically adjusting website contents to fit into different screen sizes, resolutions and orientation, users will be provided with optimal viewing and interaction experiences, enhancing readability and navigation of contents for best viewing effects. In particular, horizontal scrolling will not be required when viewing website contents, and size and spacing of contents (e.g. text, graphics) can also be automatically adjusted to fit into the screen for best viewing experience.

A thematic site on mobile friendly design of government websites is available for your reference and it can be accessed under ITG InfoStation (for government internal access only) via the following URL:

<https://itginfo.ccgo.hksarg/content/mobilefriendlywebsites/index.htm>

7. Optimise the Performance of the Websites

Many users may access government websites through mobile devices with limited bandwidth and there is cost implication for viewing web pages of large file sizes. As such, when designing websites, developers should take necessary measures to optimise the sizes of web pages and the corresponding multimedia files. The following paragraphs highlight some of the related best practices.

Remove Unnecessary HTML Tags

Unnecessary tags increase page size and induce poor semantics. Nested HTML tags are one of the common reasons of bloated HTML pages. Unnecessary or empty tags should be removed.

Avoid Inline Cascading Style Sheets (CSS) and JavaScript

Inline CSS and JavaScript codes not only increase page sizes, but also discourage the separation of functionalities. The “presentation layer” (CSS) and “behaviour layer” (JavaScript) of a web page should be separated from its structure (HTML). Separating resources files also improves the response time of a page because browsers can concurrently download the files and the page.

Enable Compression

Modern browsers support compression for HTTP requests. Enabling compression on web servers can reduce the sizes of the HTTP responses, and hence can significantly reduce the amount of time in downloading

resources, reduce data usage of the clients, and improve the time of rendering web pages.

Leverage Browser Caching

Downloading web pages may require multiple roundtrips between the clients and servers. All web server responses should specify a caching policy to help the clients determine if and when it can reuse previously downloaded contents. Less frequent updated contents, such as images, CSS and JavaScript coding, might have longer caching time, while more frequently updated contents might have no caching and shorter caching time.

Minify Resources

Minification of resources reduces the sizes of HTTP responses by removing unnecessary or redundant data, such as code comments and formatting, unused code segments, long variable and function names. There are many free tools available from the Internet for minification of various resources.

Optimise Image Sizes

As images often account for most of the downloaded bytes of a web page, optimising image sizes can often result in large byte savings and performance improvements.

Support Flexible Video Resolution

Most cloud video-streaming services in the market support users to choose a lower video resolution to save bandwidth. Some service providers can even detect the user's network condition and automatically adjust the video resolution (a.k.a adaptive bitrate). Adopting video streaming services with flexible video resolution support can help users to save data usage, particularly for viewing large video files.

8. Use of HTML5 (HTML Living Standard)

B/Ds should actively consider using HTML5 upon development or revamping of websites. The main advantages are as follows:

- It is mobile device friendly, eases the development of mobile websites and makes it possible for mobile websites to access some smart phone native functions, e.g. GPS locations.
- It is an industry standard and supported by all popular browsers. Adopting HTML5 improve website compatibility across browsers.

- It supports video and audio web contents and is convenient for playing back multimedia files directly in browsers without the need of additional software.

Reference

HTML Living Standard
<https://html.spec.whatwg.org/>

9. Improve Site Visibility to Public Users

Search Engine Optimisation

To ensure websites have high rankings among search engine results, B/Ds should include the descriptive titles in each web page and in the tag “title”. For example, use a descriptive title between “<title>” and “</title>” instead of using a common phrase such as “What’s New”. The meta tags “descriptions” and “keywords” should include keywords commonly used by users to search for the web pages. B/Ds should avoid using general titles for many web pages. Examples of such bad titles are “Press Release”, “Today’s News”, “untitled”, etc. The visibility of web pages in search engine results is generally improved if the meta tags are descriptive, relevant, precise and meaningful. On the other hand, search engine will lower the ranking of those web pages with bad titles.

Besides, it is a common practice for the popular search engines (e.g. Google) to publish their own guidelines for search engine optimisation of their own products. B/Ds may refer to these guidelines for reference. Here is an example of a Google guideline: Search Engine Optimization (SEO) Starter Guide (<https://developers.google.com/search/docs/fundamentals/seo-starter-guide>)

Reference

GovHK Search Service (for government internal access only)
<https://itginfo.ccgo.hksarg/content/ns/gsg-search.asp>

10. User Feedback

The views, opinions and feedback from public users may help improve the design and enrich the contents of the websites. Collections of user feedbacks can be carried out via online and/or offline channel(s), e.g. user satisfaction survey, focus group discussions and etc. Through these exercises, it not only provides better understanding on users' needs and satisfaction towards the websites, but also identifies areas of improvement. The findings can be used to enhance the design of the websites for better user experiences, and enrich the contents of the websites for better meeting user needs.

11. User Preference

For better relations with website users and their best viewing experience, government websites should recognise a user's previous preferences by storing his/her preferred language, font size and/or colour preference, etc., with 1st party cookie(s) (i.e. the cookie(s) under the domain of your website) based on the last access. When a user accesses a government website, B/Ds should check the 1st party cookie(s) about the stored user preferences and automatically redirect to the welcome message page of the corresponding language preference with appropriate font size and/or colour preference. However, if the user's browser does not have that cookie and it is not a departmental website, it should go to the first language selection page of the website as usual. If it is a departmental website, "Common Look and Feel Guidelines and Design Specifications" should be referred.

Reference

Common Look and Feel Guidelines and Design Specifications (*for government internal access only*)

<https://itginfo.ccgo.hksarg/content/clf/home.html>

It is important to note that, if cookies are used in a government website, the website must have a notice under Important Notices for providing relevant information on the purpose, the kind of data to be stored, and the expiry date, etc.

B/Ds should also avoid the use of 3rd party cookie(s) as browsers like Safari, Firefox and Chrome have started to block or planned to block 3rd party cookie(s) by default to prevent user tracking across the Internet to better protect user privacy and prevent exceptional user experience while accessing the government website.

For cookies related to collection of personal data of users, please refer to the “Statements for collecting personal data online” in the Guidelines.

12. Web Accessibility Conformance Logo and Statement

Government web pages conforming to W3C WCAG 2.0/2.1/2.2 Level AA standard should display the corresponding W3C conformance logo to claim the relevant conformance and to help raise awareness of web accessibility design. By default, the scope of the claim by a W3C WCAG 2.0/2.1/2.2 Level AA conformance logo refers to a single web page. If the claim is meant to apply to include more than one web page, the conformance icon may be accompanied by explicit scope information explaining which web pages are covered by the claim.

For non-conforming web pages, exceptions must be justified and a “web accessibility conformance” statement / explanation with the following logo should be provided:



This “Web Accessibility Conformance” logo can be downloaded in <https://itginfo.ccg.hksarg/content/accessibility/statements.htm>. When users click on this icon, it should link to a web page with a “web accessibility conformance” statement / explanation.

B/Ds should set out their own “web accessibility conformance” statement / explanation according to their circumstances.

Reference

W3C WCAG 2.0/2.1/2.2 Conformance Logos
<https://www.w3.org/WAI/WCAG2-Conformance>

Digital Accessibility Campaign
https://www.digitalpolicy.gov.hk/en/our_work/digital_government/digital_inclusion/accessibility/index.html

13. Linking up with the Data.Gov.HK Portal

As promulgated in September 2018 for the Open Data Policy, all B/Ds should, as a matter of principle, endeavour to release data (except personal

data) for free public use via the Public Sector Information (PSI) Portal (data.gov.hk). All data opened up should be in machine readable formats (i.e. CSV / XML / JSON), updated timely (particularly for real-time data), properly documented and without any unnecessary terms and conditions imposed on their use.

The PSI Portal has been launched since March 2015 and revamped in end 2017 to disseminate PSI in machine-readable formats for the public free use. The “Guidelines for the Dissemination of PSI” includes the standards, best practices and other technical arrangements for linking up B/Ds’ PSI with the PSI Portal.

Reference

DATA.GOV.HK (for government internal access only)
<http://psi.host.ccgo.hksarg/en/index.htm>

14. Use of GeoInfo Map Viewer

With increasing information from B/Ds containing spatial elements, it’s beneficial to provide a map viewer for better presentation of those information in B/Ds’ websites. The Lands Department has make available the GeoInfo Map Viewer service to facilitate B/Ds to embed a standard map viewer for easily presenting its spatial information in its websites. The map viewer provides a unified and up-to-date map contents and presentation of the whole Hong Kong Territory. B/Ds should consider adopting the GeoInfo Map Viewer service where applicable.



HOW TO EMBED MAP VIEWER TO DEPARTMENT WEBSITE ?

- ▷ Simple and easy coding, using **<iframe>** HTML tag
- ▷ Add the **URL** created in the Map Viewer Creator in LGRT

Sample HTML coding:

```
<iframe id="iframediv" frameborder="0" name="map"
style="width:700px;height:600px"
src="https://www.map.gov.hk/mapviewer/map.do?gmID=WuH88p6S47&lang=en"
>
</iframe>
```

Reference

GeoInfo Map Viewer
<https://www.map.gov.hk/LGRT>

15. Use of LandsD Map Application Programming Interfaces (API)

To reduce time and efforts required by B/Ds to acquire digital maps from LandsD or other digital map providers, B/Ds should consider adopting LandsD Map API services where applicable. LandsD Map API has been launched to all B/Ds since December 2018. It provides a rich set of geospatial and mapping functionalities, enabling B/Ds to build the web applications enriched with location and mapping features.

LandsD Map API adopts open-standard Representational State Transfer (REST) API framework, allowing B/Ds to integrate LandsD's digital maps into web applications. It supports open standards for the global geospatial community such as Tile Map Service and Open Geospatial Consortium (OGC) that are supported by the mapping application development frameworks including the open source map API libraries such as OpenLayers or Leaflet.

For more information on LandsD Map API reference and sample codes on using LandsD Map API, please refer to the LandsD Map API portal website.

Reference

Map API service (for Internet access)
<https://api.portal.hkmapservice.gov.hk>

Map API service (for government internal access only)
<https://mapapiintranetportal.landsd.ccgo.hksarg>

16. Enable HTTPS and URL Redirection for non-www domain names

Most web browsers enforce HTTPS connections automatically in the client side. To facilitate public users in accessing government websites with both

“www” and “non-www” domain name URLs (e.g. www.abc.gov.hk and abc.gov.hk) , webmasters should implement HTTPS server certificates for both “www” and “non-www” domain names of their websites, by the means of adopting a wildcard certificate or a multi-domain certificate. Webmasters should then implement URL redirection rules in DNS platforms such as Domain Name Hosting Service of DPO, for redirecting HTTPS/HTTP requests for “non-www” domain name to the “www” counterpart in HTTPS.

17. Other Related References

The following references are also related to the implementation and maintenance of government websites.

Reference

IT Security

[https://www.infosec.gov.hk/en/Central Internet Services - Central Internet Gateway \(for government internal access only\)](https://www.infosec.gov.hk/en/Central_Internet_Services_-_Central_Internet_Gateway_(for_government_internal_access_only))
https://itginfo.ccgo.hksarg/content/ias/ia_desc.asp

HKSARG Interoperability Framework

https://www.digitalpolicy.gov.hk/en/our_work/data_governance/policies_standards/interoperability_framework/index.html

Electronic Transactions Ordinance

https://www.digitalpolicy.gov.hk/en/our_work/digital_infrastructure/legal_framework/regulation/eto/

Domain Name System Security Extension

<https://itginfo.ccgo.hksarg/content/dn/dnssec.asp>