.eu Insights

World Report on IDN Deployment 2013

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The EURid Insights series aims to analyse specific aspects of the domain name environment. The reports are based on surveys, studies and research conducted by EURid in cooperation with industry experts and sector leaders.

World Report on IDN Deployment 2013

In this year's report

5.1 million IDN domain names

Only **2%** of the world's domain names **are** in **non-Latin script**

61,000 .eu IDNs

The **5 most popular browsers** have strong **support** for **IDNs** in their latest versions

Poor support for IDNs in **mobile devices**

92% of the world's most popular websites **do not recognise IDNs** as URLs in links

0% of the world's most popular websites **allow IDN email addresses** as user accounts

99% correlation between **IDN scripts** and **language** of websites (Han, Hangkuk, Hiragana, Katakana)

The **first** standards compliant **IDN email sent in 2012**

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Foreword

Nelson Mandela once said that “if you talk to a man in a language he understands, that goes to his head. If you talk to him in his language that goes to his heart”. The language of our thoughts and our emotions is our most valuable asset.

Multilingualism is our ally in ensuring quality education for all, in promoting inclusion and in combating discrimination. Building genuine dialogue is only possible with a foundation of respect for different languages. Every image of a better life and every developmental goal are expressed in a language, with specific words to bring it to life and communicate it. Languages are who we are: by protecting them, we protect ourselves; by promoting them, we sustain cultural diversity.

This is also true for cyberspace. To have maximum impact and be sustainable and beneficial to all, cyberspace must be inclusive. Every man and every woman should have a voice in his or her mother tongue. This is why Internationalised Domains Names are so important.

For the third consecutive year, the EU domain name registry and UNESCO are jointly publishing the World Report, which analyses the uptake of Internationalised Domain Names and identifies gaps that need to be filled in order to facilitate this process. This is not only an academic study, but also a document which draws attention to shortfalls and then calls for appropriate actions.

UNESCO applauds the steady progress which has been made in filling these gaps. Following the adoption of the IDN e-mail standard by IETF in 2012, the first fully standardised IDN email was successfully sent this year. This is a major development in ensuring increased usability of Internationalised Domain Names, an accomplishment made possible thanks to the dedication of the engineering community. But the challenge still remains. User experience is still unsatisfactory, as the world’s most popular web sites and many of the mobile devices that we increasingly rely on to support our online life simply fail to support IDNs. UNESCO is working with its member states to raise awareness of the new opportunities that IDNs bring to local internet communities and the role of governments in putting in place an enabling regulatory framework, which stimulates the use of IDNs and allows new Internet users who have not mastered the Latin script to join the online world.

Linguistic diversity is our common yet fragile heritage. There are more than 6,000 languages spoken in the world, but nearly half could die out by the end of the century. Language loss impoverishes humanity. Anybody should have the right to be heard, to learn and to communicate in his idiom. Moreover, each language conveys a cultural heritage that increases our creative diversity. Cyberspace, through the use of IDNs, provides an opportunity to safeguard this linguistic diversity. Today we count around 5 million registered Internationalised Domain Names, which represent 2% of the totality of registered domain names. This number may look considerable but it lags behind our ambitions to see multilingualism flourishing in cyberspace.

Multilingualism is a living resource. Let us promote it for the benefit of all.

Janis Karklins
Assistant Director General
Sector for Communication and Information
UNESCO

1 Executive summary

The internet's short history is full of extraordinary examples of network effects. Whereas in 2005 there were 1 billion internet users, by 2013 the number had grown to 2.7 billion[1]. As networks grow, they reach a tipping point after which rapid, mass adoption follows. Network theory tells us that success breeds success, because "new nodes express preferential attachment to the most-connected nodes in the existing network"[2], leading to the rapid emergence of powerful hubs.

This report builds on the 2012 World Report on IDN Deployment, and the 2011 study "IDNs State of Play", which found that there was a significant correlation between IDNs and local language[3]. The 2012 World Report concluded that Internationalised Domain Names (IDNs) are an essential building block towards creating a truly multilingual internet.

In support of WSIS action line C8 (Cultural diversity and identity, linguistic diversity and local content) and implementation of the UNESCO Recommendation concerning the Promotion and Use of Multilingualism and Universal Access to Cyberspace, EURid the .eu ccTLD registry in cooperation with UNESCO, and with the support of Verisign, presents the World Report on IDN Deployment 2013.

The 2012 World Report identified obstacles to be overcome before universality for IDNs could be achieved, and commented that "in general, registering and using IDNs remains an inconsistent, unsatisfactory experience for many internet users", and that until these challenges were overcome, IDN popularity would continue to lag behind that of ASCII (Latin script) domain names.

The 2013 World Report continues to observe that for Internationalised Domain Names (IDNs), while the potential is great, progress needs to be made on several fronts before we start to see the network effects associated with rapid, widespread adoption. At December 2012, out of the 252 million domain names registered globally[4], there were 5.1 million IDNs. Although IDN registrations have grown since 2011, they currently only represent 2% of the world's registered domain names. This low percentage bears no resemblance to the linguistic diversity of the offline world. Not only are overall registration figures for IDNs low, the rates of usage are also far below those seen for ASCII domain names.

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1 *ITU Key ICT indicators 2005-2013 http://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2013/ITU_Key_2005-2013_ICT_data.xls.*

2 *Werbach, K., "Connections – Beyond Universal Service in the Digital Age", 2009, Journal on Telecommunications and High Tehnology Law, Vol 7, p 85.*

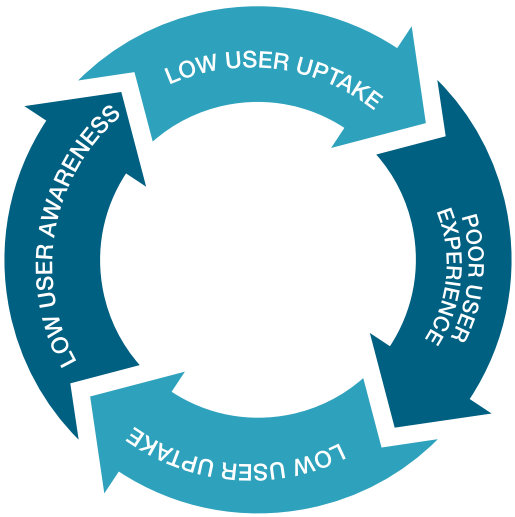
3 *EURid-UNESCO Internationalised Domain Names State of Play 2011 and World Report on IDN Deployment 2012.*

4 *Verisign Domain Name Industry Brief, April 2013, http://www.verisigninc.com/assets/domain-name-brief-april2013.pdf, accessed 2 September 2013.*

The slow rate of IDN uptake is in contrast to the burgeoning of multilingual online content. According to the Broadband Commission Report 2012, by 2015 the number of internet users accessing the web mainly in Chinese will overtake the number of internet users using predominantly English[5]. Does this disparity signal that domain names generally, and IDNs in particular, are losing their relevance? Although users are now able to locate online resources through increasingly sophisticated and varied means, domain names continue to underpin much of the internet's basic functionality and the newer trends of social sharing which depend on URLs. Growth rates of ASCII domain names continue to remain buoyant in spite of this, and the number of applications for new gTLDs (1 930) suggests that many organisations perceive that domain names have continued value to internet users.

Despite the best efforts of many within the domain name industry, most if not all current IDN implementations are underperforming compared to their potential. The wider environment is currently creating a negative cycle of poor user experience, low user uptake, and low user awareness, which itself leads to low user uptake, and so on.

Figure 1 – The IDN negative cycle



[5] *The State of Broadband 2012: Achieving Digital Inclusion for All, http://www.broadbandcommission.org/Documents/bb-annualreport2012.pdf.*

The 2013 World Report on IDN Deployment is divided into three sections. The first is a special focus on usability and usage of IDNs. The second is a special focus on IDNs in Asia and the Pacific region. The third reviews IDN news in the past 12 months, including registration numbers, results of a survey of registries and registrars and other developments. Appendices set out a background on IDNs, chart the rate of IDN adoption, provide background data for our usage study and offer nine country case studies.

1.1 Usability of IDNs

Recent years have seen advances in the support for IDNs in web browsers. However, the overall usability of IDNs remains far from satisfactory. The leading browser manufacturers have developed their own, and different, ways of handling IDNs, leading to a lack of standardised support.

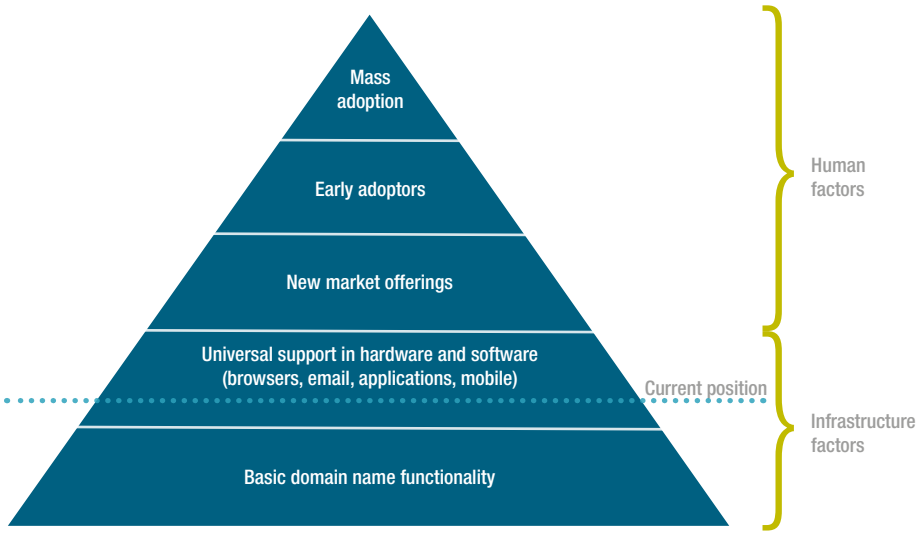
The user experience for IDNs in web-based services, such as social networks, blogging and photograph sharing sites is extremely poor. 85% of the websites tested failed to recognise IDN URLs. Only Facebook handles IDNs appropriately (in posts, comments and profiles). Meanwhile, attempts to create user accounts using an email address that included an IDN failed on every one of the world's most popular websites.

Basic functionality, such as the ability to send emails (whether through email clients, browsers or web-based services) is still lacking. Of particular concern: support for IDNs in mobile devices - which are increasingly used for internet access, especially in developing countries - is poorer than on desktops.

It seems logical that the difficulties of using IDN domain names may account for the generally lower than expected uptake of IDNs to date and for low user awareness.

Adapting Maslow's hierarchy of needs, the deployment of IDNs is still part way through the "infrastructure factors" (see figure 2), the lowest levels which form the foundation for future growth and human use. Without basic functionality and support across hardware and software, sustained mass uptake will prove elusive. Although the diagram suggests a steady progression from one step to the next, in reality, IDNs are already on the market and have been registered by early adopters – the market is also poised for a shake up with the introduction of new gTLDs including over 100 IDN gTLDs, and this may motivate further improvements at the infrastructure levels.

Figure 2 – IDNs - the hierarchy of needs



1.2 Usage of IDNs

For this year's report we analysed evidence of over 10 000 .eu IDNs and 1.25 million .com and .net IDNs. The research was made possible with the collaboration of Verisign.

Analysis of the way that IDNs are used, the language of websites, the destination of redirects and country of hosting all point to a strong correlation between the IDN script and content in languages indicated by that script. For example, for .eu IDNs in Greek script, the most popular website language was Greek, while Bulgarian featured prominently on .eu IDNs in Cyrillic script. Those languages did not appear in connection with .eu IDNs in Latin script.

The usage data supports the hypothesis that there is a link between IDNs and local language content and that IDNs are an essential part of a healthy, multilingual internet. These observations point to a great potential for IDNs as building blocks for local, multilingual content and online linguistic diversity.

At present, overall usage of IDNs lags behind that of ASCII domain names, and these low usage rates support our findings that IDNs remain challenging to use.

1.3 Special Focus on IDNs in Asia and the Pacific

Despite a world-leading internet infrastructure and a history of cross-border technical collaboration to resolve issues such as the handling of IDN variants, IDN ccTLDs in the region continue to underperform compared with their potential, and compared with ASCII TLDs for the same countries or territories. The registries are active in advocacy to improve support in mobile applications and browsers and have been involved in sending and documenting the first, fully standardised IDN email.

1.4 Facts and figures

For the first time since we began studying the deployment of IDNs, the growth rate for IDNs (2012) is lower than the growth rate for ASCII domain names. Looking at the growth of IDN ccTLDs, we see a net reduction in the numbers compared with 2011 (see section 6). While some of this can be attributed to the usual drop in registrations following renewal of a successful landrush (Russian Federation, Republic of Korea), there is also a steady downward trend in the larger IDN ccTLDs.

By region (plus gTLDs) there is a reasonably even distribution of IDN registrations across Europe, Asia and the Pacific regions and gTLDs. While overall numbers of IDNs in the Arab States are far lower, there is healthy growth year on year.

IDNs in .eu grew 1.5% in the year to December 2012, to a total of 61 228 registrations. This compares with a net reduction of .eu IDNs in the previous year and suggests a recovery following the impact of landrush renewals.

1.5 Registry and registrar survey

Each year, EURid conducts a survey of TLD registries within the CENTR community and others that have deployed IDNs. We ask their opinions on IDN uptake, support for IDNs by their registrars and end-user awareness. This year, across all parameters, the registries' opinions showed a decline compared with the previous survey. Meanwhile, comments highlight the need to handle IDNs in email and applications and raise end-user awareness.

This year, for the first time, we also undertook a survey of 24 registrars, all of whom are accredited by EURid. The results showed that registrars view end-user awareness as low. The survey also indicates that registrars offer a range of services and marketing strategies in relation to IDNs.

1.6 Other IDN developments in the last 12 months

In 2013, noting that technical challenges in using IDNs are potentially inhibiting greater uptake and user awareness, UNESCO's Director General made a public statement, encouraging the technical community to "untangle these issues and release the full power of the internet".

In 2012, ICANN opened applications for new generic top-level domains (gTLD). 1 930 applications were made, including 116 for IDNs. A year on, over 100 applications for new IDN gTLDs have now passed the initial evaluation stages and, in July 2013, the first four IDN applicants signed registry agreements with ICANN – the final stage prior to launch.

In the Arab States IDN uptake remains low, although percentage growth is positive, and domain name registries in the region are active in promoting IDNs. The Russian Federation continues to have positive experiences of IDN deployment, with 780 000 registrations under .рф in December 2012. The Russian registry has worked closely with browser manufacturers and continues to collaborate with email providers to promote uptake.

1.7 Looking ahead

While the drop in growth rate for IDN domain names during 2012 is of concern, as are the low quality of usability and low user awareness, the picture is not static and there is steady progress on a number of fronts. The technical community continues to work hard to make improvements. The first, fully standardised IDN email was sent during 2012, and modern browsers now support IDNs. The launch of new IDN gTLDs, particularly the large number of Chinese domains, may provide a boost to the market, incentivising yet more investment in updating internet infrastructure and improving user experience in popular web applications, to access potentially valuable markets. The launch of new IDN gTLDs may also help to sensitise end users to the possibility that domain names can be in languages other than English.

The evidence points to clear linkages between IDN scripts and the presence of local language content, hosted on local servers. These are positive forces in fostering the growth of online multilingualism. The challenge in the coming years will be to fulfill that potential.

2 Introduction

Part 1 of this report begins with a study on the usability of Internationalised Domain Names (IDNs). Domain names in Chinese, Arabic and Cyrillic scripts were tested in leading web browsers, across the world's most popular websites, and in email (client, webmail and mobile). The domain names were also tested on a range of devices. The usability study shows that while support for IDNs in browsers has improved, applications, email and mobile devices continue to offer poor (if any) IDN support.

Having reviewed how usable IDNs are, the report reviews how IDNs are being used. It reviews usage rates, the language of the websites associated with IDNs, including the destination of redirects, and finally the country of hosting. The usage analysis finds very high correlations between the language indicated by the IDN script (e.g. Korean is indicated by a Hangul-script domain name), the language of the associated web content and the country of hosting. These findings strengthen our theory that IDNs have an important role in fostering online multilingualism.

Part 2 provides a focus on Asia and the Pacific region, revisiting the IDN Readiness Matrix described in the 2012 World Report on IDN Deployment. The country/language indicators and ccTLD indicators continue to help explain why IDNs are doing comparatively well in some countries and not in others. However, the IDN experiences within the region exhibit the challenges in usability and uptake identified earlier in the report and reflect by industry opinions (see Appendix 4).

Part 3 provides updates from the past 12 months. It covers registration numbers and growth rates and reports on a EURid survey of the opinions of registries and registrars. Finally the report considers other IDN developments, including the letter of UNESCO's Director General, the new gTLD programme, and IDN experiences in the Arab States and the Russian Federation.

The report ends with conclusions and appendices which provide a background to IDNs, the rate of IDN adoption, the path to implementation, results of the usability study and country case studies on China, Republic of Korea, Viet Nam, Egypt, Islamic Republic of Iran, Qatar, Saudi Arabia, United Arab Emirates, and Russian Federation. The appendices also include a status update on IDN ccTLD applications (ICANN) and a glossary of terms.

PART 01

Special focus on IDN usability and usage

3 Usability of IDNs

3.1 Overview

Internationalised Domain Names are believed to be an essential element of multilingual content. For their potential to be fulfilled, however, IDNs need to work across the wide variety of services and applications that are associated with ASCII domain names.

For our report we define usability of IDNs as:

> The relative level of ease of use, predictability and memorability of IDNs in internet services and applications.

Usability is important because multilingual content comes in many shapes and forms. Because websites are easily viewable, research tends to focus on standalone web content. For IDNs to be "usable" as defined, they must not only be able to operate consistently and predictably in browsers, but also in many other contexts. For example, sharing of multilingual user-generated content takes place within popular websites whose linguistic environments and support for IDNs is controlled by a third party. Email is still the primary means of 1:1 business communication, despite the growth of instant messaging in other environments, and therefore is an important part of the multilingual online experience. Internet users are increasingly using mobile devices to access content[6], especially in developing countries. Therefore the handling of IDNs in mobile devices is an essential part of the online multilingualism ecosystem.

This section reviews the usability of IDNs in browsers and the web (including mobile browsers), IDNs in online services or applications such as popular websites and IDNs in email. It finds that while progress is being made on supporting IDNs in browsers, support for IDNs on popular websites and services and internationalised email is still in its infancy.

A table summarising the full results of our usability tests is available in Appendix 3.

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[6] http://www.w3counter.com/globalstats.php, accessed 28 August 2013.

3.2 IDNs, browsers and the web

[A] IDNs and traditional browsers

The five most popular browsers – Chrome, Internet Explorer, Firefox, Safari and Opera – all have strong support for IDNs in their current versions. These browsers support the IDN standards from the IETF and can routinely use IDNs as both links and as URLs typed into the address bar. Browsers on desktops and laptops however, are captive to the configuration of the machine on which they run. For instance, if a machine does not have font support for international scripts, the browser will be unable to display the IDN properly. For example, where a Cyrillic-script IDN is used on a machine running Windows 8 and Internet Explorer 10, the browser is perfectly capable of displaying the IDNs, but the underlying operating system fails to support it.

Modern browsers for desktop and laptop have fully-compliant support for IDNs but, while that is necessary for the success of IDNs on the World Wide Web, it is not sufficient. When a user sees the Punycode they are usually unable to recognise its content or meaning. Thus, it would be an unlikely candidate for routine use as a bookmark, shortcut or URL that was copied and pasted to other applications. The default display of the URL in Punycode strips the URL of its intuitive meaning – making it significantly less usable, even at the most basic level of reassuring the user that they are on the webpage where they expected to be.

There is an accidental mitigation of this problem. Most laptop and desktop computers used in international settings are configured for the language requirements of the locale in which they are used. This means that, in a high percentage of cases, the computer is outfitted with the fonts and keyboard support needed to make the browser's use of the IDN a success. For this study we were able to conduct an informal survey of a small number of machines in four geographic regions globally. In this informal survey, conducted in July to August 2013, when the computer was running a relatively recent operating system (defined as less than five years from initial release), the machine was configured for local language support 85% of the time. For these 85%, IDN support in leading browsers was very adequate. For the remaining 15%, the user would have to configure the operating system manually in order to ensure IDN support.

If a browser were to display all IDN characters, the user could be subjected to potential homograph attacks. Because of this, each browser developer has to make a decision about what characters to display. As a result, there is no standardisation of how browsers decide to display the IDN based on the characters in the domain name. Each browser uses a slightly different approach.

For example, originally Firefox used a whitelist of registries and characters to decide whether or not to display characters. This browser had the simple rule of: if the IDN came from a whitelisted top-level domain, Unicode would be displayed, otherwise the Punycode equivalent would be displayed. To add themselves to the whitelist, registries

had to submit policies that explained how they ensured that IDNs with confusingly similar characters would be prevented from being registered.

In the face of dramatic growth in the number of IDNs – via ICANN's new gTLD program – a whitelist approach does not scale well. Earlier this year, the Mozilla Foundation, makers of the Firefox browser, decided to supplement the whitelist approach with an algorithm that attempts to identify and limit the IDN to the display of safe characters. This approach has been implemented in the most recent versions of the Firefox browser.

Google's Chrome takes a different approach, as do other major browsers.

The confusing result for users is that some IDNs work in certain browsers but not in others. As the number of IDNs in the root grows, this has the potential to become an ever increasing problem.

[B] IDNs and the mobile browser

We also examined the usability of IDNs in browsers running on portable, mobile and embedded devices. Naturally, there is significant market growth in smartphones, tablets and other small devices, especially in developing countries. Included in these small devices are browsers of ever increasing sophistication. For instance, on iOS, versions of Safari, Chrome and Opera work very well. Internet Explorer is a natural browser for Windows Phone and Chrome dominates browsing on Android devices. Internet capability on these smaller devices, including browsing, has moved from being a novelty to being an expectation. Can IDNs be supported on these smaller, portable devices in the way that they are supported on traditional laptops and desktops?

In research conducted for this report we found that Internet Explorer on Windows Phone, Chrome on iOS and Android, and Safari on iOS could all successfully display IDNs.

However, usability for IDNs is not just measured by how the browser displays the IDN. We found that the user's ability to type an IDN into a mobile browser was severely limited. The limitations of screen space and character count were obvious. The limited screen space of many mobile devices means that, for languages with a large number of characters, entering IDNs can be extremely tedious. Even short domain names in languages with a large number of characters are difficult to use because the virtual keyboard technology for mobile systems currently finds it difficult to adapt to the requirement of selecting characters from a large character set. Interviews with registry managers in the Russian Federation and China suggested that users in those countries tend to avoid typing. The Chinese registry (CNNIC) is developing voice recognition software to enable Chinese speakers to use IDNs through voice command.

[C] Conclusion

There is no doubt that since we began studying IDN adoption in 2011, progress has been made on support for IDNs in browsers. This is confirmed in our research and also in 1:1 interviews and responses to our qualitative survey, where interviewees stated that many of the browser issues are now resolved. However, the mobile environment is still viewed as a barrier to greater IDN uptake.

3.3 IDN Support in web-based services

If the browser itself were the only factor in the usability of IDNs, then real progress would have been made in enhancing the accessibility of the internet for all global users. However, domain names play such a ubiquitous part in internet use, that IDNs in browsers are a relatively small part of the IDN usability landscape.

IDNs also make up a crucial part of the content and function of popular internet services. IDNs can appear in user names, links to other resources and in a variety of other places where the location of an internet resource needs to be specified. In particular, popular social, blogging and photography sites make extensive use of domain names – and by extension, need to support IDNs.

There are two key factors which are essential if IDNs are to be "usable" in web-based services.

First, sharing online materials by sharing URLs or links has become an essential component of online life: "we are what we share"[7]. Therefore, the service should support IDNs just as it would any other URL. For instance, in reviews of books or music on Amazon, IDNs should be supported in the same way as traditional domain names. In a social network, an IDN should be able to appear and be used in the same way as any URL created from a traditional domain name.

Second, if the service requires an email address as a component of the user identifier, the service should support email addresses built from IDNs as well as email addresses using more traditional character sets.

[A] IDN URL support in web-based services

It is rare to have a service recognise an IDN URL as a "link" or pointer to another resource. In simple terms: many online services immediately recognise and support traditional URLs and perform the expected action when the text is clicked upon. However, most sites (92.3% of the sites reviewed in our study) do not handle IDNs in the same way as traditional URLs.

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[7] *Richard Allan, Director of Policy, Facebook (IGF Workshop 2011).*

For this test we acquired a second-level domain in the Russian, UAE and Chinese IDN ccTLDs. This allowed us to test full IDNs (where the entire domain name string was not in ASCII). We also ran tests with Greek and Latin script IDNs under the ASCII .eu TLD, where the domain name ending was in ASCII but part was in the local script (a hybrid domain name). The tests were completed in the period July – September 2013.

In each case we took the zone we registered and redirected the entire zone towards a test website so that any name in the form (for instance, in Russian) 2ndlevel.pф or www.2ndlevel.pф would be redirected to a test website. We also inserted the required records so that email addresses such as name@2ndlevel.pф would be automatically forwarded to a test email account. We examined email clients (both desktop and web-based) and key internet services.

To examine the support for IDNs on popular internet services, we used three widely accepted internet ranking services. To these we added Pinterest, LinkedIn and Paypal, as popular internet services with a multilingual user base. We used multiple ranking services in an attempt to remove potential regional bias and to ensure a global view of the popularity of the services.

The services tested for this report were:

eBizMBA Rank[8]	Alexa Rank[9]	Quadcast Rank[10]	Site
1	1	1	Google
2	2	2	Facebook
3	4	3	Yahoo!
4	3	4	YouTube
5	7	7	Wikipedia
6	11	6	msn
7	15	7	Amazon
8	21	11	eBay
9	9	5	Twitter
10	22	16	Bing
		11	Pinterest
		14	LinkedIn
		28	PayPal

[8] *eBizMBA rankings are done by combining traffic rankings from multiple, independent sources.*
[9] *Alexa, a subsidiary of Amazon, provides commercial web traffic analysis and rankings.*
[10] *Quantcast is an audience measuring company which specialises in measuring and categorising web traffic.*

Figure 3 – Twitter user's input

Figure 4 – Twitter display

A typical example for full IDNs is Twitter. Twitter does allow IDNs such as http://www.2ndlevel.pф to appear in Tweets, however, it does not recognise them as links to other resources. Nothing happens when you attempt to click on the text. This behavior seems to be typical when an online service allows free form text to be input into a field.

The picture is slightly different for second-level IDNs, such as the Greek and Latin script .eu IDNs in our study. Twitter, for instance, recognises .eu as a top-level domain. When a hybrid IDN is entered into a tweet (Figure 3 shows the user's input), Twitter changes the text from the IDN into Punycode. What followers see is not what the user typed in, but the Punycode representation (Figure 4 shows the Twitter display).

Facebook also is aware of internationalisation at the second level of some TLDs. The result is that IDNs can be used, but followers and friends never see them.

Many services provide input fields for the URL of a website. As an example, you can associate a website with your Facebook account. However, if you use an IDN as the foundation of a URL, 84.6% of the sites we tested fail to accept the IDN.

Of all the online services tested, Facebook had the most interesting support for IDNs. While you could not sign up for the service using an IDN (as we shall see), once you had an account, Facebook accepted and recognised full IDNs perfectly. It is possible to put an IDN in a post, in profiles and in comments on other people's posts, and the link will be recognised and work as expected. No other online service we tested had this capability. However, when a user types a hybrid IDN into Facebook (such as our .eu IDNs), it dynamically changes it into the associated Punycode.

[B] IDN user identifiers

It is common to use an email address as the user name component of the security credentials that allow you to identify yourself to a site. Of the sites we examined, 76.9% used an email address to identify a user of that service.

For IDN usability to be satisfactory, email addresses built from a set of internationalised characters should be supported as user identifiers in the same way as email addresses built from ASCII characters. We found that support for email addresses built using our IDNs was non-existent.

We attempted to create accounts on eleven of the most popular services on the internet using an email address that included an IDN. In each case, we used a fully internationalised email address. That is, both the user portion and the domain name string were made up of non-IDN characters (Figure 5 explains the components of an IDN email)

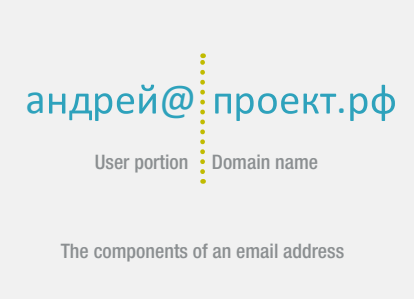
In all eleven cases, the account creation failed. Most typical was a message that indicated that the service was unable to recognise that the text entered was a well-formed email address. Some services were particularly terse and unhelpful to the IDN user, suggesting that the user had made an input error, rather than stating clearly that the service does not support such email addresses for user account creation.

We discovered that other services took the restriction even further. eBay does not allow a user to type or paste any characters into the email address field that would support an IDN. Thus, in our attempt to paste or type a Cyrillic, Arabic or Chinese character into an email address field on eBay, the webpage ignored the input.

Especially interesting were online resources that had been customised for a local audience, for example Google and PayPal. With the web page in the local language it would be natural to expect that the website would accept IDNs associated with that language.

In the case of Google, users can create an account that will allow them to customise Google, use Gmail and several other services. To create the account is simple. However, when users attempted to use non-ASCII characters in the gmail.com email address as the basis for using the service, Google rejected them. With PayPal, an attempt to use an email address with the IDNs in our study also failed (see figure 6).

Figure 5 – The components of an email adress



The components of an email address

Figure 6 – Paypal

3.4 IDNs and email

There are three common approaches to supporting email. First are the traditional email clients that run on desktop or laptop computers. Second, are web-based services that allow for the creation, consumption and management of email through a browser. Finally, there are email applications that run on mobile/portable devices such as tablets, smartphones and games consoles.

The successful internationalisation of the internet depends on both the Web and email being internationalised and also usable. Until email supports international character sets in the full address (both the user portion and the domain name (see figure 5), IDNs will not be fully acceptable to global users as multilingual email addresses.

What seems simple to describe is actually difficult to implement. The infrastructure of the internet's email system does not support alternate character sets in its headers, addresses, success or failure notifications or in the descriptions of attachments. In June 2012, the first fully standardised internationalised email was sent[11]. In an interview, the Russian ccTLD registry told us that while some of the major Russian webmail providers are now able to send Cyrillic script emails successfully from their servers, more often than not, the emails fail to arrive at their destination. This is because each mail message (whether ASCII or IDN) passes through numerous mail servers en route, and if a single mail server fails to handle internationalised characters, the email will fail to arrive. Therefore, for webmail providers, such failure is likely to generate a support load, but the fault will be difficult to identify, and may not be within the provider's span of control.

Internationalisation of email is crucial, but it requires a significant investment in the underlying servers, transports and clients that make up the internet's email ecosystem, and the investment needs to be made by numerous parties.

[A] Traditional email clients

Local language support in mainstream email clients, such as Microsoft's Outlook, the Open Source Thunderbird from Mozilla or Apple's Mail application, is a combination of success and frustration.

The successful feature of each one of these clients is that the message, its subjects and the user interface for the email client can be rendered in a local language. A message typed into Outlook using a Chinese character set and mailed to an Apple Mail user will be delivered properly: the subject line will be in the local language and all of the body text will appear in Chinese. The result is that any user can use one of the traditional email clients to send mail with the content and subject in the local language.

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[11] http://www1.cnnic.cn/InnovativeS/EAI/firstEAI/201208/t20120829_35618.htm.

On the other hand, none of the mainstream email clients mentioned above support internationalisation of the user portion of the email address.

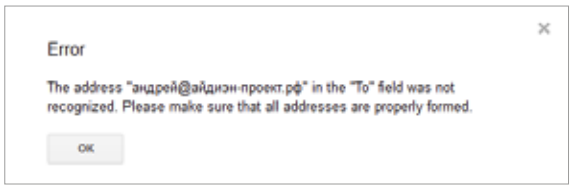
Recently, COREMAIL, a popular, traditional email client in China, was upgraded to support full internationalisation. The COREMAIL system has in excess of 600 000 000 users. As the COREMAIL infrastructure and client base are gradually upgraded a significant population of internet users will have access to standards-based, internationalised email. Still, interoperability globally remains a significant challenge, especially in developing countries, where service providers may be less likely to have the means to make the required investment.

[B] Web-based services

Web-based email is extremely popular. Services like Google's Gmail, Microsoft's Hotmail and Yahoo! Mail provide a rich and robust email environment without requiring the installation of any software beyond a browser. The result is a service that is "available anywhere" there's a browser. While not as feature-rich as the traditional clients discussed above, they provide an email service that is far from basic and has the advantage of being ubiquitous.

In addition, most ISPs provide a packaged, web-based email service to customers who sign up for access services. Therefore, with growing popularity of web-based email services, a key aspect of assessing IDN usability is to understand how these popular services support IDN email.

Figure 7 – Error message



In our survey of five online email services (Gmail, Outlook.com, Yahoo! Mail, iCloud and AOL mail) we found that none supported any internationalisation of email addresses. Figure 7 is example of a typical error message from Gmail.

[C] IDN email on mobile/portable devices

Email on mobile and portable devices is most often supported by a specialised client that is customised to take advantage of portability while attempting to cope with the display challenges of a small screen. Typically, email clients for small and portable devices have significantly fewer features than either web-based email clients or traditional clients.

For this report we tested the default email client for the iPhone, Amazon Kindle and Windows 8 Phone. In none of the cases we tested did we find an email implementation that supported any internationalisation of the email address.

3.5 Conclusion

If IDNs are to succeed, they need the support of a flourishing registry-registrar-registrant ecosystem. Just as essential is support in mainstream, popular internet services. While it is clear that the availability of local content is pivotal for IDNs to have sustained success, equally necessary is the support of popular web applications and crucial internet tools such as email. Our report finds that popular internet applications simply fail to provide support for either IDNs, usernames built from IDNs, or internationalised electronic mail. This failure is a critical part of the IDN story. The internet's users quite rightly expect to be able to use their native script anywhere they can fill in a user name, email address or URL. In this year's study we have found IDNs usability to be very low.

4 How are IDNs being used?

In previous editions of the World Report, we have shown that there is a strong link (over 90%) between the IDN scripts deployed by a ccTLD, and the language spoken in the country or region. For example, the Republic of Korea's registry has only deployed Hangul-script IDNs, the Chinese registry only Han script. European ccTLDs tend to deploy only Latin script, which provides accents and other special characters found in European languages. The only exceptions in this study are the Swedish and Polish registries which have deployed extended character sets (Hebrew in Sweden; Hebrew, Greek, Cyrillic in Poland) to support language communities within the country. EURid, the registry manager of the .eu top-level domain, has implemented Latin, Greek and Cyrillic scripts as part of its commitment to promoting multilingualism, enabling its IDN implementation to support all 24 official EU languages.

Despite more countries joining the study, the same correlation between IDN scripts deployed and local languages is observed.

In short, our hypothesis is that IDNs are an essential building block in fostering multilingual internet. In previous reports, we have lacked data on the language of web content associated with IDN domain names.

This year, for the first time, we have data on the language associated with web content in .eu, .com and .net IDNs, which complements evidence of the general usage patterns

presented in previous years. We have been able to look into the website language and usage of individual domain name registrations.

This is an opportunity to test our hypothesis that there is a strong link between IDNs and local language content.

The section contains a high-level summary of the domain script by functional segmentation, analysis of the website language associated with each domain name by script, including redirects, and an exploration of the links between the IDN script, website language and country of hosting.

4.1 Use of IDN domain names

The findings of a usage study conducted in Q3 2013 by Verisign on 10 096 .eu domain names and 1.25 million IDN .com and .net domain names are presented in this section. The .eu sample comprised all Greek (2 688) and Cyrillic (2 405) script .eu IDNs plus 5 003 Latin script domain names randomly selected from 52 953 Latin .eu IDNs. The total represents 17% of EURid's IDN registrations. The sample was put through the same tests, conducted by Verisign, on the .com/.net IDNs below, to allow for ease of comparison. No personal data was included in the sample, or results.

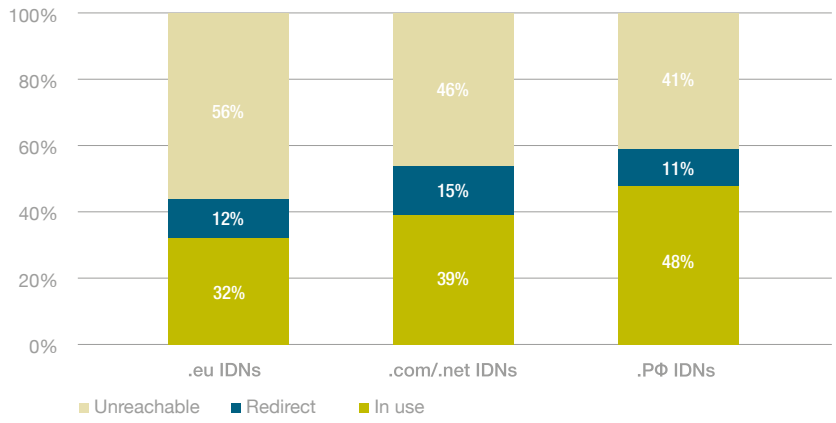
The analysis tool classifies each domain name according to numerous categories which highlight the different types of usage (e.g. online business, ecommerce, blog) and different types of error. For our purposes, the key information is whether or not the domain name points to web content and the language of that content. Redirects are also interesting, because they indicate whether or not a domain name is being used as the principal website of the registrant organisation. Therefore, we reduced the number of categories to the following:

Categories	Meaning
UNREACHABLE	There is no IP address associated with the domain name or the webserver does not respond to a query (e.g. generating Error 404 or 500).
IN USE	There is web content associated with the domain name. In many cases, it is not possible to determine the type of content/website; other categories of use include parking, pay-per-click (i.e. sponsored advertising links used to generate income), online business, blog or ecommerce.
REDIRECT	The domain name redirects to a different website. Redirection is often used in order to focus internet traffic to a domain name holder's primary website.

The analysis methodology is different from that used for analysis of .eu domains last year. With different methodologies comes the potential for discrepancies. While it is obvious where there is web content, and obvious where there are no IP addresses, categories such as "Error" can potentially include false positives, for example if there is a temporary outage, password protection, or the page takes longer to load than the automated tool allows. Also, last year's analysis classified redirects within the specific usage categories. Another source of potential distortion (for the .eu data) is that the sample analysed, while a statistically significant and a randomised selection, may not be representative of the entire data set.

4.1.1 Usage of IDNs, a comparison between .eu, .com and net domain names

Figure 8 – IDN usage comparison (.eu, .com/net; .рф) – july 2013



The usage of the IDNs in the data samples was categorised according to the parameters set out above. For the purposes of comparison, the usage of the fully IDN .рф domain names has been included. Anomalies may arise owing to differences in categorisation, as the .рф domains are analysed according to a different process[12]. Another possible cause for the higher usage in the .рф domain is that the end user has the capability of using the same script for the entire string, compared with the hybrid .com, .net and .eu IDN domains.

In terms of usage, domain names in the .рф IDN ccTLD show the highest percentage of use. This is an improvement of 12% within the past 12 months[13], since July 2012.

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[12] *http://statdom.ru/about/glossary. For the purposes of this comparison, the рф categorisations of "not delegated", "no IP address" and "error" are classified as unreachable and "in use" includes the рф categorisations of "website", "parked" and "under construction".*

[13] *Statdom.ru, usage figures for July 2012, indicated that 36% of рф domain names were in use at that time, http://statdom.ru/tld/%D1%80%D1%84/report/sitesusage/#26:date=20110501-20120701.*

Usage percentages in the .eu and .com/.net IDNs are comparatively lower (32% and 39%, respectively). Marginally higher percentage of .eu IDNs are used for online business compared with .com/.net IDNs (11% compared with 6%), while a marginally lower percentage of .eu IDNs are used for ecommerce sites compared with .com /.net IDNs (0.7% compared with 1%).

A comparatively high percentage (56%) of .eu IDNs are categorised as "unreachable", meaning that no IP address is associated with the domain name (39%) or that the web server did not respond, generating 404 or 500 Errors (17%).

The percentage of redirects is marginally higher for .com and .net IDNs (15%) compared with .eu and .рф IDNs (12% and 11%, respectively).

Generally, usage of IDNs in this comparison remains below that of ASCII equivalents[14]. IDNs under .eu were first offered in late 2009 and the .рф IDN ccTLD was launched in 2010, so both are comparatively new namespaces. This may influence the rates of usage. Improvements in usage figures for .рф IDNs over the past 12 months are encouraging, but IDN usage is not yet fulfilling its potential. IDNs under .com and .net are not new. They have been offered since 2000. The low usage rates of .com and .net IDNs suggests that issues of usability discussed elsewhere in this report may be depressing usage rates.

4.2 Language of websites associated with IDN domain names – a study of .eu and .com/.net second level IDNs

4.2.1 Results of research into language of website for IDN domain names

For this report, we analysed the language of website associated with IDN second-level domain names in .eu and .com/.net. The data sample was the same as for the analysis of the usage of these extensions (10 096 .eu IDNs, and 1.25 million .com/.net IDNs). Unlike scripts which are encoded and therefore can be measured objectively, the ability to determine the language of web content is a more challenging task especially where a single script is used across many languages (for example Latin and Arabic scripts). In these cases, the accuracy of identification of languages is dependent on how much text there is on the relevant website. Where there is one or more paragraphs of text, there is a high level of confidence in the accuracy of the language identification, done by an automated tool developed and managed by Verisign.

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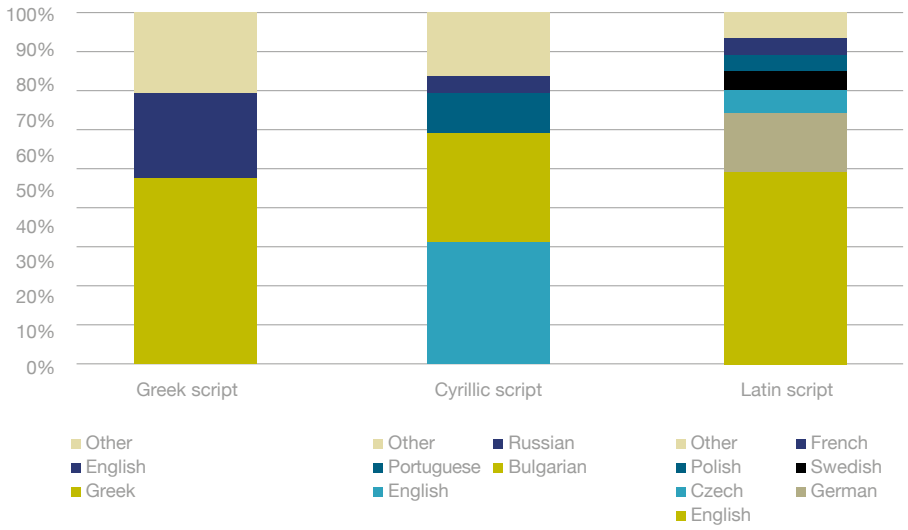
[14] *Figure 15, World Report on IDN Deployment, 2012. Excluding "Error", all other categories denote that the domain name is in use, with a range of ASCII domain usage in .com, .eu and ccTLD1 of between 73-88%. Please note: different methods have been used across the two reports, which may account for discrepancies in the output.*

4.2.2 Language of websites associated with .eu IDNs

As reported in previous studies, EURid implemented IDNs in December 2009 in the Latin, Greek and Cyrillic scripts, to support the 24 official languages of the European Union (23 official languages at the time second-level IDNs were launched). Excluded from the original data sample of 10 096 .eu IDNs were domain names in the category "unreachable" (see above) and websites where there was too little text to identify any language. This left a data sample of 2 506 IDNs, in which 2 714 instances of language were identified. In other words, the number of languages is greater than the number of domain names, because one site can have multiple languages (generally English and one or more others). This analysis covers both primary websites and the destination language of redirects.

Figure 9 – .eu IDNs, language of website



For Greek and Cyrillic IDNs, the resulting datasets were very small, and therefore small variances can lead to high percentage differences. Greek appeared on 59% of the websites associated with the 146 Greek-script IDNs, while Bulgarian appeared on 36% of the websites associated with the 446 Cyrillic-script IDNs. The only instances of Greek and Bulgarian websites within the data sample were associated with Greek and Cyrillic-script IDNs. In other words, they clustered around the IDNs whose scripts were most strongly associated with the language.

The range of languages associated with Latin-script .eu IDNs was larger than that associated with Greek and Cyrillic script. English was prominent across all three scripts and is often included in websites with more than one language.

4.2.3 Language of websites associated with .com and .net second-level IDNs

Whereas the IDN scripts offered by EURid (Latin, Greek and Cyrillic) support the 24 official languages of the EU, the scripts offered within .com/.net are more diverse, reflecting their global audience.

From the full data of .com/.net IDNs, six languages were selected which had the following features:

- Substantial sample size
- Language readily identifiable by Verisign's technical tools.

While Arabic script is used across multiple languages, and therefore the confidence levels of the language are lower for those domain names, they were included because Arabic-script languages are so widely spoken globally.

Language	Script
Chinese	Han
Korean	Hangul
Japanese	Han, Katakana, Hiragana
Arabic	Arabic
Persian	Arabic

In all cases, the script of the domain name near perfectly correlates with the language of the website. Conversely, there are very few websites associated with IDN scripts which are not closely associated with the language of the website. The only exception is English, which is found in websites associated with numerous IDN scripts.

According to the analysis, online business websites are more likely to be found in IDNs using Han (Chinese website) and Arabic (Persian website).

The analysis also shows a breakdown by script and language, highlighting a near perfect correlation between the language indicated by the script of an IDN and the language found on the website associated with that domain name.

Table 1 – .com and .net IDNs – website language

	A: Number in script for language identified	B: Total number of websites in identified language	A as a percentage of B
Chinese website / Han domain	40 843	41 093	99.4
Korean website / Hangul domain	39 317	39 328	100.0
Russian website / Cyrillic domain	4 452	4 469	99.6
Arabic website / Arabic domain	1 276	1 313	97.2
Persian website / Arabic domain	1 298	1 299	99.9

The Japanese language uses three scripts: Han, Katakana and Hiragana. When combined, the same correlation is observed.

Script	Han	Katakana	Hiragana	A: Combined total Han, Katakana, and Hiragana	B: Total of Japanese language websites	A as a percentage of B
Japanese website	109 251	21 619	5 040	135 910	135 922	99.9

On average there is a 99% correlation between the website languages associated with .com and .net IDNs and the language associated with the IDN script. This supports the hypothesis that there is a very strong link between IDNs and local language content.

4.3 Destination of redirects for .com and .net second level IDN domains

Both for .eu and .com/.net IDNs, a significant portion redirect to other domain names (12% and 15%, respectively). For the .com and .net IDNs, we have data on the language of the website to which the IDN redirects. This data is not currently available for .eu IDNs.

The destination of domain names that are redirected to other TLDs reveals an interesting pattern. If an organisation or individual has more than one domain name registered, it is common practice to point, or redirect, ancillary domain names to the main site. The percentage of redirects itself tells us that organisations and individuals are unlikely to

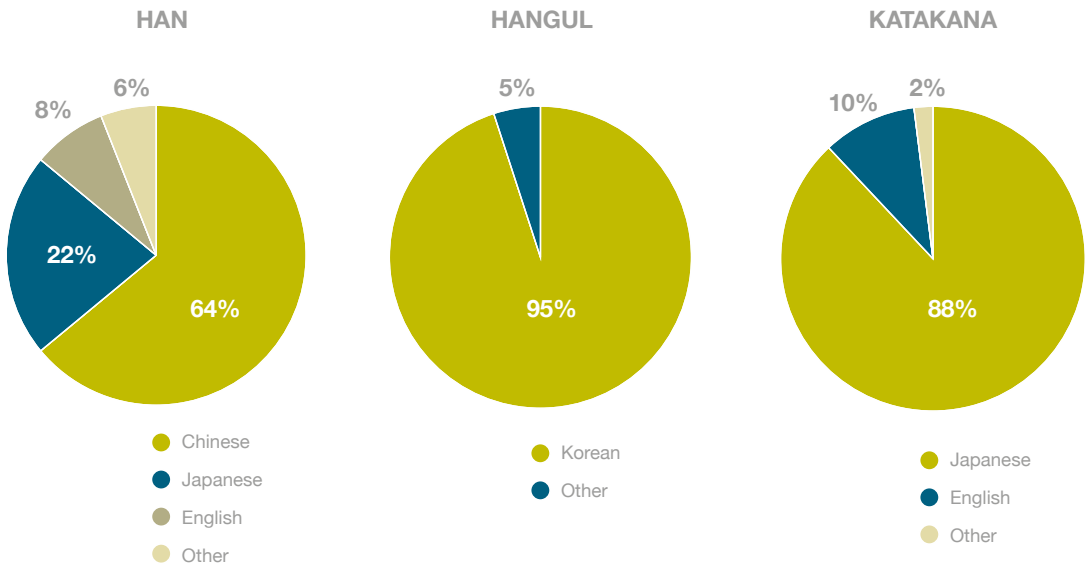
redirect their principal domain name. Therefore a higher than average percentage of IDN redirects would indicate that IDNs are not being used as principal websites. For IDNs, we speculate that the high instance of redirects may reflect that the registrant (whether a business or individual) understands the limitations of IDNs in terms of usability, or does not wish to exclude international visitors who do not speak the language indicated by the IDN script.

Similarly, the language of a destination website, if it correlates with the language indicated by the script of the IDN, would further strengthen our hypothesis that IDNs foster and signal users towards local language content.

Verisign analysed the destination of redirected second-level IDN domain names in .com and .net. A sample of 153 000 redirects was analysed and the language of the destination website noted.

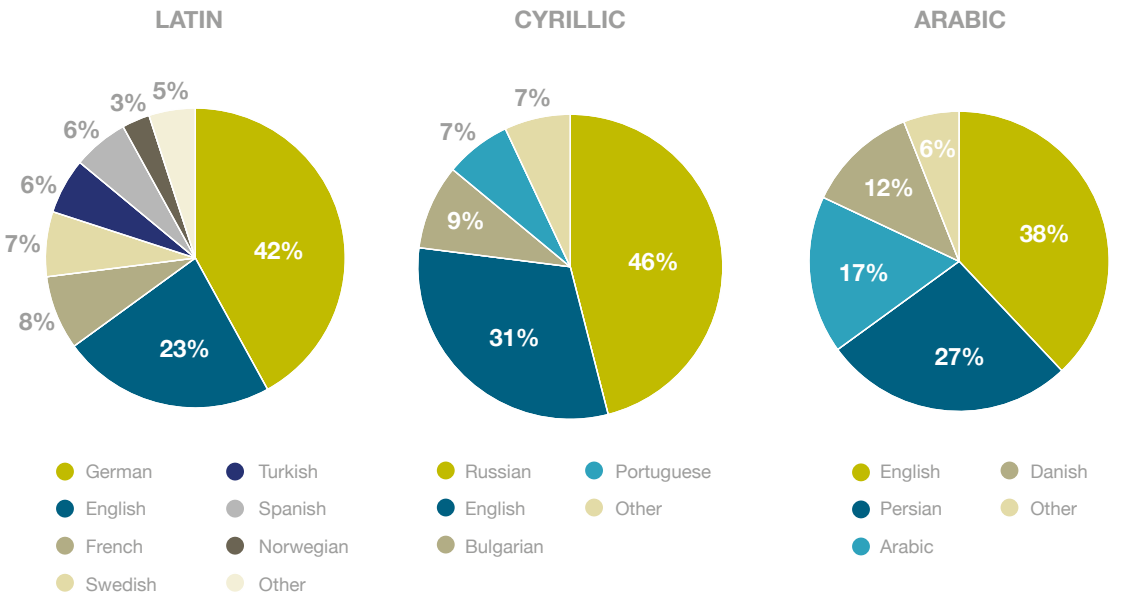
The analysis of redirects shows a high correlation between the language(s) most associated with the relevant script and the language of the destination website. Other languages (apart from English) make up a very small percentage of the sample. Our hypothesis is that there is a strong link between IDNs and multilingual online content. This analysis strengthens that hypothesis.

Figure 10 – Destinations of redirects



The correlation is particularly striking with the scripts supported by TLDs based in Asia and the Pacific, particularly Hangul. The Latin script, used in a number of European languages, presents a linguistically diverse range of languages. Even with redirects of Cyrillic-script IDNs, Russian and Bulgarian sites are in the majority (55%). The destination of redirects for Arabic-script IDNs are an anomaly, with English being the most common language of destination websites (38%) and Danish also popular (12%). There may be a number of reasons for this: there is a lower number in the sample (3 700 compared with 69 000 Han) and the hybrid Arabic.com domains present even greater usability challenges because of the mixture of right-to-left and left-to-right scripts.

Figure 11 – Destinations of redirects



4.4 IDNs and country of hosting

Research by UNESCO, OECD and ISOC (2011) found a significant correlation between local servers and local language content, and that language is a local factor. Our research in 2012 indicated the prime role of having a local registrar network in ensuring good deployment of IDNs in countries where a particular language/script is relevant. Therefore, if IDNs are acting as enablers of local language content, and bearing in mind the link between local servers and local content, we would expect to see a higher proportion of registrars in countries associated with particular scripts or characters than for ASCII domain names.

This study comprised .eu, .com and .net second-level IDNs.

4.4.1 .eu IDNs

EURid has approximately 750 accredited registrars, representing a geographically diverse registrar-base, across the EU and overseas. The top 100 .eu registrars manage about 84% of all registrations, with 35% of .eu registrations managed by German registrars.

If the correlation between local language content and local servers is borne out, we would expect to see clusters of hosting for .eu IDNs in countries associated with particular scripts (e.g. Greece for the Greek script and Bulgaria for Cyrillic) and perhaps to see a different distribution of hosting for IDNs than for ASCII domain names – a higher percentage of IDN-type registrars. Overall, the picture is a little blurred, as many registrars operate through networks of resellers, who may be located in any country.

Of the 10 096 IDNs in the sample, it was impossible to identify the hosting country for 3 637 as no IP addresses are associated with those domains, leaving a data sample of 6 459.

A comparison of ASCII and IDN .eu registrations by country of registrar produces some interesting results. Germany's relative share increases from 35% (all) to 50% (IDN), reflecting perhaps that the German language uses diacritics and special characters. Of the IDNs hosted in Germany, 82% are in Latin script.

Bulgaria and Greece, which do not feature in the top ten countries for the whole register, are in the top ten for IDNs. Of the IDNs hosted in Bulgaria, 99.6% are in Cyrillic script. Of the IDNs hosted in Greece, all are in Greek script.

Figure 12 – .eu registrars – registrations by country of registrar (whole register)

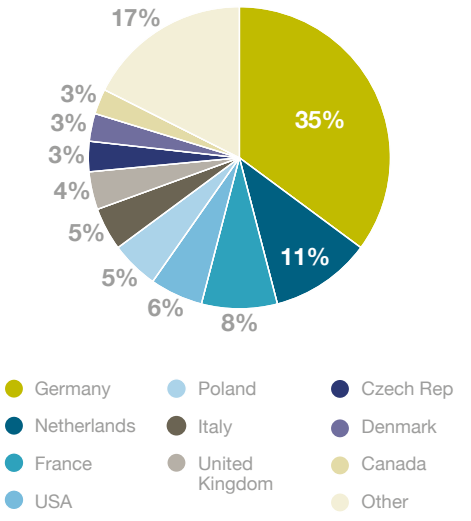
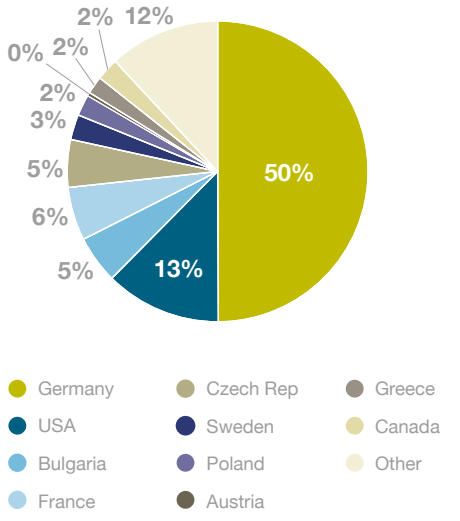


Figure 13 – .eu registrars – IDN registrations by country of registrar



The results of the analysis of .eu IDN hosting support the findings of third-party research which correlates local servers with local content and emphasises the link we have made in previous IDN studies between IDNs and content in the language indicated by the IDN script.

4.4.2 .com and .net IDNs

The analysis of country of hosting for IDNs was also conducted for .com and .net IDNs. The data sample comprised a larger number of scripts than for .eu IDNs, reflecting the larger number of scripts in the target market for gTLDs.

Of the 1.25 million IDNs in the data sample, it was not possible to identify the hosting country for 350 000 as no IP addresses were associated with those domains. Therefore, the total data sample comprised 900 000 .com and .net IDNs.

The analysis looked not only at the country of hosting and script of IDN, but also the language of any associated website.

The top five countries for hosting .com and .net IDNs are:

Country	Number of .com and .net IDNs hosted
Germany	175 266
Japan	170 202
USA	133 511
China	117 225
Republic of Korea	75 161

To some degree, the results for the country of hosting reflect the dynamics of the global registrar market, where a few multinational companies based in the USA and Germany control a high proportion of the market.

In all cases, the automated tool categorised a large number of domains as “Too little text” (to identify language) or “No language identified”. In these cases, it was not possible to determine the language of web content with any confidence. For the purposes of our language analysis, these categories are ignored. However, the high numbers in these categories (particularly in IDNs hosted in China and Germany) support anecdotal evidence from the Chinese registry that people view IDNs as investments, or commodities at the current time.

Of the IDNs hosted in Germany, 46% are identified as German language content/Latin Script IDN. English is well represented in the data sample.

A sample from countries more strongly associated with a specific script or language suggests that there is a striking correlation between the script, language and country of hosting. For this analysis, we have excluded IDNs from the sample where the automated tool was unable to identify the language of the website. The percentage figure is derived from the total number of IDNs hosted in the relevant country.

Table 2 – Correlation between script, language and country of hosting

Country of hosting	Script	Language of website	Percentage of IDNs hosted in stated country
Republic of Korea	Hangul	Korean	94%
Japan	Han, Katakana, Hiragana	Japan	94%
Russian Federation	Cyrillic	Russian	80%
China	Han	Chinese	90%

IDNs hosted in the USA display the greatest spread of languages and scripts, while for IDNs hosted in Japan, China, Republic of Korea and Russian Federation, the numbers fall away very quickly after the local language.

The results for .com and .net hosting support the findings of research which correlates local servers with local content and emphasises the link between IDNs and content in the language indicated by the IDN script.

PART 02

Special focus on IDN deployment in Asia and the Pacific region

5 IDNs by country, focus on Asia and the Pacific Region

This report has demonstrated that there is a clear link between IDN script and language of web content. It has also highlighted that there are significant challenges to using IDNs and that, although progress is steadily being made, these challenges go to the core of IDNs' usability and are likely to inhibit uptake.

Therefore, it seems that IDNs have the potential to foster and signal the presence of multilingual online content, but are currently underachieving compared with their potential. We believe that, given the strong linkages which we have shown between IDNs and language of content, underachievement poses a risk to the successful migration towards a truly multilingual internet.

Even so, it is clear that IDNs in some countries or territories are doing better than in others. In an effort to understand why this might be, we started to gather information about local conditions through country case studies. Last year's report included case studies from five countries that implemented, or were about to implement, IDNs at the top level: the Russian Federation, Qatar, Saudi Arabia, Egypt and the Republic of Korea. This year, the number of country case studies has been expanded to nine, with the addition of China, Viet Nam, United Arab Emirates and Islamic Republic of Iran.

The country case studies were made possible through the generous collaboration of ccTLD registry staff in these countries.

Like last year, the countries were selected because, unlike many of the European ccTLDs which operate primarily in the Latin script and use IDNs to represent special characters, the countries of the case studies are not well served by the mixed-script, hybrid IDNs. The exception is Viet Nam, which uses Latin script, but has been included because of its extraordinary experiences in implementing IDNs.
The ccTLD registries in the case-study countries have played an active role in advocating the adoption of IDNs at the top level and have been first movers in fully rolling out IDNs.

5.2 IDN-readiness matrix

Each of the countries in the case studies was evaluated across numerous indicators, which have remained consistent with last year and build upon research by ISOC, UNESCO and OECD[15].

[15] *"The Relationship between local content, internet development and access prices", Internet Society, OECD and UNESCO, 2011.*

These seek to identify the "IDN readiness" of a country or territory, as follows:

- Country/Language indicators
  - Level of linguistic and cultural homogeneity
  - Presence of Local Internet Exchange Points (IXPs)
  - Broadband penetration (fixed and mobile)
  - Local language content
  - Size of population and online population

- ccTLD (local domain name) indicators
  - Strength of local registrar network
  - Registration policies
  - Low prices
  - Strength of ccTLD brand

The IDN-readiness matrix was presented in the World Report on IDN Deployment 2012, which set out the rationale for each of the indicators. These include the significant correlation that has been identified[16] between the development of network infrastructure and the growth of local content. The measure of "cultural homogeneity" is built up through a range of indicators on cultural diversity[17], net migration both in the general population and of students, international flows of selected cultural goods and services and, where country data is present, highlights from the World Values Survey[18].

Figure 14 – IDN-readiness matrix ALL

[16] *ibid*
[17] *UNESCO World Report on Cultural Diversity, 2009.*
[18] *World Values Survey database, 2008, referenced in UNESCO World Report on Cultural Diversity 2009, table 6.*

The results are presented in the IDN-readiness matrix and help to explain why IDNs are doing comparatively well in some countries and not in others. It must be emphasised that this analysis makes no judgment on the countries or territories, ccTLD registries or any aspect of their operation.

The vertical axis reflects the summary of country/language factors. These reflect the macro-environment in which the IDN is offered. Some of the factors (linguistic homogeneity and cultural homogeneity) will be slow to move, others (broadband penetration, presence of IXPs and online population) can change quite rapidly, enabling mobility through the vertical axis.

The horizontal axis reflects the summary of the micro-environment that is the ccTLD registry, its policy, pricing, brand and crucially a network of local registrars. These are more readily affected than the country factors and therefore it is foreseeable that individual countries or registries could have high mobility across the horizontal axis year by year. The only significant movement from last year's chart (apart from the addition of new countries) is the adjustment of China's position due to the availability of more accurate data through collaboration with CNNIC.

Appendix 4 sets out the tables with the IDN-readiness indicators, and a description of the IDN experiences across the nine countries studied.

5.2 Focus on Asia and the Pacific region

Last year's report focused on the challenges of implementing IDNs in the Arab States, where IDN registration numbers tend to be very low. It also highlighted a number of reasons for this, which spanned both cultural and linguistic factors, basic internet penetration and access and ccTLD policies.

Turning to Asia and the Pacific, the environment is very different. Cultural, linguistic, internet and ccTLD indicators are all more favourable to IDN deployment.

However, even in Asia and the Pacific region, overall the IDN registration numbers remain below the level of ASCII registrations in most cases and are far from achieving their potential.

This section looks at the region's extensive contribution towards the refinement of IDN standards and the introduction of the IDN ccTLD. It then reviews implementation of IDNs by country or territory, with a particular focus on China, Republic of Korea and Viet Nam, followed by a round-up for the rest of the region. It identifies the core problem as lack of end-user awareness. Finally the section concludes by revisiting the IDN-Readiness Matrix, finding that while the factors are still relevant, generally IDN registrations are under-performing compared with their potential, due to a combination of poor user experience and lack of user awareness.

5.3 IDNs in Asia and the Pacific region, a history of cross border collaboration

The region has an impressive history in the field of devising IDN technical standards and of implementation. Some of the earliest launches of IDNs at the second level took place in Asia and the Pacific region: Taiwan of China (2000), Japan (2001), China (2002) and Republic of Korea (2003).

Through the longstanding cooperation of domain registries and other technical communities in Asia and the Pacific region, a consensus for the handling of variants was developed in 2000 and further refined over the following decade[19].

Since 2002, a Joint Engineering Task Force Working Group has worked to coordinate with the Japanese registry and Republic of Korea (which also uses some Chinese-script characters), and has reached a solution which ensures universal resolution. They have made different rules based on language rather than script, which are flexible enough to meet liberal generation rules. For example, in Chinese there is no difference in meaning between traditional and simplified characters (visually similar and semantically identical). In contrast, the Japanese language has different meanings according to whether traditional or simplified characters are used (visually similar but semantically different).

The members of the Working Group believe that their consensus rules are sufficient to handle Chinese-script variants[20], and are trying to convince ICANN to support variants. ICANN's current policy is to wait until *all* the IDN scripts are ready before implementing IDN variants. The ICANN Board resolution on the Variant Issues Project has determined to let all those communities wait for whom IDN variants are relevant[21].

5.4 IDNs by country or territory

Appendix 4 includes country case studies for China (new), Viet Nam (new) and Republic of Korea (updated). The following text highlights some key points in relation to IDN implementation.

5.4.1 China

China saw a strong launch of its IDN ccTLD, .中国/中國, in 2010 achieving 380 000 registrations in its first month. Prior to that .中国/中國 had been available to Chinese users as a locally resolving domain name, and therefore the launch did not exhibit the signs of "landrush renewals" seen in other environments. Nevertheless, since 2010, IDN

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[19] *See RFC 3743 (2004) http://www.ietf.org/rfc/rfc3743.txt, and RFC 4713 (2006) http://tools.ietf.org/html/rfc4713, accessed 18 July 2013.*

[20] *For an explanation on the need for character variants, please see China case study in Appendix 4. This is an area where extensive work is currently being undertaken through the ICANN process to identify ways of handling variants at the TLD level http://www.icann.org/en/resources/idn/variant-tlds.*

[21] *See http://www1.cnnic.cn/InnovativeS/EAI/firstEAI/201208/t20120829_35618.htm, accessed 1 September 2013.*

registrations have declined and at February 2013 stood at 270 000. Usage of its IDN domains is low, and the Chinese registry, CNNIC, told us that many view 中国/中國. domain names as commodities or investments rather than as internet addresses.

CNNIC reports that the latest versions of the major browsers all support Chinese-script IDNs. In 2012, the first fully standards-compliant internationalised email (in Chinese script) was successfully sent[22].

CNNIC's implementation of 中国/中國. allowed ASCII characters to be included in the domain name, so long as there was at least one Chinese character. In 2012, this restriction was removed, allowing full ASCII domain names to be registered under 中国/中國. This is the only implementation of mixed scripts and ASCII strings under an IDN domain that we are aware of.

Like many ccTLD registries, CNNIC has been active in advocating for IDNs, for example, persuading Microsoft and Google to support mixed scripts in 中国/中國. domain names. CNNIC has also been active in research and development and is currently working on voice activation for Chinese IDNs to work in a mobile environment. The Chinese language does not have a "dot" character, which is essential for domain names. CNNIC has managed to make the small circle character (the Chinese equivalent to the "dot" character) resolve interchangeably with the dot, so that users do not have to switch keyboards when typing an IDN.

CNNIC cited the lack of support for character variants at the top level (by ICANN) as a major barrier to widespread adoption of IDNs in China.

5.4.2 The Republic of Korea

Like China, the Republic of Korea ccTLD registry has seen a drop in the number of IDNs under its .한국 (Hanguk) domain. Registrations fell from 210 000 (December 2011) to 91 000 (December 2012). Noting that only 30% of the original registrations were delegated (i.e. able to be used), KISA the Republic of Korea ccTLD registry has made it a goal to improve the average utilisation of .한국 domains. By December 2012, the number of IDNs in use rose to 55% (consistent with levels seen in .pф,). KISA will also be investing in increasing user awareness and communicating the public benefits of the .한국 domain.

IDN registrations at the second level under .kr also fell during the year, with 115 445 registrations at December 2012, a growth rate of -17%.

KISA has been active in its advocacy for IDNs and continuing research and development. For example, it has constructed a test lab to examine the user environment for IDN email addresses and intends to implement a trial of Korean language internationalised email in 2014.

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[22] http://www1.cnnic.cn/InnovativeS/EAI/firstEAI/201208/t20120829_35618.htm, accessed 1 September 2013.

5.5 Viet Nam

Compared with China and the Republic of Korea, Viet Nam has a greater linguistic diversity (see country case study in Appendix 4). The Vietnamese language does not use pictograms but is written in the Latin script with diacritics. As a result, the .vn ASCII domain is meaningful for Vietnamese speakers. In April 2011, VNNIC, the Viet Nam ccTLD registry, started to offer free and unlimited registration of IDNs under .vn. By October 2012, the numbers of .vn IDNs had reached over 800 000.

However, over 90% of the IDNs under .vn are not in use, and of the 80 000 IDNs that are in use, 74% simply redirect to an existing website and 25% go to a web hosting template.

This experience follows patterns associated with domain name give-aways in the wider industry, where usage rates and renewal rates are usually poor. Nevertheless, the initiative has achieved success in its own terms and may contribute to raising user awareness.

5.5.1 Rest of the region

In Hong Kong SAR of China, the IDN ccTLD (.香港) closed 2012 with 12 129 registrations. At the same time, the number of IDN registrations at the second level under .hk fell by nearly 11 000, to 14 376. This may indicate that users are migrating away from the hybrid IDN domain names under .hk toward the fully IDN domains under .香港.

Japan does not yet offer registrations under the IDN ccTLD. It continues to offer IDN registrations at the second and third levels under .jp. Between 2011 and 2012, IDN registrations in .jp showed positive growth (+2%) for the first time since 2009, with 121 937 IDN registrations at December 2012. Representatives of the Japanese ccTLD (JPRS) have contributed actively to the JET project[23], and to the initiation of the ICANN IDN ccTLD Fast Track process and its refinement. Through that process JPRS has applied for .日本 and, according to the registry's website[24], is awaiting approval from the Japanese government, which is necessary for the successful completion of the ICANN process.

Taiwan of China has bucked the trend elsewhere in the region, by more than doubling its registrations under its IDN ccTLD from 41 001 in December 2011 to 84 108 in December 2012, a growth rate of 105%. Before the launch of its IDN ccTLD, TWNIC already had over 160 000 IDN registrations under .tw. The registry offers bundling of IDN registrations, so a registration under one of the IDN endings (台灣, or 台湾), reserves the same string under the other IDN ending and under .tw. The registry reports that its total number of IDN registrations (across all its domains) is 291 000 at December 2012.

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[23] *RFC 3743, www.ietf.org/rfc/rfc3743.txt, accessed 16 September 2013.*
[24] *http://jprs.co.jp/en/notice/dotnjppon.html, accessed 4 September 2013.*

IDN uptake under the Singapore IDN is slow. Registrations under the Tamil IDN totaled just 14 in December 2012, with 244 under the Chinese script IDN.

Islamic Republic of Iran: the registry for the .ir ccTLD started registering IDNs at the third level under ایران .ir, where (ایران means IRAN, in Perso-Arabic script), in 2006. The registration system embodied a robust bundling system to avoid abuses that could arise from the confusion of Arabic and Persian keyboards[25]. At its height, the number of IDN registrations reached 6 000, but began to drop once ICANN announced the IDN gTLD Fast Track Process. The registry is currently awaiting government approval for its IDN ccTLD application and in the meantime has suspended IDN registrations under .ir.

The managers of ccTLD for India confirmed that they have not yet launched their IDN ccTLDs.

5.6 Revisiting the IDN-Readiness Matrix

Returning to the IDN-Readiness Matrix, the uptake in Asia and the Pacific countries featured in this year's case studies appears to be far below the potential suggested by the matrix. Either the matrix itself is not a valid tool, or the uptake is underperforming against potential.

The IDN-Readiness Matrix assumes that IDNs are basically usable and that end users are aware that IDNs exist.

Nevertheless, the authors believe that the factors underlying the matrix are sound, and help to explain regional differences in IDN uptake (e.g. between Asia and the Pacific and Arab States).

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[25] *Direct communication with IRNIC. For more information on homoglyph bundling under .ir, see https://www.nic.ir/Allowable_Characters_dot-iran#Table_3, accessed 5 July 2013.*

PART 03

Developments in the past 12 months

IDN registration figures

Registry and registrar survey

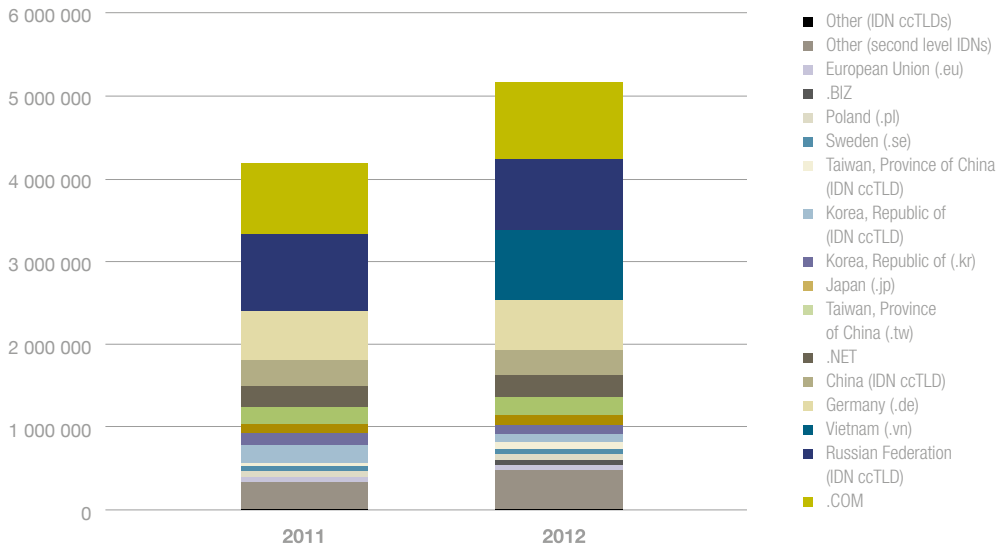
Other developments

6 IDN registration numbers and growth 2011-2012

The data set for this year's World Report on IDN adoption has increased in 2012 to 228 million, or 90% of domain registrations across all top level domains[26]. This contrasts with a data set of 203 million in 2011 and 163.7 million in 2010. The total number of IDNs in the sample studied was 5.2 million as at December 2012, compared with 4.2 million in December 2011 at December 2012. This figure includes both IDN.IDN and IDN.ASCII domain names. IDNs represented 2% of the world's total domain name registrations of 252 million[27]. As new data sources were discovered, we have back-filled our database for the years 2009-2011. This accounts for minor variations in the reports compared with the 2012 edition.

6.2 Total IDN registrations 2011-2012 (IDN ccTLDs and IDNs at second level)

Figure 15 – Total IDN registrations 2011-2012



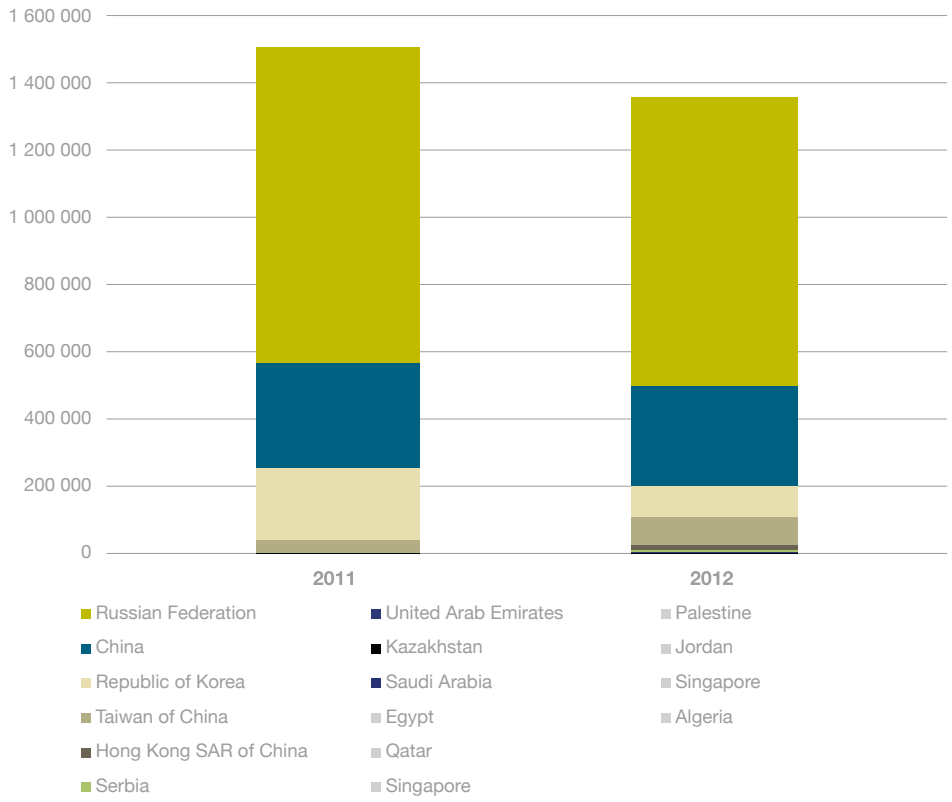
[26] *Verisign Domain Name Industry Brief April 2013, states that the fourth quarter of 2012 closed with more than 252 million domain name registrations across all top-level domains, http://www.verisigninc.com/assets/domain-name-brief-april2013.pdf, accessed 28 August 2013.*

[27] *ibid*

6.2 IDN ccTLDs

IDNs occur at the second level e.g. παράδειγμα.eu or as an IDN ccTLD e.g. 例子.中国. Figure 15 shows the total registration figures (2011 and 2012) for all IDNs in our data sample, comprising both IDN registrations at the second level and IDN ccTLDs.

Figure 16 – IDN ccTLDs (global) 2011 and 2012



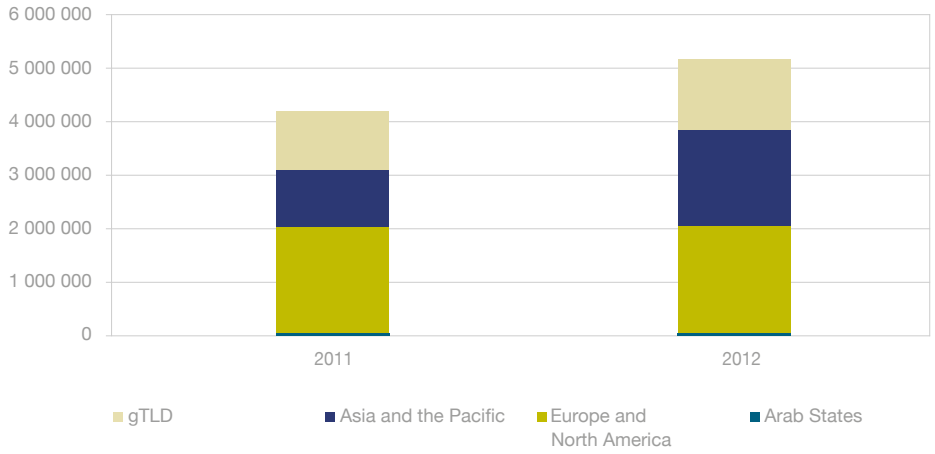
There has been a net reduction in the total registrations in IDN ccTLDs (IDN.IDN) of 150 000 over the year. This has been caused by reductions in the net figures for the top three IDN ccTLD registries, Russian Federation, China and the Republic of Korea.

6.3 IDNs by region

Figure 17 includes all IDNs (i.e. IDN.IDN and second level IDNs) and shows IDN registrations by UNESCO geographic region plus gTLD IDN registrations[28].

[28] *Note that the data sample for 2012 is larger than for 2011, so this chart shows the totals in our data sample in the two years and not the growth rate.*

Figure 17 – IDN registrations by region



An analysis of the IDN registration figures (both IDN ccTLDs and IDNs at the second level) shows that IDNs in Asia and the Pacific region had the greatest net growth between 2011-2012. Much of this is attributable to the immense growth of .vn IDNs. Following a change in policy in 2011, .vn IDNs are currently given away free of charge. However, with less than 10% in use, we anticipate that the number of .vn IDNs is likely to reduce dramatically on renewal. The .vn figures mask a net reduction in IDNs in Asia and the Pacific region between 2011-2012, with China and Republic of Korea in particular showing large losses.

The slight reduction in the Europe and North America figures for 2012 is attributable to a net reduction in the Russian Federation IDN ccTLD during the year (due to the impact of landrush renewals). However, strong growth is seen in the region with the launch of the Ukraine and Kazakhstan IDN ccTLDs in 2012.

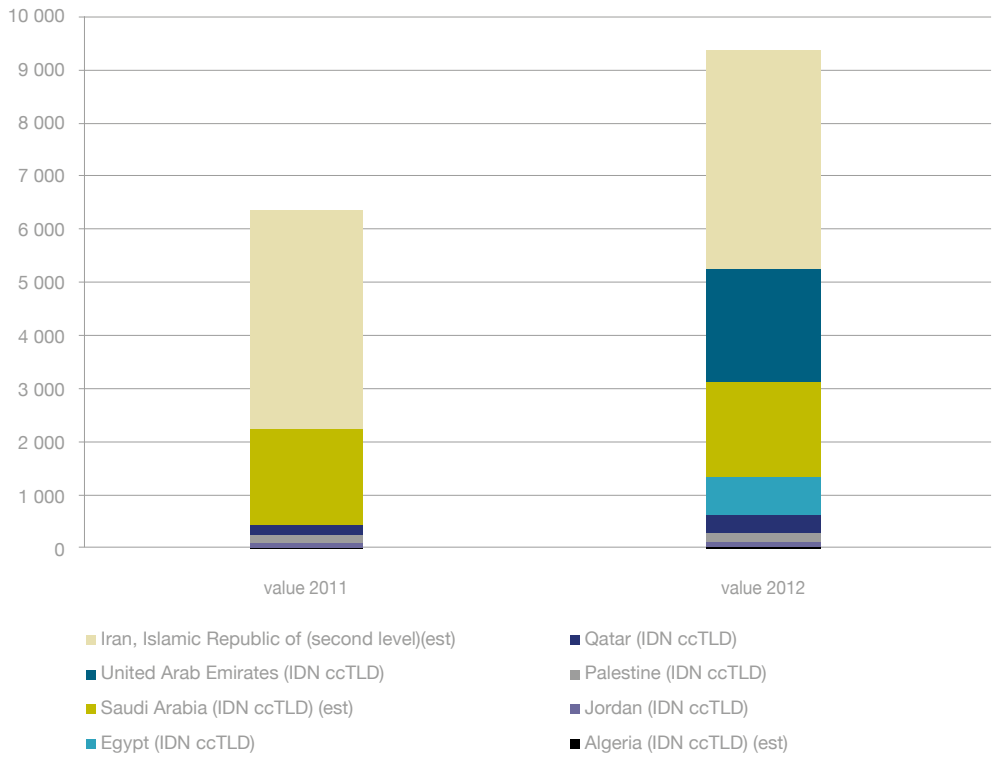
IDN registrations (at the second level) in Europe remained steady between 2011 and 2012.

In the Arab States, there is a net increase in the Arabic-script IDNs (see Figure 18).

6.4 Growth rate of IDNs compared with ASCII domain names

Last year, it was reported that the average IDN percentage growth rate for the year to December 2011 was 15%, while the average whole register growth rate (ASCII domain names) was lower at 13%. In the year to December 2012, both IDN and whole register growth rates have decreased, and for the first time since we started observing IDNs,

Figure 18 – Arabic script IDNs 2011-2012



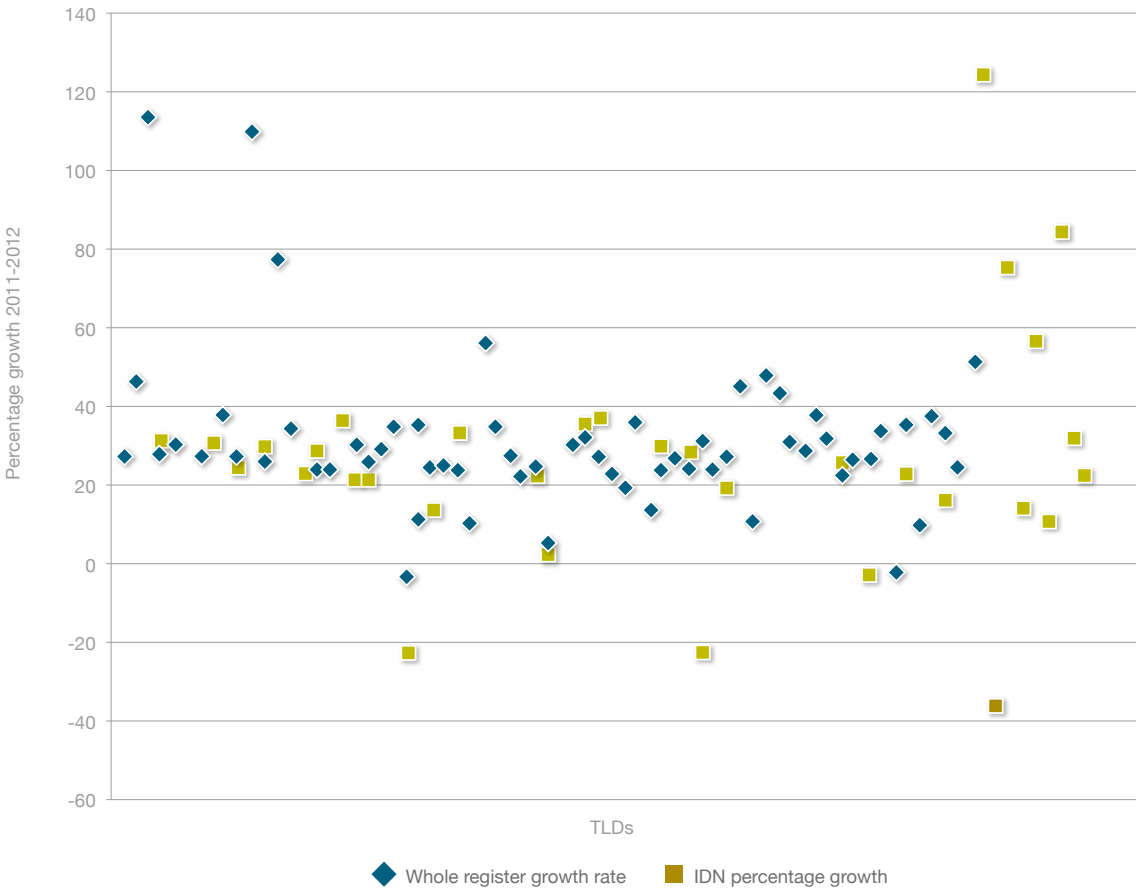
the IDN growth rate for the year to December 2012 (6%) is lower than that of ASCII domains (whole register) for the same period (8%, excluding outliers and estimates, explained below).

Individual registries' IDN growth rates (where available) are compared with that of the whole register (in other words, ASCII domains) in 76 TLDs. Figure 19 shows the comparison. Registries which have both ASCII and IDN registrations under the same TLD are shown with two dots, one above the other.

The average growth rate for the whole register is raised by 90% growth in .cn (China), 94% in .am (Armenia), and 58% in .coop. Excluding these outliers, the average growth rate is 8% for the whole register with a standard deviation of 11.

The IDN growth rate (average 6%) has a higher standard deviation (30), reflecting the higher distribution around the mean. The IDN numbers tend to be fairly low, or comprising a small percentage of the total register, and therefore low growth in numbers can result in high percentage growth. For example, the IDN TLD for Qatar grew by 64% in 2012, from 189 to 310 registrations, IDNs under .nz (New Zealand) experienced negative growth of -42%, but the actual numbers are small (200 to 116). As in previous

Figure 19 – Comparison of IDN and whole register growth rates 2011-12

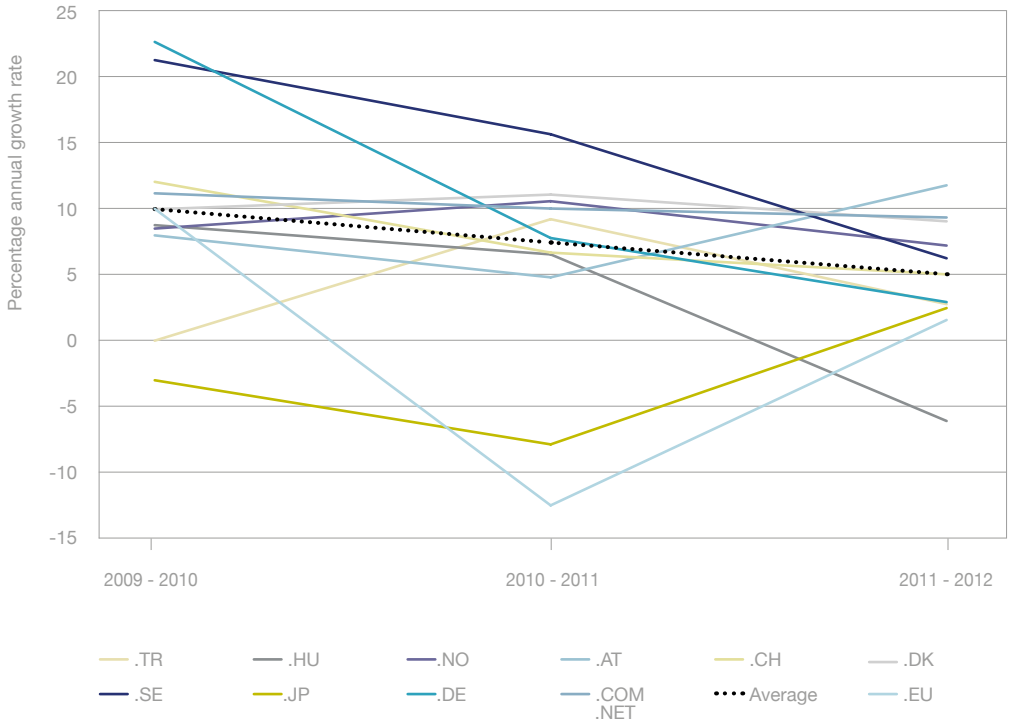


years, high growth rates are observed in some cases (e.g. 105% for the IDN ccTLD for Taiwan of China), but unlike last year there are several dramatic shrinkages in larger IDN registers, e.g. -43% for IDNs in .hk and -56% for Republic of Korea IDN ccTLD. The IDN ccTLD for China had -6.5% growth for the year.

The drop in average growth rate for IDNs from 2011-2012 indicates a downward trend. A review of the annual growth rates of registries that have recorded over 10 000 IDN registrations since 2009 supports this view (figure 20), as the average growth rate has decreased from 10% (2009-10) to 5% (2011-12). The .eu IDN growth rates reflect the "landrush renewals" pattern seen following the successful launch in December 2009.

Despite the general downward trend in IDN growth rates, there are also positive indications: in 2011-2012 IDNs under .jp (Japan), .eu (European Union) and .at (Austria) recorded positive growth, reversing negative growth in the previous year.

Figure 20 – IDN growth rate (%) 2009-2012



In comparison, an analysis of the annual growth rates of the whole register for TLDs with over 1 million domains indicates steady average annual growth of 9%. Exceptions are .cn (China) which reversed several years of negative growth with a 90% growth in 2011-2012. .kr (Republic of Korea) and .info (gTLD) both saw negative growth in 2011-2012 (-16% and -10%, respectively).

7 Registry and registrar survey: qualitative responses

7.1 A reminder of the domain name supply chain

The different actors within the domain name supply chain all have similar names.

The **registry** is the operator of the top-level domain, and is responsible for maintaining the database of all domain name registrations and their associated IP addresses (equivalent to a wholesaler). The registry is the authoritative entity for that top-level domain, and is included in the "root" directory, the Internet Assigned Numbers Authority (IANA) database. Most of the larger registries included in this study do not have direct interaction with end users at the domain name registration phase.

Registrars sell domain name registrations to end users (equivalent to a retailer). They typically also provide a number of other services and many offer a range of different TLDs to their customers. Registrars are usually accredited or otherwise authorised by a registry to sell individual TLDs.

Registrants are the people or organisations who register domain names for their own use (customer).

Figure 21 – The domain name supply chain.

7.2 Methodology

7.2.1 Registry survey

Every year, we send out a questionnaire to registries. The survey goes to the CENTR membership and associate members[29], and to individual registries with whom we are in contact. The number of responses to each question is noted by year.

As well as asking for objective data (e.g. number of IDN registrations at identified date points), we also asked for opinions on four questions:

1. How does the uptake of IDN registrations relate to your expectations?
2. How well are IDNs supported by your registrars?
3. How would you rate end-user awareness of IDNs?
4. What single change would improve IDN uptake?

Each question was scored on a Likert scale[30] from 0 (far below expectations) to 5 (exceeds expectations).

The first question aims to determine the registrar's overall satisfaction with the level of IDN registrations (e.g. for some, a low number may be completely in line with expectations. One registry told us "we don't expect mass market appeal for IDNs in our environment").

The second and third questions are aimed at the two primary methods of sales: in marketing jargon, one is supplier "push" and the other is end user "pull". If registrars (the channel to market) are not able to support IDNs, then a marketing push (e.g. through advertising, price promotions or other push strategies) will not be effective. Likewise, if customers are not aware of IDNs, then there will be little or no consumer "pull" (e.g. proactive requests by customers).

The fourth question is aimed at identifying the perceived barriers to greater uptake of IDNs.

The same registry survey has been conducted for the last three years (in 2011, 2012, and 2013). In 2013, 31 registries responded to the qualitative questions, the largest response so far. The registries represented a geographically diverse sample including Europe and North America, the Arab States and Asia and the Pacific. Not every registry answered every question.

The registry survey is based on a small sample and therefore small differences in numbers can give a large difference in percentage differences. However, the participants are expert in their field. So, while the results are not conclusive, they give an interesting picture of industry impressions of IDN uptake, from a geographically diverse base.

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[29] *www.centr.org/members.*
[30] *Likert, R. (1932). A Technique for the Measurement of Attitudes. Archives of Psychology, 140, 1–55.*

7.2.2 Registrar survey

This year, for the first time, we sent out a similar survey to selected registrars. The registrars were selected by EURid from its accredited registrar base, representing regional balance and different business models. The survey was completed by 23 registrars, 22 of which offer IDNs to their customers. All of them offer IDNs under .com and .eu, and 35% also offer IDN registrations under other ccTLD and gTLD extensions.

Of the 23 registrars who participated in our survey, the geographical distribution is shown in Table 3. The third column indicates the number of IDNs managed by the registrars who responded by region (following EURid's classification of its registrar base).

Table 3 – Registrars by number of IDNs under management

Region	Number of registrars	Number of IDNs under management
Central Europe	3	14 604
Northern Europe	5	10 111
Southern Europe	6	11 642
Western Europe	5	69 333
Outside Europe	4	267 655

Six (6) of the registrars did not provide information for "number of IDNs under management", so the figures above are incomplete. The larger number of IDNs under management from two (2) of the four (2) registrars based outside Europe reflects that the information comes from very large registrars.

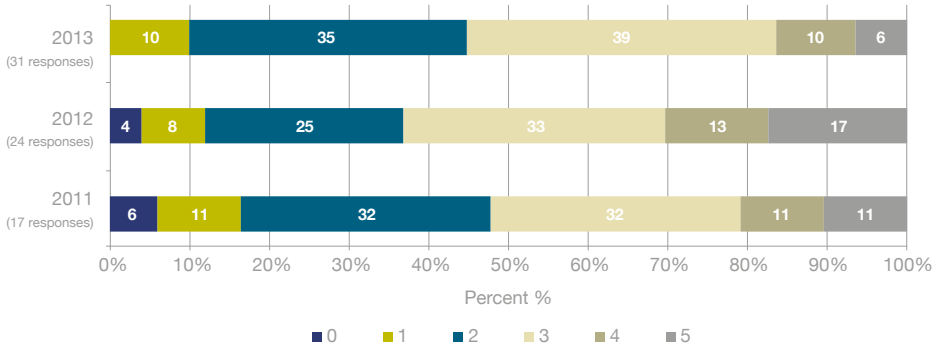
7.3 Results of registry survey

7.3.1 How does the uptake of IDN registrations relate to your expectations?

The 2013 figures suggest a slight decline in some registries' opinions about the level of uptake of IDNs compared with the previous year, but the average scores are fairly consistent year on year - 2.6 (2011), 2.9 (2012) and 2.67 (2013) - suggesting that registries are comparatively less happy with the level of IDN uptake compared with last year. Only 16% of registries who responded to the survey told us that uptake of IDNs was very good or exceeded their expectations, reduced from 30% in the previous year (22% in 2011).

At the other end of the scale, 10% of registries indicated that uptake of IDNs was below or far below expectations. This compares with 12% in 2012 and 17% in 2011. So, the more negative scores are gradually reducing, while the more positive scores have yet to pick up.

Figure 22 – How does the uptake of IDN registrations relate to your expectations? (0-5) 0 = below expectations, 5 = exceeds expectations

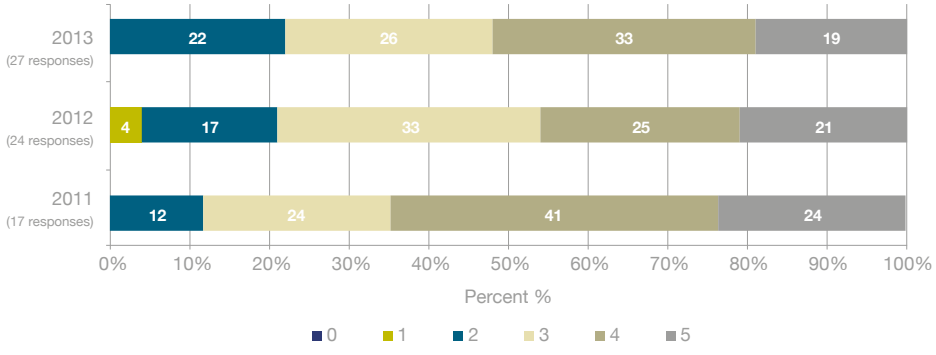


7.3.2 How well are IDNs supported by your registrars?

The overall picture remains positive, with the average score for 2013 a slight increase on the previous year.

The average scores for this question declined from 3.76 in 2011, but have remained steady across 2012 (3.42) and 2013 (3.49), suggesting that registries are reasonably satisfied with levels of support for IDNs by registrars, while the number of IDNs under management (Table 4) indicate that IDNs do not represent a major business for their registrars. 52% of registries who responded to the survey told us that uptake of IDNs was very good or exceeded their expectations. This represents a 6% increase since last

Figure 23 – How well are IDNs supported by your registrars? (0-5) 0 = Not at all, 5 = Excellent



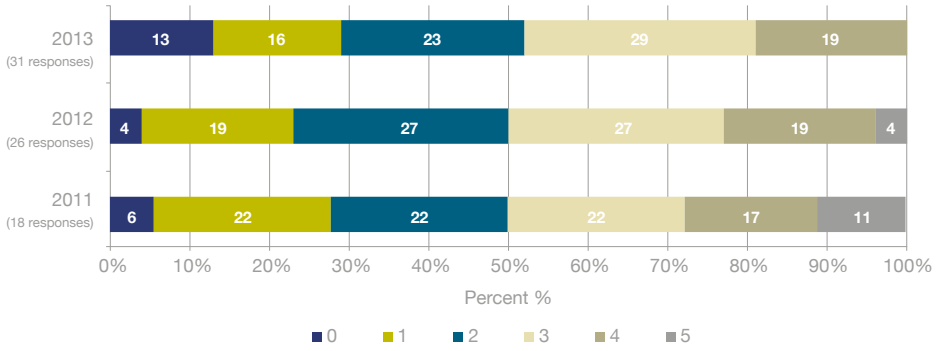
year's survey, when 46% of registries rated registrar support as very good or exceeding expectations (65% in 2011).

This year, 0% of registries used the two lowest ratings (the only time this has occurred was in 2012, 4%), suggesting that registries view their registrars are generally supporting IDNs at a reasonable level or above.

7.3.3 How would you rate end-user awareness of IDNs?

The figures across the three years of the survey are fairly steady and present a picture of low end-user awareness. The average scores for this question per year are 2.56 (2011), 2.5 (2012) and 2.25 (2013). 23% of registries told us that user awareness of IDNs was very good and 0% felt that it exceeded their expectations. This is a 4% decline in the top two categories since 2012 (23%), and a 9% decline compared with 2011 (28%).

Figure 24 – How would you rate end-user awareness of IDNs? (0-5) 0 = non existent, 5 = excellent



At the other end of the scale, 29% of registries indicated that end-user awareness was below or far below expectations (compared with 23% in 2012 and 28% in 2011), with an increase in the "far below expectations" category to 13% (compared with 4% in 2012 and 6% in 2011).

7.3.4 What single change would improve IDN uptake?

Survey participants were asked what single change would improve uptake of IDNs. The responses were free-text and no suggestions were given.

In 2011, there were ten responses; in 2012 there were 20. This year, 19 registries responded, although some gave more than one suggested change. In previous years the comments have highlighted the need for improvements in email functionality and better support in browsers. In 2013, none of the comments raised browsers as an issue. This year, for the first time, the need to raise end-user awareness clearly emerged as the most popular comment (10) whether through marketing, price promotions or by prominent brands adopting IDNs as their main website. This was closely followed by the need to implement IDN email (7) and support across all software, applications and protocols (3). Compared with previous years, the comments clustered more readily around a few topics.

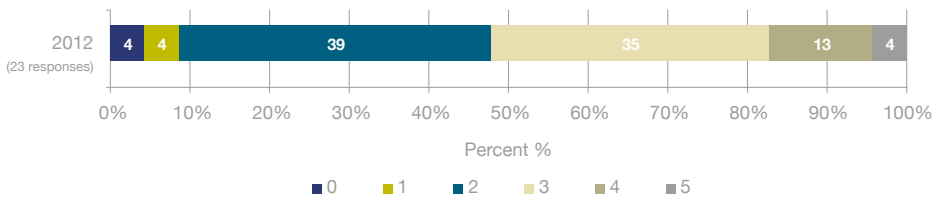
7.4 Results of registrar survey

Registrars operate closer to the end user in the supply chain compared with registries, and several in our survey sell across many TLDs. Therefore registrars' opinions are likely to be informed by their knowledge of how IDNs are performing compared with the registrar's other domain name offerings.

The opinions below suggest that registrars are slightly more optimistic than their registry counterparts about uptake and slightly more pessimistic about end-user awareness of IDNs.

7.4.1 How does the uptake of IDN registrations relate to your expectations?

Figure 25 – How does the uptake of IDN registrations relate to your expectations? (23 responses) (0-5) 0 = below expectations, 5 = exceeds expectations



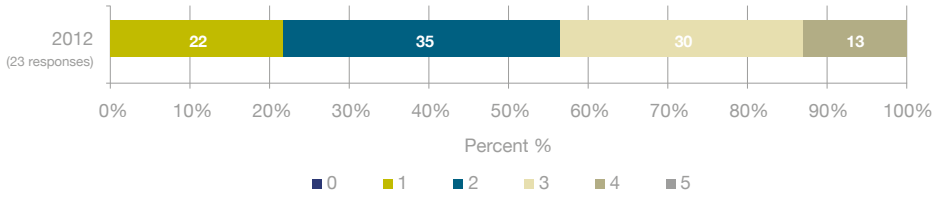
In 2013, registrar responses were broadly consistent with those of registries. The average score for this question was 2.6 for registrars, compared with 2.38 for registries.

17% of registrars told us that uptake of IDNs was very good or exceeded their expectations.

At the other end of the scale, 8% of registries awarded the two lowest scores, signalling that uptake of IDNs was below or far below expectations.

7.4.2 How would you rate end-user awareness of IDNs?

Figure 26 – How would you rate end-user awareness of IDNs?
(0-5) 0 = non existent, 5 = excellent



Registrar opinions of end-user awareness were more skeptical than their registry counterparts, scoring an average of 2.34 compared with the registries' 2.47. This average is solidly within "below expectations".

0% of registrars said that end-user awareness exceeded expectations and only 13% marked end-user awareness as very good.

At the other end of the scale, 22% of registries awarded the two lowest scores, indicating very low or non-existent end-user awareness.

7.4.3 How are registrars offering IDN services?

In our registrar survey, we asked various questions about aspects of the IDN service offered. As the channel to market, registrars have a key role in raising customer awareness and in shaping customer opinions about how easy or difficult to register IDNs are.

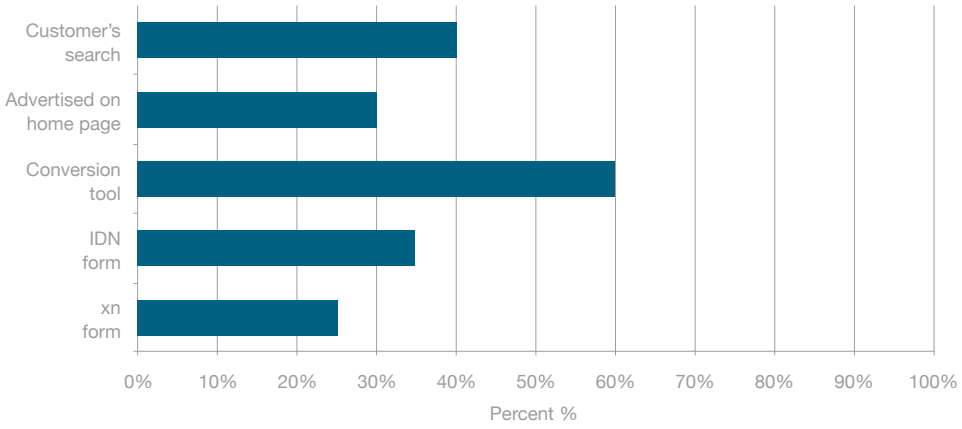
All of the 22 registrars who offer IDNs provide online user accounts for their customers, yet only 36% accept IDN email addresses as usernames for login. Nonetheless, that is a far higher percentage than we found in our research of major global websites.

7.4.3.1 A: In what ways do you advertise / inform your customers about your IDN offering?

Registrars play an important role in helping customers who are thinking about registering a domain name to decide which type of domain, or TLD to choose. In last year's report we found that some registrars promote IDNs on their home page, while others rely on users to scroll through multiple screens in order to register an IDN.

It was possible for registrars to highlight as many options as applied in answering this question. The options include a mixture of pull and push strategies. We received a total of 20 responses.

Figure 27 – In what ways do you advertise /inform your customers about your IDN offering?



The most popular way of advertising IDNs was through a conversion tool (50% of responses), of which there are a variety. Some do a straight conversion from Punycode to the IDN string and vice-versa. Others offer more sophistication, including translating a string into different languages. Also popular is to offer a customer search (40% of responses).

Of the options given in the question, the least user-friendly is to advertise the xn-form (25% of responses), as it relies on the end user knowing the Punycode for his or her chosen IDN. However, it does have the merit of precision.

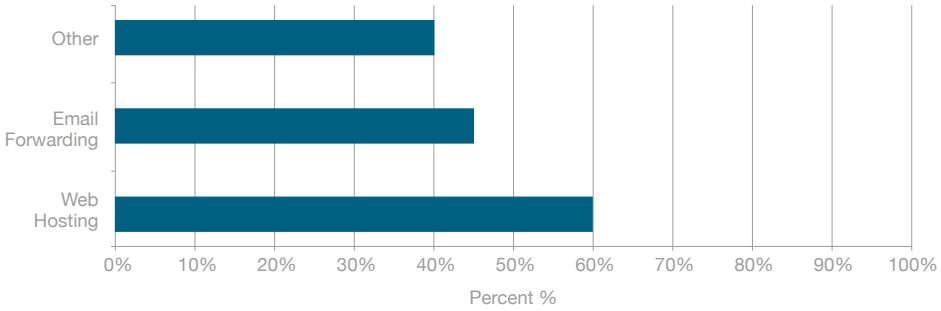
All of the above are to varying extents "pull" strategies, which rely on the customer knowing that they can have an IDN, although conversion tools do raise customer awareness of what is possible in terms of what endings and scripts can be used in domain names.

30% of responses indicate that IDNs are advertised on the registrar's home page, a "push" strategy.

7.4.3.2 B: What services do you provide for IDN registrants?

The registrars in our survey cover a variety of business models and therefore offer a wide range of different services to their customers.

Figure 28 – What services do you provide for IDN registrants?



As with the previous question, it was possible for registrars to select as many options as applied. We received 20 responses to this question, and the answers indicate that registrars tend to provide the expected range of services to IDN customers. We do not have data to show whether there are any differences between the services registrars offer to their ASCII domain name customers.

The results of both the registry and registrar surveys highlight the need for regular and even stronger cooperation between these two players in the domain name supply chain to ensure greater adoption of IDNs at the end-user level, thereby supporting linguistic diversity online.

8 Other IDN developments in the last 12 months

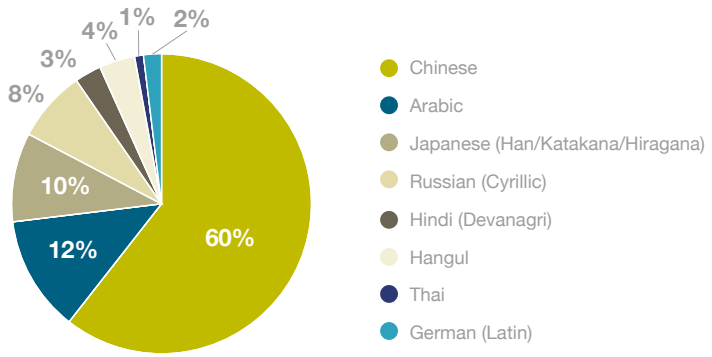
8.1 UNESCO Director General's public statement

In June 2013, UNESCO's Director General Irina Bokova issued a statement on linguistic diversity on the internet[31]. The statement praises the work of the technical community over the past decade in developing IDNs. Bokova's statement highlights that the next obstacles to more widespread adoption of IDNs are technical (see section on usability of IDNs section 3 of this report) and asks the technical community to "untangle these issues and release the full power of the internet", noting that "we need the support of all actors to make this a reality."

8.2 IDNs and the new gTLDs

ICANN opened applications for new gTLDs in January 2012. A total of 1 930 applications were made, of which just 116 (6%) were for IDNs. At the time of writing there are now 104 IDN applications still live. In July 2013, the first four IDN applicants (شبكة, онлайн, сайт, 游戏) have signed registry agreements with ICANN, the final stage before implementation.

Figure 29 – IDN gTLD applications by language/script

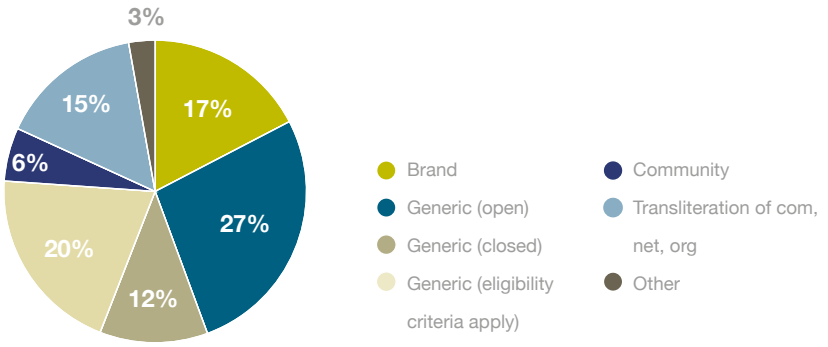


[31] http://www.unesco.org/new/en/unesco/about-us/who-we-are/director-general/singleview-dg/news/statement_of_the_director_general_on_linguistic_diversity_on_the_internet/#.UiNDexusiG4, accessed 1 September 2013.

Analysis of the 104 IDN gTLD applications by script shows the disparity between the world's most popular first-languages offline and their representation in IDN gTLD applications. For example, Hindi, the world's 4th most popular first-language, only has 3% of applications, and Arabic, the 5th most popular[32], only 12%.

The IDN applications show a broad range of intended purposes (Figure 30), similar to the range seen in ASCII applications.

Figure 30 – IDN New gTLDs by type (%)



15% of IDN gTLD applications are for transliterations of .com, .net and .org. In July 2013, Verisign announced that it intends to link registrations in each of the .com and .net TLDs (in whatever script), so that a registration in one TLD will give a registrant rights to register the same string in the others[33].

8.3 Developments in the countries examined by the report in its previous editions

8.3.1 Arab States

Appendix 4 contains country case studies for Egypt, Qatar and the United Arab Emirates (new).

Egypt: The IDN TLD, xn--wgbh1c (مصر.), was delegated in April 2010 – among the first four IDN ccTLDs to be approved and delegated through ICANN's IDN Fast Track

[32] *Ethnologue http://www.ethnologue.com/statistics/size, Table 3, Languages with at least 50 million first-language speakers, accessed 6 September 2013.*

[33] *http://blogs.verisigninc.com/blog/entry/update_on_verisign_s_idn, accessed 1 September 2013.*

Process.[34] The launch of landrush registrations (i.e. opening up to the general public following a period for trade mark owners), was delayed by the political unrest following the Arab Spring and finally took place in January 2013. By February 2013, the Egyptian IDN registry was reporting that it had 3 041 registrations, making it one of the larger IDN registries in the region. There are reports that the IDN TLD is being used as the main website for a popular news portal and one of Egypt's mobile operators, among others.

Qatar: The IDN ccTLD for Qatar, .قطر, was launched in 2010. The Qatar registry supported the launch of the domain with an aggressive marketing campaign. A three-month sunrise period was followed by a landrush. In December 2012, there were 310 registrations under the .قطر TLD. The registry told us that it believes that the situation will only improve with greater user awareness. To this end, Qatar Domains Registry has developed and deployed a mobile app which allows users to search for IDNs at the .qa registry and treats them on an equal basis with ASCII strings.[35] The mobile app is unique to those ccTLDs in the case studies in that it represents both an independent piece of marketing by the registry and a tool for promotion of IDNs.

United Arab Emirates: One of the largest ASCII TLDs in the region is .ae, run by .aeda. It launched the IDN .امارات TLD in 2010, and by 2012 had approximately 2 000 registrations. The registry operator reports that user and registrar awareness of the IDN have been difficult to build. Other reported challenges include poor support for Arabic in applications. Like others in the region, .aeda reported that ISPs and hosting industry players have found it difficult to deploy Arabic-script IDNs. The registry reports that initiatives are underway to both improve the consumer view of the IDN ccTLD as well as to help educate the internet infrastructure industry on its use.

8.3.2 Russian Federation

Appendix 4 contains an updated country case study for the Russian Federation.

The Russian registry remains upbeat about progress on IDN adoption at the top-level and in December 2012 had 780 000 IDN registrations, of which 74% are in use (have active name servers), a slight improvement in overall usage compared with the previous year. Nevertheless, the percentage of active websites in .рф is low (19% compared with 45% in .ru), reflecting the IDN usage findings reported in section 4.

The registry told us that many of the browser issues have been resolved for Cyrillic domain names. As seen in other countries, the registry is working as an advocate, urging search providers to implement indexation of IDN URLs in search results. It has also written to Facebook to request that it updates its software to recognise Cyrillic websites (our tests showed that Facebook now does this).

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[34] *IDN Fast Track Process, http://www.icann.org/en/resources/idn/fast-track, accessed: 24 July 2013.*
[35] *Qatar Domains' Mobile App goes Live, http://www.domains.qa/en/news/%E2%80%98qatar-domains%E2%80%99-mobile-app-goes-live, accessed 30 July 2013.*

The Russian registry continues to report email as problematic for Cyrillic domain names. The largest email portals are able to support sending email through their web pages. Unfortunately, webservers will not *deliver* the email. Therefore, the sending of IDN email remains unsatisfactory. Again, the Russian Registry has made efforts to contact widely used webservers to urge the support of IDN emails.

In 2012, the registry ran a photo competition and entries showed that the IDN domain names are popular in advertising and on billboards.

9 Conclusions

"In Europa, il fatto di parlare lingue differenti è un simbolo prezioso della nostra diversità e del nostro patrimonio culturale. Ma, al tempo stesso, può anche rappresentare un ostacolo, nel momento in cui un sito web è in una lingua diversa dalla nostra. Per molti, questo non è un problema, ma per chi non ha molta dimestichezza con le lingue straniere la lingua può essere un ostacolo all'utilizzo della rete: ben il 44% degli europei sostiene di perdere informazioni importanti, dal momento che le pagine web sono in una lingua che non conosce. Questo, a sua volta, può scoraggiare la partecipazione alla rivoluzione di Internet – in particolare per coloro che parlano lingue non molto diffuse".

Neelie Kroes, November 2012[36]

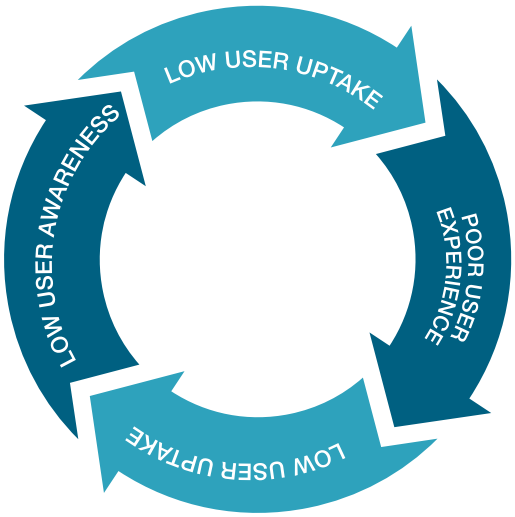
[36] *Getting multilingual online, Neelie Kroes, http://blogs.ec.europa.eu/neelie-kroes/getting-multilingual-online/.*

As Neelie Kroes, Vice President of the European Commission and European Commissioner for the Digital Agenda, stated in 2012, many within Europe do not feel comfortable operating in languages other than their mother tongue, and such people risk losing the benefits that the internet presents for development. However, if the internet can thrive even within the multilingual Europe, it can thrive anywhere. Recent years have seen great advances in the growth of multilingual content, and increasing numbers of individual internet users.

IDNs have an important role to play in supporting the growth of multilingual content. The potential is great, but progress needs to be made on several fronts before we start to see the network effects associated with rapid, widespread adoption.

As a result, most if not all current IDN implementations are underperforming compared to their potential, despite the best efforts of the people involved. The wider environment is currently working against them creating a negative cycle of poor user experience, low user uptake, and low user awareness, which itself leads to low user uptake, and so on.

Figure 31 – The IDN negative cycle



9.1 Key areas for improvement:

- Usability of IDNs
- End-user awareness of IDNs.

Steady progress is being made on improving the usability of IDNs, with the first fully standards compliant IDN email being sent in 2012 and modern browsers now supporting IDNs. Further improvements are required particularly in mobile devices and popular applications. The UNESCO Director General has called on the technical community to help untangle the issues and work towards wider uptake of IDNs.

Where IDNs are in use, there is a strong correlation between the language/script of the domain name and the language of any website content. This supports the hypothesis that IDNs have a vital part to play in fostering a multilingual internet.

Looking ahead, the introduction of IDN gTLDs, including around 60 in Chinese characters may provide a welcome boost, incentivising the industry to improve usability, and raising end-user awareness of IDNs as domain names of choice.

The potential of a multilingual internet remains a high priority for many countries and stakeholders. IDNs can help to improve the local language content presence on the internet. That is why it is of paramount importance not only that the technical community, including the ccTLD registries like EURid, continues to work on technical development and advocacy for IDNs with relevant suppliers and manufacturers, but also that all relevant parties strengthen the dialogue and cooperation needed to facilitate the evolution of IDNs in the ultimate interest of end users.

APPENDICES

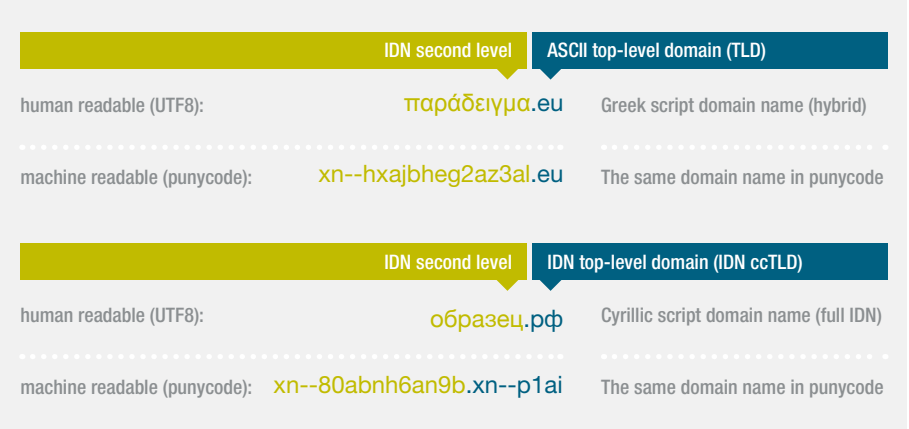
APPENDIX 1

What are Internationalised Domain Names and why are they important?

Domain names, the internet's addressing system, work because they are interoperable and resolve uniquely. This means that any user connected to the internet, anywhere in the world, can get to the same destination by typing in a domain name (as part of a web- or email address). The plan to internationalise the character sets supported within the Domain Name System is almost as old as the internet itself. However, technical constraints and the overriding priority of interoperability resulted in a restricted character set within the Domain Name System: ASCII[37] a to z, 0 to 9 and the hyphen[38].

Technical standards to internationalise domain names were developed from the mid-1990s. The solution retains the Domain Name System's restricted character set and transliterates every other character into it. Each series of non-ASCII characters is transliterated into a string of ASCII characters prefixed with xn--, called Punycode. Punycode domain names are meaningless to humans, but meaningful to machines that resolve domain names (name servers). Thus, humans see the meaningful, transliterated characters when they navigate the internet, whilst the underlying technical resolution of domain names remains unchanged.

Figure 1 – Internationalised Domain Names explained



[37] *For an explanation of ASCII, see http://en.wikipedia.org/wiki/ASCII, accessed 21 August 2012.*
[38] *Internationalization of Domain Names; A history of technology development, Klensin, J and Fältström, P.*

Implementation of IDNs at the second level began in 2000 (under .com and .net) and 2001 (.jp). In the ten years that followed, several ccTLDs deployed IDNs, primarily supporting local-language character sets. Some experimented with other strategies for internationalising domain names, but the IDN technology proved the most successful. Following pressure from the ccTLD community, ICANN introduced a Fast Track Process to create IDN ccTLDs in 2007-2008. From 2010, IDNs became available at the top level having completed the specific process set by ICANN (for example, السعودية for Saudi Arabia, рф for the Russian Federation)[39].

IDNs are technically complex to implement. Many challenges remain, including (at a technical level) how to handle the variant characters[40] prevalent in Arabic and Chinese scripts. Another challenge is the user experience, e.g. consistent representation in browsers and emails.

Despite the technical challenges, IDNs are viewed by many as a catalyst and a necessary first step to achieving a multilingual internet. According to UNESCO, in 2008 only 12 languages accounted for 98% of internet web pages. English, with 72% of web pages, was the dominant language online[41]. Recent reports indicate that other languages are growing rapidly online. For example, by 2010, only 20% of Wikipedia articles were in English[42]. Supporters of IDN believe that enabling users to navigate the internet in their native language is bound to enhance the linguistic diversity of the online population and that IDNs are strongly linked to local content.

While this study focuses on the web, it should be noted that other applications also require internationalisation, e.g. email, File Transfer Protocol, etc.

1 IDN timeline

For more than a decade, hybrid IDNs have been available at the second level in ASCII top-level domains (for example, παράδειγμα.eu in figure 1). This situation was only satisfactory for the Latin-based scripts used by most European languages, where the IDN element would commonly reflect accents or other diacritical marks on Latin characters. For speakers of languages not based on Latin scripts (e.g. Chinese or Arabic), the hybrid IDN/ASCII domains were unsatisfactory. Right-to-left scripts, such as Arabic and Hebrew created bi-directional domain names when combined with left-to-right

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[39] http://www.icann.org/en/topics/idn/idn-activities-seoul-28oct09-en.pdf.

[40] IDN variants have been a focus for working groups within ICANN recently. See http://www.icann.org/en/news/public-comment/idn-variant-tld-revised-program-plan-04may12-en.htm, accessed 16 May 2012.

[41] Address of Janis Karklins, Assistant Director General, Communications and Information Sector, UNESCO, Opening Ceremony of the IGF Vilnius 2010.

[42] "The relationship between local content, internet development and access prices", Internet Society, OECD and UNESCO, 2011.

TLD extensions, requiring users to have a familiarity with both their own language and Latin scripts in order to navigate the internet. As explained in the report IDNs State of Play 2011, bi-directional domain names not only require Internet users to change script when typing in a single web address, but also potentially confuse the strict hierarchy of the Domain Name System. Industry experts describe bi-directional domains as "barely usable"[43].

Figure 2 – Examples of hybrid and bi-directional IDN domain names (Japanese, Arabic and Hebrew)

Internet governance discussions from 2006 onwards highlighted the lack of IDNs in the root domain zone (which would enable full IDN domain names, also at the top level) as a key building block towards the goal of a multilingual internet[44]. From 2005, there was increasing pressure on ICANN, the global coordinator of internet domain names, to implement IDNs in the root zone.

In the meantime, some countries created their own work-arounds. For example, China and the Republic of Korea developed keyword searches at the domain name servers for .cn and .kr. For those searching for domains within the country, the keyword system resolves the domain without the user having to type the Latin-script domain ending (TLD). In China and Egypt, browser add-ons were developed to translate a domain into another name that would be looked up on national servers, to enable internet users to enter local character strings into browsers. However, this solution relied on users downloading a plug-in, which

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[43] *Lipsicas, B. and Shikmoni, D., "Internationalized Domain Names: the long and winding road", CENTR Domain Wire, Issue 1, 2007.*
[44] *Internet Governance Forum 2006, Diversity main session, http://www.intgovforum.org/cms/IGF-SummingUp-011106.txt, accessed 23 May 2012.*

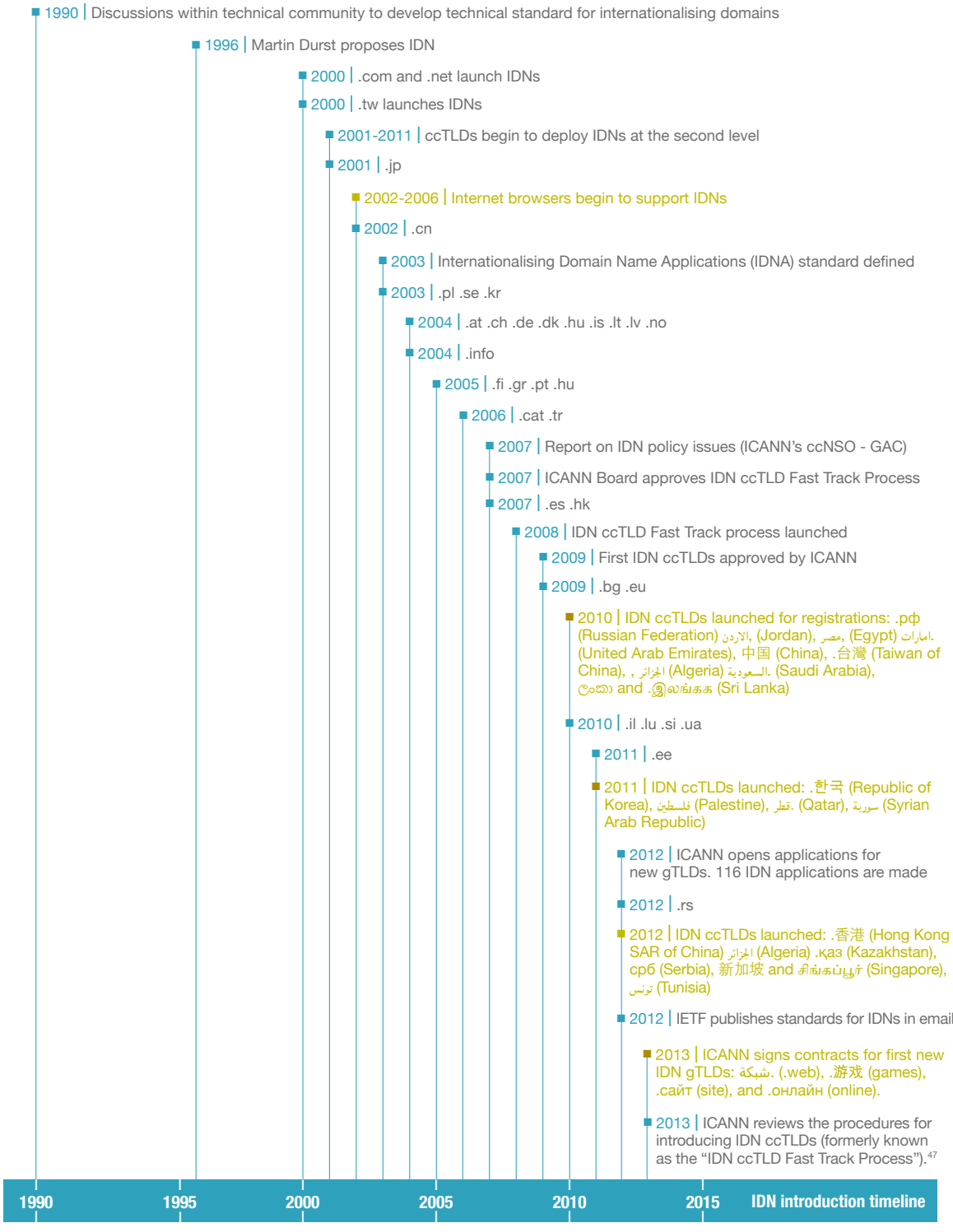
was not compatible with every browser. These efforts indicate the importance that policy makers and technologists have placed on internationalising domain names and that IDNs emerged as the superior technology amongst a number of alternatives.

In 2009, the ICANN Board approved a Fast Track Process for IDN ccTLDs, describing the programme as a "top priority"[45]. By April 2011, 17 IDN ccTLDs had been launched. Since then, there has been a steady expansion of the number of IDN.IDN registries launched, including .한국 (Republic of Korea), .قطر (Qatar), فلسطين (Palestine), الجزائر (Algeria), .香港 (Hong Kong SAR of China), سورية (Syrian Arab Republic), .қаз (Kazakhstan), срб (Serbia), 新加坡 and சிங்கப்பூர் (Singapore).

1.1 Timeline

As at July 2013, 34 IDN ccTLDs (for 24 countries and territories) have been added to the internet root zone[46], of which 23 have been launched, in addition to the original ASCII ccTLDs. This represents an increase of four since the same time last year. A further seven are approaching the end of the approval process.

[45] http://www.icann.org/topics/idn/idn-activities-seoul-28oct09-en.pdf.
[46] http://www.icann.org/en/resources/idn/fast-track/string-evaluation-completion, accessed 23 April 2012, and https://charts.icann.org/public/index-idn.html, accessed 17 June 2012.



47 http://www.icann.org/en/resources/idn/fast-track.

APPENDIX 2

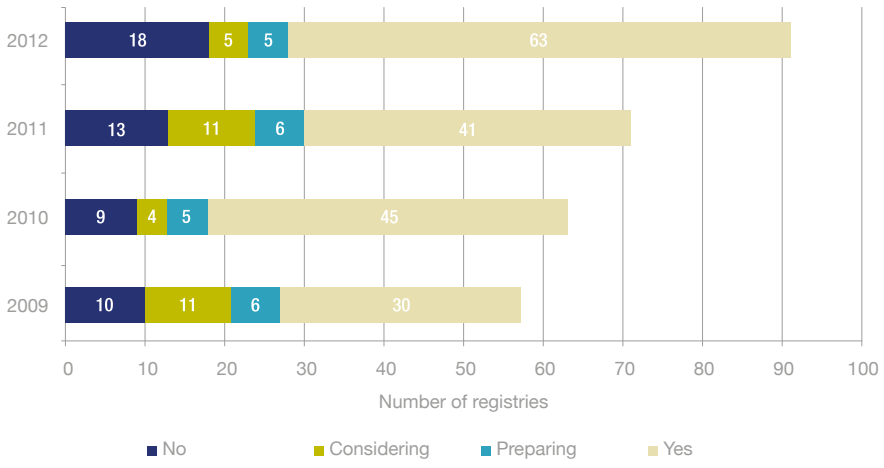
Adoption of IDNs – 2012

1 Deployment of IDNs by domain name registry

Each year, we ask the domain name registries in our study (see section 7) whether or not they have adopted IDNs, whether at the second level (eg παράδειγμα.eu) or as an IDN ccTLD (eg 例子.中国). The registries are asked "Does your registry allow IDNs?", and the range of available responses are Yes; No, but we are preparing to launch IDNs; No, but we are considering deployment of IDNs; and No.

This year the data set of registries has increased to 91 (compared with 71 in 2011 and 63 in 2010). For the first time, we now have data from the Latin American region, thanks to the cooperation of LACNIC. The number of registries that have launched IDNs has increased to 63, compared with 41 in last year's study. The increase is a combination of registries beginning to launch IDNs (e.g. the registries for France, Italy and Serbia

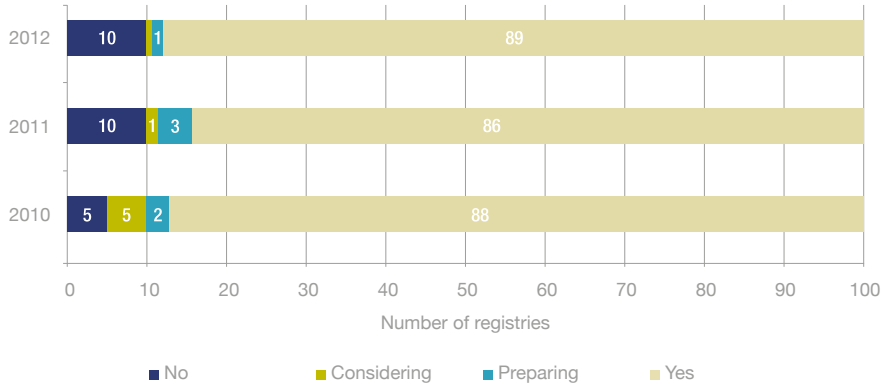
Figure 3 – Deployment of IDNs by registry



launched in 2012) and an increase in the data set. Since 2009, the numbers considering deployment and preparing to launch IDNs have decreased as a percentage of the whole. The number of registries reporting that they are not deploying IDNs has increased in 2012. This increase is attributed to the larger data sample.

When viewed by the number of domain names under management, there has been a slight increase in the percentage of domains under management offering IDN registration ("Yes") to 88.6 (from 85.7 in 2011). While the size of the .com/net registry (1.2 million domain names) contributes to the high percentage under "Yes" (IDNs deployed), .com/net account for 54% of the data sample (compared with 64% last year). The percentage for "No" (IDNs not deployed) remains steady, at around 10%. The numbers for the transitional stages are decreasing year on year, whether considered by number of registries or number of domains managed. This suggests that established registries are either completing their IDN implementation cycles, deciding against implementation or postponing implementation.

Figure 4 – Deployment of IDNs by domains managed



2 The path to IDN implementation

The table below charts the progress of individual registries towards IDN deployment from 2009-2012. Gaps in the data are indicated by blank cells. The data indicates that the process of IDN deployment takes 2-3 years from the point where it is first considered. The table also suggests that some registries (e.g. United Kingdom, Romania) decide against IDN adoption after first considering it. The example of Islamic Republic of Iran is also highlighted (see country case study).

TLD	Country or territory	2009	2010	2011	2012
.AM	Armenia	No			
.AN	Netherlands Antilles[48]				No
.AR	Argentina				Yes
.ASIA					Yes
.AT	Austria	Yes	Yes	Yes	Yes
.BE	Belgium	No		No, but we are preparing IDN launch	No, but we are preparing IDN launch
.BG	Bulgaria	Yes	Yes	Yes	Yes
.BIZ					Yes
.BR	Brazil				Yes
.CA	Canada	No, but we are considering IDN deployment	No, but we are preparing IDN launch	No, but we are preparing IDN launch	Yes
.CAT		Yes	Yes		Yes
.CH	Switzerland	Yes	Yes	Yes	Yes
.CL	Chile				Yes
.CN	China	Yes	Yes	Yes	Yes
.CO	Colombia				Yes
.COM		Yes	Yes	Yes	Yes
.CR	Costa Rica				No
.CW	Curacao[49]				No

[48] *Netherlands Antilles included as a country code because it is in the ISO 3166 list. It is an associate member of UNESCO. It ceased to exist on 10/10/2010, and separated into Curacao and Sint Maarten, both of which are newly admitted associate members of UNESCO.*

[49] *The Caribbean island of Curacao is included as a country code because it is in the ISO 3166 list. It is an associate member of UNESCO and not an independent territory.*

TLD	Country or territory	2009	2010	2011	2012
.CZ	Czech Republic	No	No	No	No
.DE	Germany	Yes	Yes	Yes	Yes
.DK	Denmark	Yes	Yes	Yes	Yes
.DO	Dominican Republic				No
.EE	Estonia			Yes	Yes
.ES	Spain	Yes	Yes	Yes	Yes
.EU	European Union	Yes	Yes	Yes	Yes
.FI	Finland	Yes	Yes	Yes	Yes
.FR	France	No, but we are considering IDN deployment		No, but we are preparing IDN launch	Yes
.GR	Greece	Yes	Yes	Yes	Yes
.GT	Guatemala				Yes
.HK	Hong Kong SAR of China	Yes	Yes	Yes	Yes
.HR	Croatia	No, but we are considering IDN deployment	No, but we are considering IDN deployment	No, but we are considering IDN deployment	No, but we are considering IDN deployment
.HT	Haiti				No
.HU	Hungary	Yes	Yes	Yes	Yes
.IE	Ireland	No, but we are considering IDN deployment	No, but we are preparing IDN launch	No, but we are preparing IDN launch	No, but we are preparing IDN launch
.IL	Israel	No, but we are preparing IDN launch	Yes	Yes	Yes
.INFO		Yes	Yes	Yes	Yes
.IR	Islamic Republic of Iran	Yes	Yes	Yes	No, but we are preparing IDN launch
.IS	Iceland	Yes	Yes	Yes	Yes
.IT	Italy	No, but we are considering IDN deployment	No, but we are preparing IDN launch	No, but we are considering IDN deployment	Yes
.JP	Japan	Yes	Yes	Yes	Yes
.KR	Republic of Korea	Yes	Yes	Yes	Yes
.KY	Cayman Islands[50]				No
.KZ	Kazakhstan		No	No	No

[50] *The Cayman Islands is included as a country code because it is in the ISO 3166 list. It is an associate member of UNESCO and not an independent territory.*

TLD	Country or territory	2009	2010	2011	2012
.LI	Liechtenstein[51]	Yes	Yes	Yes	Yes
.LT	Lithuania	Yes	Yes	Yes	Yes
.LU	Luxembourg	No, but we are preparing IDN launch	Yes	Yes	Yes
.LV	Latvia	Yes	Yes	Yes	Yes
.MA	Morocco				No
.ME	Montenegro		No, but we are preparing IDN launch	No, but we are preparing IDN launch	No, but we are considering IDN deployment
.MX	Mexico	No	No	No	No, but we are preparing IDN launch
.NET		Yes	Yes	Yes	Yes
.NI	Nicaragua				Yes
.NL	Netherlands	No	No	No	No
.NO	Norway	Yes	Yes	Yes	Yes
.NZ	New Zealand	No, but we are preparing IDN launch	Yes	Yes	Yes
.ORG		Yes	Yes	Yes	Yes
.PL	Poland	Yes	Yes	Yes	Yes
.PS	Palestine		No	No	No
.PT	Portugal	Yes	Yes	Yes	Yes
.PY	Paraguay				No, but we are preparing IDN launch
.QA	Qatar			No	No
.RO	Romania	No, but we are preparing IDN launch	No, but we are preparing IDN launch	No	No
.RS	Serbia				No
.RU	Russian Federation	No	No	No	No
.SA	Saudi Arabia			No	No
.SE	Sweden	Yes	Yes	Yes	Yes
.SI	Slovenia	No, but we are considering IDN deployment	Yes	Yes	Yes
.SK	Slovakia			No, but we are considering IDN deployment	No, but we are considering IDN deployment

[51] *Liechtenstein is included as a country code because it is in the ISO 3166 list. It is not a member state of UNESCO.*

TLD	Country or territory	2009	2010	2011	2012
.SV	El Salvador				No, but we are considering IDN deployment
.TR	Turkey	Yes	Yes	Yes	Yes
.TW	Taiwan of China	No, but we are considering IDN deployment	No, but we are considering IDN deployment	Yes	Yes
.UA	Ukraine		Yes	Yes	Yes
.UK	United Kingdom	No	No, but we are considering IDN deployment	No	No
.UY	Uruguay				No
.VN	Viet Nam				Yes
TW_IDN_MULTI	Taiwan of China	No, but we are preparing IDN launch	Yes	Yes	Yes
xn--3e0b707e	Republic of Korea			Yes	Yes
xn--80ao21a	Kazakhstan				Yes
xn--90a3ac	Serbia	No, but we are preparing IDN launch	No, but we are preparing IDN launch	Yes	Yes
xn--clchc0ea0b-2g2a9gcd	Singapore				Yes
xn--fiqs8S	China				Yes
xn--fzc2c9e2c	Sri Lanka		Yes	Yes	Yes
xn--j6w193g	Hong Kong SAR of China				Yes
xn--mgbaam7a8h	United Arab Emirates				Yes
xn--mgbayh7gpa	Jordan			Yes	Yes
xn--mgberp4a-5d4ar	Saudi Arabia		Yes	Yes	Yes
xn--o3cw4h	Thailand				
xn--ogbpf8fl	Syrian Arab Republic				
xn--p1ai	Russian Federation		Yes	Yes	Yes
xn--wgbh1c	Egypt			Yes	Yes
xn--wgbl6a	Qatar			Yes	Yes
xn--xkc2al3hye2a	Sri Lanka		Yes	Yes	Yes
xn--yfro4i67o	Singapore				Yes
xn--ygbi2ammx	Palestine	No, but we are considering IDN deployment		Yes	Yes

APPENDIX 3

Results of usability study

	Website Ranking			Cyrillic script				
	eBizMBA	Alexa	Quantcast	CrAct	ConAct	Login	Prefs	Usability
Google	1	1	1	N	[n/a]	[n/a]	[n/a]	0[52]
Facebook	2	2	2	N	[n/a]	[n/a]	[n/a]	2[55]
Yahoo	3	4	3	N	[n/a]	[n/a]	[n/a]	0
YouTube	4	3	4	N	[n/a]	[n/a]	[n/a]	0
Wikipedia	5	7	7	-	-	-	-	-
msn	6	11	6	N	[n/a]	[n/a]	[n/a]	0
Amazon	7	15	7	N	[n/a]	[n/a]	[n/a]	0
eBay	8	21	11	N	[n/a]	[n/a]	[n/a]	0
Twitter	9	9	5	N	[n/a]	[n/a]	[n/a]	0[58]
Bing	10	22	16	N	[n/a]	[n/a]	[n/a]	0
Pinterest			11	N	[n/a]	[n/a]	[n/a]	0
LinkedIn			14	N	[n/a]	[n/a]	[n/a]	0
PayPal			26	N	[n/a]	[n/a]	[n/a]	0

Legend:

CrAct : The ability to create an account using an email address that uses an IDN as the FQDN

ConAct : The ability to confirm an account creation, usually by done by email

Login : The ability to successfully log in using an IDN once an account has been created using the IDN as the FQDN

Prefs : Once logged into a web site, the ability to change preferences for the service

Usability : A subjective score (0: lowest; 10: highest) of how well the service supports IDNs and email addresses using IDNs

Arabic script					Hangul script				
CrAct	ConAct	Login	Prefs	Usability	CrAct	ConAct	Login	Prefs	Usability
N	[n/a]	[n/a]	[n/a]	0[53]	N	[n/a]	[n/a]	[n/a]	0[54]
N	[n/a]	[n/a]	[n/a]	2[56]	N	[n/a]	[n/a]	[n/a]	2[57]
N	[n/a]	[n/a]	[n/a]	0	N	[n/a]	[n/a]	[n/a]	0
N	[n/a]	[n/a]	[n/a]	0	N	[n/a]	[n/a]	[n/a]	0
-	-	-	-	-	-	-	-	-	-
N	[n/a]	[n/a]	[n/a]	0	N	[n/a]	[n/a]	[n/a]	0
N	[n/a]	[n/a]	[n/a]	0	N	[n/a]	[n/a]	[n/a]	0
N	[n/a]	[n/a]	[n/a]	0	N	[n/a]	[n/a]	[n/a]	0
N	[n/a]	[n/a]	[n/a]	0[59]	N	[n/a]	[n/a]	[n/a]	0[60]
N	[n/a]	[n/a]	[n/a]	0	N	[n/a]	[n/a]	[n/a]	0
N	[n/a]	[n/a]	[n/a]	0	N	[n/a]	[n/a]	[n/a]	0
N	[n/a]	[n/a]	[n/a]	0	N	[n/a]	[n/a]	[n/a]	0
N	[n/a]	[n/a]	[n/a]	0	N	[n/a]	[n/a]	[n/a]	0

[52] *Google does not allow you to sign up for an account using an email address with an IDN. Gmail will not allow you to address an email to a recipient who has an email with an IDN.*

[53] *Google does not allow you to sign up for an account using an email address with an IDN. Gmail will not allow you to address an email to a recipient who has an email with an IDN.*

[54] *Google does not allow you to sign up for an account using an email address with an IDN. Gmail will not allow you to address an email to a recipient who has an email with an IDN.*

[55] *Facebook allows for, and successfully resolves, IDNs in posts of existing customers with ASCII email addresses.*

[56] *Facebook allows for, and successfully resolves, IDNs in posts of existing customers with ASCII email addresses.*

[57] *Facebook allows for, and successfully resolves, IDNs in posts of existing customers with ASCII email addresses.*

[58] *Twitter will allow you to put an IDN into a Tweet but will not recognise it as a URL and will not open the page if you click on the IDN.*

[59] *Twitter will allow you to put an IDN into a Tweet but will not recognise it as a URL and will not open the page if you click on the IDN.*

[60] *Twitter will allow you to put an IDN into a Tweet but will not recognise it as a URL and will not open the page if you click on the IDN.*

APPENDIX 4

Country case studies

Outline of this appendix

Because the number of case studies has increased this year, the IDN-Readiness indicators are presented in tabular format (see tables 1 and 2).

The IDN experiences of each of the countries studied is set out by UNESCO region.

1 Asia and the Pacific

1.1 China[61]

The ccTLD registry for China, CNNIC, has been established and in continuous operation since 1997. At one stage, .cn was the largest ccTLD in the world and had the same market share as .com in China. Registration numbers have fluctuated in recent years.

As well as managing the operation of .cn and 中国/中國, it conducts research and development and publishes an annual report on the development status of China's internet.

[61] http://www.nationsonline.org/oneworld/, accessed 28 August 2013.

CNNIC was one of the first registries in the world to implement internationalised domain names (trial under .cn in 2000).

The IDN ccTLD 中国/中國. launched in 2010. In the first month of registration over 380 000 domains were registered. Over time, registrations have steadily decreased and by February 2013 stood at just over 270 000.

Mixed scripts

When first launched, ASCII registrations were not allowed under 中国/中國. Noting that many of the popular Chinese brands use a combination of Chinese and ASCII characters, CNNIC now allows ASCII registrations under 中国/中國. Every application for a domain name registration is subject to human review and mixed scripts that impugn consumer security are not allowed. However, if no security issues arise, a mixed-script domain name will be registered under .cn or 中国/中國. This is the only IDN ccTLD that the authors are aware of which allows ASCII registrations at the second level.

Following the launch of ASCII domains under 中国/中國., there was a rise of 10 000 registrations in the month of October 2012.

Han Script variants

The Han Script writing system is in use in China, Japan, Republic of Korea and other countries in Asia and the Pacific region. Over time, and for historical reasons, the Han scripts have evolved to two systems: simplified Chinese script and traditional Chinese script, which are variants of each other. Chinese variants have the same pronunciation and meaning as the official form and Chinese users regard them as interchangeable. CNNIC's experiences with .中国 show that over 10% of the DNS queries are for the variant form. Therefore if the variants have not been handled properly, similar labels which can easily cause user confusion might be registered by different people. In the worst case, the variants can easily be utilised for phishing and other malicious purposes.

CNNIC identifies the handling of variants at the top level as a crucial factor preventing more widespread uptake. In particular, the handling of variants at the top level is still a work in progress, and requires international agreement to move forward.

At the second level, ccTLD registries in Asia and the Pacific region (CNNIC, JPNIC, HKIRC, TWNIC, MONIC and SGNIC) have developed community rules to handle variants. CNNIC has deployed "pair delegation". Users who choose to register one character version are automatically delegated the other character version. In cases of mixed script, CNNIC will generate two standard preferred variants, resulting in 3 strings. Preferred strings are used most frequently. The registration price covers the package including variants.

Using Chinese IDNs – browsers, mobiles and email

Browsers – many browsers do not accept mixed scripts. CNNIC has negotiated with Microsoft and Google and they now support them, as does the leading Chinese search engine, Baidu. CNNIC has analysed support for Chinese script IDNs in browsers (IE7, IE8, Opera, Firefox, Safari, and the most popular Chinese browser 360), which indicated that the 中国/中國 domain is well supported in browsers.

The support for IDNs on mobile devices remains a challenge. However, many of the leading Chinese mobile providers have applied for new gTLDs in Chinese script and therefore the situation may improve in the medium-term.

IDN email standards – For many years, the registries of China, Japan, Republic of Korea and Taiwan of China have cooperated successfully on the technical level. They have worked through the IETF to develop standards for POP and IMAP[62]. In 2004, CNNIC began the Chinese Email Address Implementation trial. In 2006, CNNIC encouraged the IETF to form a Working Group on Email Address Internationalisation, leading to the publication of an internet standard (RFC) in 2012.

On June 19, 2012 CNNIC, through the newly established internationalised email demonstration platform and in conjunction with multiple internet information centres in Asia and the Pacific region, held a ceremony in Beijing to celebrate the successful sending of the first fully standards-compliant, internationalised email.

Subsequently, CNNIC's proposal to promote internationalised email address technology in Asia and the Pacific region has been widely supported by APEC economies[63]. This means that the internationalised email address technology has gained support and recognition in the APEC region both at government level and amongst email service vendors, so the process of its deployment is expected to accelerate.

Locally resolving domain names

In 2008, CONAC (a Chinese government organisation) launched a locally resolving IDN domain, 政[64]. 政务 domain names do not work outside China. Registration figures are not available, but are estimated to be around 400 000.

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[62] *http://www1.cnnic.cn/AU/MediaC/rdxw/hotnews/201304/t20130416_39287.htm.*

[63] *47th Meeting of the APEC Telecommunications Conference (APEC TEL 47) Bali, Indonesia from 22 to 27 April 2013 approved the proposal at a vote.*

[64] *http://www.chinagov.cn/english/News/CONACNews/201209/t20120912_182025.html, accessed 18 July 2013.*

1.2 Republic of Korea

1.2.1 IDNs in .kr[65]

In 2009, the Korean Internet and Security Agency (KISA) was established by integrating three governmental agencies including the National Internet Development Agency which was responsible for IP addresses, DNS infrastructure and the .kr domain. The older KRNIC was incorporated into KISA to manage IP names and identifiers.[66] Among its duties, KISA is now responsible for both the .kr ccTLD and the .한국. As of 1 August 2013, there were approximately 1.2 million domains registered by KISA.[67] Of these, 91 000 are in the .한국.

The Republic of Korea's IDN was launched with a sunrise period starting May 25, 2011 and a landrush period starting August 22, 2011. The general launch for the IDN started in October of 2011 and by the end of 2011 there were 210 000 .한국 domains registered. There has been a sharp decrease in registrations of .한국: at the end of 2012 there were 91 000 due to lack of renewal of landrush .한국 IDNs.[68]

Much of the initial registration volume appears to have come from name speculation. At the end of 2011, only 29.45% of the names registered in .한국 resolved to a resource on the internet. With the significant reduction in the number of domains registered in 2012, the number of IDNs that actually resolved rose to 55.17%. That compares to a resolution rate of 71.26% in the same time period for .kr domains.

In addition to speculation in the names market, KISA also identified that the software application environment was partly to blame. While KISA has found that the IDN works properly with Microsoft's Internet Explorer version 7.0 and higher, Opera, Safari and Firefox users with older versions of browsers found it impossible to use the IDN. KISA estimates the number of users in Republic of Korea who would experience this problem as being more than 750 000 individual users.

The Hangul script (for Korean language) does not have variants and therefore the issue of variants does not affect the implementation of .한국 or the ASCII .kr domain.

KISA has also identified electronic mail as a critical requirement. KISA has constructed a test lab for examining the user environment for electronic mail combined with internationalised electronic mail addresses. KISA intends to implement a trial of Korean language internationalised email in 2014.

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[65] *Nations Online, http://www.nationsonline.org/maps/korea-south-admin-map.jpg, accessed 1 August 2013.*
[66] *Chronology, http://www.kisa.or.kr/eng/aboutkisa/chronology.jsp, accessed 2 August 2013.*
[67] *Statistics, http://isis.kisa.or.kr/eng/, accessed 2 August 2013.*
[68] *Domain PR and Marketing Results of 2012, independent paper obtained from author.*

KISA's goals are to:

- Improve the average annual utilisation rate by 120% over the previous year
- Maintain the number of registrations at 100 000
- Work on awareness and image enhancement for 한국 focusing on public benefit and accessibility.

KISA has adopted a national promotional strategy for 한국 in 2013 as a means to achieve these goals.

1.3 Viet Nam[69]

Until 2001, the incumbent Post and Telephone service for Viet Nam managed the ccTLD. From 2001, VNNIC, the Viet Nam Network Information Center, took over management of .vn. VNNIC is an administrative department of the Viet Nam Ministry of Information and Communications.[70] As at March 2013, .vn had more than 378 000 registered names of which over 60% were in use (delegated). It is estimated that there are more than 850 000 total domain name registrations (across all top-level domains) by Vietnamese organisations[71], suggesting that .vn has approximately 44% national market share. The .vn domain is the fourth largest in the ASEAN region, behind Japan, Republic of Korea and .asia.[72]

The Vietnamese language is written in the Latin script with diacritics, so, the .vn domain itself is meaningful for Vietnamese speakers.

The .vn registry conducted a trial of IDNs for .vn from 2004 to 2006. After the results of that trial were analysed, an official launch of the .vn IDNs took place in March or 2007. The official launch was limited to existing holders of ASCII .vn registrations.

In April of 2011, free and unlimited registration of .vn IDNs began. On the first day of the landrush 14 000 were registered. During the first week there were 113 129 registrations under this policy. In the first four months there were 360 357 registrations. By October 2012, the number of Vietnamese IDN registrations had reached 836 173. However, further study indicates that only 9% are in use (i.e. delegated). Of that small percentage of active .vn IDNs, 74% simply redirect to an existing web site. A further 25% land on a web hosting template.[73]

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69 *Nations Online http://www.nationsonline.org/maps/vietnam-political-map.jpg, accessed 1 August 2013.*
70 *VNNIC, http://www.vnnic.vn/en/, accessed 4 August 2013.*
71 *Internet Statistics, http://www.vnnic.vn/en/stat/report-internet-statistics, accessed 4 August 2013.*
72 *Report on Viet Nam Internet Resources 2012, http://vnnic.vn/sites/default/files/tailieu/ReportOnVietNamInternetResources2012.pdf, accessed 4 August 2013.*
73 *Report on Viet Nam Internet Resources 2012, http://vnnic.vn/sites/default/files/tailieu/ReportOnVietNamInternetResources2012.pdf, accessed 4 August 2013.*

1.4 Islamic Republic of Iran

With approximately 380 000 registrations, the registry for .ir, IPM/IRNIC has the highest number of registrations of any IDN ccTLD which uses the Arabic script and is one of the fastest growing ccTLDs in the world with near 40% growth in 2012, according to CENTR[74].

IPM/IRNIC, the registry for the .IR ccTLD, started registering IDNs at the third level under ایران .ir, where (ایران means IRAN, in Perso-Arabic script), in 2006. The registration system embodied a robust bundling system to avoid abuses that could arise from the confusion of Arabic and Persian keyboards[75].

At the time, the use of this domain presented various difficulties, including the lack of a standardised Persian Windows operating system, and most registrants just experimented with the domain, according to IPM/IRNIC. As result, not many of the original registrants maintained their domains and there was considerable oscillation in the total number of registrations. The number went up to 6 000, but started dropping when ICANN announced the opportunity of registering under the fast-track scheme.

With the backing of the government, IPM/IRNIC applied for the ایران string under the ICANN IDN ccTLD Fast-Track Process and the string was approved by ICANN on Oct 15, 2010. Anticipating the launch of second-level registration of IDNs directly under this string, IPM/IRNIC froze further third-level IDN registrations, which at that time stood at 3 200 in order to avoid future conflicts between second-level and third-level registrations, the plan being to transfer third-level domains to second-level in a timely and organised manner.

Unfortunately, IPM/IRNIC informs us that the final governmental approval for placing the IDN string in the root, as required by ICANN, has been delayed, even though promised. IPM/IRNIC remains hopeful that the said approval will be forthcoming very soon, but until that happens, the IDN registration is frozen.

IPM/IRNIC believes that the opening up of IDN registrations, when and if it occurs, could prove to be a great boost to the meager development of IDNs in countries and territories which use the Arabic script.

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[74] *http://www.centr.org/news/statistics/02-06-2013/2547/high-growth-cctlds-2012.*

[75] *Direct communication with IRNIC. For more information on homoglyph bundling under .ir, see https://www.nic.ir/Allowable_Characters_dot-iran#Table_3, accessed 5 July 2013.*

2 Arab States

2.1 Egypt

The National Telecom Regulatory Authority (NTRA) of Egypt is the operator of the .مصر TLD. The TLDs .مصر and .eg are operated by different organisations. The .eg domain has fairly low registration figures, and therefore limited visibility in the local market. Plans to raise awareness of the .مصر domain through marketing campaigns have been put on hold due to political circumstances affecting Egypt. NTRA started registering IDNs in 2010. The IDN ccTLD, xn--wgbh1c (.مصر), was delegated in April 2010 – among the first four ccTLD IDNs to be approved and delegated through ICANN's IDN Fast Track Process.[76]

In December 2012, .مصر had 747 IDN registrations (compared with 9 000 registrations total in .eg[77]), but this number may be misleading for reasons outside the registry's control. In six months in 2012, the rate of growth in registrations was slightly less than 1%.[78]

Events in Egypt have meant that a scheduled landrush phase for the IDNs was delayed until January of 2013. In the opinion of the registry, those same events have turned local internet users' attention away from the potential of registration of IDNs.[79]

However, the initial landrush was successful. In the first day there were 396 IDN domain names registered; in the first week, 1 840 and in the first month, 2 255. More than 3000 domains were registered under the land rush strategy. By February 2013, the registry was reporting that it had 3 041 domains registered under .مصر.. The registry feels that more public awareness of the availability of IDNs is necessary.[80]

Despite this, the registry feels that the resellers' knowledge of both the availability and process for registering IDNs is very good.

According to the .مصر registry, the following are examples of popular websites which use the IDN ccTLD.

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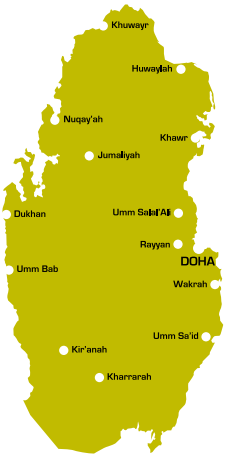
[76] *IDN Fast Track Process, http://www.icann.org/en/resources/idn/fast-track, accessed 24 July 2013.*
[77] *Egypt's IDN ccTLD A Country Experience from the Arab Spring. Presentation, Christine Arida, WSIS+10 Review Event, UNESCO HQ Paris, February 2013.*
[78] *Direct communication with NTRA, interview, June 2013.*
[79] *Direct communication with NTRA, interview, June 2013.*
[80] *Egypt's IDN ccTLD A Country Experience from the Arab Spring. Presentation, Christine Arida, WSIS+10 Review Event, UNESCO HQ Paris, February 2013.*

- مصراوى.مصر – a popular news portal
- دستور.مصر – created in the context of the new constitution
- لابتوب.مصر – a website for selling laptops
- فودافون.مصر – one of the mobile operators in Egypt and owns one of the registrars.

Despite relatively low registration figures (3 123 at August 2013), 52% of the registered مصر. domain names have active domain servers associated with them, indicating that the domain names are in active use. This is a higher percentage than many of the IDN ccTLDs in the study.

2.2 Qatar[81]

In 2010, the Qatar ccTLD registry changed operator to the Supreme Council of Information and Communication Technology.[82] The previous operator of the registry had run .qa as a closed registry with restricted registration policies. The new registry changed this by introducing a new, first-come, first-served policy, with no limit on the number of domains registered by a single entity.



The IDN ccTLD for Qatar, قطر., was launched at the same time as the relaunch of the .qa (ASCII) registry. The Qatar registry supported the launch of the IDN ccTLD with an aggressive marketing campaign. A three-month sunrise period was followed by a landrush.

Qatar has not seen a tidal wave of IDN registrations. In June of 2012 there were 256 registrations under the Arabic قطر.. Six months later there were 310. In relative terms this is a healthy annual growth rate, but in absolute numbers these are a small number of IDNs considering that the registry promotes them alongside the ASCII TLD.

In communication with the registry we found that they felt that the need to break "the most common mindset of registrants that fail to look beyond the traditional domain extensions." They felt that this was due to "market perception" of the IDNs and that it would change with increased awareness.

The registry also reports that homoglyph bundling is allowed. In fact, variants of the registered .qa IDNs are first reserved upon request of the registrant. Up to five different variant domains can be registered for free.

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[81] *Nations Online, http://www.nationsonline.org/maps/qatar-map.jpg, accessed 28 July 2013.*
[82] *Qatar Regulatory Authority Annual Report 2012, http://www.ictqatar.qa/sites/default/files/documents/RA_Annual_Report_2011_EN_1.pdf, accessed 25 July 2013.*

2.3 Saudi Arabia[83]

From 1995 to 2006 the Saudi ccTLD (.sa) was operated by the King Abdullah City for Science and Technology. In 2006, responsibility for the ccTLD was transitioned to SaudiNIC under the control of the Communication and Information Technology Commission (CITC). The number of .sa domains was 26 766 in December 2011, and the number of registrations in the Saudi IDN domain, .السعودية , 1 790. Today, the number of .sa registrations is 32 232.[84] The current number of Saudi IDN registrations currently has dipped to 1 710.[85]

In previous Internationalised Domain Names Surveys we have noted that the Saudi IDN domain, .السعودية , had seen substantial growth rates in annual percentage terms. In fact, at one time the IDN had grown to 7% of the size of .sa (the ASCII domain) within a few months of launch.

Today the situation is different. Growth in the absolute number of IDNs in the Saudi IDN domain has flat lined. The number of IDNs has dropped from a high of 7% of the total registrations to the current 5.9%. While SaudiNIC is an important advocate for the Saudi IDN domain, it suffers from a lack of visibility amongst ISPs and hosting providers – commercial entities that would otherwise be natural advertisers of the IDN.

Last year's report also noted that beside the lack of marketing, SaudiNIC is unable to provide variants of the IDN ccTLD since these have not been approved and delegated by ICANN. The Saudi ccTLD manager also pointed to the problems of using Arabic IDNs in contemporary browsers as a source of confidence loss in the new TLDs.

2.4 United Arab Emirates[86]

The .ae Domain Administration (.aeDA) was established in 2007 by the Telecommunication Regulatory Authority (TRA) as a department, regulatory body and registry operator in the .ae domain name business in the United Arab Emirates (UAE). The .aeDA is responsible for setting and enforcing all policies regarding the operation of the .ae ccTLD, as well as overseeing the operation of the country's registry system.[87]

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[83] *Nations Online, http://www.nationsonline.org/maps/Saudi-Arabia-Map.jpg, accessed 28 July 2013.*
[84] *SaudiNIC, http://nic.sa/en/, accessed 29 July 2013.*
[85] *SaudiNIC Statistics, http://nic.sa/en/view/statistics, accessed 29 July 2013.*
[86] *Nations Online, http://www.nationsonline.org/maps/united_arab_emirates_map.jpg, accessed 28 July 2013.*
[87] *.aeda, About Us, http://www.aeda.ae/eng/aboutus.php, accessed 29 July 2013.*

In September of 2012, .aeda passed the threshold of 100 000 domain names registered.[88] However, according to the registry operator, less than 2% of those are in the .امارات IDN namespace. The registry has been offering registrations in the IDN since April of 2010.[89]

The registry operator reports that the UAE experienced a typical IDN launch cycle which included a marketing campaign. User and registrar awareness of the IDN have been difficult to build. In addition, there was some confusion over how a native IDN was supposed to work with the more traditional ASCII names.The registry reports that it proved difficult to convince people that the IDN reflected an alternative way to reach internet destinations.

Another barrier for the UAE IDN was poor support for Arabic in applications. Customers of the registry found that, if they typed a UAE IDN into a browser, the application converted it to Punycode. That translation of characters was viewed by some consumers as unexpected and possibly unwelcome behaviour by the browser.

However, the registry also found barriers in the ISP and hosting industry. If a customer had registered an IDN and wanted to use it for a website, the ISP or web hosting company had to know how to deploy the IDN. Early adopters found that the ISPs and infrastructure providers in the UAE were not yet prepared for the new development.

The registry reports that initiatives are underway to both improve the consumer view of the IDN ccTLD and to help educate the internet infrastructure industry on its use.

3 Europe

3.1 The Russian Federation[90]

The Russian Federation ccTLD operator, the Coordination Centre for TLD RU, is a not-for-profit company established in 2001. Following its foundation, the domain name registration system was substantially reorganised and new accreditation processes

[88] *Domain Administration Celebrates Passing of 100 000 Registration Mark, http://www.aeda.ae/eng/news.php?id=107, accessed 1 August 2013.*

[89] *.emarat (.امارات) IDN confirmed for April 2010, http://www.domaining.ae/2009/11/emarat-%D8%A7%D9%85%D8%A7%D8%B1%D8%A7%D8%AA-confirmed-for-april-2010/, accessed 1 August 2013.*

[90] *http://www.nationsonline.org/oneworld/asia_map.htm, accessed 28 August 2013.*

introduced. In 2010, the Coordination Centre was delegated the Cyrillic IDN ccTLD for the Russian Federation, .рф[91].

In terms of volumes, the Russian Federation IDN ccTLD, .рф, remains one of the most successful IDN experience to date. When the landrush for .рф was opened in November 2010, 600 000 domain names were registered in a single month. By February 2012, .рф had lost 16% of its total register as the impact of landrush renewals was felt[92], but registrations continued at a healthy rate, with 780 000 .рф domain names at December 2012. Renewal rates of .рф domain names averaged 61% during 2012, 10% below the average renewal rate for .ru domain names. Renewal rates for .рф have recovered to just under 70% in the first half of 2013, suggesting that the lower rates seen during 2012 may have been connected to non-renewal of speculative domain registrations after the launch of .рф.

Usage

According to Statdom.ru[93], a dedicated website providing statistics for .ru and .рф domain names, 74% of .рф domains are delegated (in use) in December 2012, up by 2% on the previous year. This still lags behind the delegation rate of 91% in .ru.

Statdom has also analysed the usage of .ru and .рф domains. Since 2011, Statdom has increased the detail of categorisation, adding “parked” and “under construction”, and eliminating “not specified” for domain names which are broadly in use.

Overall usage of .рф domains has increased from 42% (December 2011) to 49% (2012) plus 8% redirects. This is comparable with usage rates in .com and .net IDNs and .eu IDNs (see section 4), but still below the usage rates in the ASCII .ru domain. The comparatively low usage rates are consistent with reported difficulties in using IDN domain names.

The higher levels of non-delegation and redirects are partly to be expected in a newer domain, and this is supported by EURid’s research on general website usage[94]. The relatively high figures for pay-per-click and parked pages are consistent with existing domain name speculation practice.

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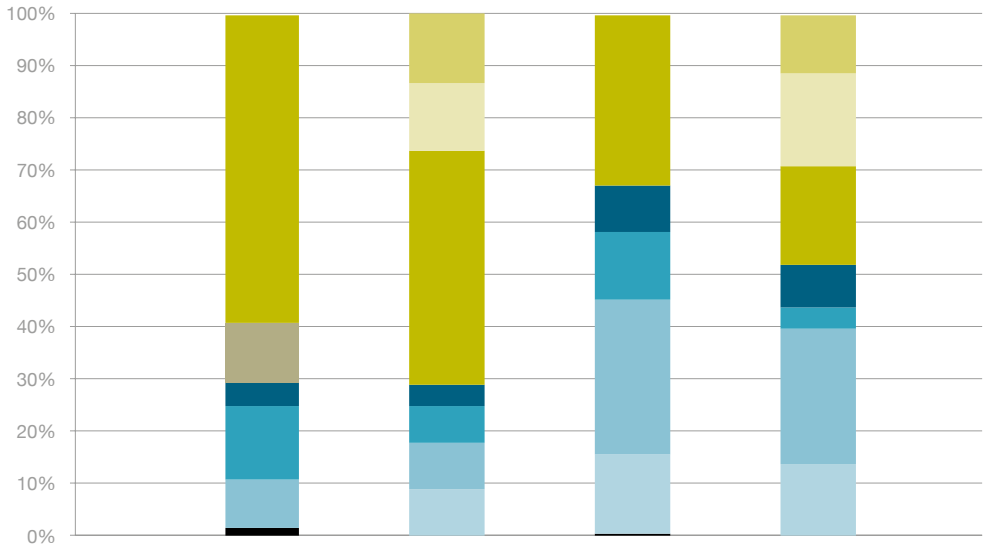
91 http://cctld.ru/en/about/ *Coordination Center for TLD RU website, accessed 24 May 2012.*

92 *From 937 913 (December 2011) to 783 373 (February 2012)*

93 http://statdom.ru/tld/ru/report/sitesusage/#26:date=20120101-20121201, *accessed 28 August 2013.*

94 *EURid Insights: Website usage trends among top-level domains 2012,* http://www.eurid.eu/files/Insights_Cat3.pdf*: “Older, more established TLDs have a higher percentage of business sites than the new TLDs.*

Figure 5 – Comparison between .ru and .рф usage, 2011-2012



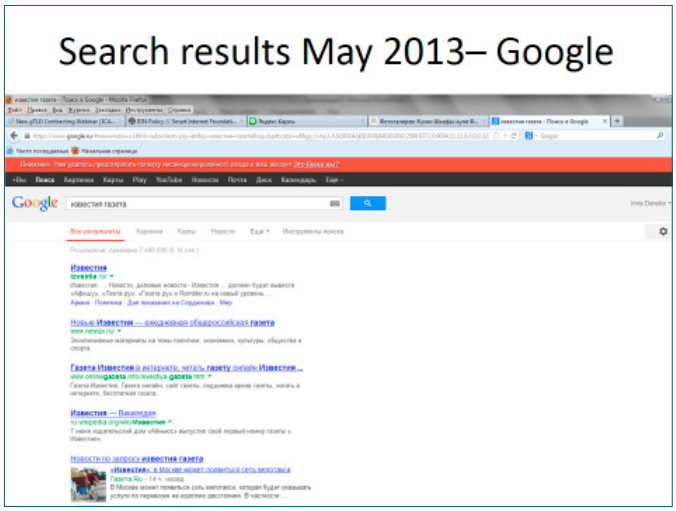
	.ru 2011	.ru 2012	.рф 2011	.рф 2012
Under construction		12%		12%
Parked		13%		18%
Website	59%	45%	33%	19%
Not specified	11%			0%
Redirect	4%	4%	9%	8%
Error	14%	7%	13%	4%
Not delegated	9%	9%	30%	26%
No IP address		9%	15,10%	14%
Others	2%		1%	0%

3.1.1 The user experience of Cyrillic domain names

According to the Russian Registry, Russians tend to avoid typing in English and Russian web portals do not require typing in ASCII. Google is also localised for Russian users. However, the registry reports that search engines do not seem to prioritise Cyrillic URLs in their indexation. For example, that the first link to a .рф website appears on the seventh page of the search results (see Figure 6). Over 60 preceding links are ASCII.

Search results display the ASCII URLs [95]

Figure 6 – Results for a Cyrillic script Google search



The Russian registry is has been in discussions with web browser manufacturers and reports that Cyrillic script IDNs are now well supported in the latest version of leading browsers. The registry has also written to Facebook to request that it updates its software to recognise Cyrillic websites.

The Russian registry continues to report email as problematic for Cyrillic domain names. The largest email portals are able to support sending email through their web pages. Unfortunately, webservers will not *deliver* the email. So, end-to-end the email sending is still unsatisfactory. Again, the registry has made efforts to contact widely used webservers.

The Russian registry identifies the biggest barrier to uptake of IDNs as the lack of email functionality. If email were solved, the next issue would be the keyboard. The @ sign is not a Cyrillic character, requiring users to switch between Cyrillic and Latin keyboards when typing an email address.

[95] *Presentation by ccTLD.RU, May 2013.*

Table 1 -Country and language factors

	China	Republic of Korea	Viet Nam	Islamic Republic of Iran	Egypt	Qatar	Saudi Arabia	United Arab Emirates	Russian Federation[96]
UNESCO Region	Asia and the Pacific				Arab States				Europe and North America
GDP rank[96]	2	15	56	22	39	54	20	32	11
Literacy (secondary +)[98]	99%[99]	96%	93.2%	99%	72%	96%	87%	89%[100]	98%
Cultural homogeneity[101]	High	High	High	High	High	Low	Moderate	Low	High
Official Language (Script)	Chinese (Han)	Korean (Hangul)	Vietnam-ese (Latin)	Persian (Arabic)	Arabic (Arabic)	Arabic (Arabic)	Arabic (Arabic)	Arabic (Arabic)	Russian (Cyrillic)
Linguistic homogeneity[102]	Moderate	High	Low / moderate	Moderate	High	Low	High	Low	High
Internet Exchange points[103]	4	4	3	0	2	0	1	1	16
Broadband Penetration[104]	13% (fixed) 9.5% (mobile)	37.5% 105.1%	4.4% 15%	4%	2.2% 21%	8.7% 61%	5.7% 40.4%	11% 21.7%	14.5% 183.5%[105]
Local language applications[106]	High[107]	High	---	--	High	Low	Low[108]	Low	--
Size of population[109]	1.35 bn	50 m	89 m	78 m	83 m	2 m	23.7 m	9.2 m	142 m
Online population[110]	42%	83%	35%	26%	40%[111]	88%	67%	71%	44.3%
IP address allocation[112]	High	High	Low-Moderate	--	Low	High	Low-Moderate	Moderate-high	--
Overall country/ language rating	Moderate-High	High	Low-moderate	Low-mderate	Moderate-high	Low	Low-moderate	Low-moderate	High

[96] *Country/language data for Russian Federation was last updated for the 2012 World Report on IDNs.*
[97] *World Bank, http://data.worldbank.org/data-catalog/GDP-ranking-table (updated July 2013).*
[98] *World Bank Education Statistics, http://databank.worldbank.org/data/views/variableSelection/selectvariables.aspx?source=education-statistics-~-all-indicators (updated July 2013).*
[99] *http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=124&IF_Language=en&BR_Country=1560.*
[100] *http://www.uaecd.org/education-introduction, accessed 4 September 2013.*
[101] *This measure is drawn from a number of indicators in UNESCO World Report on Cultural Diversity 2009, http://unesdoc.unesco.org/images/0018/001852/185202e.pdf, including migrant stock, national pride, outbound and inbound student flows, cultural home production imports and exports, tourism inbound and outbound flows.*
[102] *Ethnologue, http://www.ethnologue.com (provides information by country).*
[103] *Packet Clearing House, https://prefix.pch.net/applications/ixpdir/summary/, plus interviews with ccTLD operators in country.*
[104] *ITU time series by country 200-2012, aggregate data 2006-2013, http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx, and The Broadband Commission, The State of Broadband 2012: Achieving Digital Inclusion for All, http://www.broadbandcommission.org/Documents/bb-annualreport2012.pdf.*
[105] *2012 figure for CIS region, Source: ITU Key Aggregate Data 2005-2013, http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.*
[106] *Interviews with ccTLD operators in country and ISOC, OECD, UNESCO study on Local Infrastructure and Local Content 2011.*
[107] *CNNIC Statistical Report, 2013, http://www1.cnnic.cn/IDR/ReportDownloads/201302/P020130221391269963814.pdf.*
[108] *The Broadband Commission, The State of Broadband 2012: Achieving Digital Inclusion for All, http://www.broadbandcommission.org/Documents/bb-annualreport2012.pdf.*
[109] *World Bank, Doing Business Report 2013, http://www.doingbusiness.org/rankings (updated April 2013).*
[110] *ITU time series by country 2010-2012 and aggregate data 2006-2013, http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.*
[111] *Egyptian Ministry of ICT, http://www.mcit.gov.eg/Upcont/Documents/Publications_1172013000_Indicators_in_Brief_June.pdf.*
[112] *IPv6 Test, http://ipv6-test.com/stats/country/SA.*

Table 2 - ccTLD Factors[113]

	China	Republic of Korea	Viet Nam	Islamic Republic of Iran	Egypt	Qatar	Saudi Arabia	United Arab Emirates	Russian Federation
UNESCO Region	Asia and the Pacific				Arab States				Europe and North America
Local registrars	High	High	Moderate	Moderate	Low-moderate	Low	None	Moderate	High
Policies	Eligibility criteria	Open	Open	Open	Eligibility criteria	Open	Eligibility criteria	Open	Open
Pricing	Low	Low	Free (IDN)	-- Moderate (registrar)	---- High (registrar)	High	Free (registry) High (registrar)	Moderate	Low
Brand strength	Moderate - High	High	Moderate	Moderate-High	Low-moderate	Moderate	---	Moderate	High
Overall ccTLD factor rating	Moderate-High	High	Moderate	Moderate	Low-moderate	Low-moderate	Low-moderate	Moderate	High

[113] *Interviews with ccTLD operators; ccTLD websites and registrars' websites.*

APPENDIX 5

IDN ccTLD applications – status of delegated strings as at July 2013

	ccTLD reference	Primary string	String in English	Script	Year of launch
United Arab Emirates	AE	xn--mg-baam7a8h امارات	Emarat	Arabic	2010
China	CN	xn--fiqs8S , 中国 xn--fiqz9S , 中國	China	Simplified Chinese Traditional Chinese	2010[114]
Algeria	DZ	xn--lgbbat1ad8j الجزائر	Algeria/Al Jazair	Arabic	2012[115]
Egypt	EG	xn--wgbh1c مصر	Egypt	Arabic	2010
Hong Kong SAR of China	HK	xn--j6w193g 香港	Hong Kong SAR of China	Han (simplified, traditional)	2011
India	IN	xn--h2brj9c भारत xn--mg-bbh1a71e بھارت xn--fpcrj9c3d భారత్ xn--gecrj9c ભારત xn--s9brj9c ਭਾਰਤ xn--45brj9c ভারত xn--xkc2d-l3a5ee0h இந்தியா	Bharat / India	Devanagari (Hindi) Arabic Telugu Gujarati Gurmukhi (Punjabi) Bengali Tamil	Not yet launched
Jordan	JO	xn--mgbayh-7gpa الاردن	Al-Ordon	Arabic	2010

[114] http://www.cnnic.cn/jczyfw/zwym/zwymtjxx/201206/t20120612_26518.htm, accessed 13 July 2013.
[115] http://xn--ggbdmbaav3cjl1c9heugfv.xn--lgbbat1ad8j/, accessed 13 July 2013.

	ccTLD reference	Primary string	String in English	Script	Year of launch
Kazakhstan	KZ	xn--80ao21a қаз	Kaz	Cyrillic	2012
Republic of Korea	KR	xn--3e0b707e 한국	Republic of Korea	Hangul	2011
Sri Lanka	LK	xn--fzc2c9e2c ලංකා	Lanka	Sinhala	2010
		xn--xkc2al3h-ye2a இலங்கை	Ilangai	Tamil	
Morocco	MA	xn--mgb-c0a9azcg المغرب	Morocco / al-Maghrib	Arabic	Not yet launched
Malaysia	MY	xn--mgbx4cd-0ab ملیسیا.	Malaysia	Arabic	Not yet launched
Oman	OM	xn--mgb9awbf عمان	Oman	Arabic	Not yet launched
Palestine	PS	xn--ygbi2ammx فلسطين	Palestine	Arabic	2011
Qatar	QA	xn--wgbl6a قطر	Qatar	Arabic	2011
Russian Federation	RU	xn--p1ai рф	rf	Cyrillic	2010
Serbia	RS	xn--90a3ac срб рб	srb	Cyrillic	2012
Saudi Arabia	SA	xn--mgberp4a-5d4ar السعودية	Al Saudiah	Arabic	2010
Singapore	SG	xn--yfro4i67o 新加坡	Singapore	Han	2012
		xn--clchc0e-a0b2g2a9gcd சிங்கப்பூர்		Tamil	
Syrian Arab Republic	SY	xn--ogbpf8fl سورية	Syrian Arab Republic	Arabic	2011 (registrations not currently available)
Taiwan of China	TW	xn--kpry57d 台灣	Taiwan of China	Simplified Chinese	2010
		xn--kprw13d 台湾	Taiwan of China	Traditional Chinese	
Thailand	TH	xn--o3cw4h ไทย	Thai	Thai	Not yet launched
Tunisia	TN	xn--pgbs0dh تونس	Tunis	Arabic	2012[33]
Ukraine	UA	xn--j1amh укр	Ukr	Cyrillic	Not yet launched

Pending delegation as at 13 July 2013[116]

	ccTLD reference	Primary string	String in English	Script
Bangladesh	BD	xn--54b7fta0cc বাংলা	Bangla	Bangla
Georgia	GE	xn--node გე	ge	Georgian (Mkhedruli)
Islamic Republic of Iran	IR	xn--mgba3a4f16a ایران	Iran	Arabic
Mongolia	MN	xn--l1acc МОН	Mon	Cyrillic
Pakistan	PK	xn--mgbai9azgqp6j پاکستان	Pakistan	Arabic
Sudan	SD	xn--mgbpl2fh سودان	Sudan	Arabic
Yemen	YE	xn--mgb2ddes اليمن	AlYemen	Arabic

[116] http://www.icann.org/en/resources/idn/fast-track/string-evaluation-completion

APPENDIX 6

Glossary of terms

- **ASCII**
  The American Standard Code for Information Interchange, representing text in computers, communications equipment and other devices. In the context of the Domain Name System, ASCII means the letters “a-z” inclusive, the numerals “0-9” inclusive and the hyphen “-”. Until the year 2000, no other characters were allowed in domain names, and in 2009 the first IDN ccTLDs were introduced.

- **ccTLD**
  Country code top-level domain, which represents a country or territory found in the ISO 3166 list. For example, .eu (European Union), .de (Germany), .uk (United Kingdom) or .fr (France).

- **CENTR**
  The European country code top-level domain organisation, a not-for-profit organisation which supports the interests of ccTLD managers. www.centr.org.

- **EURid**
  The European Registry of Internet Domain Names (EURid) manages the .eu top-level domain under contract to the European Commission. The .eu TLD was launched for general registration in 2006 and has over 3.6 million domain names.

- **gTLD**
  Generic Top Level Domain, which does not represent a particular country or territory. Examples include .com, .net, .org, .info and .biz.

- **Hybrid IDN, hybrid domain**
  An internationalised domain name in which the constituent elements are in different scripts. Examples of hybrid IDNs are shown in Figure 2.

- **ICANN**
  The Internet Corporation for Assigned Names and Numbers. A non-profit company responsible for management of the domain name root operation (the IANA), policy coordination for generic top-level domains (gTLDs) and for internet numbering. In 2012, ICANN launched a process to create an unlimited number of new gTLDs, over 1 900 applications were received. ICANN’s policy development is guided by a number of support organisations and advisory committees representing various stakeholder groups, including governments, the domain name industry, business, ccTLD registries, and civil society. www.icann.org.

- **IDN**

  Internationalised Domain Name. A domain name written in non-Latin scripts such as Chinese, Arabic, Hangul or Cyrillic. For an explanation of IDNs, see Appendix 1.

- **IDN ccTLD**

  A country code top-level domain written in non-Latin scripts. Examples include .한국 (the Republic of Korea), .قطر (Qatar), .中国 (China) and .рф (the Russian Federation).

- **IDN ccTLD Fast Track**

  A process developed within ICANN by the ccTLD registries to implement IDN ccTLDs. The first IDN ccTLDs were approved by ICANN in 2009.

- **IETF**

  Internet Engineering Task Force. Develops internet standards. Its members are volunteers from the international technical community and it is open to any interested individual. IETF standards are published as Requests for Comment (RFC). www.ietf.org.

- **ISOC**

  The Internet Society. Formed in 1992, it promotes the open development, evolution and use of the internet for all. www.isoc.org.

- **ISP**

  Internet Service Provider. An organisation that provides access to the internet and a variety of related services, including web hosting or email services.

- **IXP**

  Internet Exchange Point. Internet Service Providers (ISPs) can exchange internet traffic between their networks, thereby reducing costs and increasing speed in resolving internet queries (e.g. web pages).

- **Landrush**

  When a new TLD is first launched, there is a period of time when trademark holders and others who have prior rights to particular names or brands have the opportunity to pre-register domain names (sunrise period). Following the sunrise period, the registry opens to general registrations - this is called the landrush.

- **OECD**

  Office for Economic Co-operation and Development. www.oecd.org.

- **Punycode**

  The syntax by which a string of Unicode characters is transliterated uniquely and reversibly into the ASCII character set used by the Domain Name System. Punycode is the underlying technology which makes IDNs possible. See Appendix 1 for further explanation.

- **Register**

  The domain name database managed by a registry.

- **Registrant**

  A domain name registrant is the person or organisation in whose name or on whose behalf a domain name is registered. For example, UNESCO is the registrant of the domain name unesco.org.

- **Registrar**

  A domain name registrar. An organisation that is allowed to register domain names in one or more TLDs on behalf of its customers. To register gTLDs, registrars must be accredited by ICANN. Most ccTLDs operate their own systems of registrar accreditation. Examples of well-known registrars are Go Daddy Inc., Tucows and 101Domains.com.

- **Registry**

  A domain name registry is a top-level domain provider. For example EURid is the registry for .eu as is Verisign for .com.

- **Second level domain**

  Domain names have a hierarchical structure, starting (in left-to-right scripts) to the right of the dot, with the top-level domain. Most domain names are registered at the second level, e.g. under .eu or .com. For the domain name example.com, “example” is the second level domain. Some domains, e.g. .uk and .jp, only register domain names at the third level, e.g. under .co.uk or .co.jp.

- **TLD**

  Top-level domain. The domain name system is hierarchical and is organised into various top-level domains (TLDs), e.g. .com, .eu or .рф under which domain names can be registered.

- **UNESCO**

  United Nations Educational, Scientific and Cultural Organisation, whose mission is building peace in the minds of men and women. UNESCO is organised into four sectors, including the Communication and Information Sector whose mission is building inclusive knowledge societies through information and communication, www.unesco.org.

- **Unicode**

  A technical standard used for consistent encoding of text from ASCII into other scripts.

- **WSIS**

  The World Summit on the Information Society a UN process which took place between 2003 and 2005 and resulted in the Geneva Declaration of Principles and the Tunis Agenda. A number of UN organisations, including UNESCO, have been tasked with fulfilling action lines resulting from the WSIS.

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