Project Report

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Research Title
Longitudnal study of adoption of Top-level Domain (TLD) Names and Domain Name System
Security Extensions (DNSSEC)
This question is read only.

Please provide a short summary of the work that was completed as part of this project / research *
Our project was focused on understanding the evolution of DNS top-level domain names
and security features. Our methodology was data-driven, where we collect DNS traces
to understand the uptake of new top-level domain names, which have been approved by
ICANN in recent years. Simultaneously we also focus on how these top-level domain names
have adopted DNS security extensions. We have collected DNS traces and we are currently
analyzing the top-level domain name adoptions and security features.
Describe the 'who, what, where, when and why' of your initiative

Timing

Is your project / research complete? *
◉ Yes ○ No
If your initiative is still in progress, pick 'no'

Start Date	Finish Date
01/05/2018	26/07/2019
Must be a date.	Must be a date.

Milestones

What have been the major steps / stages (i.e. milestones) involved in delivering your initiative to date?

Milestone	Description
Passive measurements	This is an empirical research project and relied heavily on trace-driven analysis. We stared with the appropriate data collection approaches and best practices in Internet measurements. We were able to collect some good quality datasets containing raw data or metadata that would enable providing insights into the usage and adoption of TLD and DNSSEC.

Data analysis	We developed several tools to analyze the data. The data needed to be checked for errors or gaps. Once we did our sanity checks on the data, we aggregated the data, and started categorizing them.
Characterization	This stage required generating insights from the clean data. We developed several scripts/tools relying on Internet measurements analysis and data science principles. We relied on statistical analysis to get insights. We used measures such as CDFs, CCDFs, PDFs, summary tables, etc. to get deep insights into the data that we collected and understanding the trends in usage and adoption of TLDs and DNSSEC.
e.g. planning; major activities; evaluation	

Outcomes

What outcomes were generated as a result of this project / research?

Outcomes are the changes that have occurred for the beneficiaries of your initiative. Generally outcomes can be framed as an increase or decrease in one or more of the following:

- Skills, knowledge, confidence, aspiration, motivation, (these are generally **immediate** or short-term outcomes)
- Actions, behaviour, change in policy (these are generally **intermediate** or medium-term outcomes)
- Social, financial, environmental, physical conditions (these are generally **long-term** outcomes)

Immediate outcomes occur directly following an activity (e.g. within 1 month); intermediate outcomes are those that fall between the immediate and long-term (e.g. between 1 month and 2 years); and long-term outcomes are those we expect to see years later (e.g. 2, 5, 10 or 50 years after the activity).

We also want to learn more about how you tracked the outcomes of your initiative - what you measured and how.

If you need more help understanding what outcomes are, read the help sheets at www.ourcommunity.com.au/evaluation

List your initiative's outcomes and attached information in the following table. Leave blank any fields that do not apply to your project.

Outcome	Were these outcomes anticipated?	Timeframe	Indicator	Verification Method
Insights into usage of TLDs	Anticipated	Immediate	Packet traces and meta data	Data analysis

Viability of the new gTLD program	Anticipated	Long-term	Interesting trends were found which shows slow uptake of the new gTLDs	Data analysis
Outcomes are the changes that you believe were generated or influenced by your initiative. See information above.	Choose from the list	Choose from the list (see description above)	What you used to measure this outcome - e.g. 'change in teenage pregnancy rates from x to y'	e.g. survey; interviews; focus groups

What (if anything) did you change in your approach and practices as your project? research proceeded, and why? *

We are using well-defined measurement techniques. We started with data collection, scrutinizing the datasets, analyzing the datasets, and generating plots/charts to visualize our results. We are also using well-known statistical measures to analyze the datasets. Hence, the process has not changed from our initial planning phase.

We may use this information to help inform others undertaking similar work

What did you learn as a result of undertaking this project/program? *

We performed a longitudinal study on the adoption of TLDs. We also analyzed the evolution of DNSSEC implementation. We studied how DNSSEC is deployed and managed as well as how DNS resolvers validate DNSSEC record in relation to the evolution of generic TLDs. The popularity of new generic TLDs is growing in various domains, but the percentage of queries to new generic TLDs is still low. The top-10 TLDs are still dominated by the original TLDs. DNSSEC deployment is improving although it is slow. DNSSEC may not be fully effective due to a greater number of insecure delegations and incorrect delegation signer records.

We are particularly interested in lessons that may help others undertaking similar work. Think about what you learned about your inputs (money, skills, personnel, time - too much; too little; about right?); your assumptions (were they 100% right, only partly right, or were the results a complete surprise?); and the context of the project/program (timing; targeted beneficiaries; geographic settings - were they right; wrong; about right?)

How will you share your learnings from this project/research? *

We have communicated our work for possible publication in a peer-reviewed venue. We will share our results through seminars in the universities within the city. We will also integrate the results of the work in graduate studies at the university. The results will also be shared in international forums such as the Internet Engineering Task Force and Internet Research Task Force meetings for comments and feedback.

What mediums were used to share the learnings? Have you reached the audience you expected?

We'd love to see some visual and audio representations of your work. Please share below.

Upload files: *No files have been uploaded*

                                                     and/or

Provide web link:

                                                     Must be a URL

                                                     and/or

Provide additional   Please include captions, if relevant
details:

Can we use your media   ○ Yes   ○ No   ○ Please contact us first
content in our own   e.g. in our annual report
communications?

Financial Report

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Project Income & Expenditure

Please provide details of any project income (funds received) and project expenditure (funds spent) to date.
Use the 'Notes' column to provide any additional information you think we should be aware of.

Income Description	Income Type	Confirmed Funding?	Income Amount ($)	Notes
Internet NZ	Other Income *	Confirmed *	$10,000.00	This is the funding recieved from Internet NZ.

Expenditure Description	Expenditure Type	Expenditure Amount ($)	Notes
Research assistants	Salaries and Wages *	$9,000.00	
Data storage and cloud computing	Infrastructure and/or Hardware	$1,000.00	

Income and Expenditure Totals

Total Income Amount

$10,000.00
This number/amount is calculated.

Total Expenditure Amount

$10,000.00
This number/amount is calculated.

Income - Expenditure

$0.00
This number/amount is calculated.

Have you experienced any issues with your intended project budget to date? If so, please explain reasons for any major variances or for providing incomplete information:

Certification and Feedback

Feedback

You are now nearing the end of this form. Before you review your application and click the **SUBMIT** button please take a few moments to provide some feedback. (If you would rather provide anonymous feedback, please go to **{{ Grantmakers: provide a link to an anonymous survey or delete this sentence }}**

Please indicate how you found the acquittal process:
○ Very easy   ○ Easy   ○ Neutral   ○ Difficult   ○ Very Difficult

How many minutes in total did it take you to complete this form?

Estimate in minutes (i.e. 1 hour = 60 minutes)

Please provide us with your suggestions about any improvements and/or additions to this form that you think we need to consider: