CDAR
Continuous Data-driven Analysis of Root Zone Stability

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NLnet Labs   SIDN labs   TNO

Context

- ICANN RFP "Root Stability Study"

- Purpose of this study (RFP):
  - "… ICANN committed to review the effects of the New gTLD Program on the operations of the DNS Root system, … "

- Goal of the study (RFP):
  - "… thorough review of the impact of the Program on the security and stability of the DNS."

- Scope of Work (RFP):
  - "… conduct a technical study of the root zone system …"

- Contract granted to consortium NLnet Labs, SIDN, TNO ⇔ October 2015

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Our Vision

- Provide **clear view** on the **current and future impact** of the new gTLD program on the security and stability of the DNS
- **Identify steps** to safeguard the root system's security and stability

- Contribute to using **commonly accepted, best practice** root stability parameters and reference data
- Facilitate constructive discussion in ICANN's multi-stakeholder community => requires an **open and transparent study approach**
- **Contribute to broad consensus** of the study results

- Root stability investigation should be **extensible** for **continuous** future monitoring

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CDAR approach:
Measurements, Analysis & Modelling

- Objective and data-driven
  - Active measurement
  - Passive measurement
  - Public data sources

- Extrapolations to future scenarios
  - Simulation model

- Contribute to continuous Root stability monitoring

- Instrumentation will be available to ICANN's multi-stakeholder community

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Active Measurements

- Employ the RIPE Atlas probes to measure the stability of the root servers
  - plan what to measure, where to measure, and for how long to measure
- Continuous measurements
  - allows us to measure these metrics as new TLDs are added to the root zone
- Measurements for IPv4, IPv6, and DNSSEC when relevant
- The consortium has a SW framework to
  - support ease-of-development for measurements
  - support repeated measurements on the ATLAS monitoring infrastructure

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Passive Measurements

- Collect data available from
  - the root servers (I, K, and L)
  - SIDN's .NL data

- Careful planning of what will be measured
  - e.g., metadata (NetFlow) or full packets, SNMP, etc.
  - for how long (time period)

- We are open to investigate how other data sets such as the Day In The Life of the Internet (DITL) could provide additional insights

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Public Data Sources

- DNS OARC has stored all root zone files in their repository
  - accessible for DNS OARC members

- From the root zone files extract parameters
  - e.g., the Root Zone File size and possible errors in the Root Zone Files

- For new gTLD zone files similar data can be retrieved from ICANN's centralized zone data service

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Simulation Model for Scenario Analysis

- Development and implementation of a quantitative simulation model of the root system

- <u>Goal</u>: Execute "what-if" scenarios and sensitivity analysis in order to determine impact of future growth of the root zone on root stability

- Based on analysis of the collected data sets
  - Finding correlations
  - Investigating statistical characteristics

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Analyzing the Root Server System
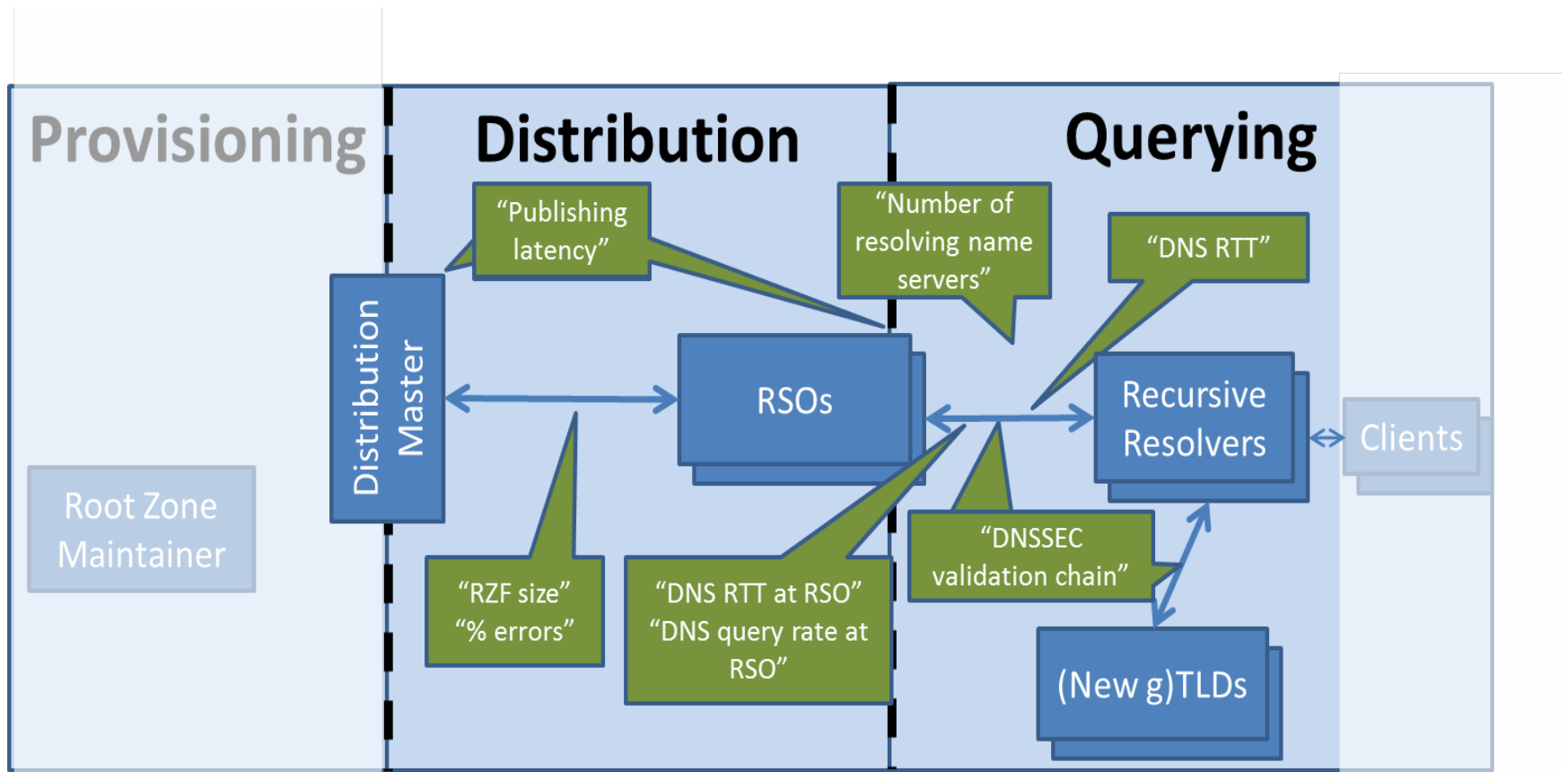

- Includes a.o. parameters specified in RSSAC-02
- Additional suggestions for Root security & stability metrics are welcome

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Study Work Packages

- WP 1: Involving RSOs and the DNS community
- WP 2: Measurements design and execution
- WP 3: Security and stability analysis of collected DNS data
- WP 4: Future scenario analysis of DNS root security
- WP 5: Dissemination of results and instrumentation
- WP 6: Clarifying and discussing findings with ICANN's community
- WP 7: Project management

Proposed Timeline
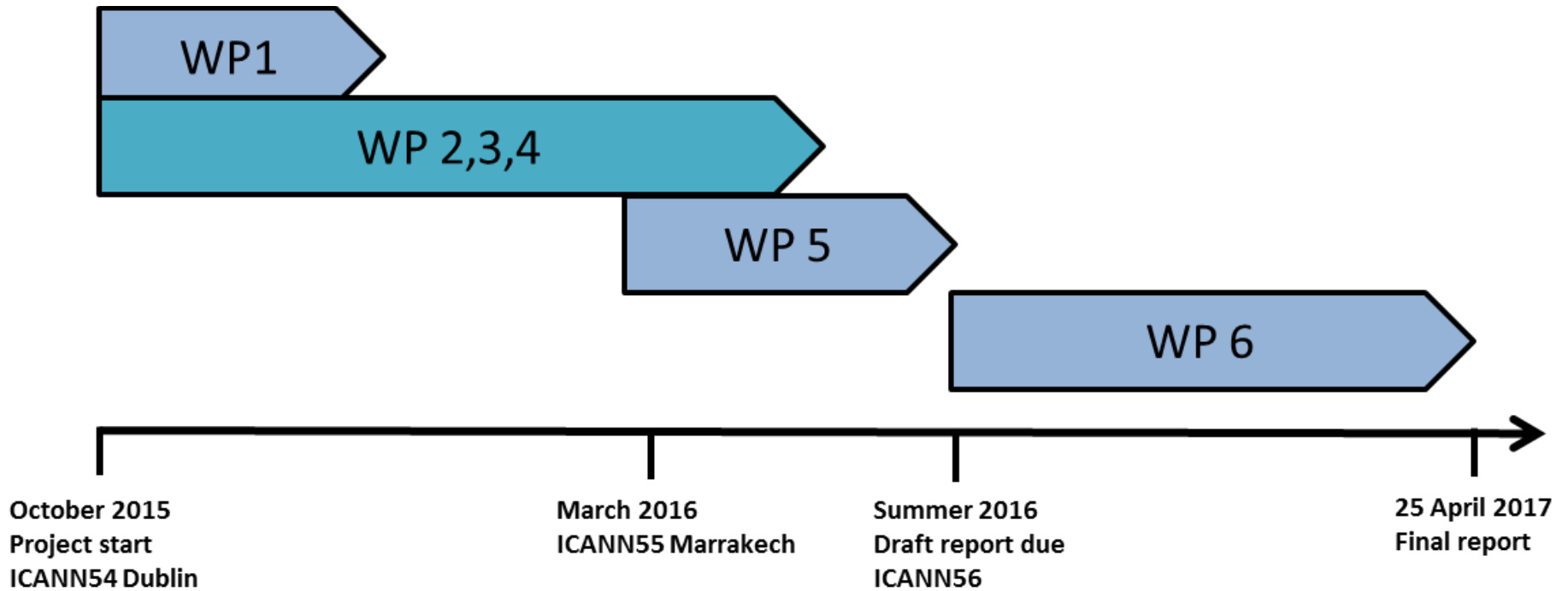
Summary

- Objective, data-driven study to root server system stability

- Current state and extrapolations to future scenarios

- Continuous root stability monitoring

- Complementary expertise of consortium partners

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Questions?

Suggestions?

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