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Facilitating Global DNSSEC Deployment

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DNS Track
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Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

DNSSEC Misconfiguration

- **DS Mismatch** – No DNSKEY matching DS in parent zone
- **DNSKEY Missing** – DNSKEY not available to validate RRSIG
- **NSEC Missing** – NSEC RRs not returned by authoritative server
- **RRSIG Missing** – RRSIGs not returned by some servers
- **RRSIG Bogus** – Signature in RRSIG does not validate
- **RRSIG Dates** – Expired or premature RRSIG dates

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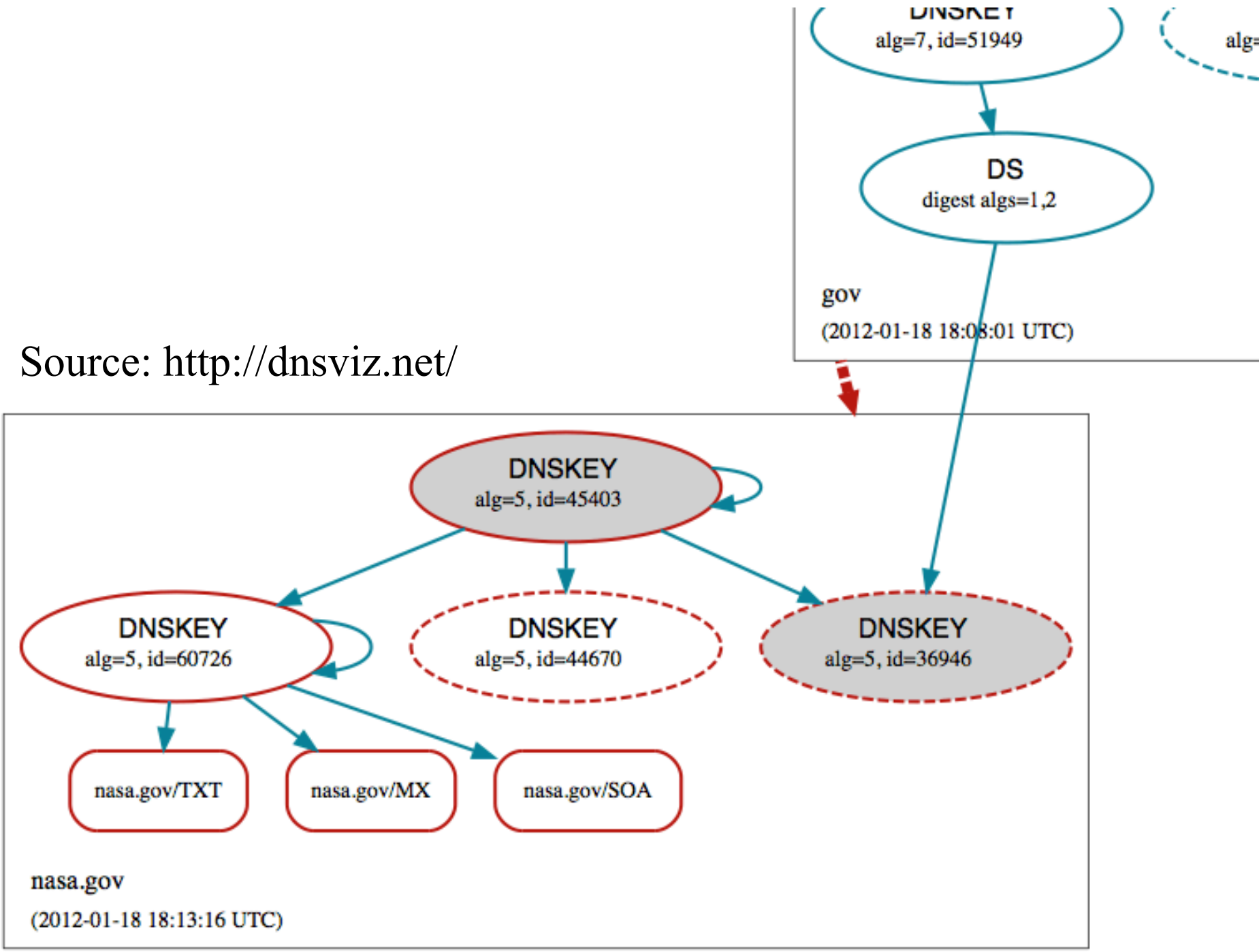

Source: http://dnsviz.net/

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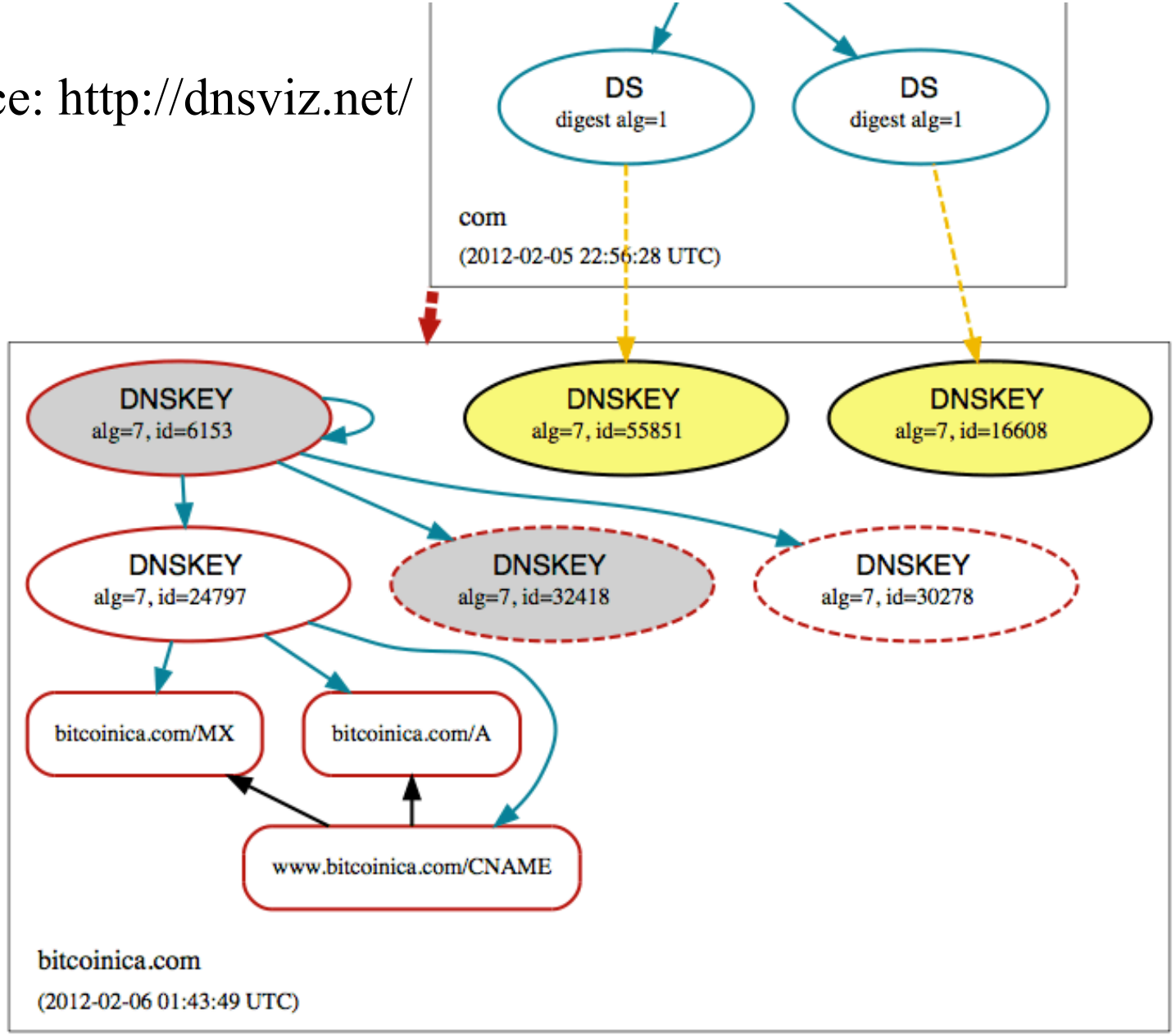
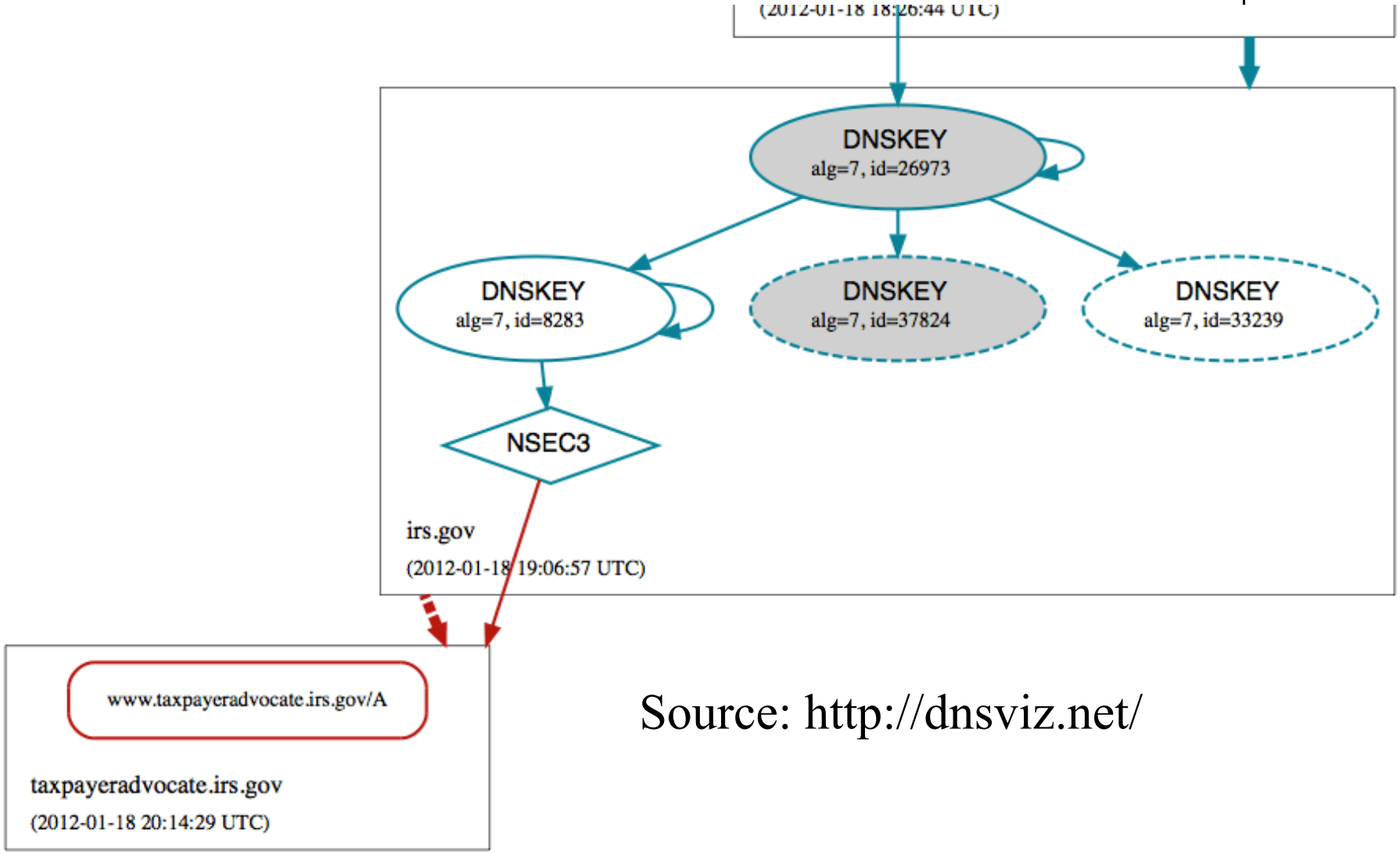
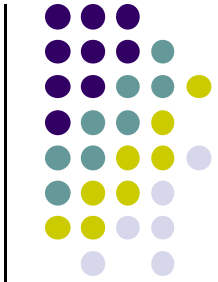




Source: http://dnsviz.net/

DNSSEC deployment survey



- Polled ~2,700 production signed zones over a year time frame (May 2010 – July 2011)
- Validation of SOA RR analyzed several times daily, anchored at ISC DLV or root zone (after July 2010 root signing)
- Identified maintenance and misconfigurations

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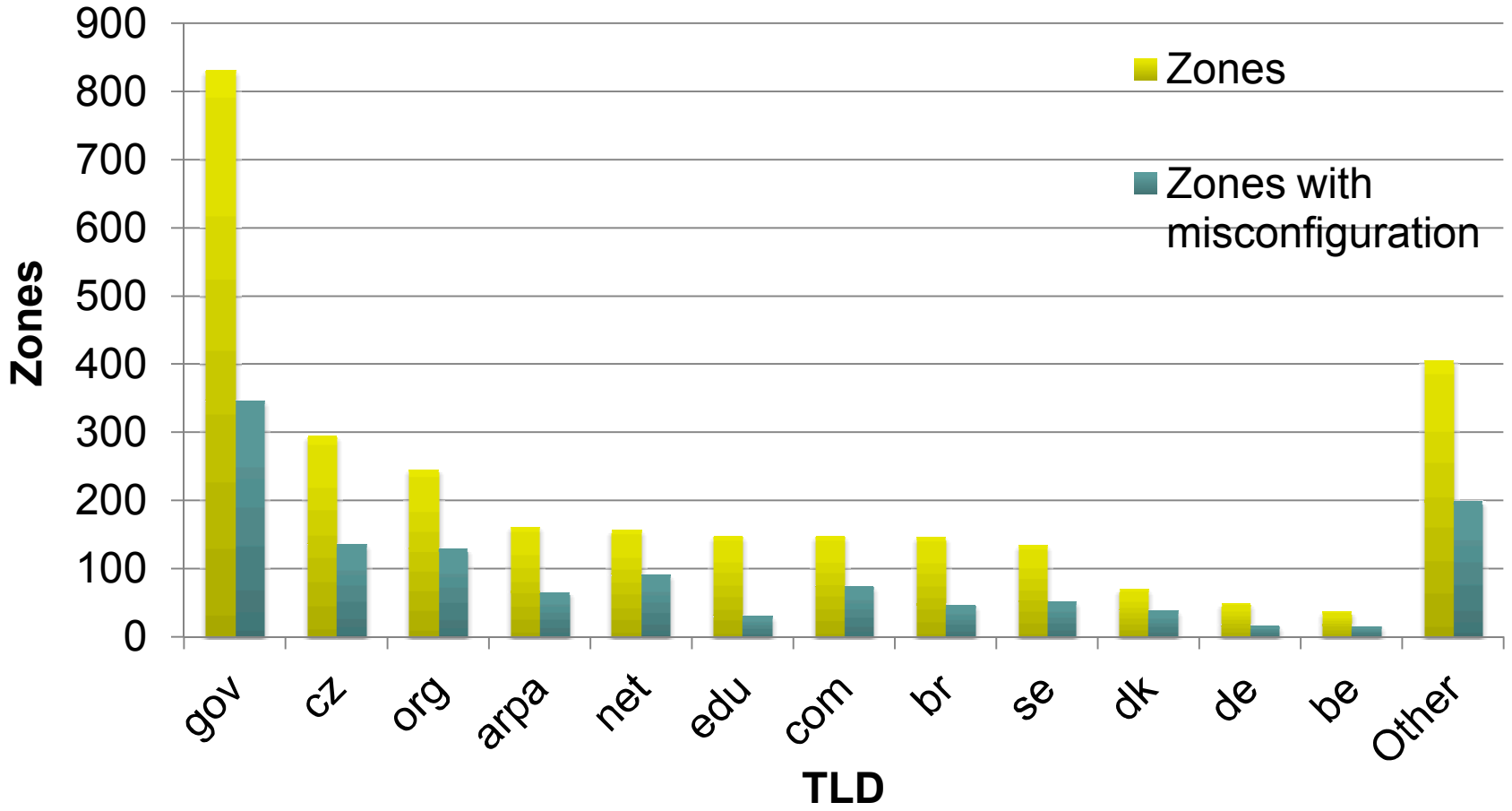
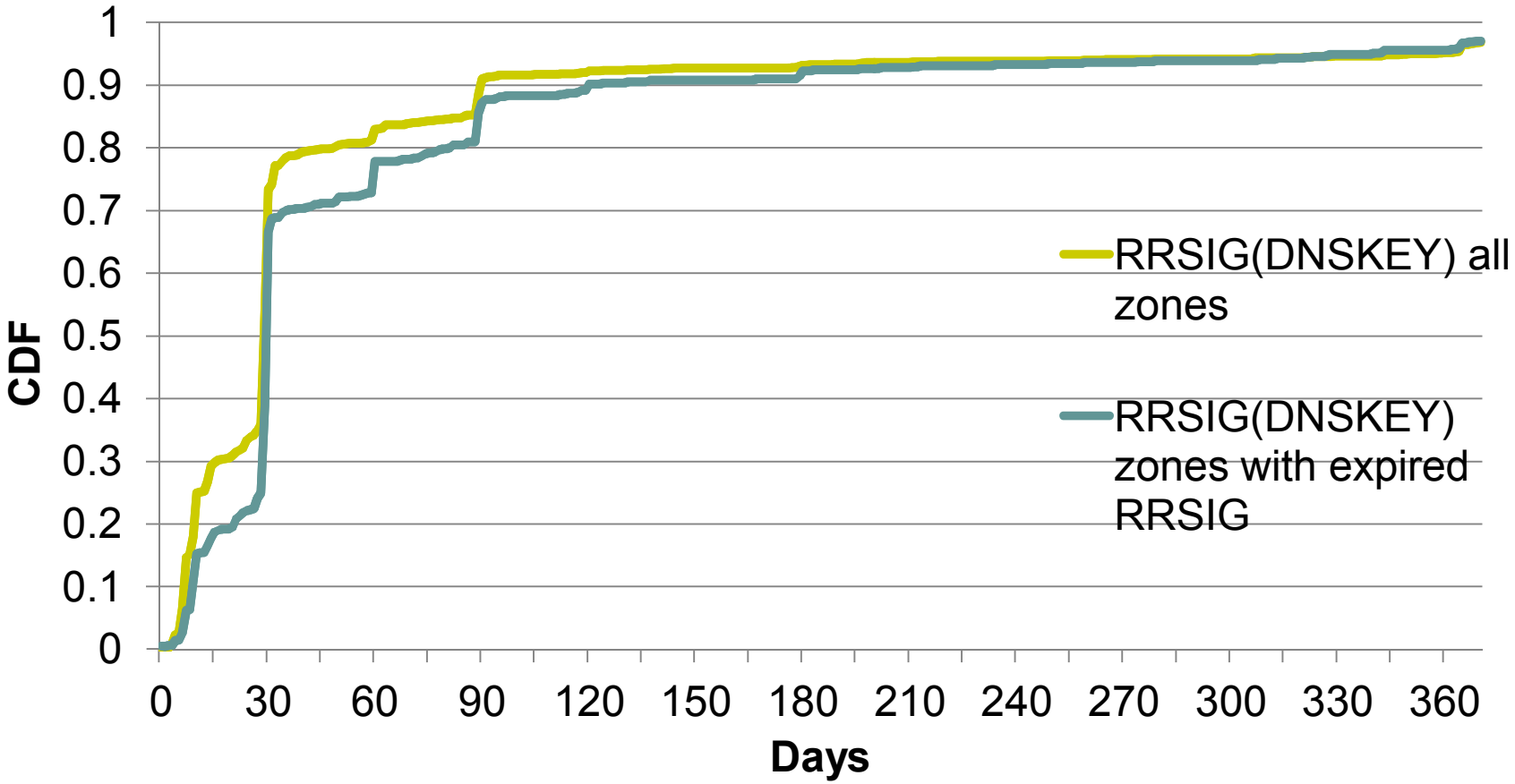
Survey breakdown by TLD



RRSIG lifetimes



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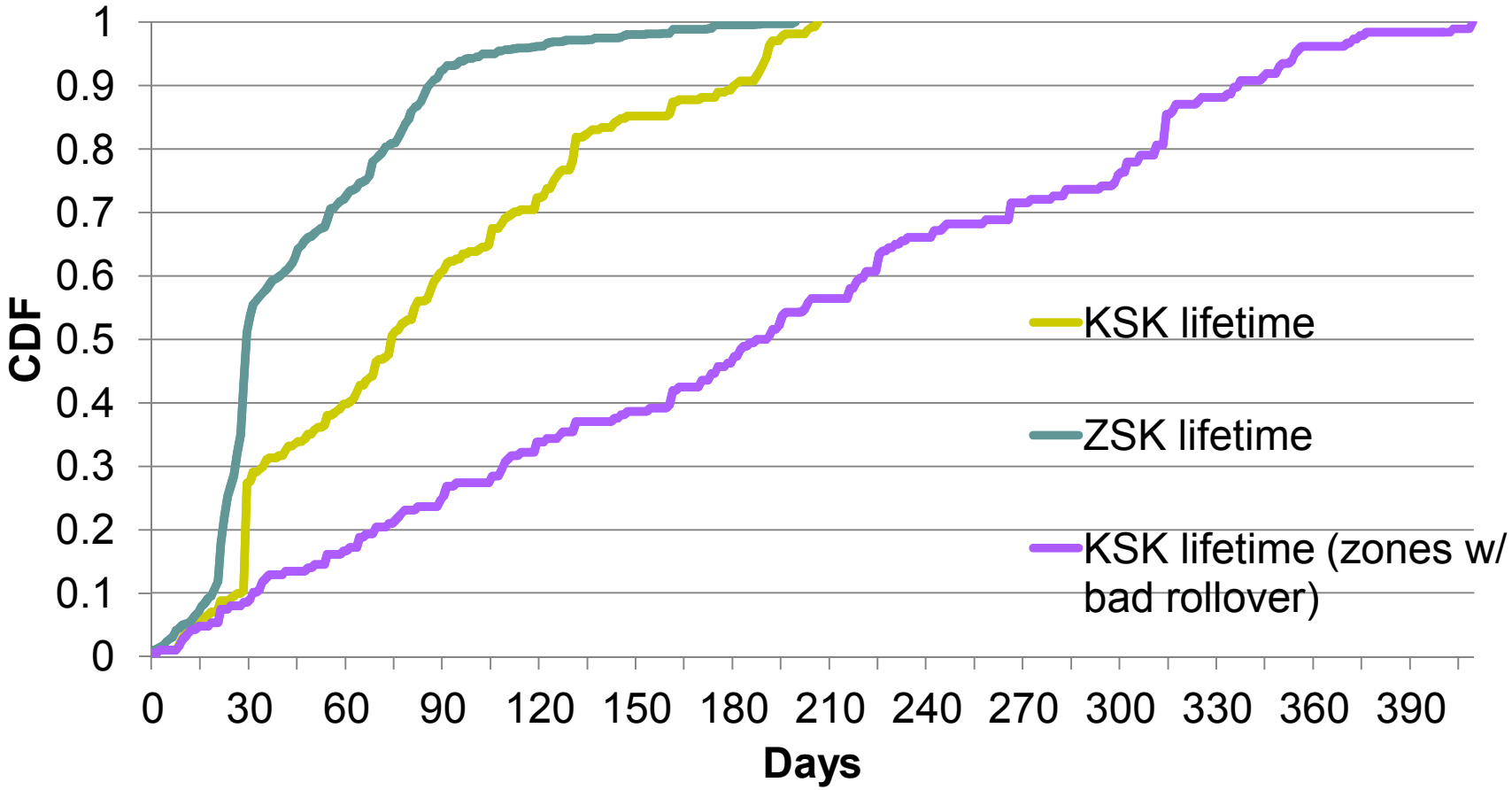
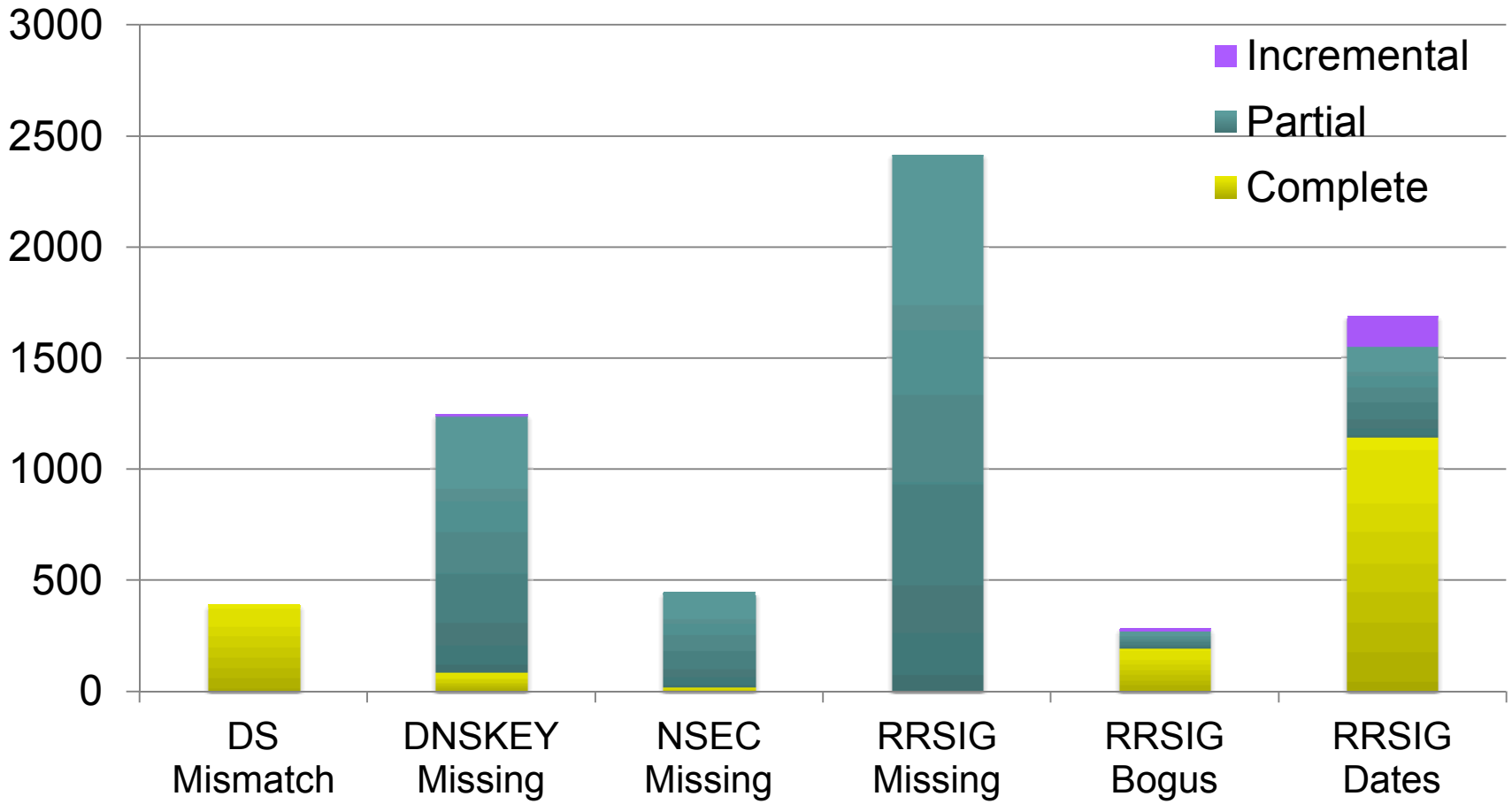
DNSKEY lifetime



DNSKEY rollovers

Key role	Zones that did not roll key (0)	Zones that rolled key once (1)	Zones that rolled key more than once (>1)
ZSK	37%	11%	52%
KSK	72%	17%	10%

Misconfigurations by type



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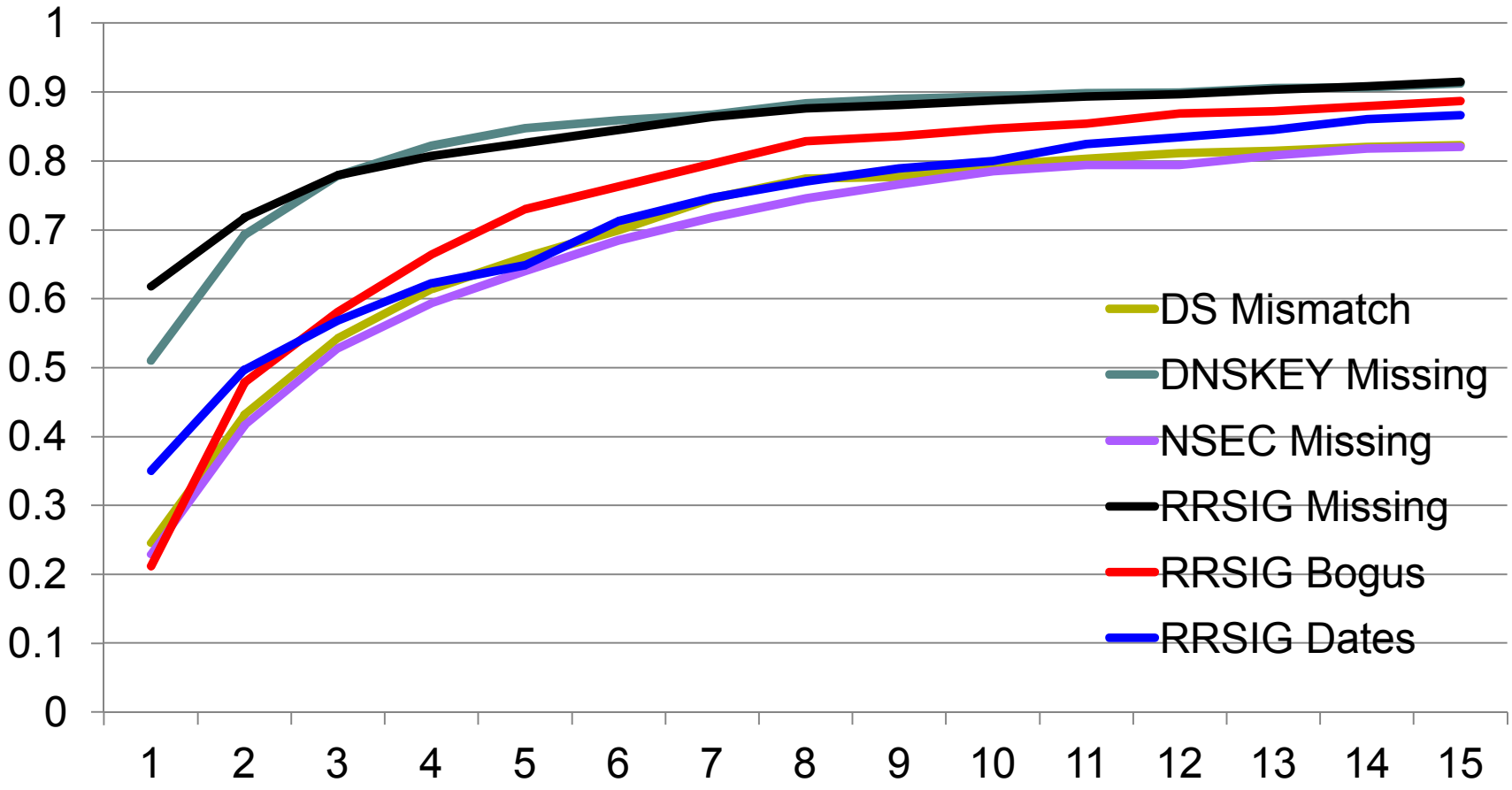
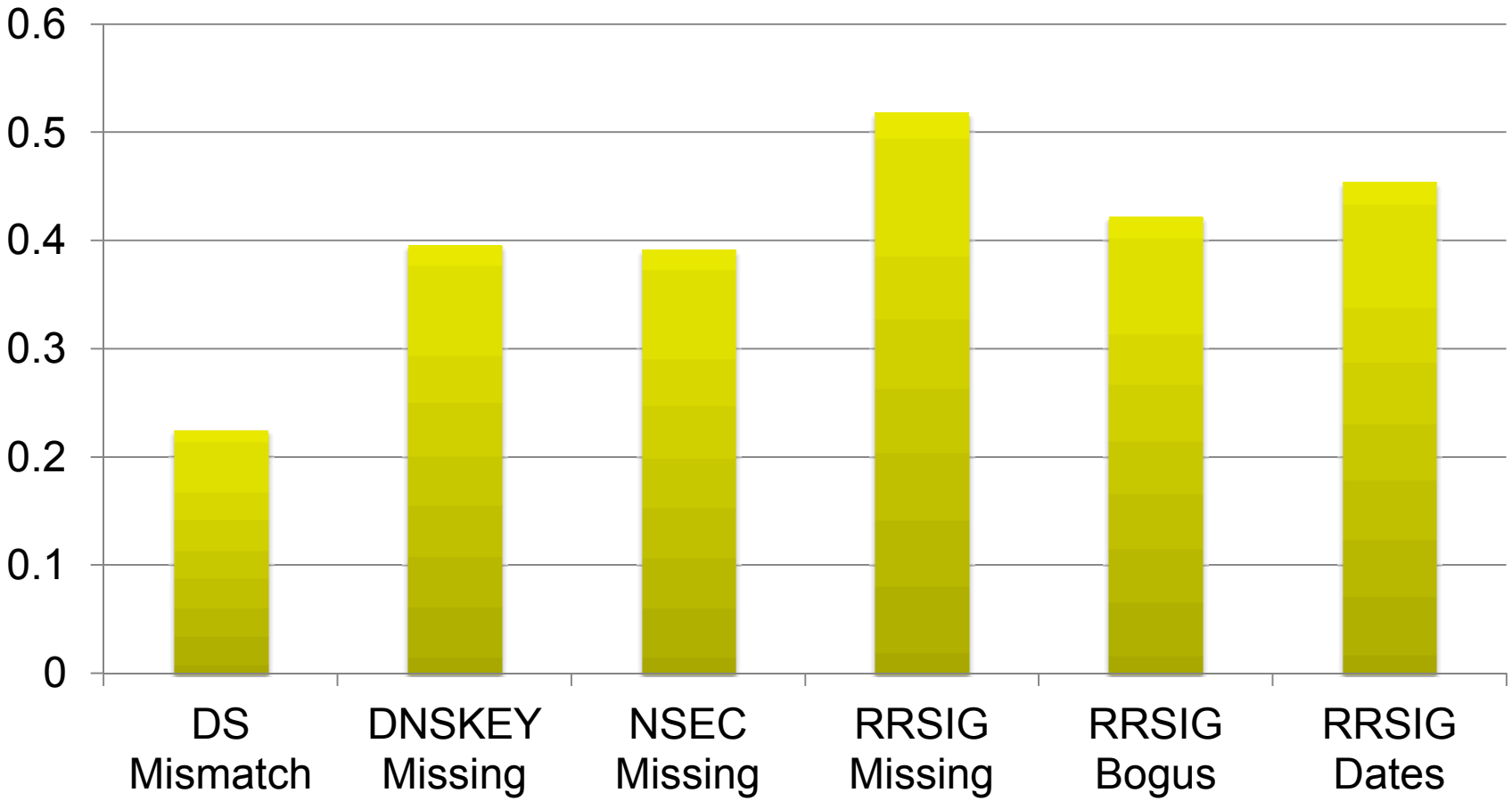
Event duration



Repeat offense rate



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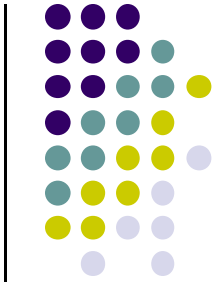
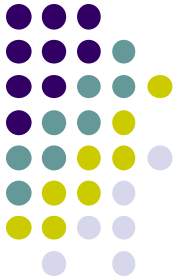
Summary of Observations



- Administrators aren't detecting and correcting their DNSSEC problems in a timely fashion.
- Administrators aren't learning from past mistakes.
- There are varying levels of DNSSEC support in production DNS implementations.
- DNSSEC implementations are new and still being improved.

How do we “sell” DNSSEC?



- Are we selling DNSSEC with too much maintenance complexity?
- What are the essential elements for successful DNSSEC deployment?
- How do we appropriately educate engineers and administrators of sophisticated DNSSEC maintenance?
- Does DNSSEC make sense for all domains?
- What are best current operational practices for DNSSEC?
  - Root zone
  - TLD
  - Major site
  - Other site

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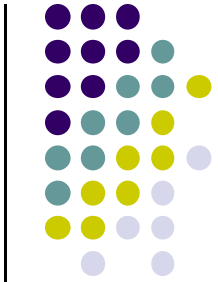
Deployment Considerations



- RRSIG lifetime
- NSEC/NSEC3
- Regular KSK rollovers
- Signing of reverse zones
- Use of HSMs for offline key storage
- DNS hosting/registrar transfer

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