DNS Privacy, Service Management, and Research: friends or foes?

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Different **Challenges**

DNS
privacy

DNS
service
management

DNS
research

Different **Stakeholders**

DNS privacy

computer users

operators

DNS service management

DNS research

researchers

Different **Problems**

computer users

DNS privacy

DNS can leak information:
johnsiphone.usc.edu A ?
googgle.com A?

operators

DNS service management

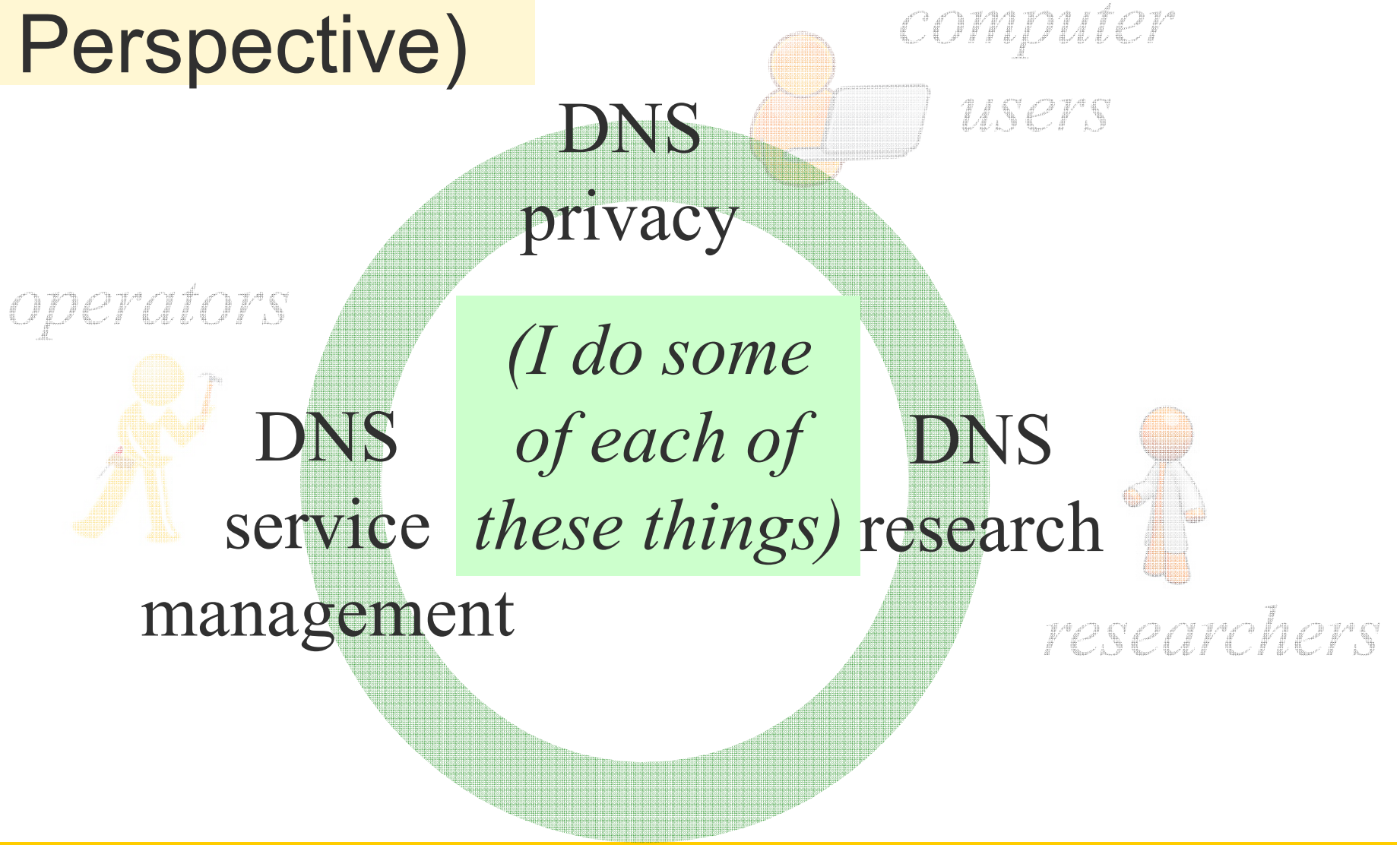
need to run DNS:
why 10k q/hour from 192.0.2.1?
…oh, they're for johnsiphone.usc.edu

DNS research

researchers

need to learn things:
my new IDS found 10k q/hour?
was it an attack?
or a bug in my IDS?

(My Perspective)



Traditionally: Users Aren't Concerned

DNS privacy

computer users

DNS can leak information:
johnsiphone.usc.edu A ?
googgle.com A ?

operators

here google, keep my grocery list
...doubleclick.net: apples now on sale at cornershop.com

here comcast, take me to googgle.com
...let me redirect your NXDOMAIN to my search page to monetize that

DNS search

researchers

Traditionally: Operators Keep the Lights On

operators

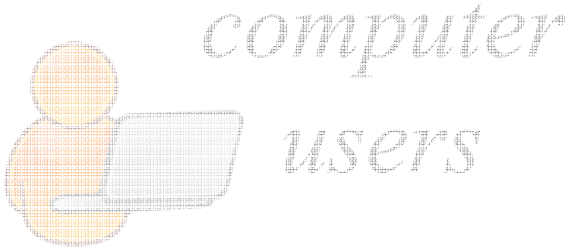
DNS service management

10k q/hour from 192.0.2.1
…hmm, what does tcpdump tell us

how can we fix this?
…oh, that data is from rm 1141, maybe they were hacked

need to run DNS:
why 10k q/hour from 192.0.2.1?
…oh, they're for johnsiphone.usc.edu

Traditionally: Researchers Make Do



my new IDS found 10k q/hour?
...hmm, does ground truth help verify that?

or perhaps today
...no access to ground truth, my algorithm must be perfect, time to publish!

DNS research

researchers

need to learn things:
my new IDS found 10k q/hour: was it an attack? or a bug in my IDS?

What Do We **Want?**

computer users

DNS privacy

users deserve privacy (without asking)

operators

DNS service management

operators need to find and fix problems

DNS research

researchers

research needs to be possible

Trends

- new **technical methods** improve DNS privacy
  - DNS over TLS: anti-eavesdropping
  - qname minimisation: share less with auth. servers
  - *both are standardized, but deployment is early*
- new **policies** to manage disclosure
  - helps where technical means are not enough

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Suggestions for Operators

- will shift to in-server-software logging
  - not just passive packet capture

- perhaps anonymized logging by default
  - keep data at rest "safe"
  - perhaps reversable for debugging,
    but only *on demand*, *with auditable logs*

Suggestions for Researchers

- researchers need data
  - some may be sensitive
  - an *old* problem (consider medical research)
- perhaps formalize research access to data
  - an explicit process, not back-room handshake
  - can constrain what is shared
    - minimize the contents
    - review needs (Institutional Research Boards)?
    - agree (by policy) data will not be joined to de-anon.
  - further drill-down will be needed, but hopefully rarely

Context: the Broader DNS "Ecosystem"

- for operations
  - US laws: CALEA, ECPA, Stored Comm. Act, etc.
  - also international laws, like in EU
  - need to consider how these are handled inside orgs
- for researchers
  - Menlo Report—how principles from medical ethics apply to computer research
  - some academic conferences now require an "ethics statement" in papers

Where From Here?

- challenge
  - can we flip the switch to “default private”?
  - with a “narrow on” with auditing,
    for operations and research?
- questions
  - for researchers, would this be better than today?
  - for operators, could you still do your job?
  - for users (and user watchdogs), better? sufficient?