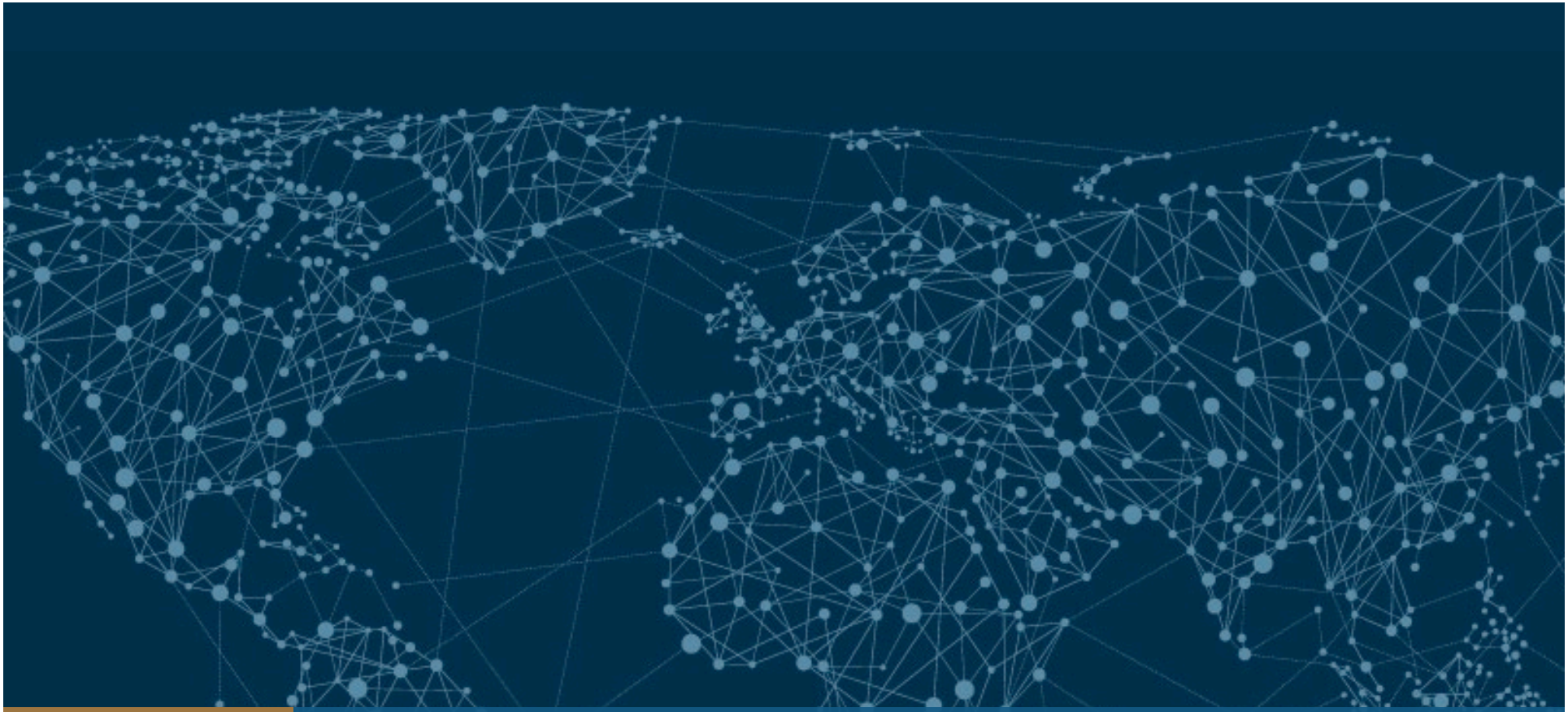


ITHI DNS Sanitas: Sine Morbus

(DNS Health: Free from Diseases)

Alain Durand, ITHI, ICANN57, November 7th 2016

ICANN Strategic Plan 2016-2020

https://www.icann.org/en/system/files/files/strategic-plan-2016-2020-10oct14-en.pdf

2.1 Foster and coordinate a healthy, secure, **stable, and resilient** identifier ecosystem.

KEY SUCCESS FACTORS (OUTCOMES)

- Increased collaboration with the global community that improves the security, stability and resiliency of the unique identifier ecosystem (including updates of the root zone, Internet numbers registries, and protocol parameter registries, operation of the "L" root server, and other operational infrastructure supporting the identifier ecosystem).
- Ecosystem is able to withstand attacks or other events without loss of confidence in the operation of the unique identifier system.
- Unquestionable, globally recognized legitimacy as coordinator of unique identifiers.
- Reduction of government/industry/other stakeholders' concerns regarding availability of IP addresses.
- …

ITHI Project Timeline

http://www.icann.org/ithi
Mailing list: ithi@icann.org

March 2016: ITHI kick-off at ICANN55

Number community, through the NRO, joined the ITHI project but demanded to drive their own component.

September 2016: ITHI workshop at ICANN DC office
October 2016: ITHI workshop with M3AAWG, Paris
November 2016: ITHI session at ICANN57

ITHI: Methodology

We are following SSAC SAC077 recommendations:

1) Define Health
2) Define Metrics to measure health
3) Get data to compute above metrics

Status: - We are at step 1: defining health.

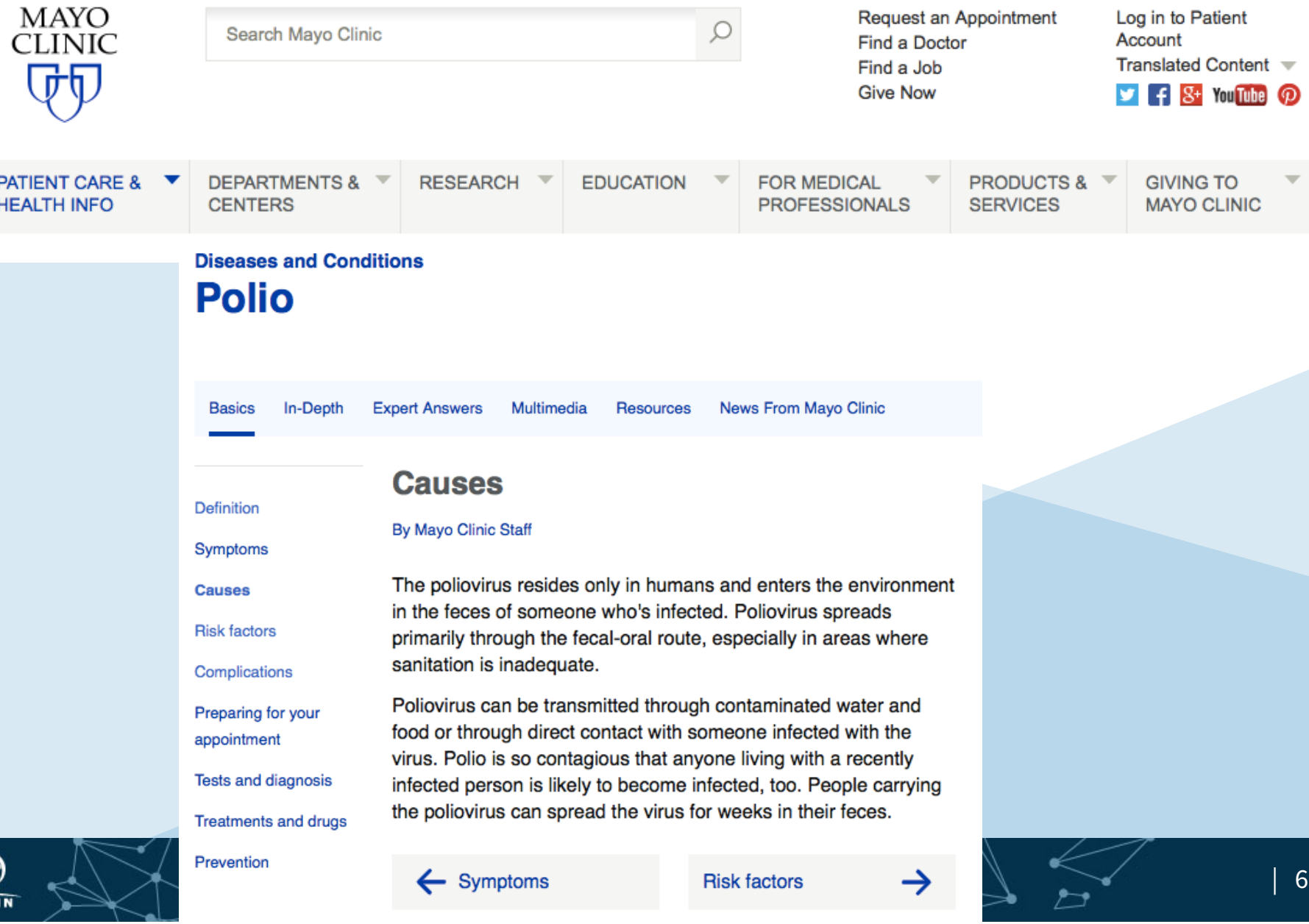
Next steps: - Get community consensus on step 1:
- Public comment period following ICANN57
- Get to step 2 by ICANN58

Heath: Definition

health |helTH|
noun
the state of being free from illness or injury

- Merriam Webster Dictionary

Describing Diseases: Example from the Mayo Clinic



Definition of Terms

Definition	A statement of the exact meaning of a word
Symptoms	A sign of the existence of something, especially of an undesirable situation
Causes	A person or thing that gives rise to an action, phenomenon, or condition
Risk Factors	A risk factor is any attribute, characteristic or exposure that increases the likelihood of developing a disease or injury.
Complications	A secondary disease or condition aggravating an already existing one
Impact	The effect or influence of one person, thing, or action, on another
Potential Treatment	Treatment: medical care given to a patient for an illness or injury

Latin & Greek Terminology

Sanitas: Health
Morbus: Disease
sine: without

Data: Data
Malus: Bad
Nefar: Crime
Magintudo: Quantity
Perfluo: Leak
Fallax: Lying

-**itis**: Infection
-**Pathy**: Disorder
-**ism**: Condition
-**algia**: Pain

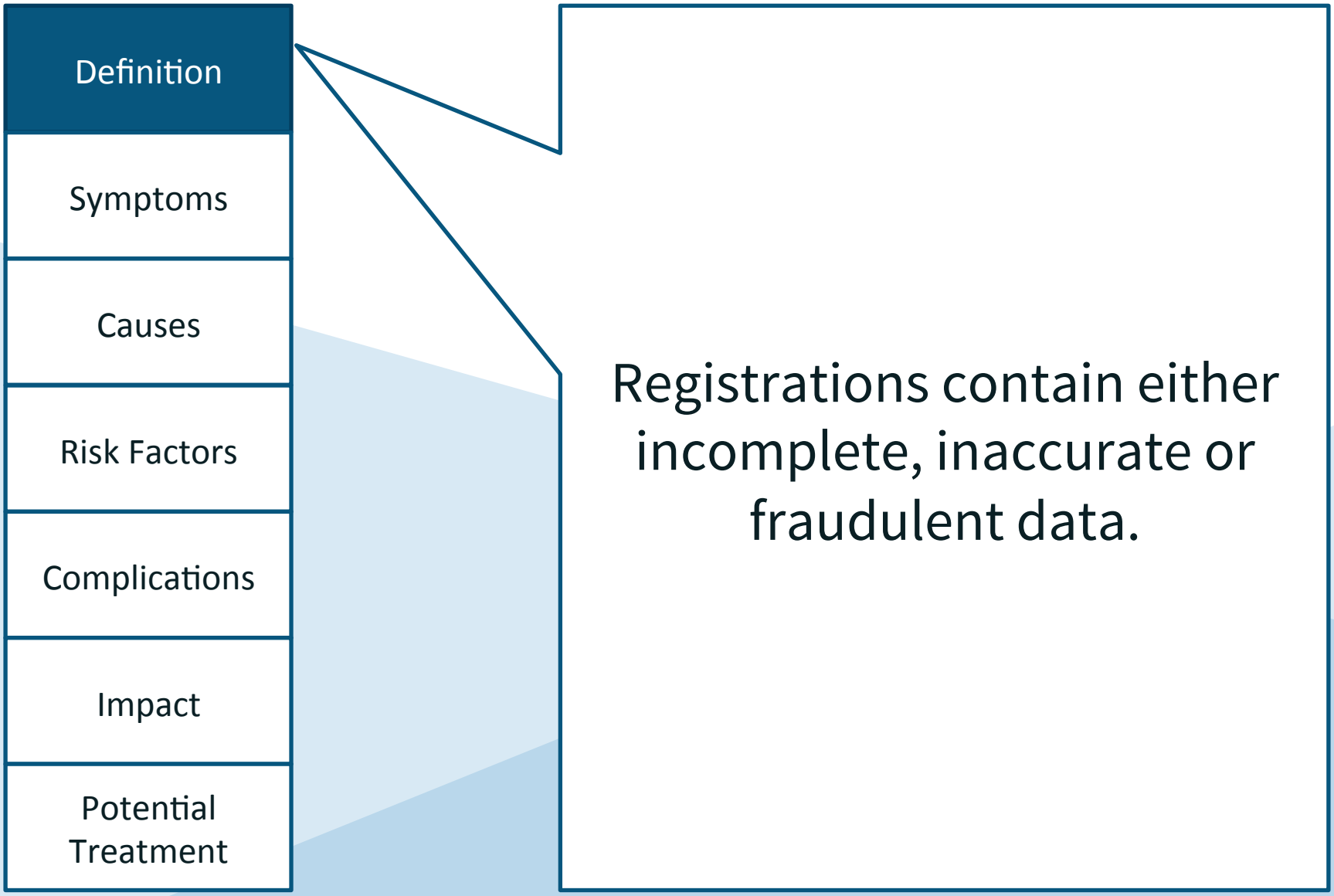
Heath: Who is the Patient?

The patient is the system of unique Internet Identifiers ICANN helps coordinate.

Domain Name Abuse Diseases

DATAMALGIA (Pain from Bad Data)

Datamalgia (Pain from Bad Data)



Datamalgia (Pain from Bad Data)

- Contact information points to erroneous or non-existing locations or persons
- Large numbers of registrations with similarly incomplete, inaccurate or fraudulent information (often indicative of a spam campaign)

Datamalgia (Pain from Bad Data)

- Some registrants don't supply accurate Whois.
- Out of scope: registrants who use privacy/proxy services
- Registrant/registrar Whois accuracy obligations and registrar verification/ validation obligations not enforced or not consistent.

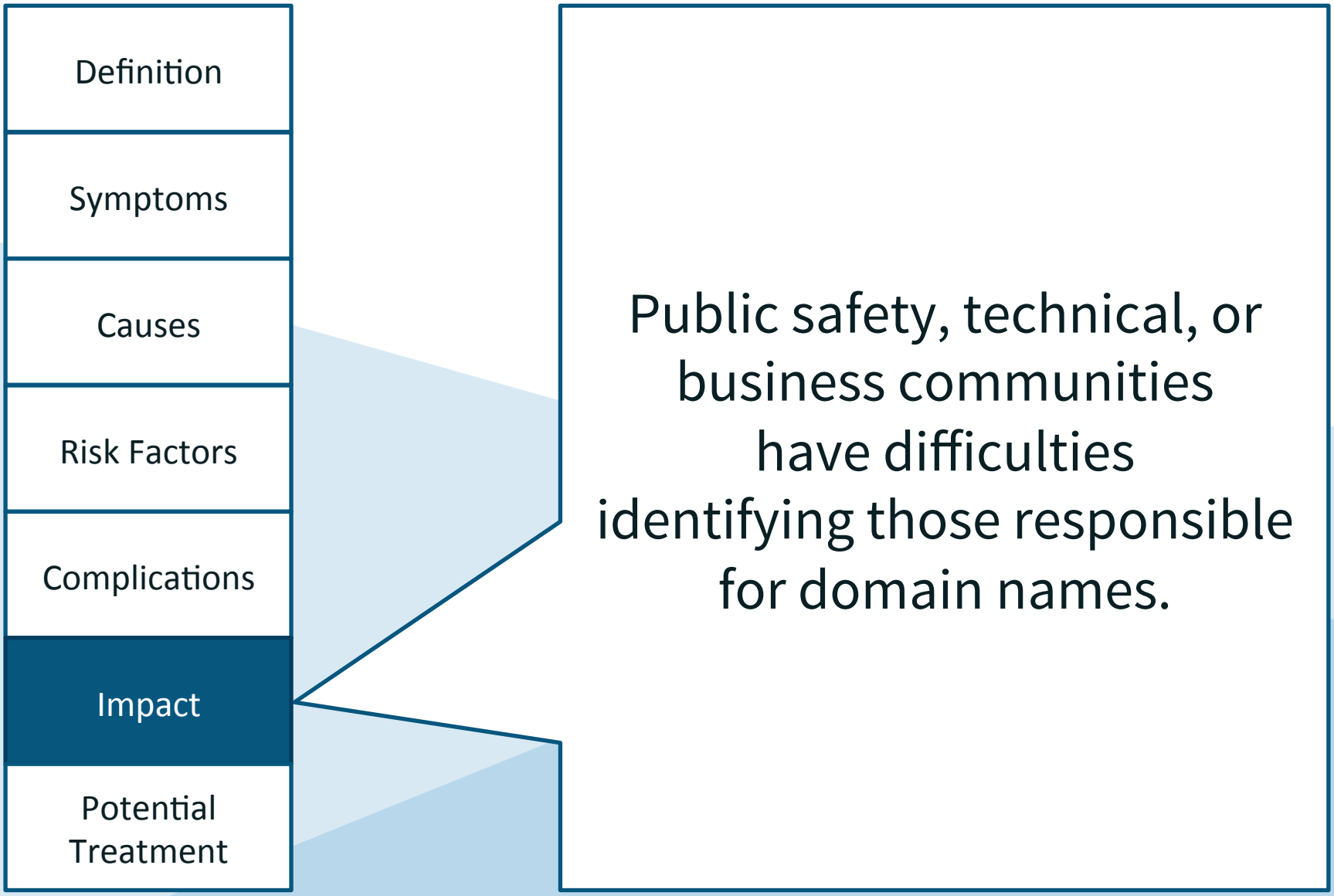
Datamalgia (Pain from Bad Data)

- Lack of agreed upon definition of accuracy
- Data accuracy/verification/ validation is not enforced (or not enforceable) or not consistent
- National laws may be in conflict with getting access to accurate data (conflict of interest between accuracy and privacy)
- Data may exist but not accessible.

Datamalgia (Pain from Bad Data)

- Registrant fraud:
  - Unauthorized domain name transfers
  - Loss of *contactability*
- Can escalate to Abusitis

Datamalgia (Pain from Bad Data)



Datamalgia (Pain from Bad Data)

- Contract enforcement: RAA/Registration Agreements, Terms & Conditions
- Acceptable Use Policies that prohibit abuse and misuse of domain names
- National laws may force data accuracy checks

Domain Name Abuse Diseases

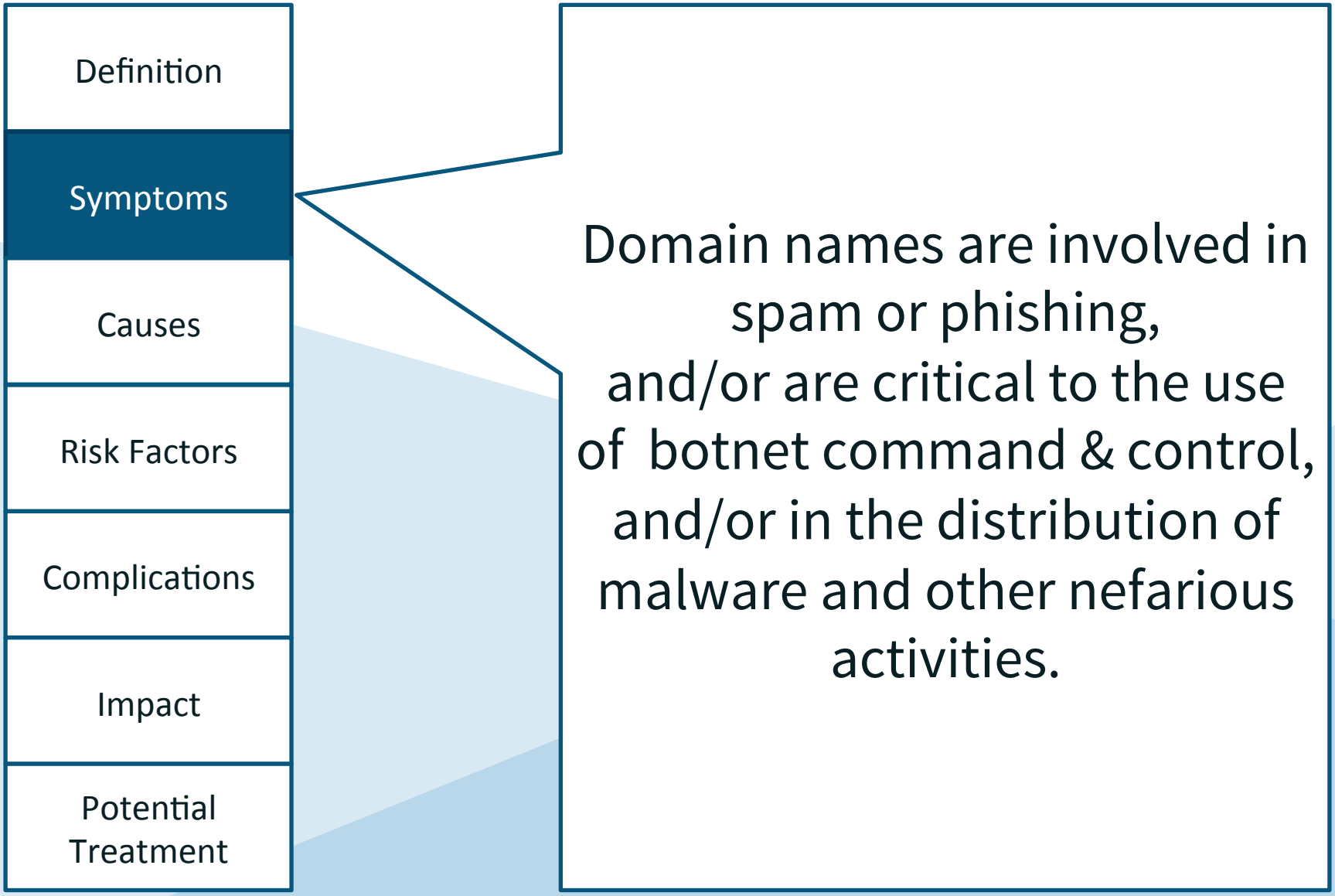
Abusitis (Abuse Infection)

Abusitis (Abuse Infection)

- Definition
- Symptoms
- Causes
- Risk Factors
- Complications
- Impact
- Potential Treatment

Domain name abuse is the registration or use of a domain name with the capability to cause spam, phishing, malware distribution or command & control of botnets.

Abusitis (Abuse Infection)



Abusitis (Abuse Infection)

- Abusive and/or harmful activities facilitated by the registration and use of domain names.
- Contractual & operational weaknesses or poor contractual enforcement in domain name registration process and life cycle.

Abusitis (Abuse Infection)

- Nefarious intent of the registrant may not be discovered at the time of registration
- Use of privacy/proxy services
- Incompetent, complacent or complicit behavior of registries/registrars.
- ICANN compliance department rendered ineffective

Abusitis (Abuse Infection)

Abuse or criminal activities including but not limited to:

- Phishing
- Botnet Command and Control
- Malware Distribution
- Spam
- …

Abusitis (Abuse Infection)

- Domain names associated with abuse may appear in anti-abuse lists.
- Large economical impact for merchants and consumers/damage to brand
- Erosion of consumer confidence
- Erosion of confidence in the DNS system
- Fragmentation of the DNS

Abusitis (Abuse Infection)

- Pre-registration automatic screening
- Post registration anti-abuse responses
- Where possible, accelerated procedure for take down
- Common registry/registrar contractual anti-abuse provisions
- Universal minimum price

DNS Server Operation Disease

MAGNITUDALGIA (Pain from Quantity)

ICANN

Magnitudalgia (Pain from Quantity)

- **Definition**
- Symptoms
- Causes
- Risk Factors
- Complications
- Impact
- Potential Treatment

Higher volume of traffic than should be observed in an ideal* world hits DNS servers.

*ideal: no more than a few queries per name per network for the duration of the TTL

Magnitudalgia (Pain from Quantity)

- Monitoring systems detect higher than normal traffic
- DNS servers start dropping traffic.

Magnitudalgia (Pain from Quantity)

- Many queries are often sent at rapid intervals for the same questions, ignoring TTLs.
- A large number of queries are seen for non-existent names.
- DDOS attacks exacerbate the problem.

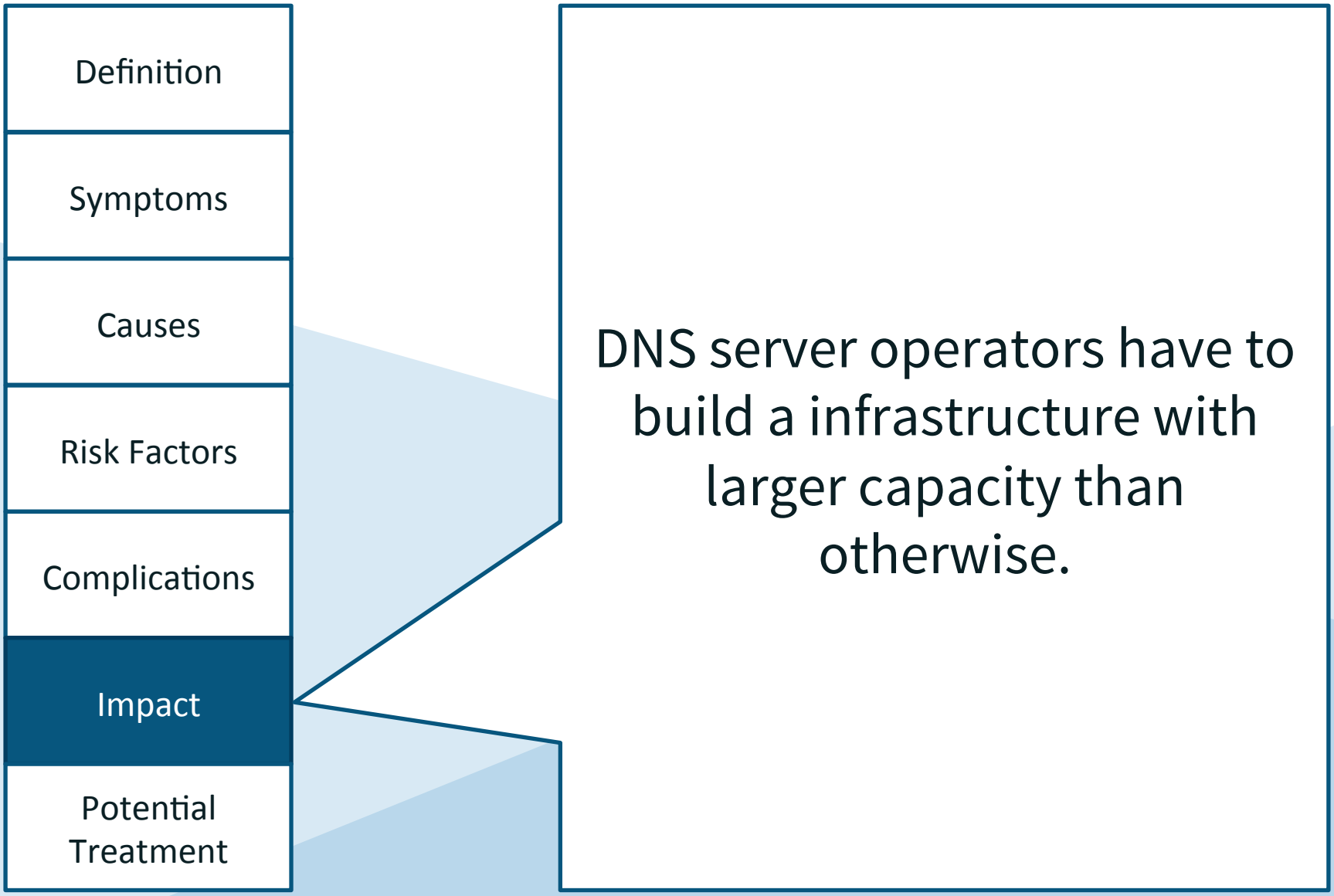
Magnitudalgia (Pain from Quantity)

- Prevalent existence of poorly managed open resolvers
- Proliferation of misconfigured or buggy DNS resolvers
- Lack of deployment of BCP38 (ingress filtering)
- Compromised IoT devices

Magnitudalgia (Pain from Quantity)

- Unreachability of name servers
- In extreme cases, names will not resolve

Magnitudalgia (Pain from Quantity)



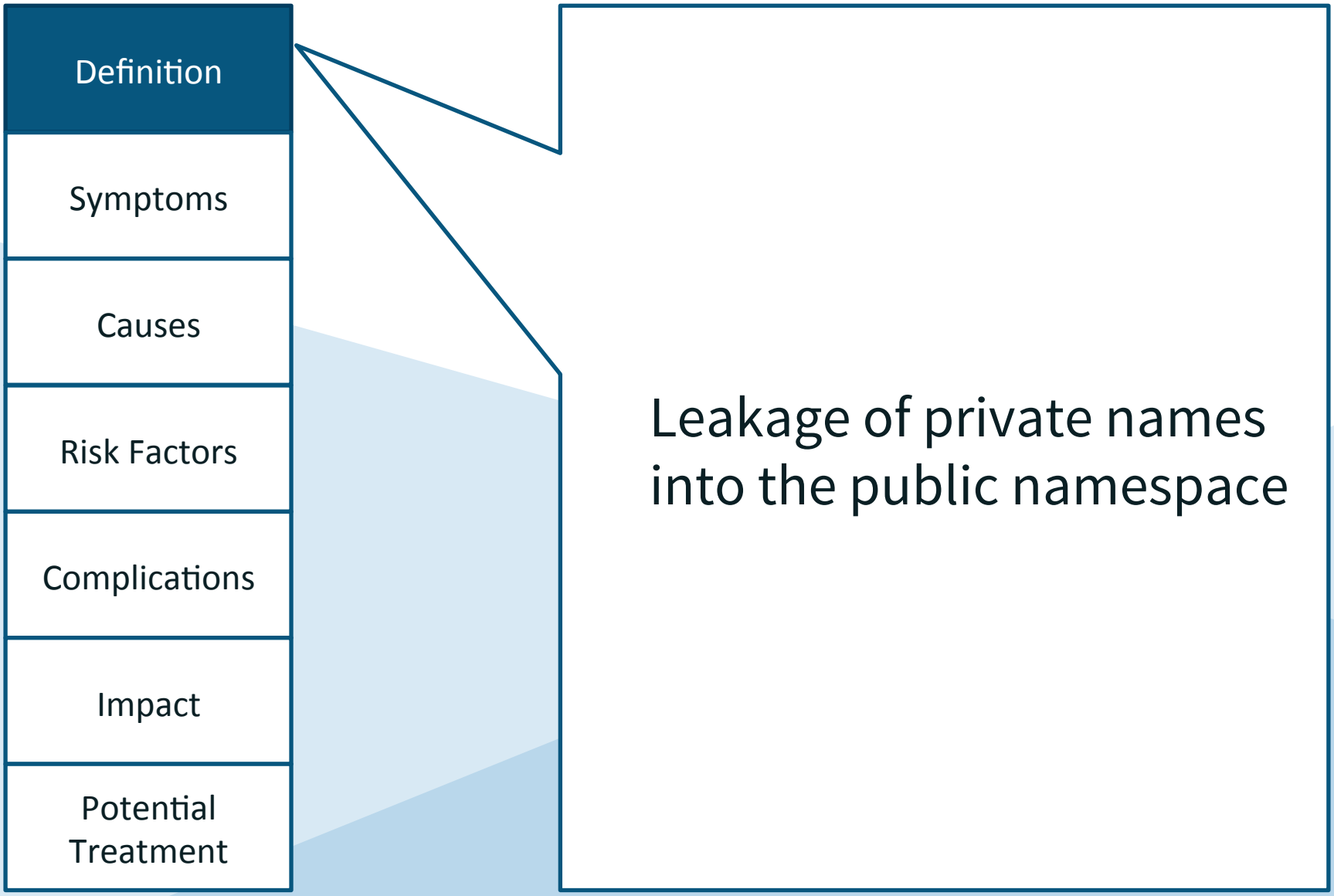
Magnitudalgia (Pain from Quantity)

- DDOS mitigation
- Excessive query suppression
- Capacity adaptation

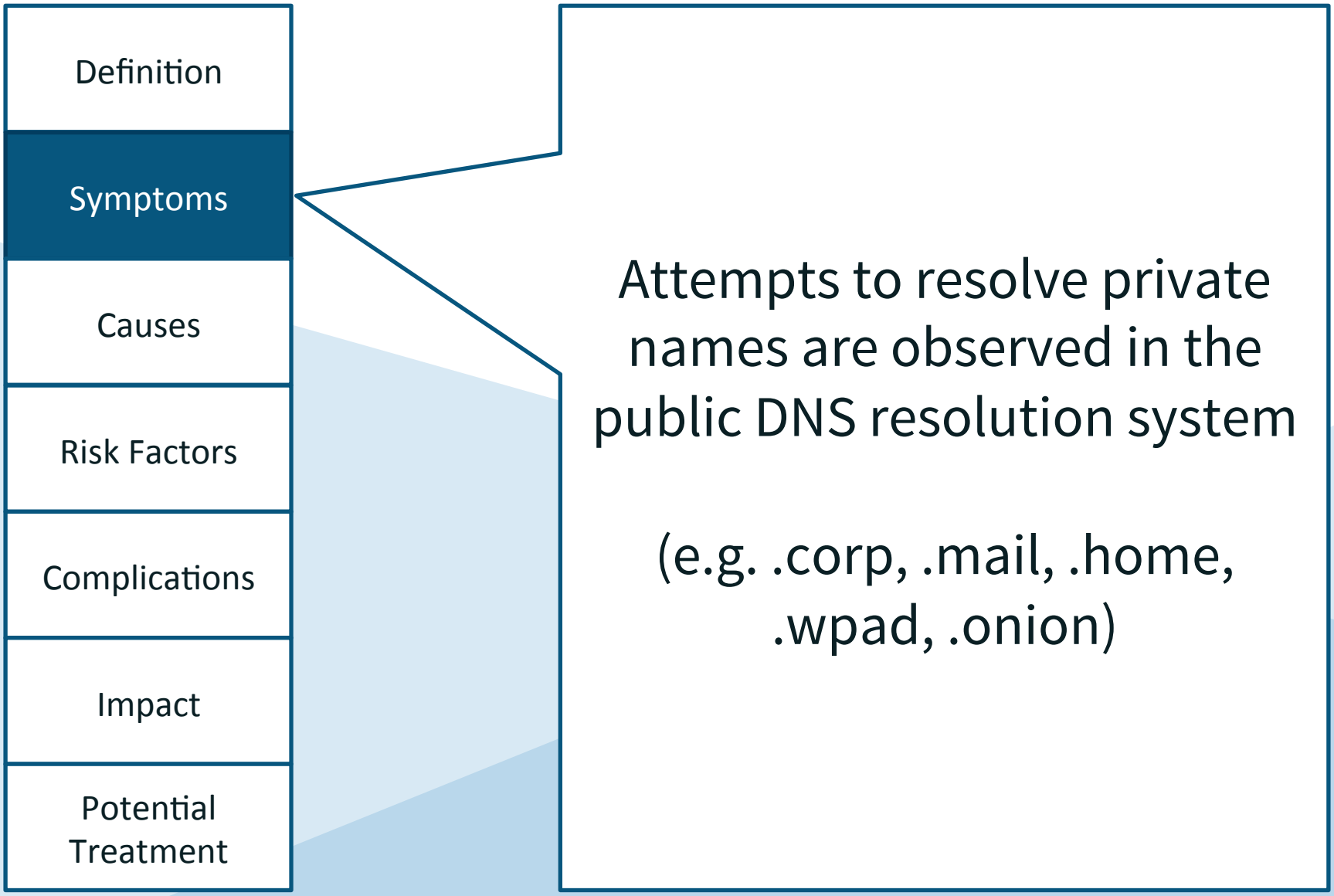
DNS Transmittable Diseases

PERFLUOISM (Leakage Condition)

Perfluoism (Leakage Condition)



Perfluoism (Leakage Condition)



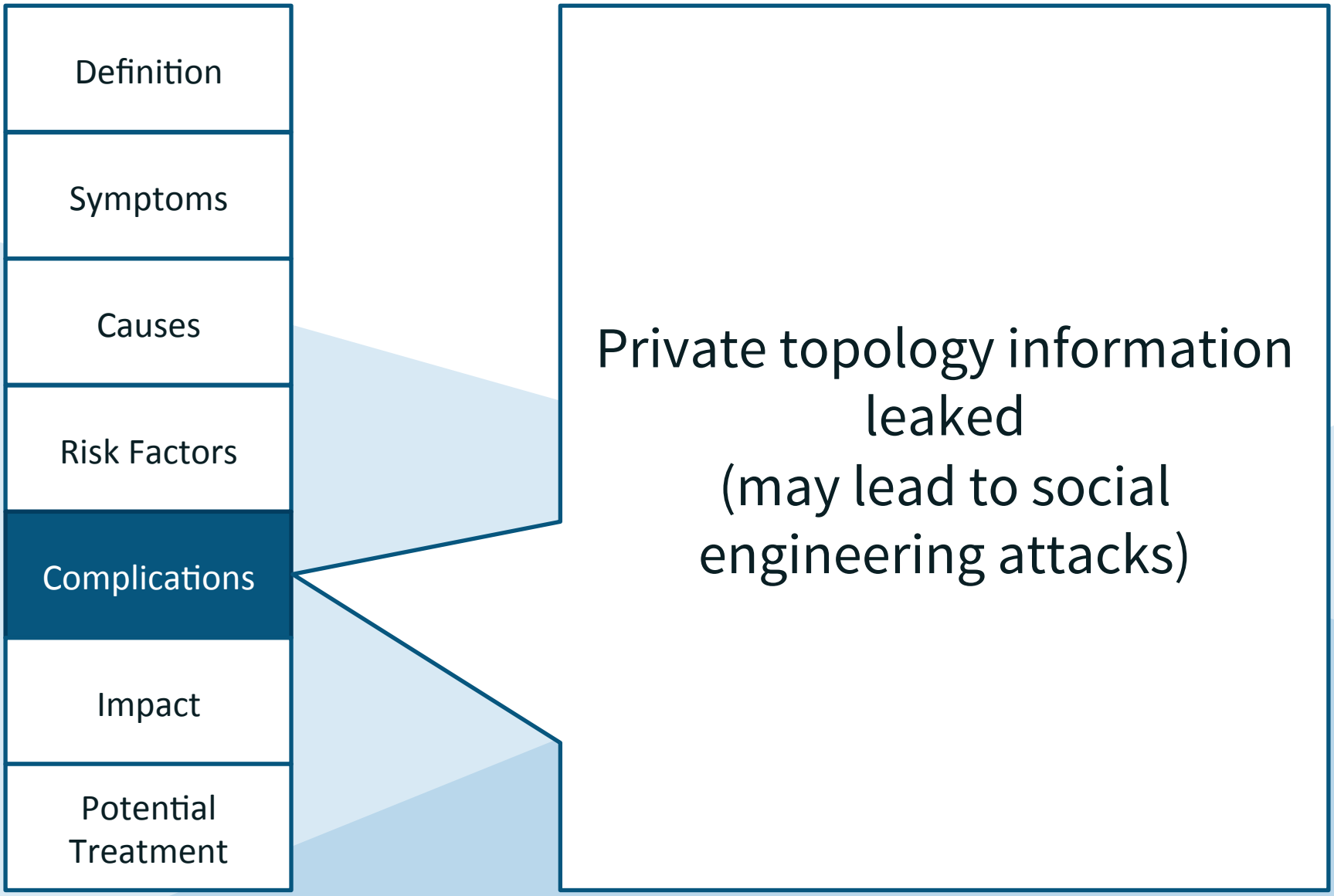
Perfluoism (Leakage Condition)

- Misconfigured software
- Poor or inaccurate guidance from vendors regarding use of private TLDs
- “Bring your laptop at home”/connection attempts before VPN is active

Perfluoism (Leakage Condition)

- Confusion or lack of awareness of name collision problem
- Unwillingness to change, apathy
- Difficult-to-upgrade (legacy) equipment that embeds private names
- Low cost devices with buggy software using private names

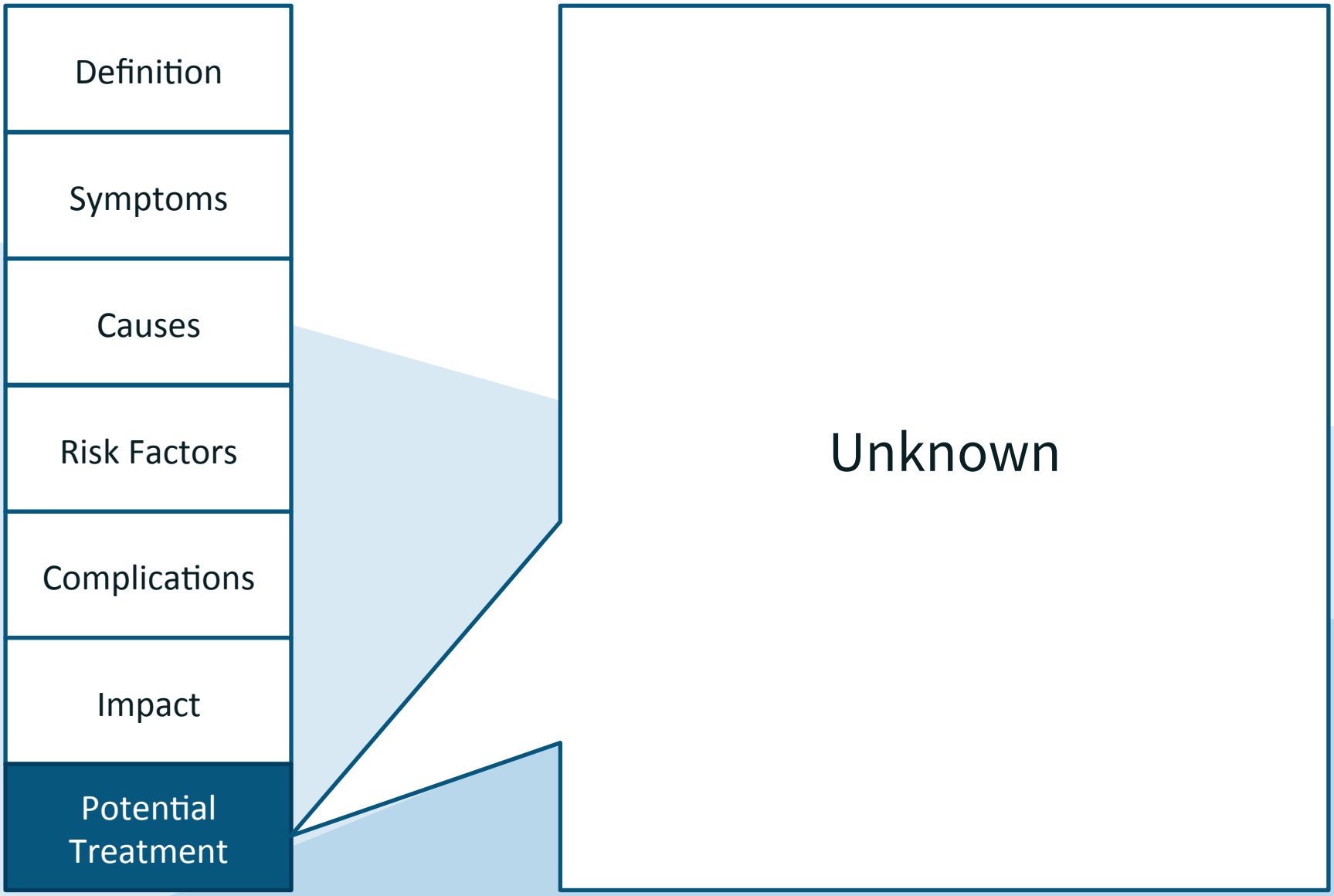
Perfluoism (Leakage Condition)



Perfluoism (Leakage Condition)

- Privately chosen suffix may become unusable in the global DNS.
- Issue of whether suffix should be made a reserved string

Perfluoism (Leakage Condition)



DNS Transmittable Diseases

DATAFALLAXOPATHY (Lying Disorder)

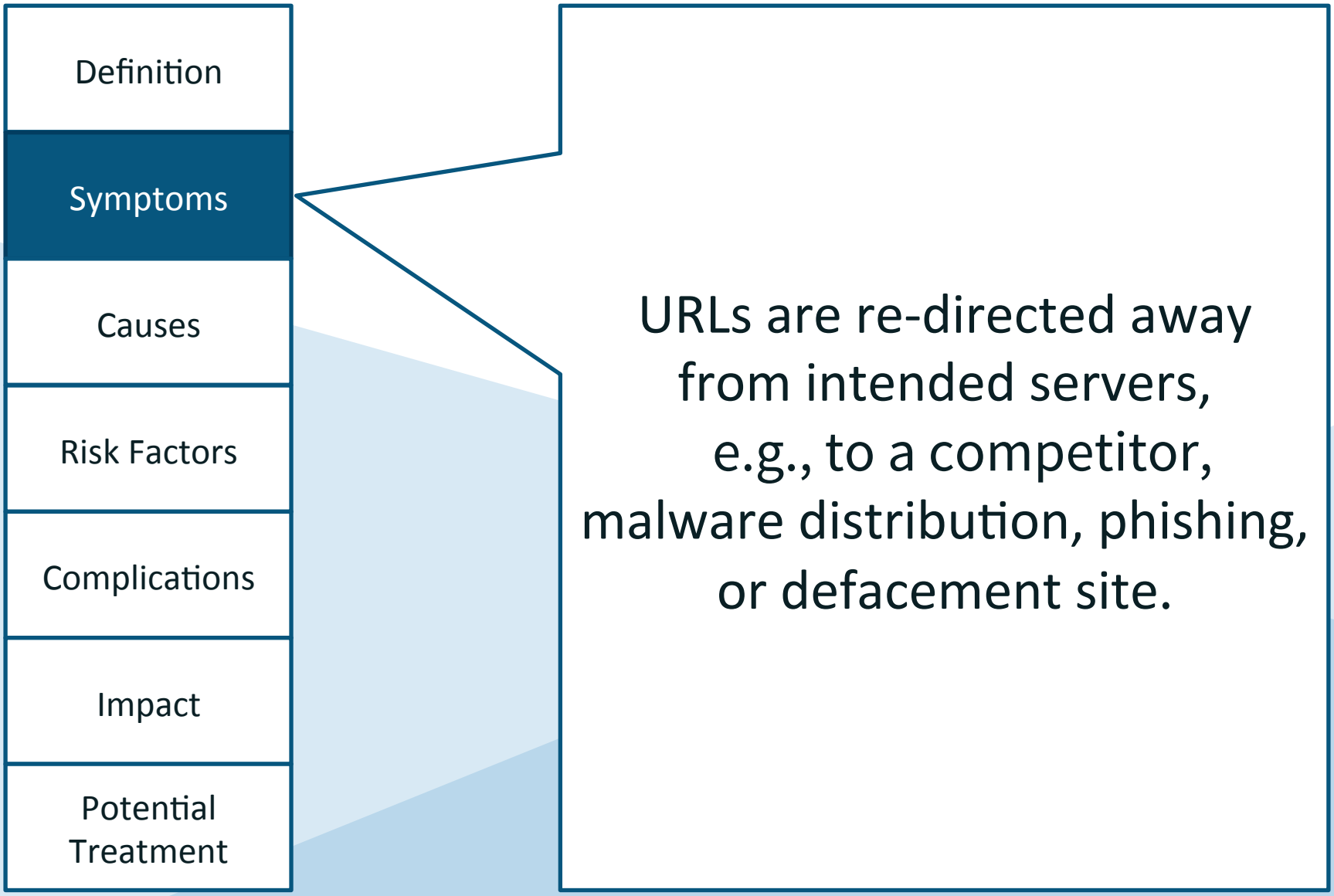
Datafallaxopathy (Lying Disorder)

- **Definition**
- Symptoms
- Causes
- Risk Factors
- Complications
- Impact
- Potential Treatment

Responses from DNS resolvers to DNS queries contain unauthorized/ forged/tampered data.

Note: This does not include access blocking by regulators or parental control

Datafallaxopathy (Lying Disorder)



Datafallaxopathy (Lying Disorder)

- Cache poisoning or DNS hijacking
- Error resolution service providers (See SAC 032, DNS response modification)

Datafallaxopathy (Lying Disorder)

Incompetent, Complacent or Complicit ISPs:

- Services based on name error resolution deployed despite known adverse consequences
- …

Datafallaxopathy (Lying Disorder)

Abuse or criminal activities including but not limited to:

- Malware Distribution
- Phishing, fraud, defacement, hacktivism, DNS or search traffic theft
- Interference with network monitoring or administration (name errors are important to admins!)

Datafallaxopathy (Lying Disorder)

- Loss of business
- Financial loss (from phishing or from response modification that directs revenue-potential traffic to competitor)
- Loss of confidence in the DNS system.

Datafallaxopathy (Lying Disorder)

Local DNSSEC validation

(indirect effect: if DNSSEC validation was ubiquitous, such attacks would not be possible)

Number Diseases

Number Resource Organization (NRO) update:

"Currently the NRO (trough the Registration Services Coordination Group leadership) is working on the analysis stage for this project, we have identified several steps to complete this work.

During the RSCG face to face meeting which will be held in late November at the AfriNIC meeting, they will review this project definition and work on the risks identification steps (which are the initial parts of the project).

We will share […] any relevant finding after that meeting"

Oscar Robles, LACNIC CEO, rotating NRO chair.
September 30th, 2016