VborNet

National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

WP4: Strategic paper I

Towards an integrated approach in monitoring and surveillance of vector-borne diseases in Europe

By Marieta Braks on behalf of WP4

19 April 2011

VbornNet

National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

Content

1. Basics
2. Monitoring and surveillance system
3. Harmonization and Priority setting
4. Surveillance and intervention
5. From monitoring to surveillance: Decision making
6. Conclusion

1. Basics

- **Public health**
  - branch of medicine concerned with the prevention and control of disease and disability in a population, and the promotion of physical and mental health of the population on the international, national, or intra-national administrative level.

- **Medical entomology**
  - the application and study of insect and other arthropod biology to disease transmission or sanitary matters

- **Vector-borne disease**
  - Disease of which the causative agent is transmitted between vertebrate hosts by another organism (vector)

- **Vector**
  - Here: an arthropod which is exclusively required for the transmission and propagation of the pathogen.

1. Basics

Different types of VBD context

based on the current presence (√) or absence (-) of disease (endemic human cases), pathogen or vector

Context	Endemic disease	Pathogen	Vector	Examples of diseases holding for the Netherlands
1	√	√	√	Lyme borreliosis
2	-	√	√	Dirofilariasis
3	-	-	√	West Nile Fever
4	-	√	-	Leishmaniasis
5	-	-	-	Crimean Congo haemorrhagic fever

1. Basics

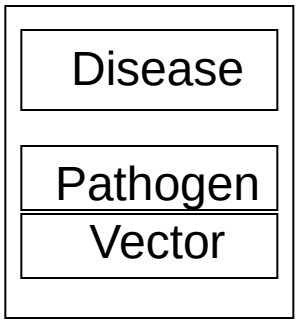
Different types of VBD context

based on the current presence (√) or absence (-) of disease (endemic human cases), pathogen or vector

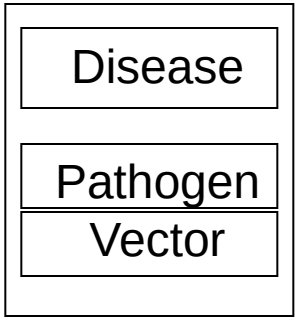
Context	Endemic disease	Pathogen	Vector	Priority setting based on
1	√	√	√	Disease burden
2	-	√	√	Threat
3	-	-	√	Threat
4	-	√	-	Threat
5	-	-	-	Threat

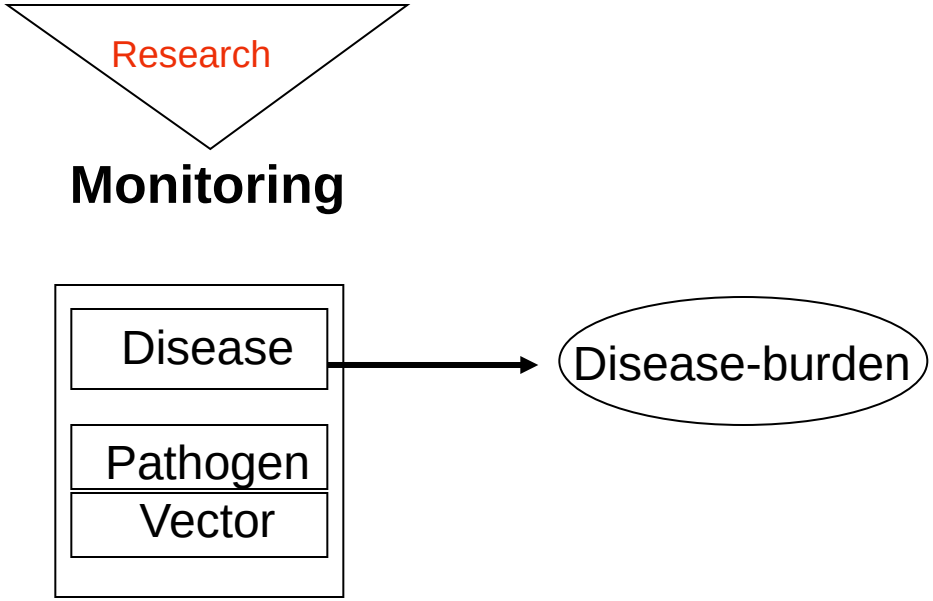
2. Monitoring and surveillance system

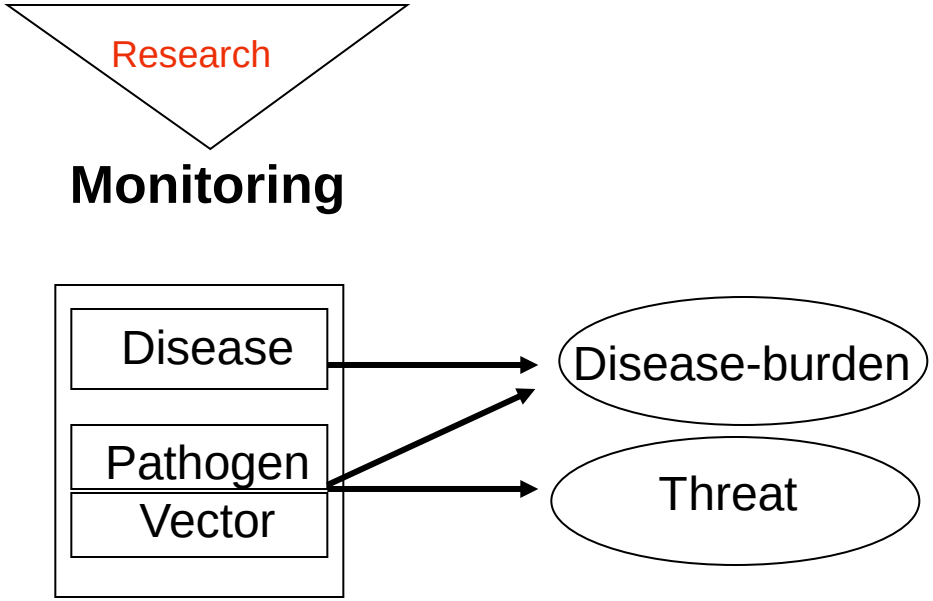
Monitoring

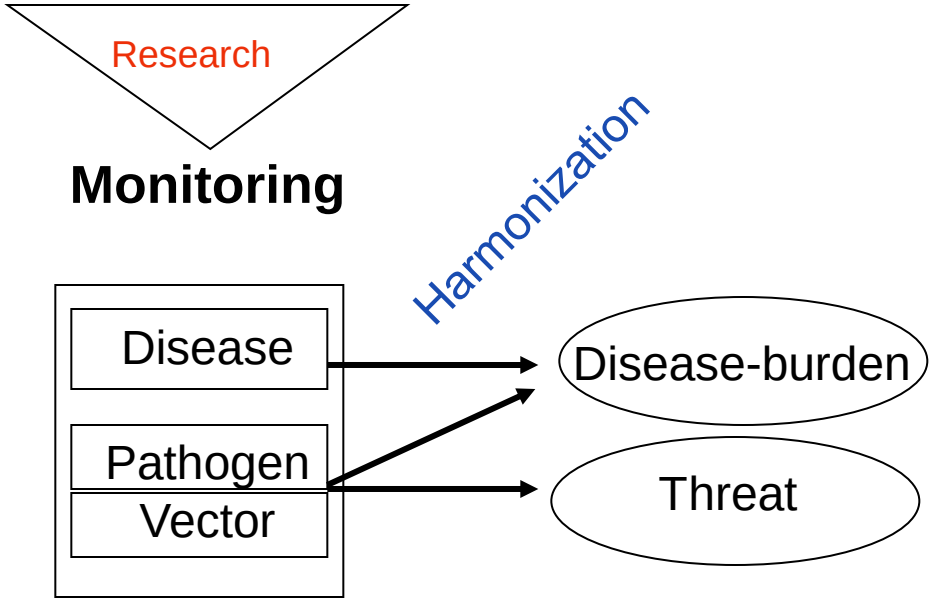


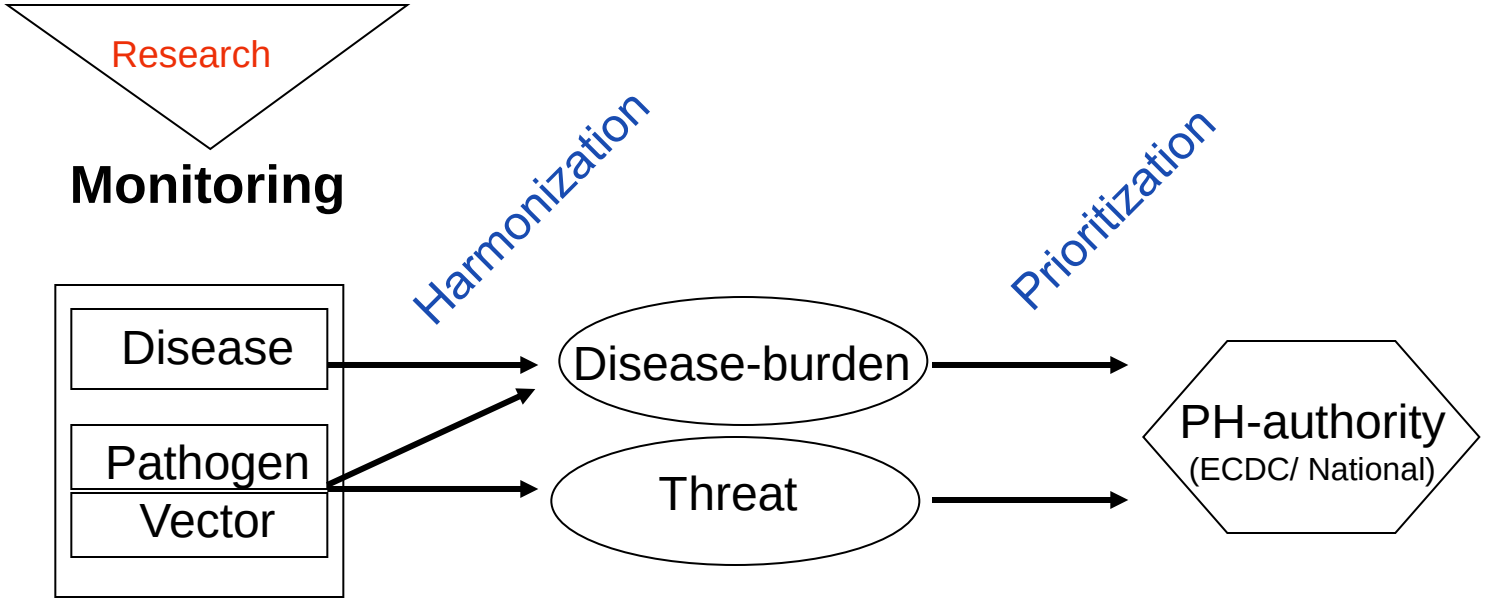
Monitoring

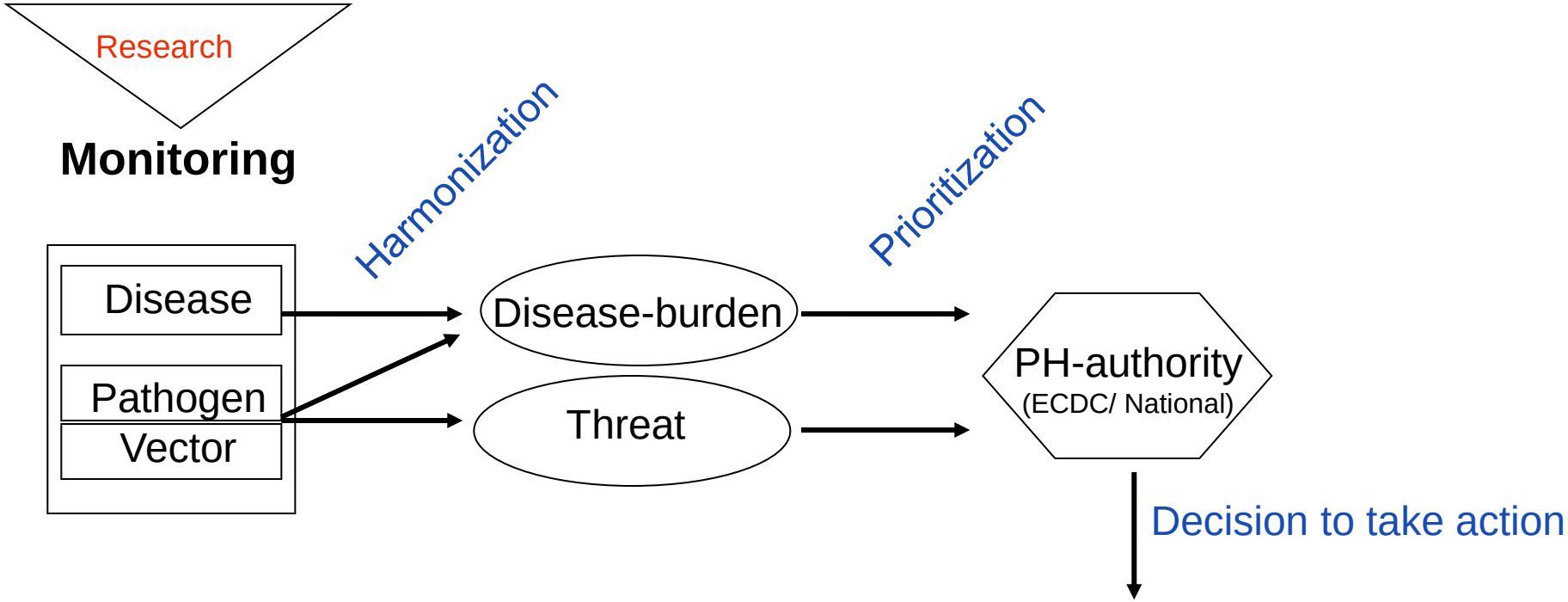


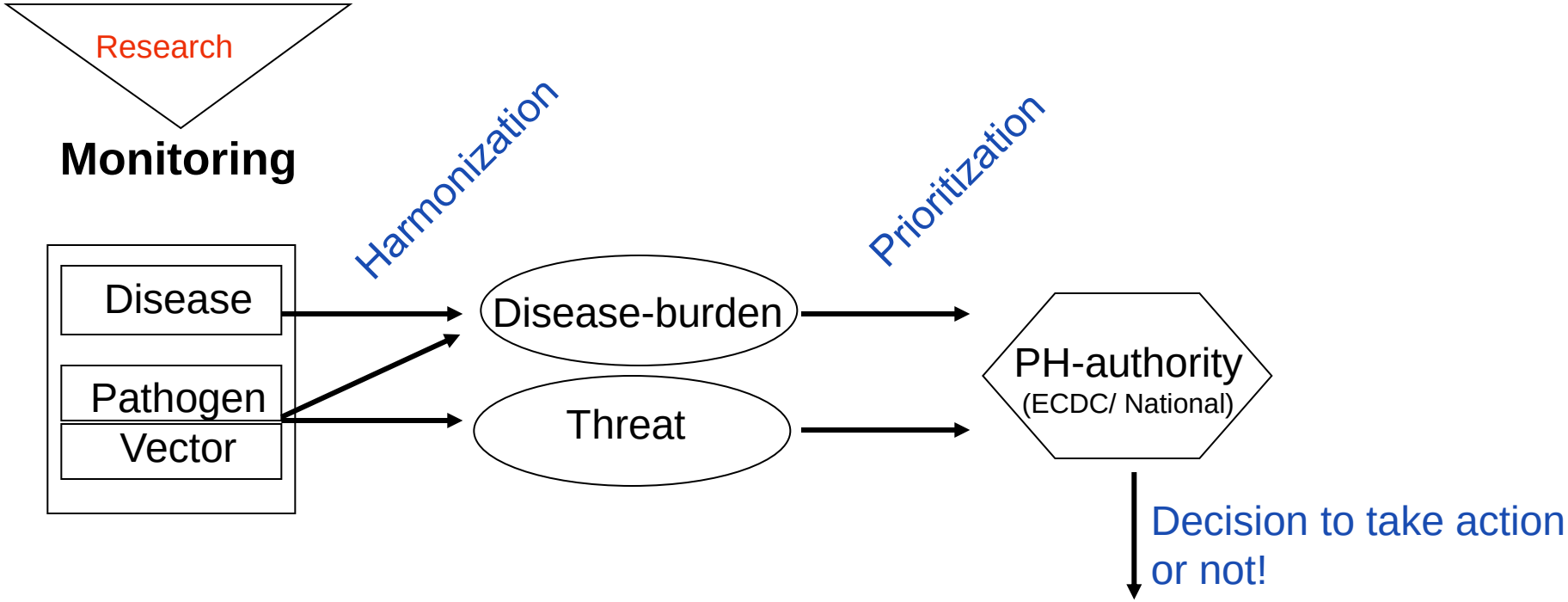

Research
Monitoring
Disease
Pathogen
Vector
Disease-burden

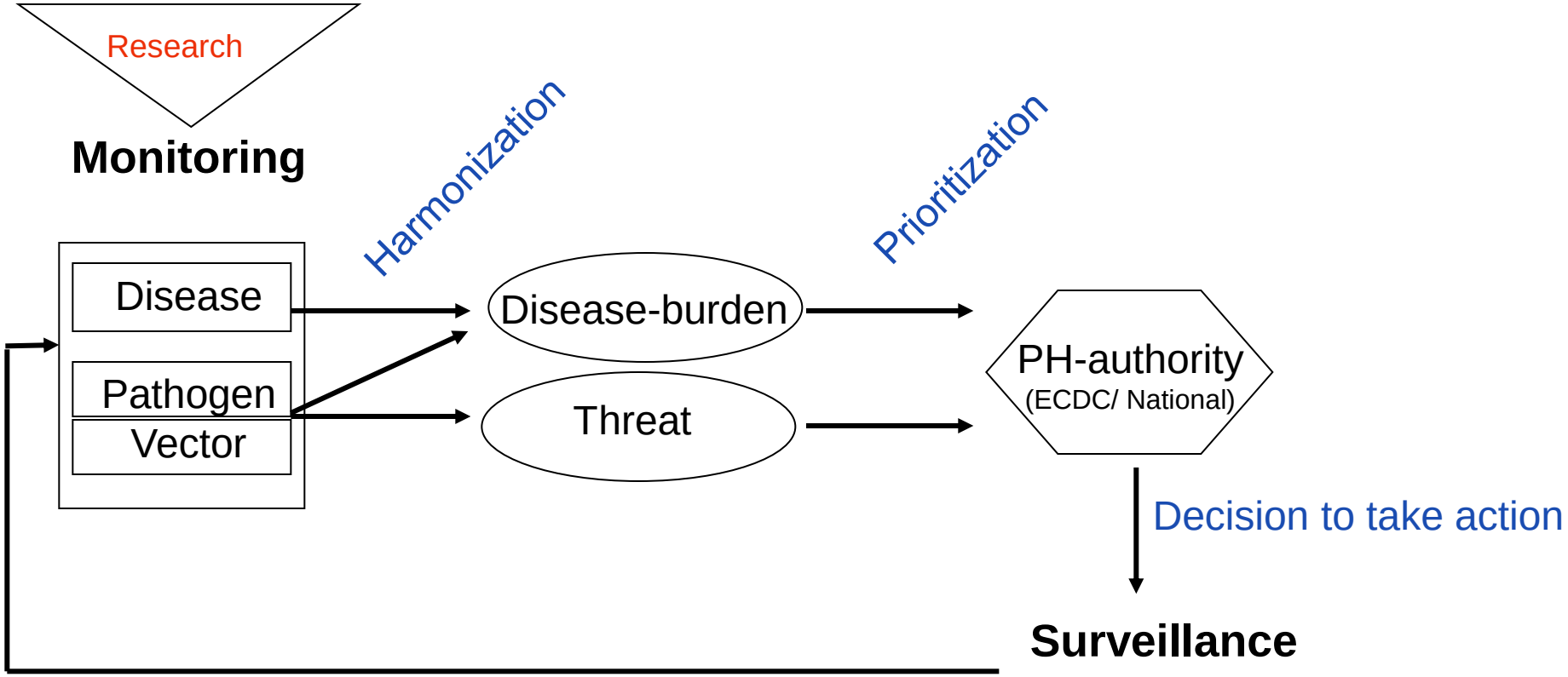

Research
Monitoring
Disease
Pathogen
Vector
Disease-burden
Threat

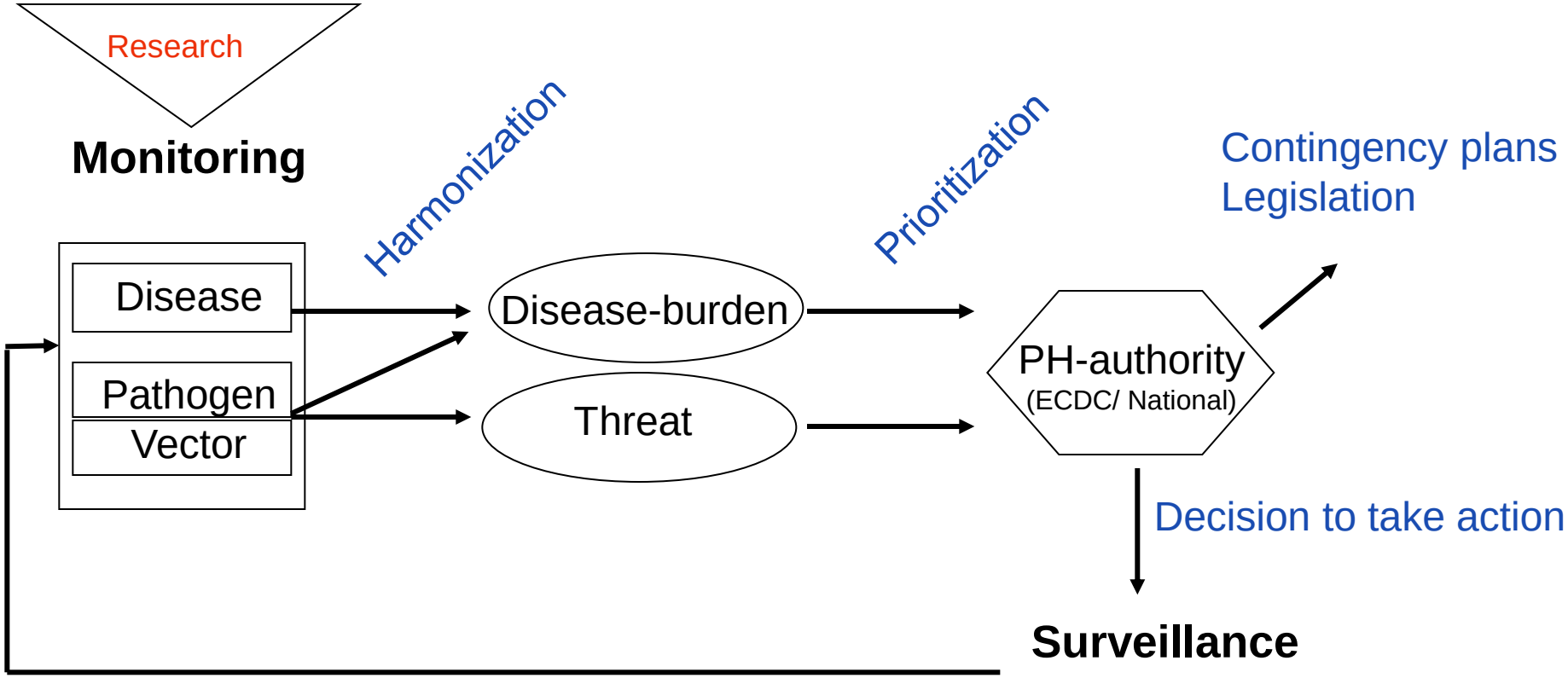

Research
Monitoring
Harmonization
Disease
Pathogen
Vector
Disease-burden
Threat

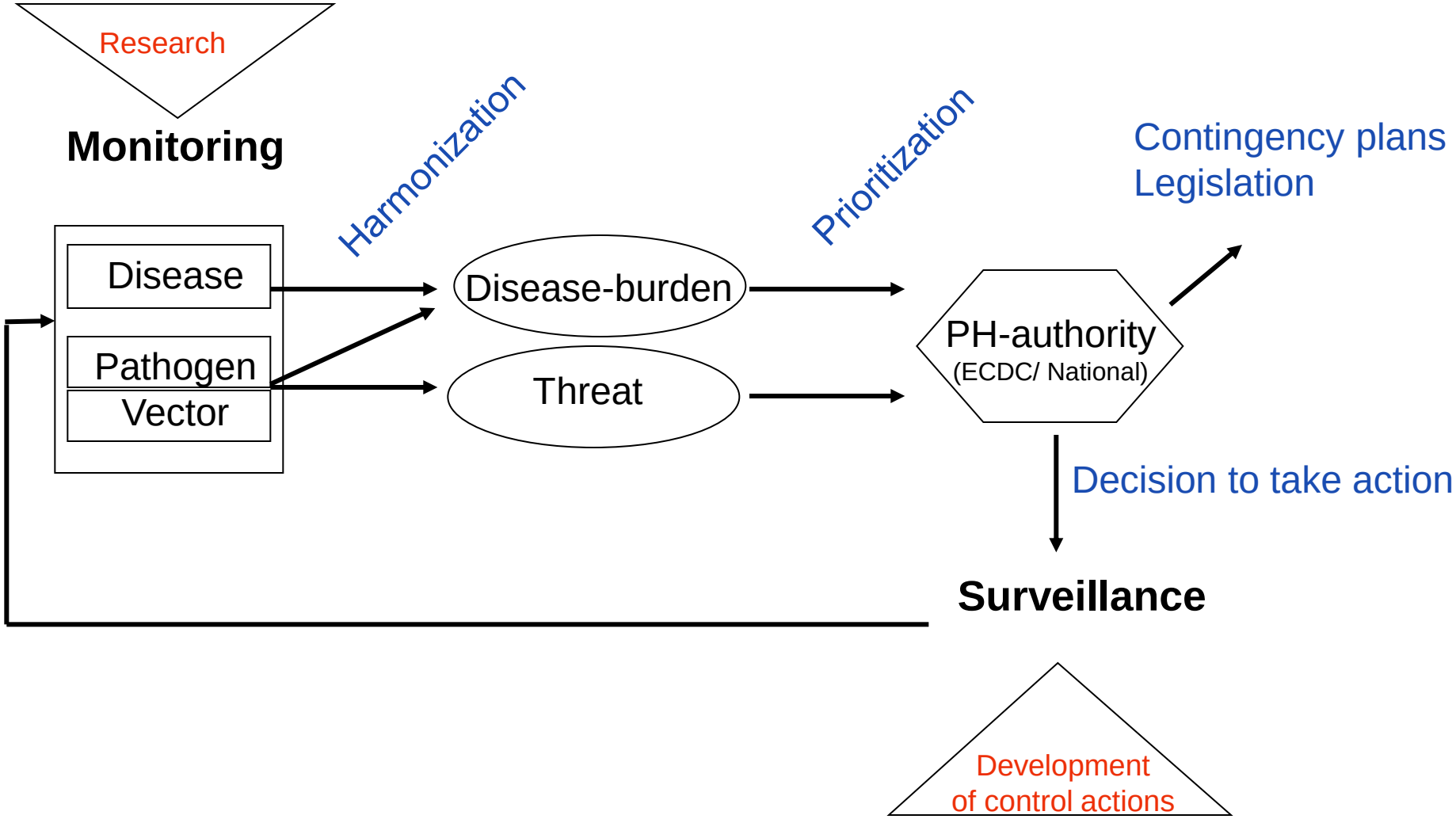

Research
Monitoring
Harmonization
Prioritization
Disease
Pathogen
Vector
Disease-burden
Threat
PH-authority
(ECDC/ National)


Research
Monitoring
Harmonization
Prioritization
Disease
Pathogen
Vector
Disease-burden
Threat
PH-authority
(ECDC/ National)
Decision to take action


Research
Monitoring
Harmonization
Prioritization
Disease
Pathogen
Vector
Disease-burden
Threat
PH-authority
(ECDC/ National)
Decision to take action
or not!


Research
Monitoring
Harmonization
Prioritization
Disease
Pathogen
Vector
Disease-burden
Threat
PH-authority
(ECDC/ National)
Decision to take action
Surveillance


Research
Monitoring
Harmonization
Prioritization
Contingency plans
Legislation
Disease
Pathogen
Vector
Disease-burden
Threat
PH-authority
(ECDC/ National)
Decision to take action
Surveillance


Research
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Prioritization
Contingency plans
Legislation
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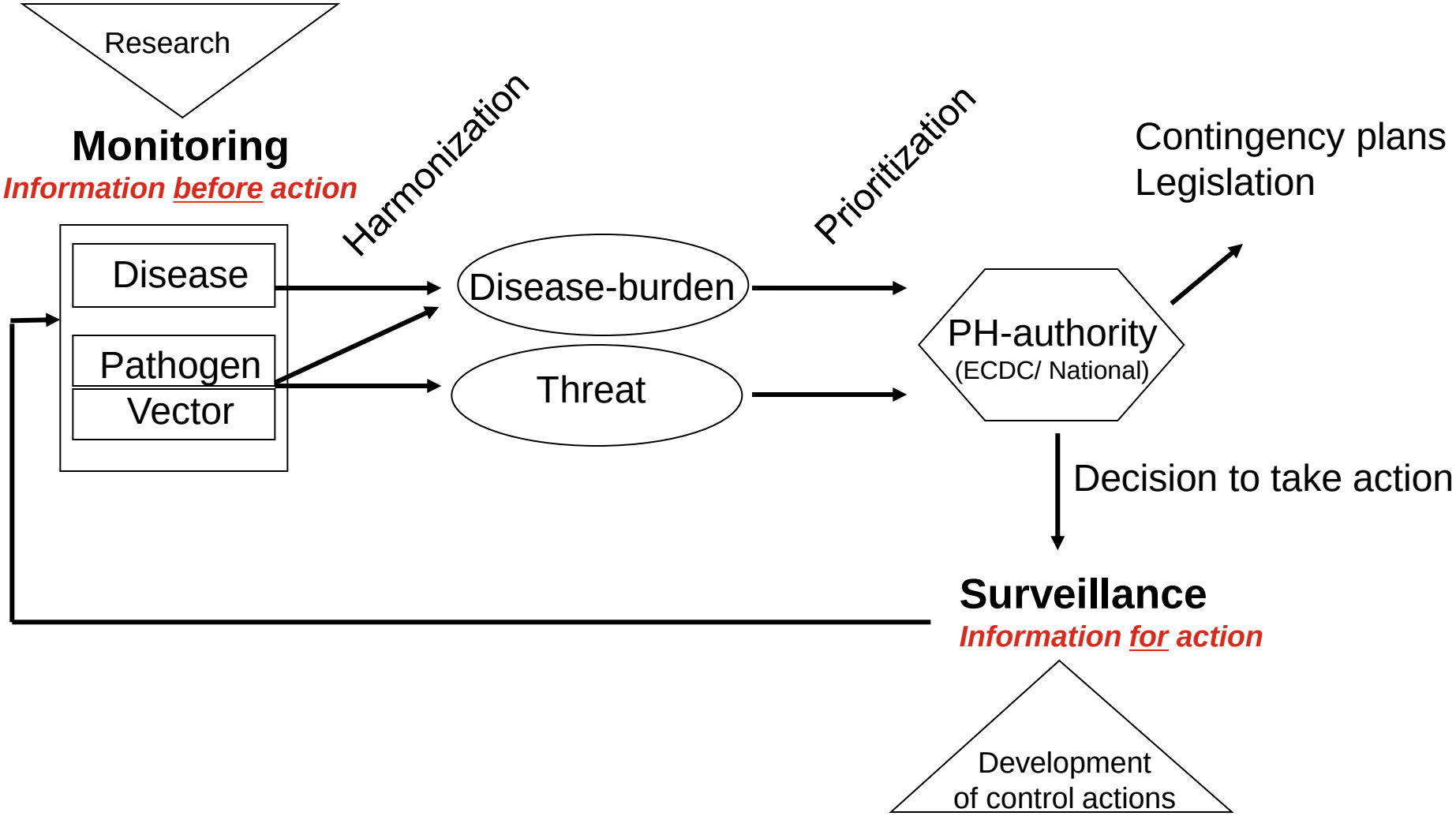
Pathogen
Vector
Disease-burden
Threat
PH-authority
(ECDC/ National)
Decision to take action
Surveillance
Development
of control actions


Research
Monitoring
Information before action
Harmonization
Disease
Pathogen
Vector
Disease-burden
Threat
Prioritization
PH-authority
(ECDC/ National)
Contingency plans
Legislation
Decision to take action
Surveillance
Information for action
Development
of control actions

Monitoring

Different types of data input

1. .
2. .
3. .
4. .
5. .

Monitoring

Different types of data input

1. Germ data
   - Pathogen detection and identification in human, reservoir, vector

Monitoring

Different types of data input

1. Germ data
2. Serological data
   - immunological response in blood of humans and animals to exposure to pathogen

Monitoring

Different types of data input

1. Germ data
2. Serological data
3. Clinical data
   - Basic data from clinical patient files

Monitoring

Different types of data input

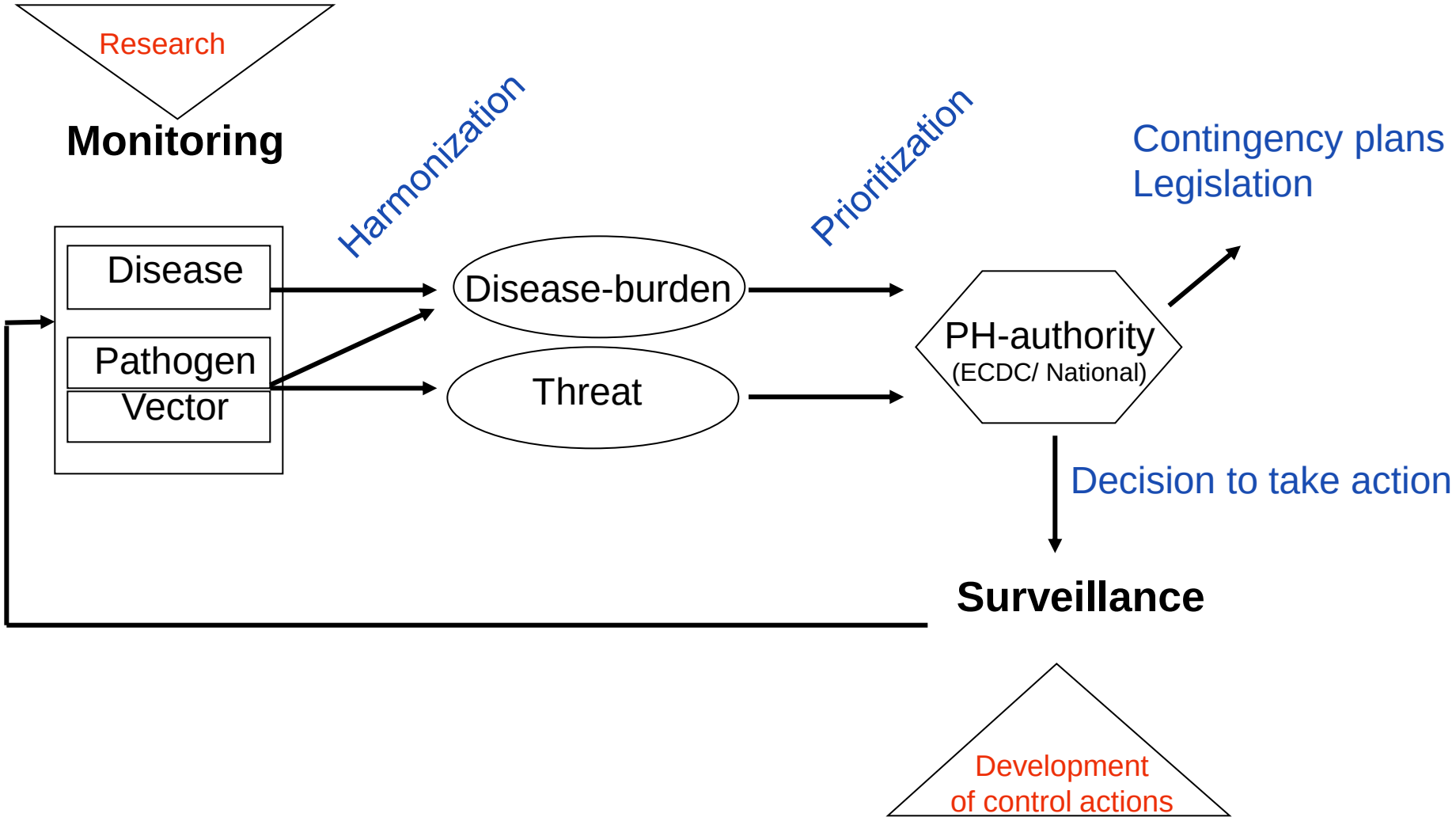
1. Germ data
2. Serological data
3. Clinical data
4. Syndromic data
   - Data on clinical symptoms without any differential/laboratory diagnosis

Monitoring

Different types of data input

1. Germ data
2. Serological data
3. Clinical data
4. Syndromic data
5. Risk data
   - Detecting risk factors e.g. presence absence of vectors
     human risk behaviour

3. Harmonization and priority setting


Research
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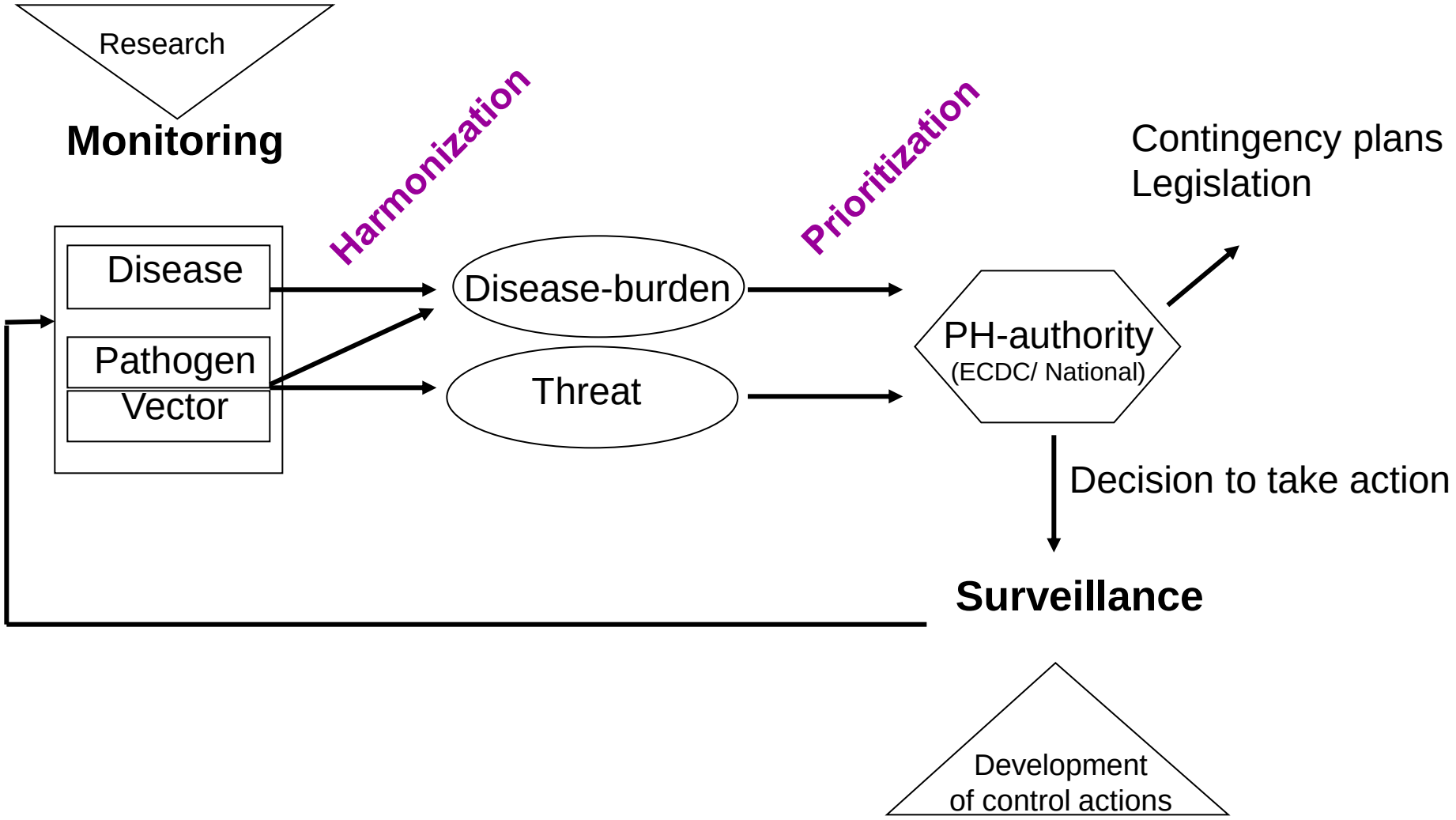
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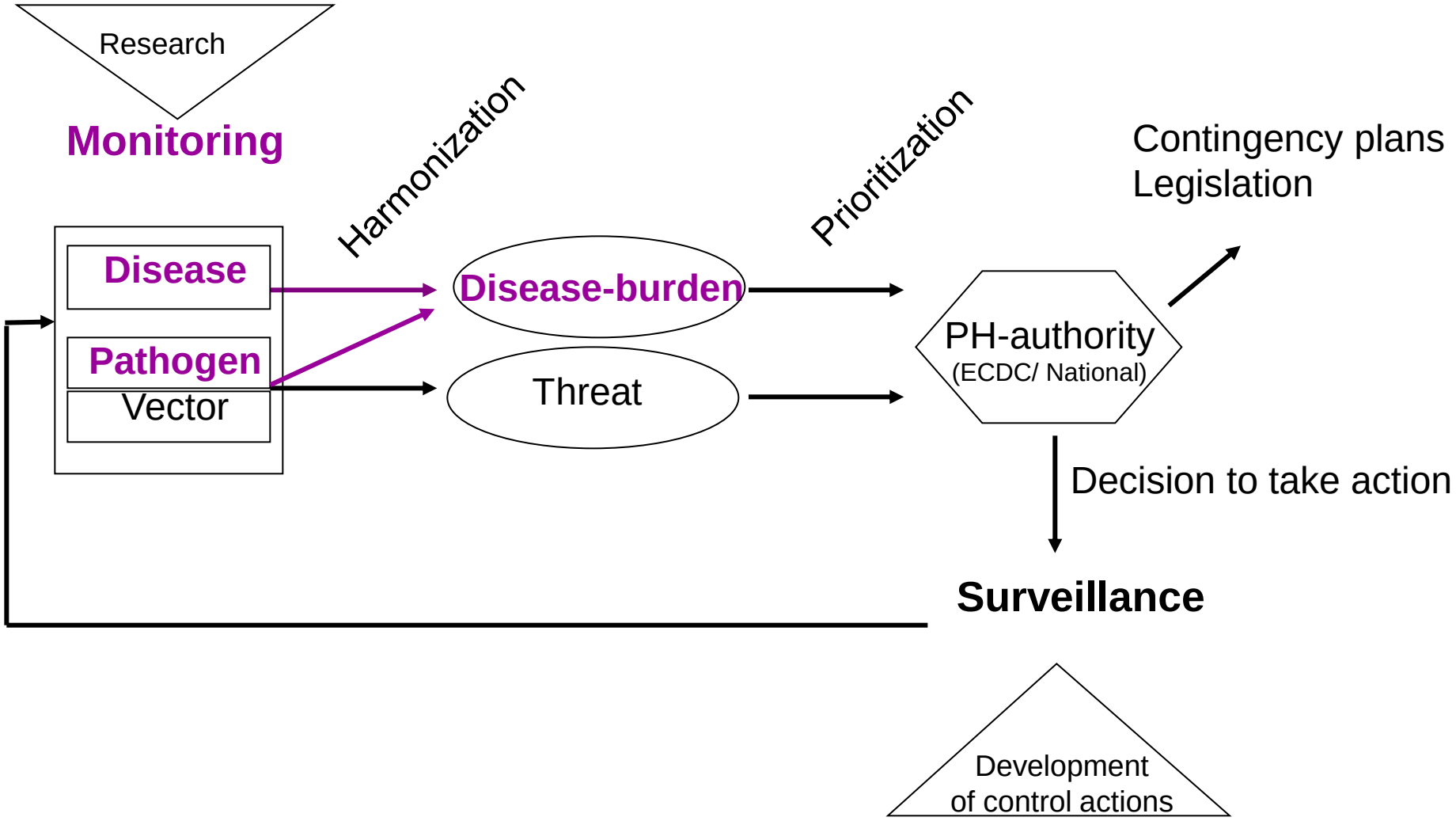
Research
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Disease-burden
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(ECDC/ National)
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of control actions

3. Harmonization and priority setting

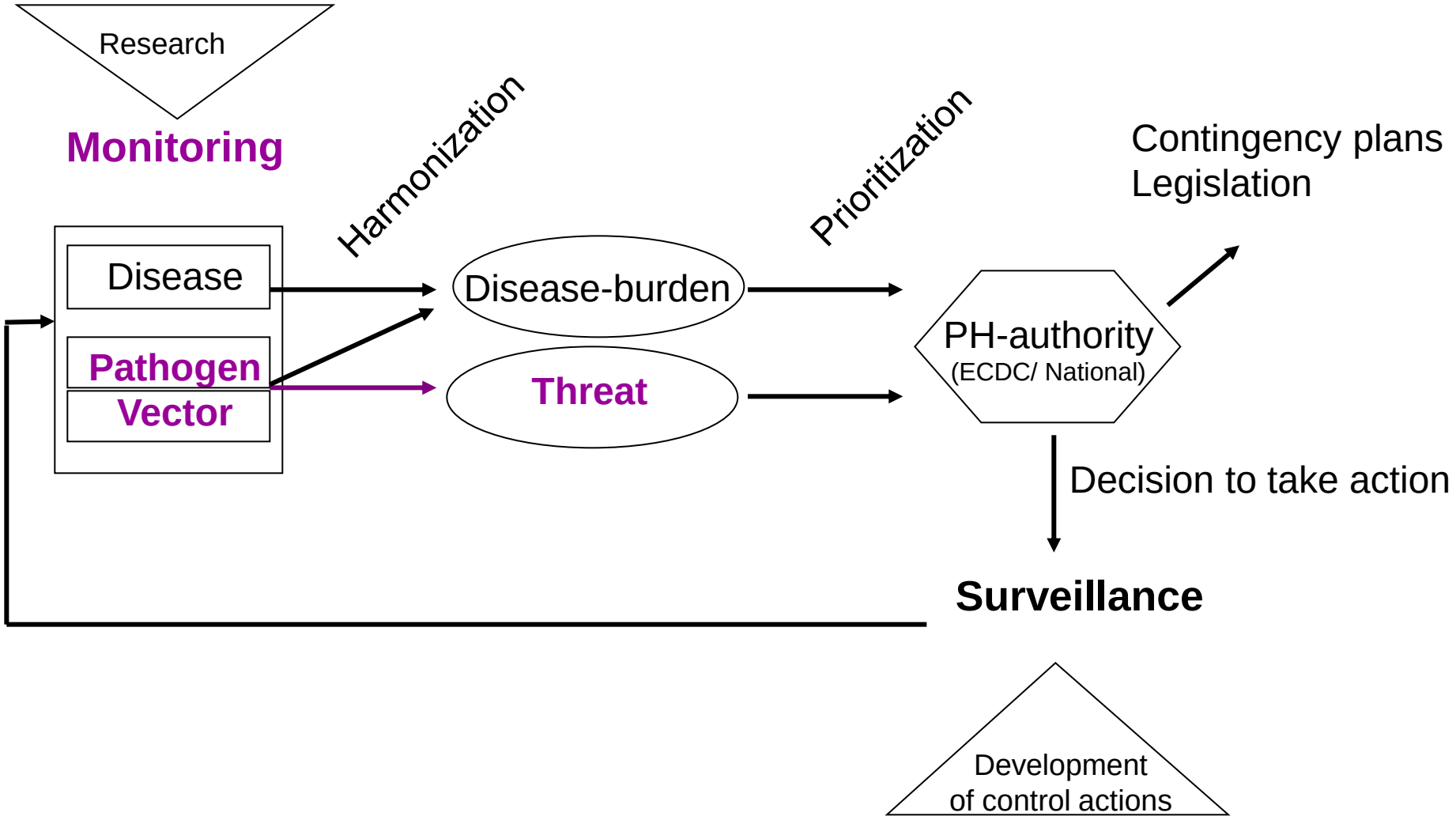
Disease -> Disease burden

To a lesser extent **pathogen**-> Disease burden

See two presentations later today:

14h15 – 15h00:
Burden of Disease assessments: the experience of BCoDE,
Cheryl Gibbons (University of Edinburgh, UK)

16h15 – 17h00:
Public health impact Lyme disease in Temperate Europe.
Kees van den Wijngaard (RIVM, the Netherlands)


Research
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3. Harmonization and priority setting

Pathogen / vector -> Threat

3. Harmonization and priority setting

Pathogen / vector -> Threat

Harmonization

- Presence / absence and abundance data of vector
- Prevalence of pathogen in vectors
- Prevalence of pathogen in reservoirs

3. Harmonization and priority setting

Pathogen / vector -> Threat

Harmonization

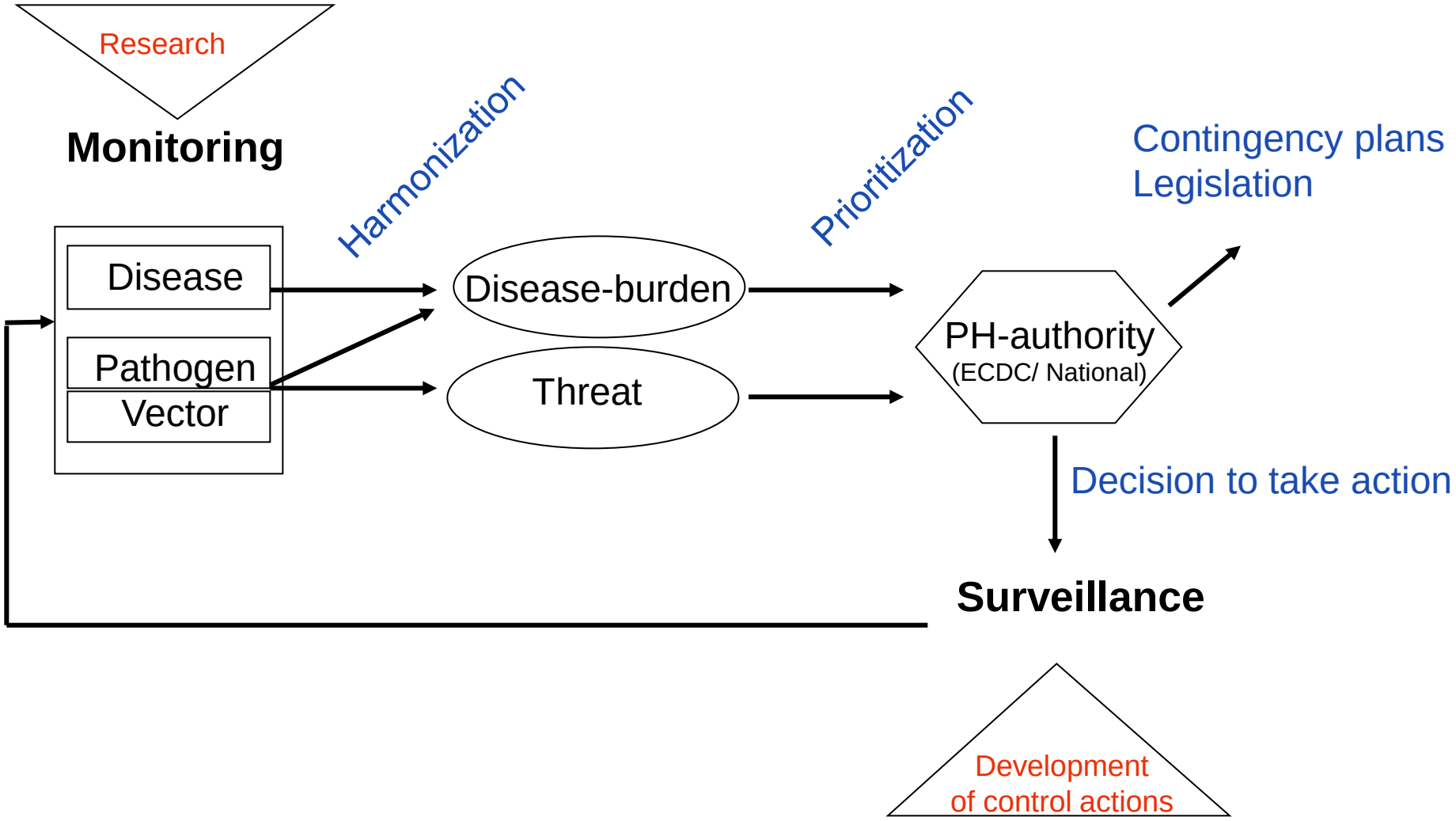
- Presence / absence and abundance data of vector
- Prevalence of pathogen in vectors
- Prevalence of pathogen in reservoirs

Priority setting

- Comparing threats is difficult

Havelaar et al. Priorizing emerging zoonoses in the Netherlands. PLOS one 2010
Tool developed **E**merging **Z**oonoses **I**nformation and **P**riority **s**ystem
http://ezips.rivm.nl/

4. Surveillance and intervention


Research
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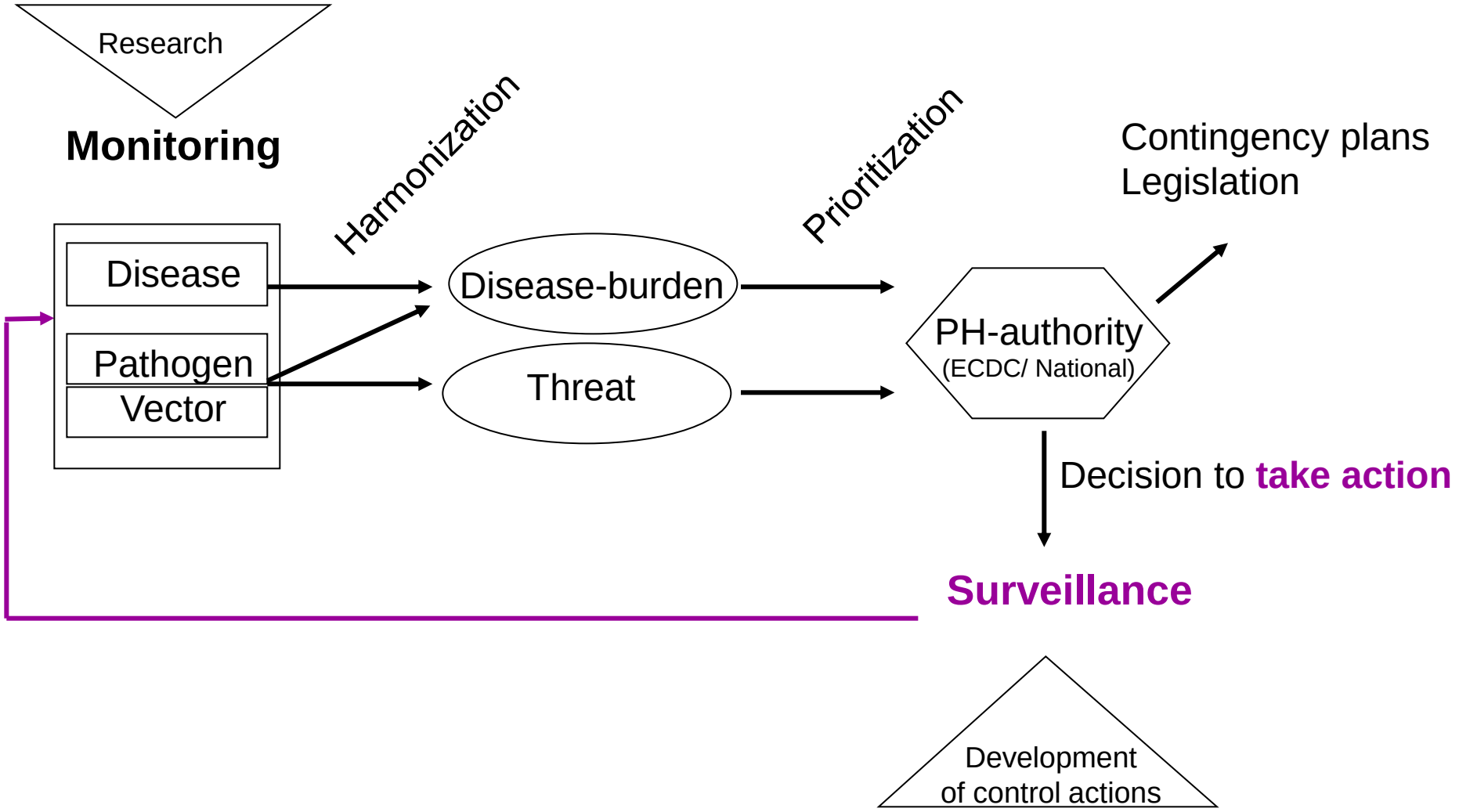
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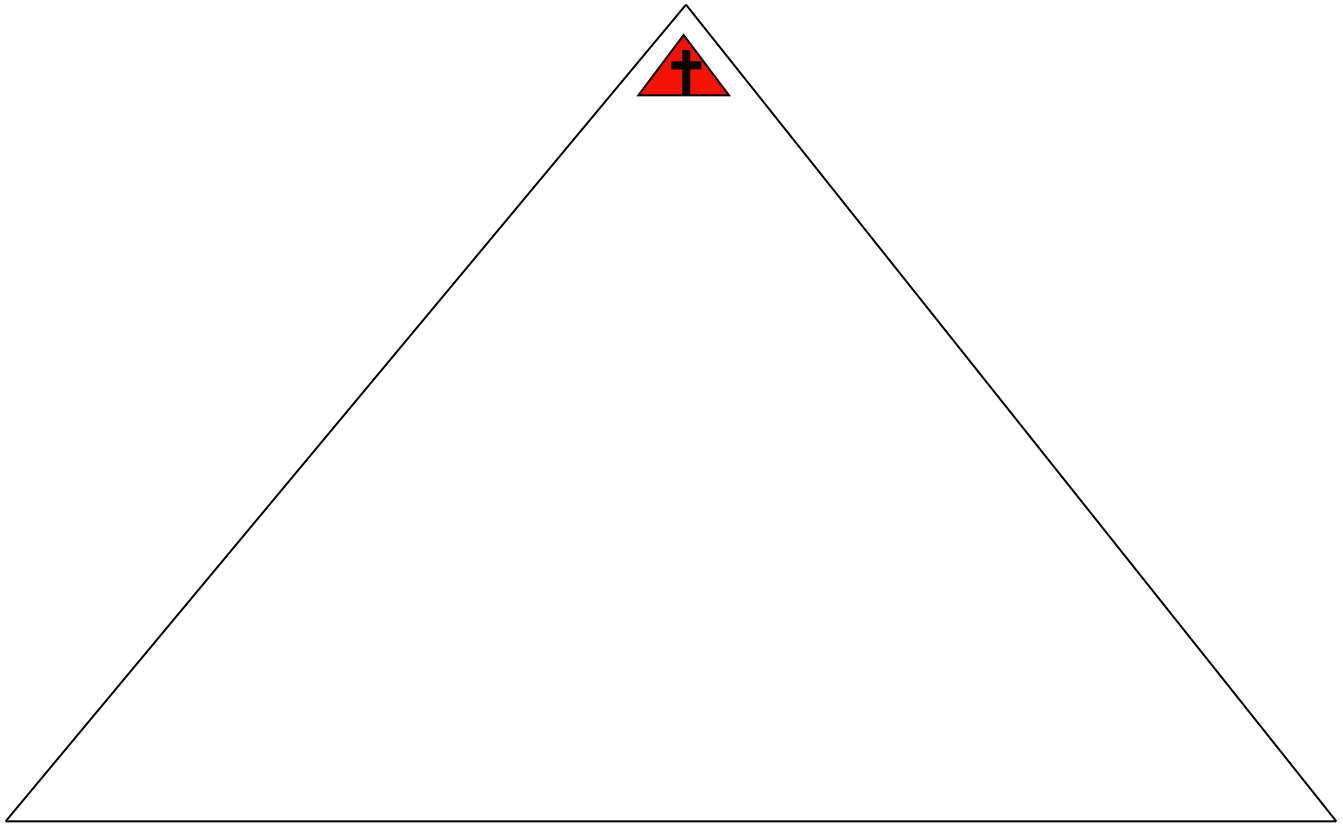
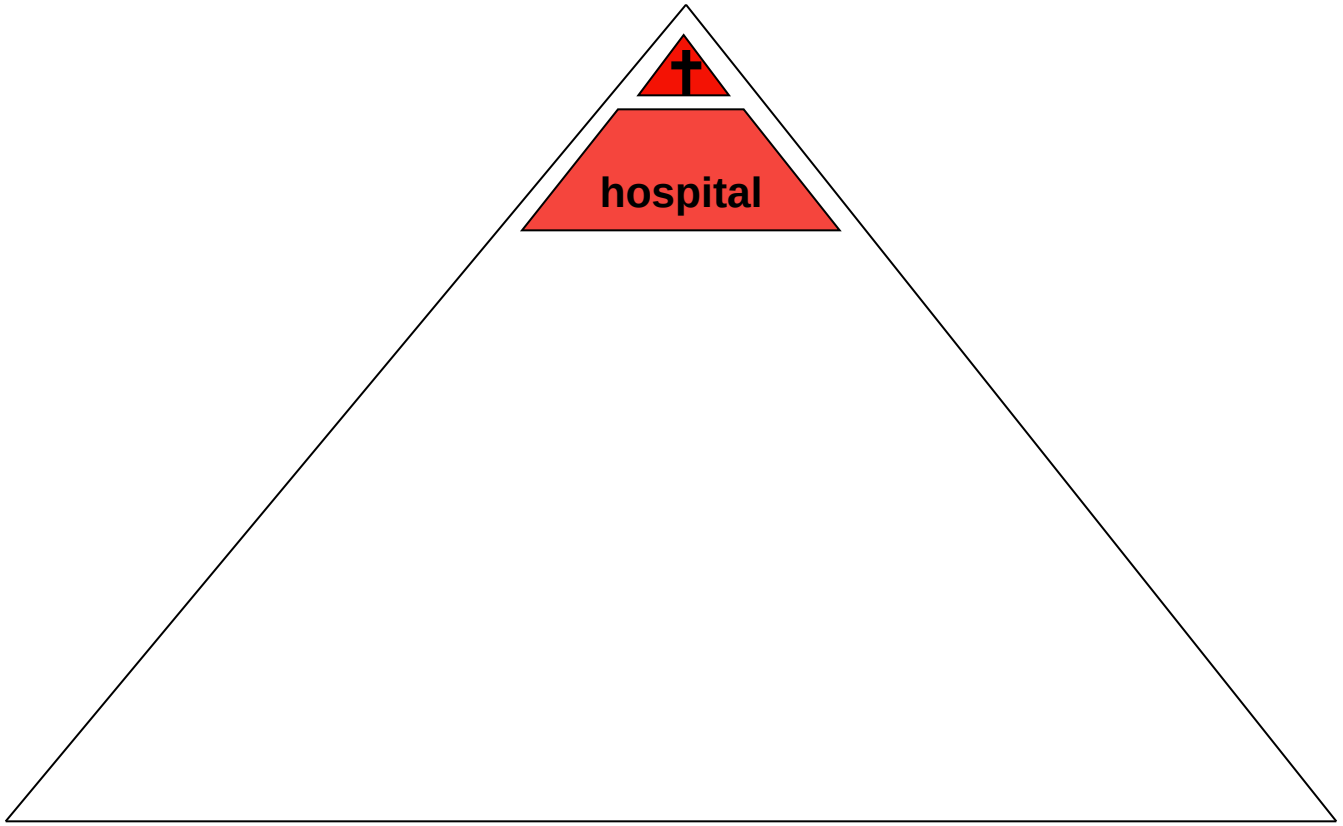
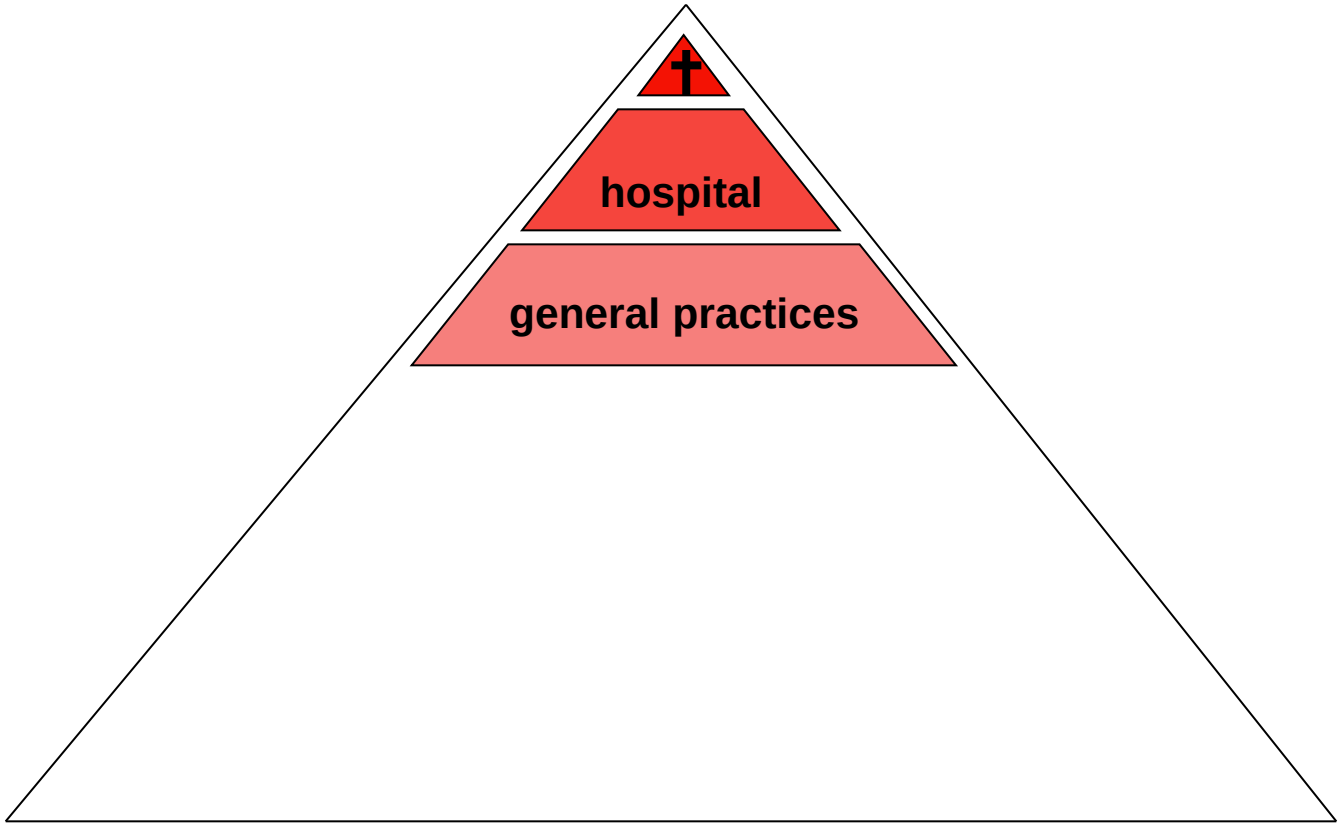
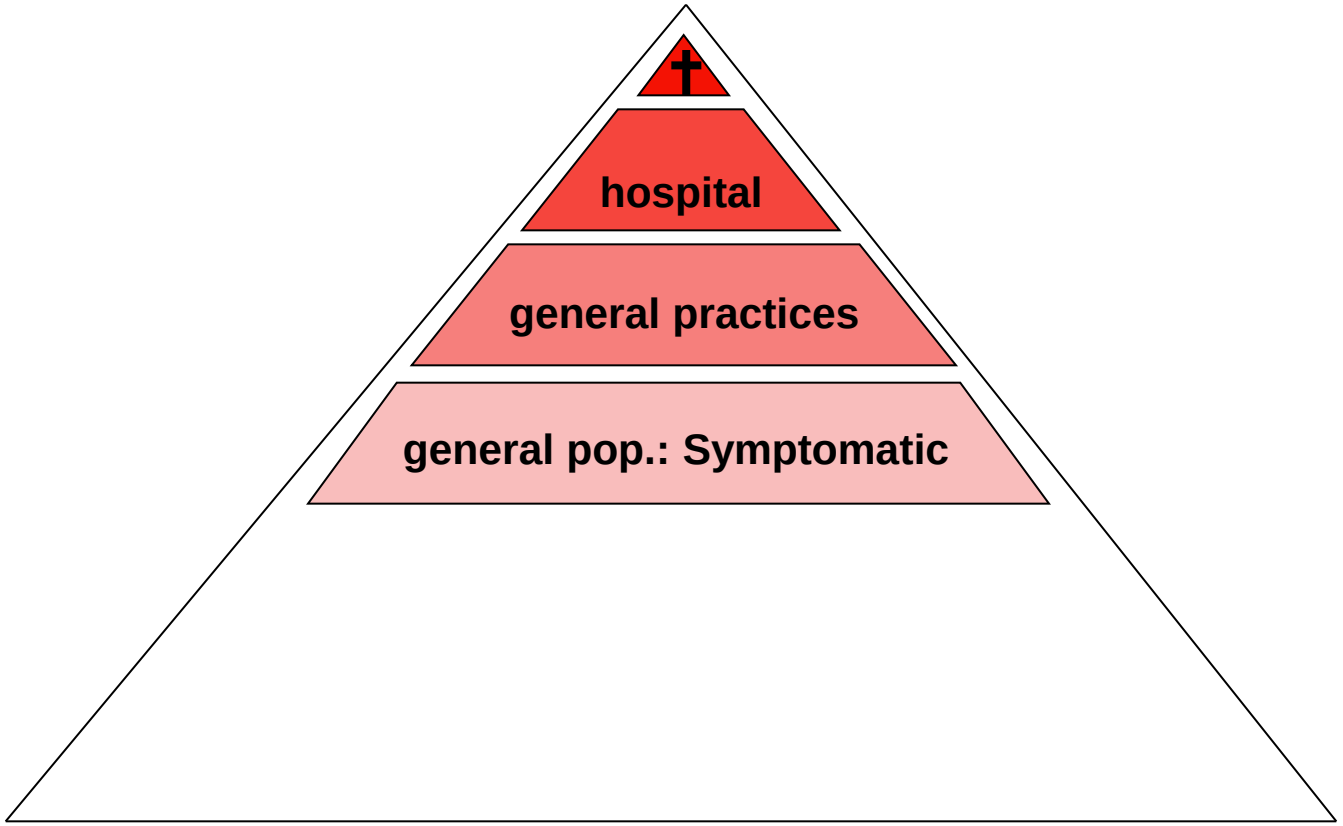
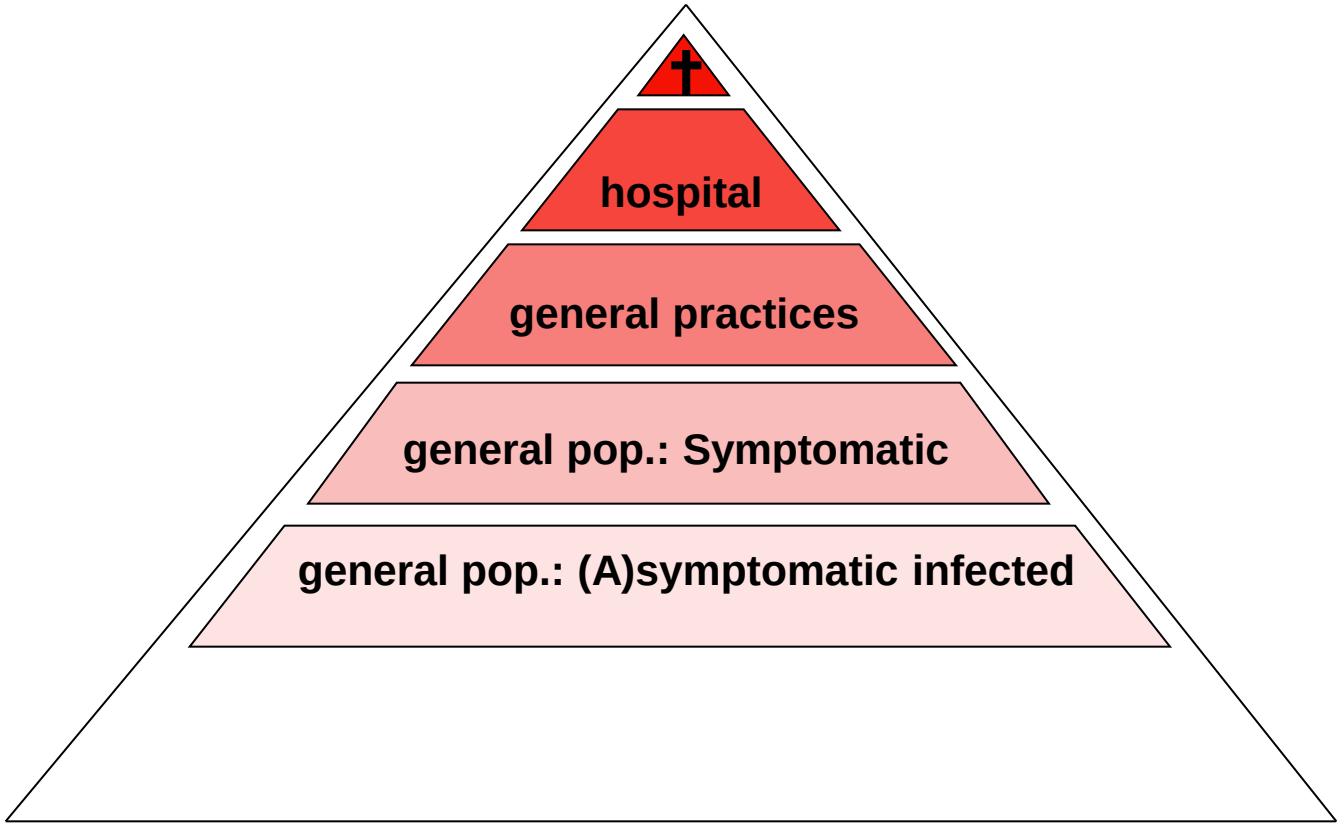
4. **Surveillance** and intervention

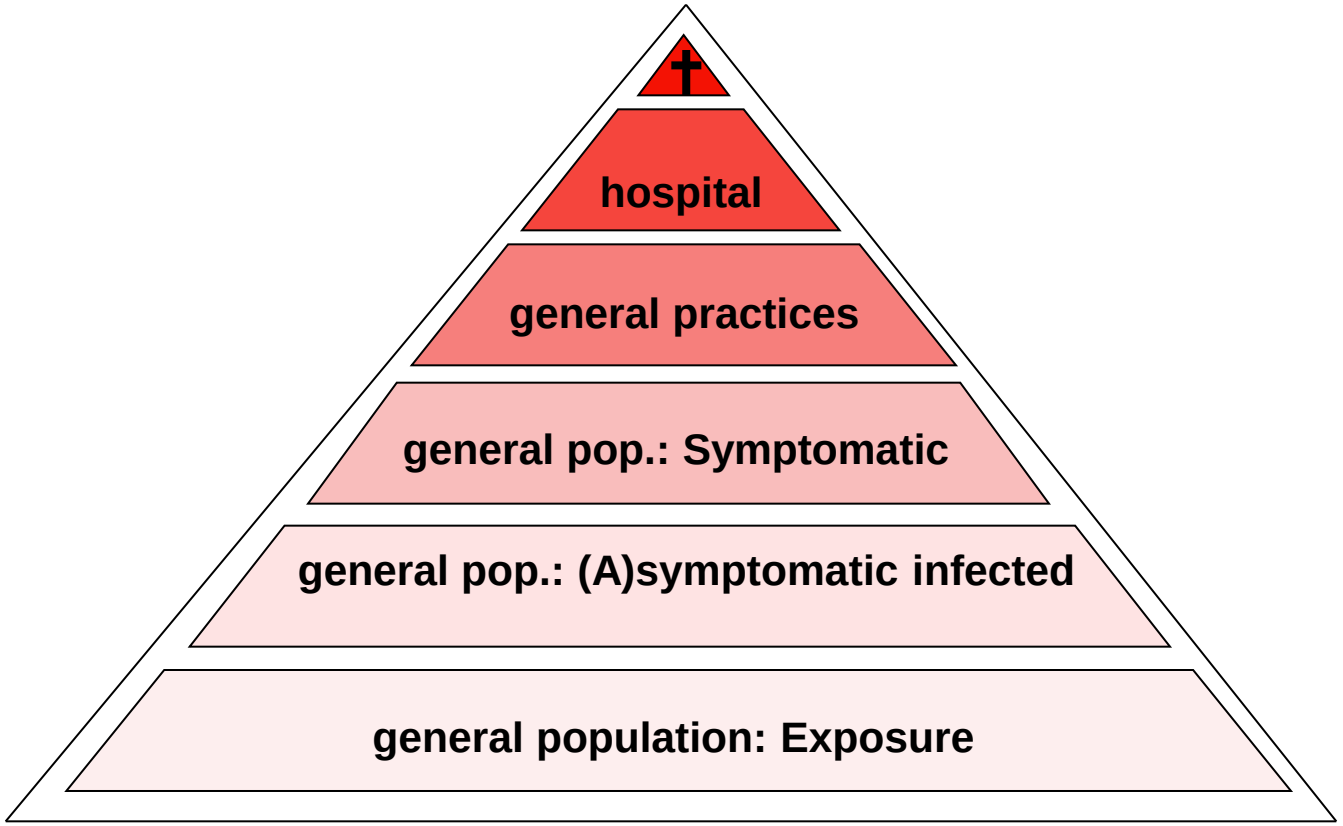


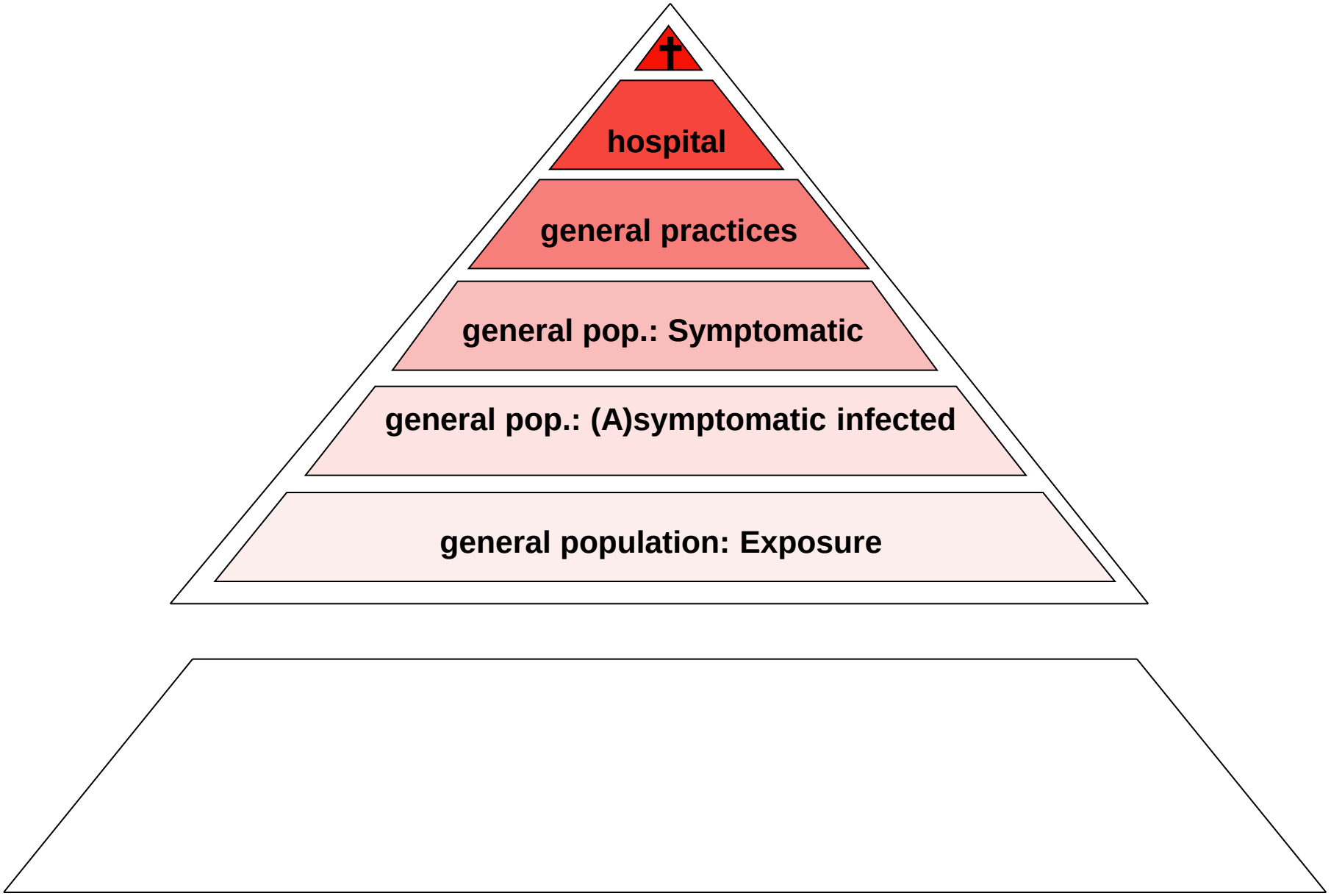

hospital

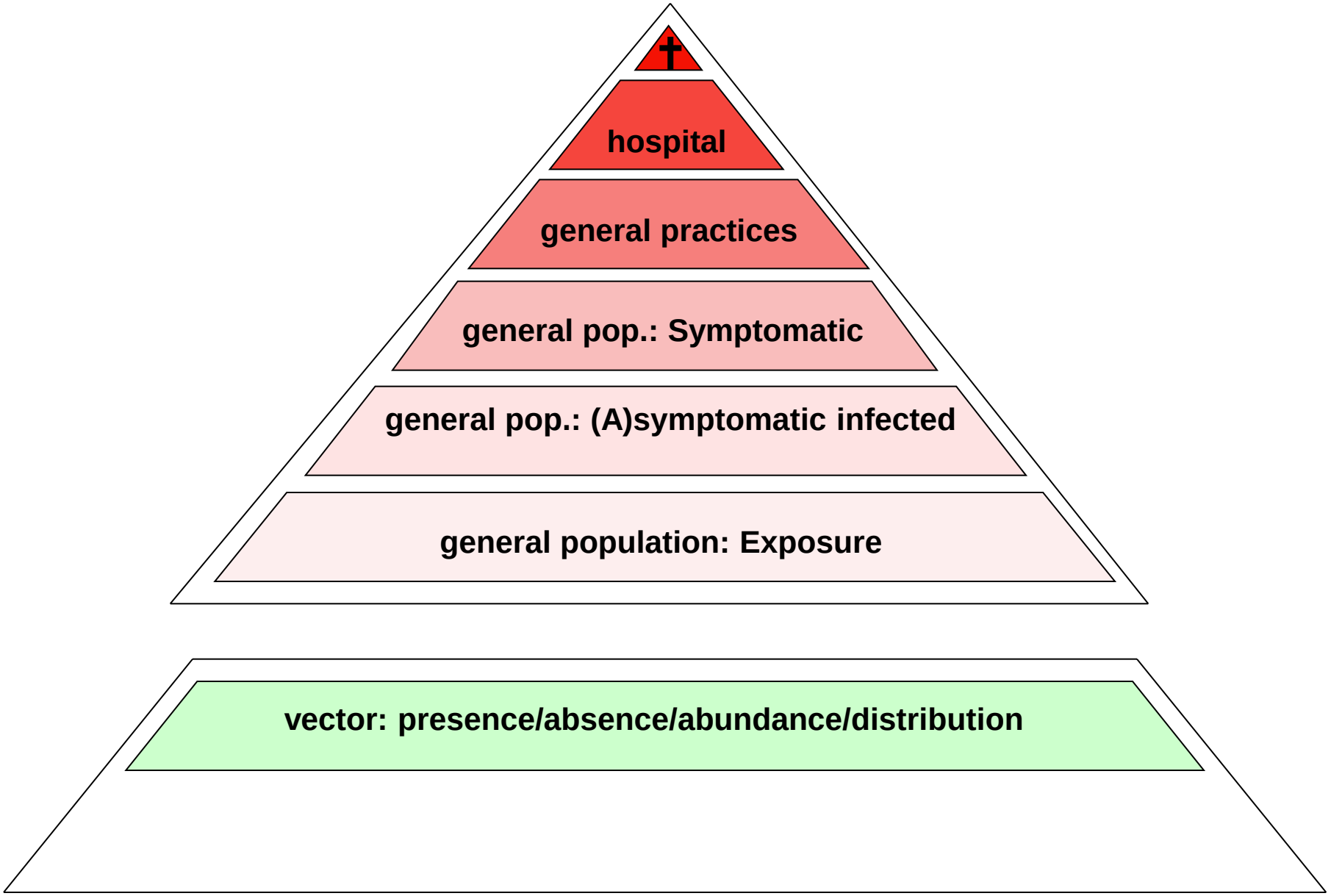

hospital
general practices

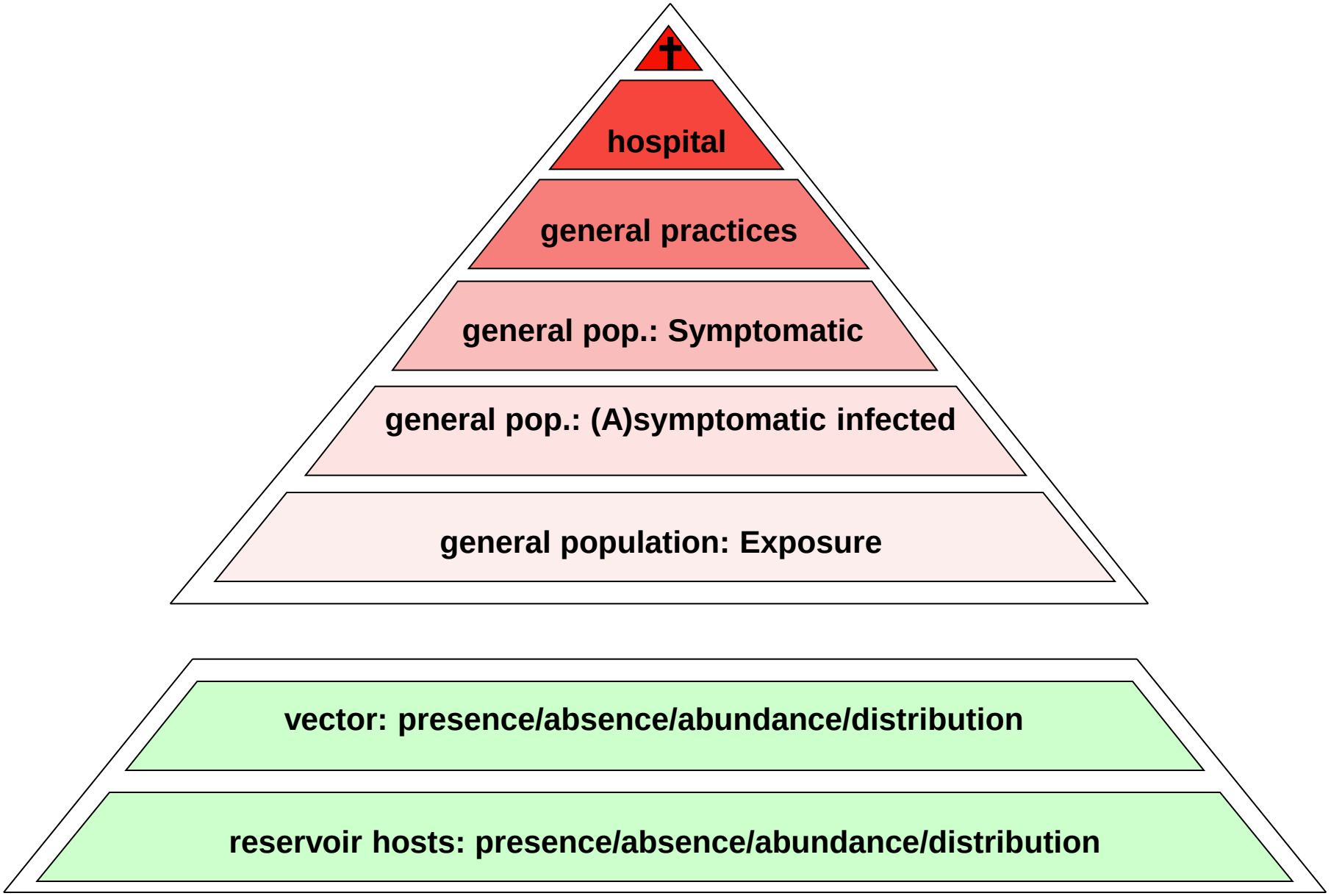

hospital
general practices
general pop.: Symptomatic

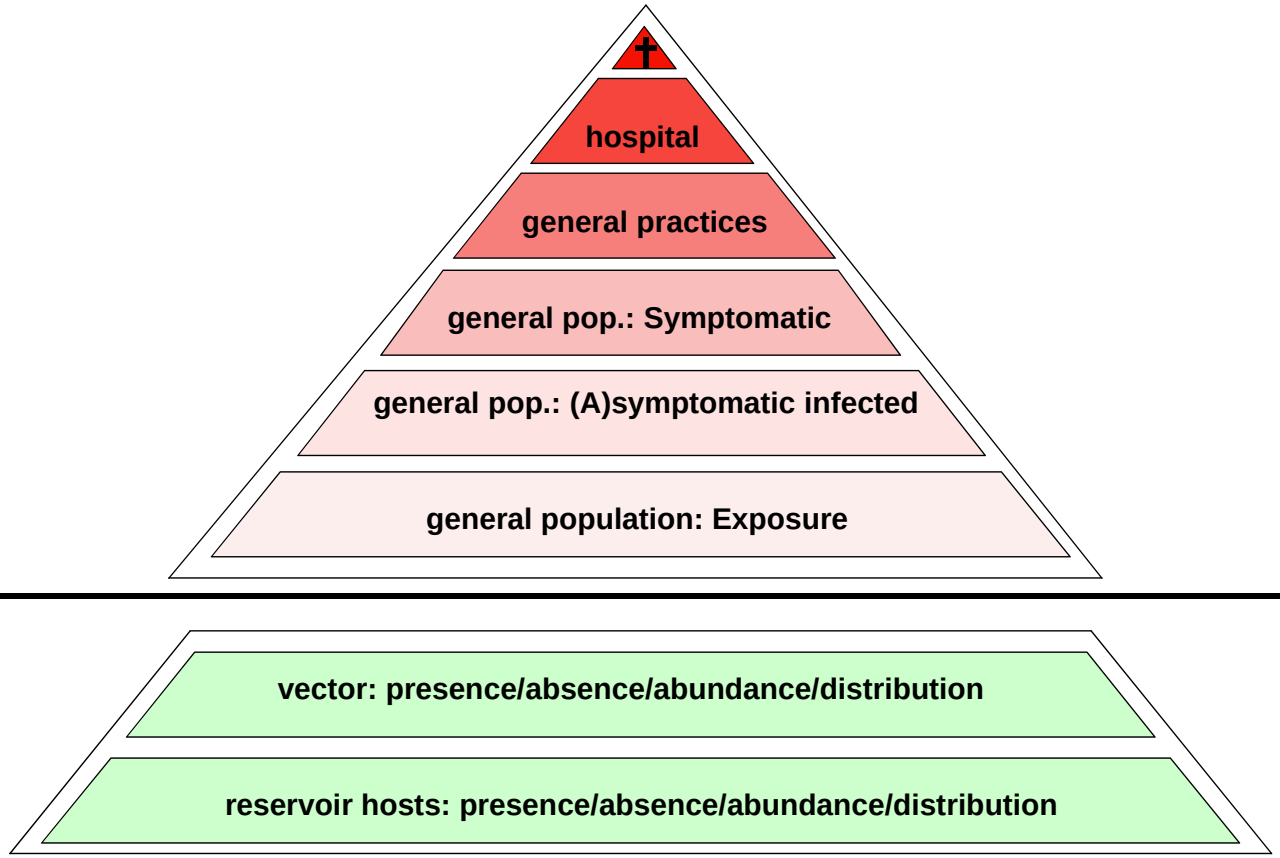

hospital
general practices
general pop.: Symptomatic
general pop.: (A)symptomatic infected


hospital
general practices
general pop.: Symptomatic
general pop.: (A)symptomatic infected
general population: Exposure

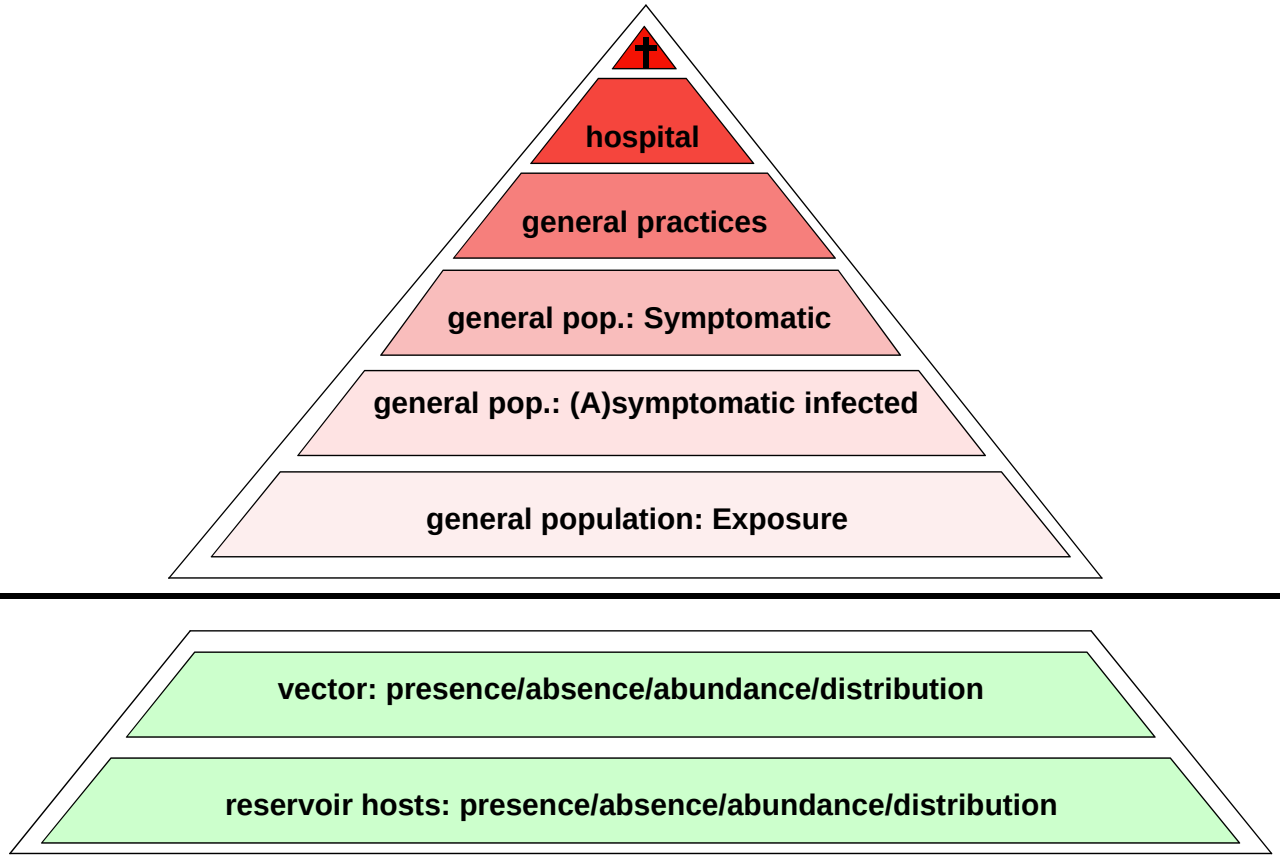

hospital
general practices
general pop.: Symptomatic
general pop.: (A)symptomatic infected
general population: Exposure


hospital
general practices
general pop.: Symptomatic
general pop.: (A)symptomatic infected
general population: Exposure
vector: presence/absence/abundance/distribution

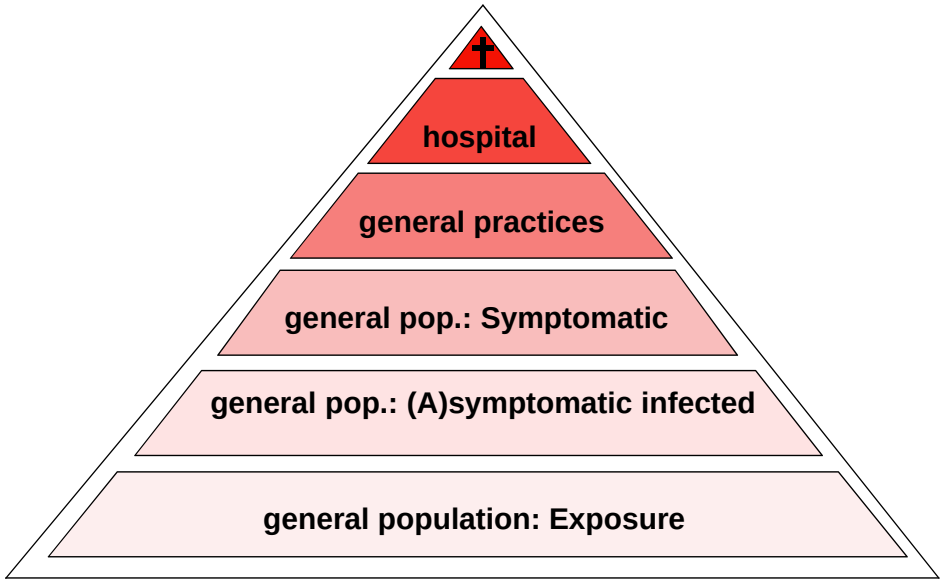

hospital
general practices
general pop.: Symptomatic
general pop.: (A)symptomatic infected
general population: Exposure
vector: presence/absence/abundance/distribution
reservoir hosts: presence/absence/abundance/distribution


hospital
general practices
general pop.: Symptomatic
general pop.: (A)symptomatic infected
general population: Exposure
vector: presence/absence/abundance/distribution
reservoir hosts: presence/absence/abundance/distribution

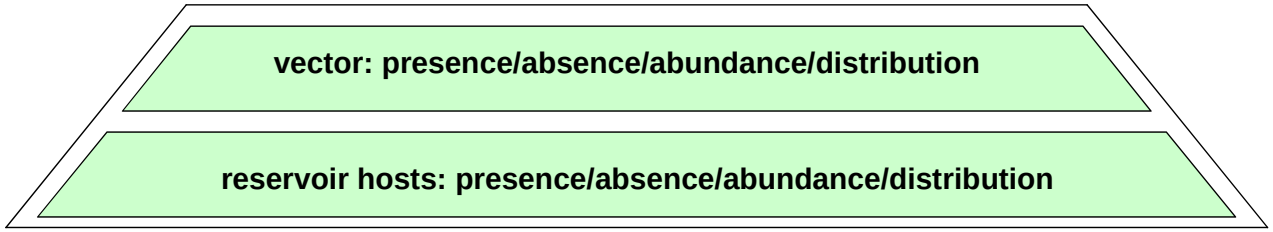
Disease burden

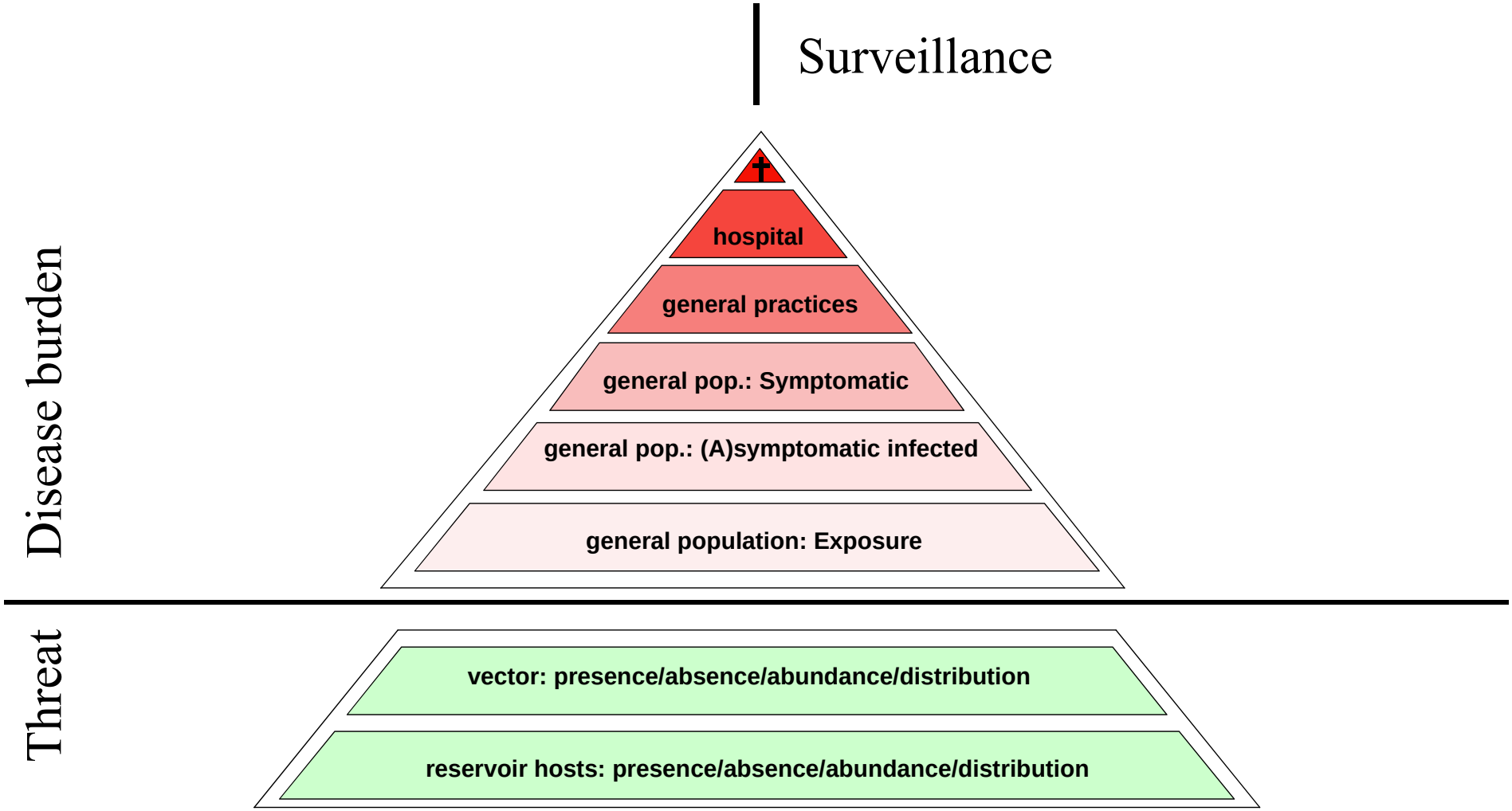


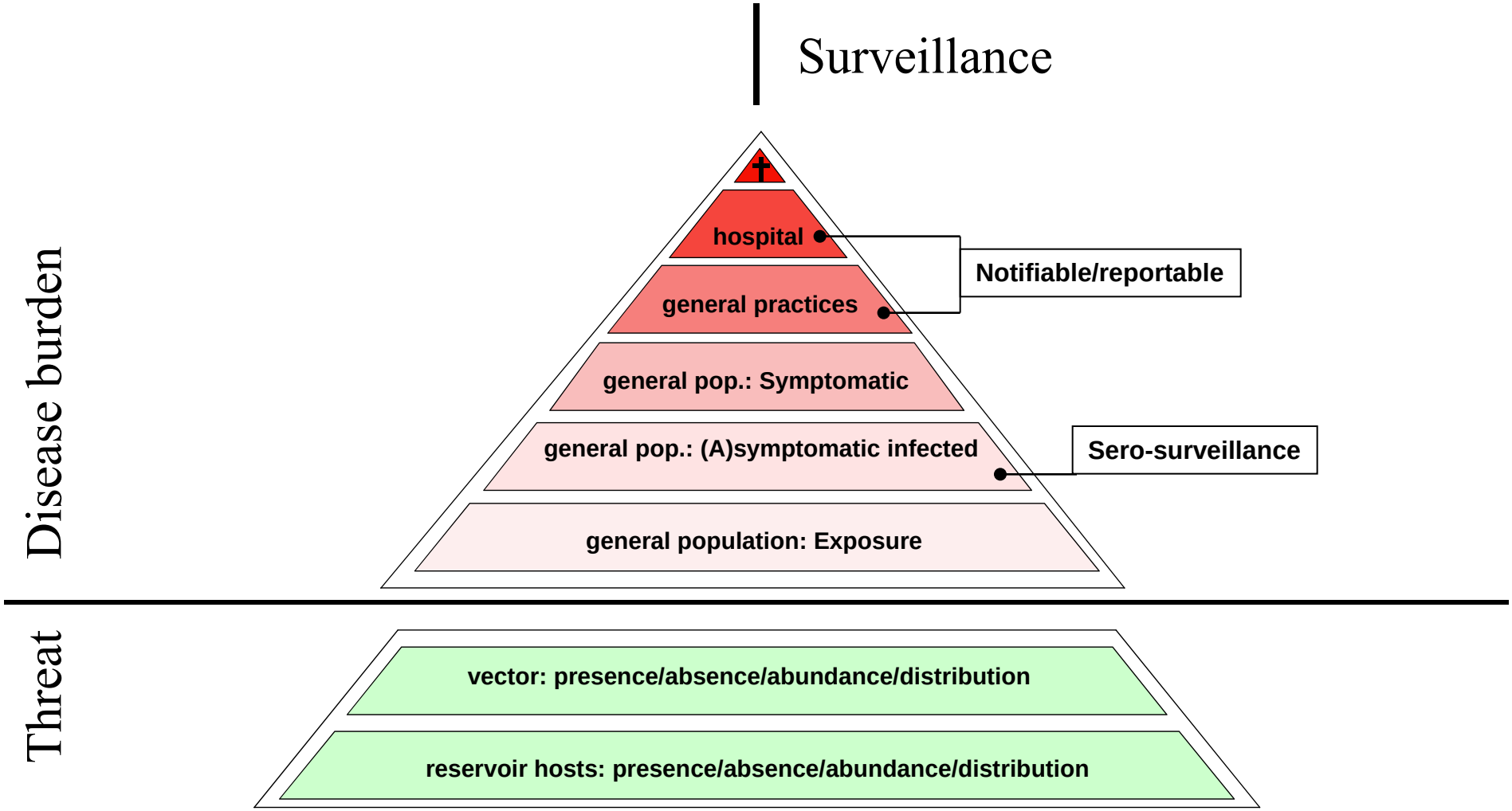
Disease burden

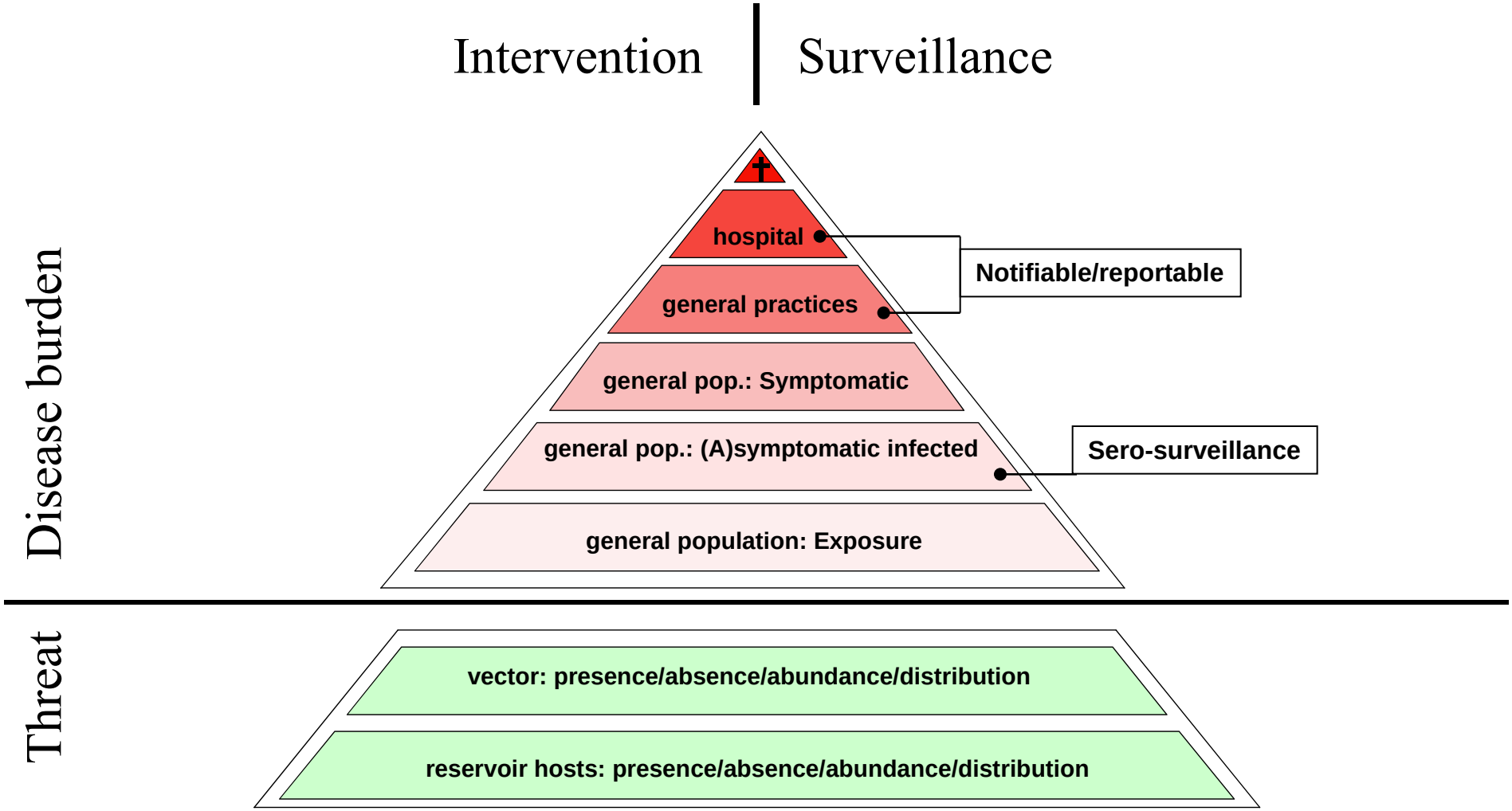


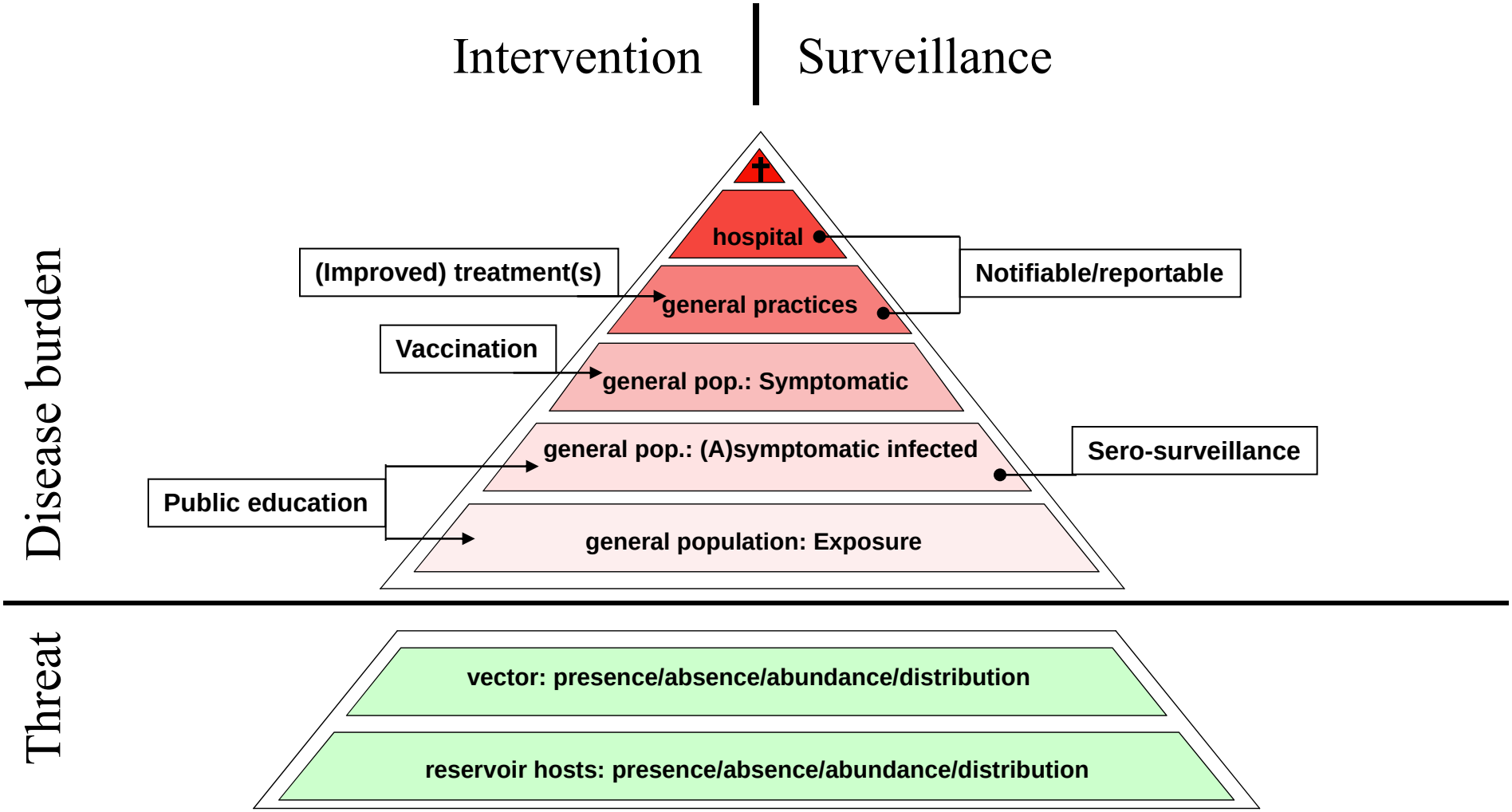
Threat

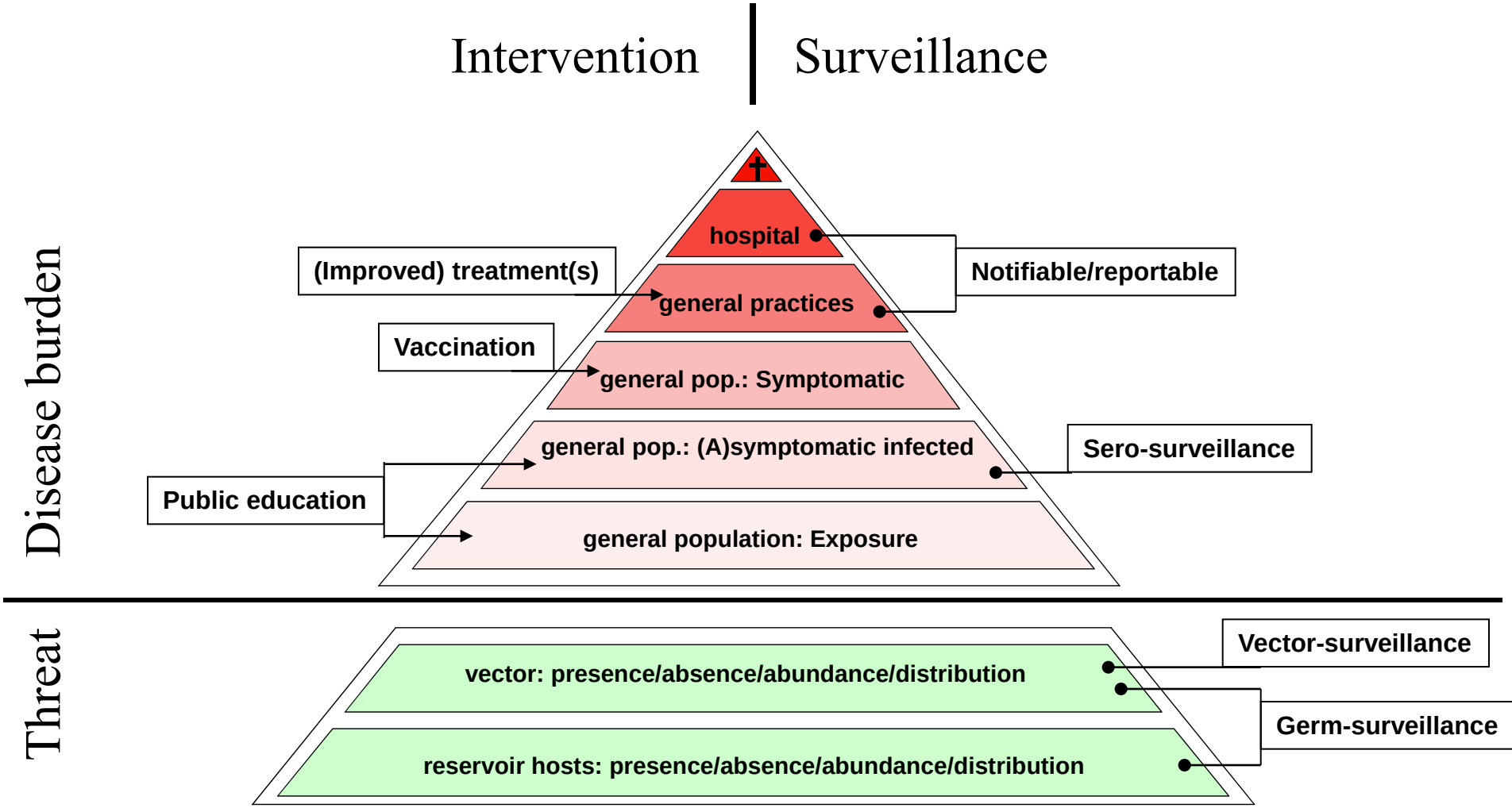



Surveillance
Disease burden
hospital
general practices
general pop.: Symptomatic
general pop.: (A)symptomatic infected
general population: Exposure
Threat
vector: presence/absence/abundance/distribution
reservoir hosts: presence/absence/abundance/distribution


Surveillance
Disease burden
hospital
general practices
general pop.: Symptomatic
general pop.: (A)symptomatic infected
general population: Exposure
Notifiable/reportable
Sero-surveillance
Threat
vector: presence/absence/abundance/distribution
reservoir hosts: presence/absence/abundance/distribution


Intervention
Surveillance
Disease burden
hospital
general practices
general pop.: Symptomatic
general pop.: (A)symptomatic infected
general population: Exposure
Notifiable/reportable
Sero-surveillance
Threat
vector: presence/absence/abundance/distribution
reservoir hosts: presence/absence/abundance/distribution


Intervention
Surveillance
Disease burden
Threat
hospital
(Improved) treatment(s)
Notifiable/reportable
general practices
Vaccination
general pop.: Symptomatic
general pop.: (A)symptomatic infected
Sero-surveillance
Public education
general population: Exposure
vector: presence/absence/abundance/distribution
reservoir hosts: presence/absence/abundance/distribution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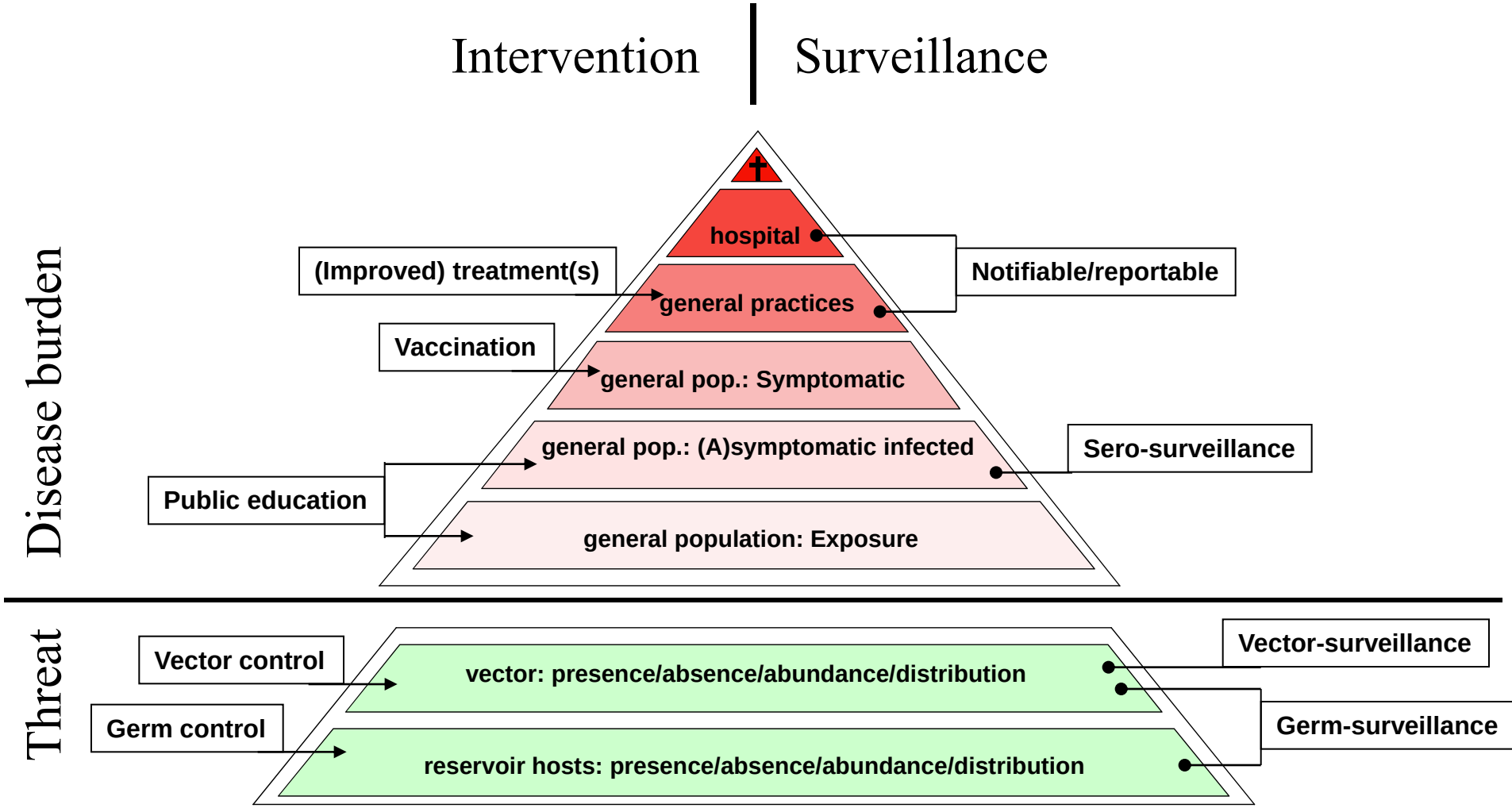
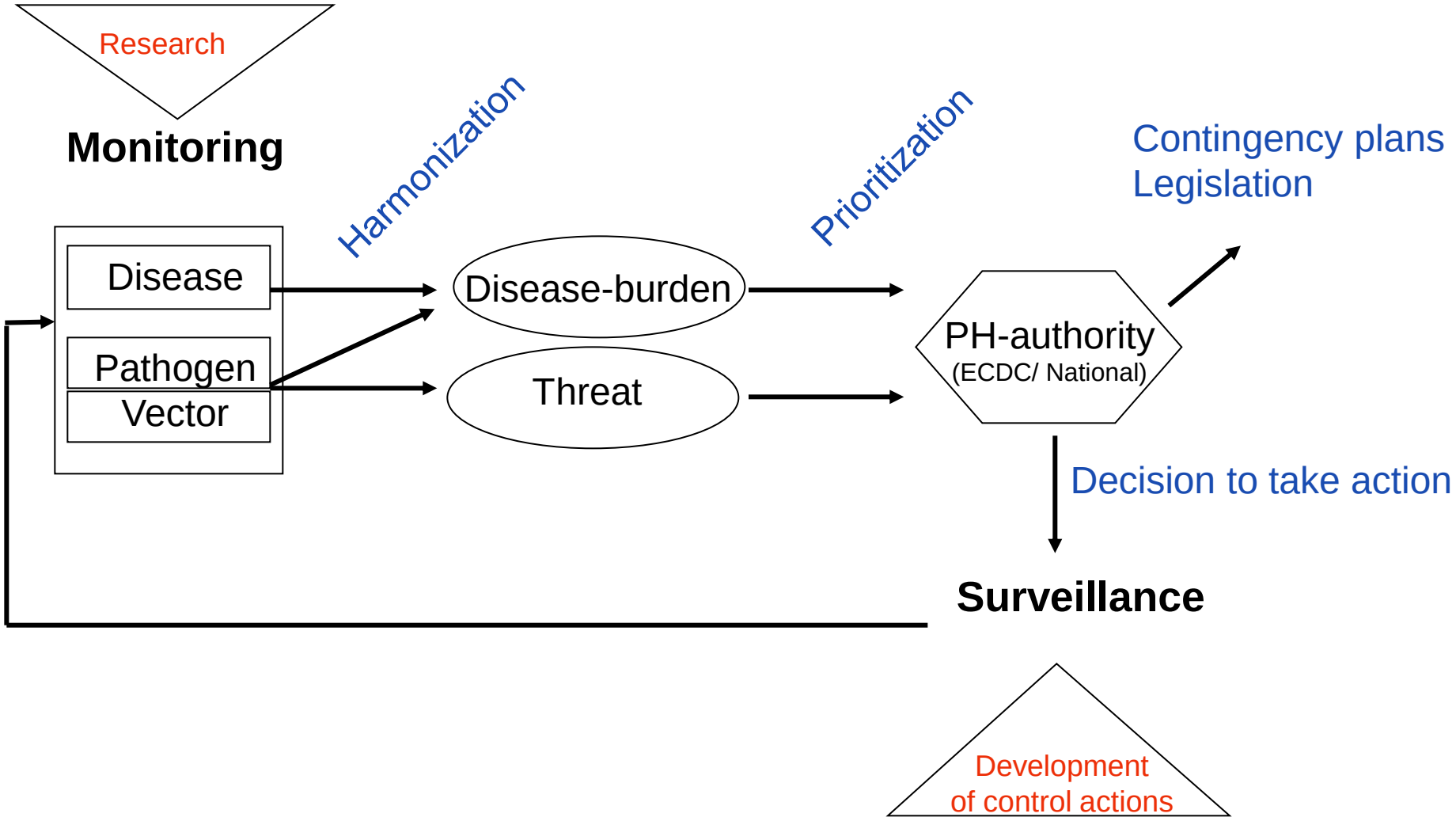
general practices
Vaccination
general pop.: Symptomatic
general pop.: (A)symptomatic infected
Sero-surveillance
Public education
general population: Exposure
Vector-surveillance
vector: presence/absence/abundance/distribution
Germ-surveillance
reservoir hosts: presence/absence/abundance/distribution


Intervention
Surveillance
Disease burden
hospital
(Improved) treatment(s)
Notifiable/reportable
general practices
Vaccination
general pop.: Symptomatic
general pop.: (A)symptomatic infected
Sero-surveillance
Public education
general population: Exposure
Threat
Vector control
vector: presence/absence/abundance/distribution
Vector-surveillance
Germ control
Germ-surveillance
reservoir hosts: presence/absence/abundance/distribution

6. From monitoring to surveillance: Decision making


Research
Monitoring
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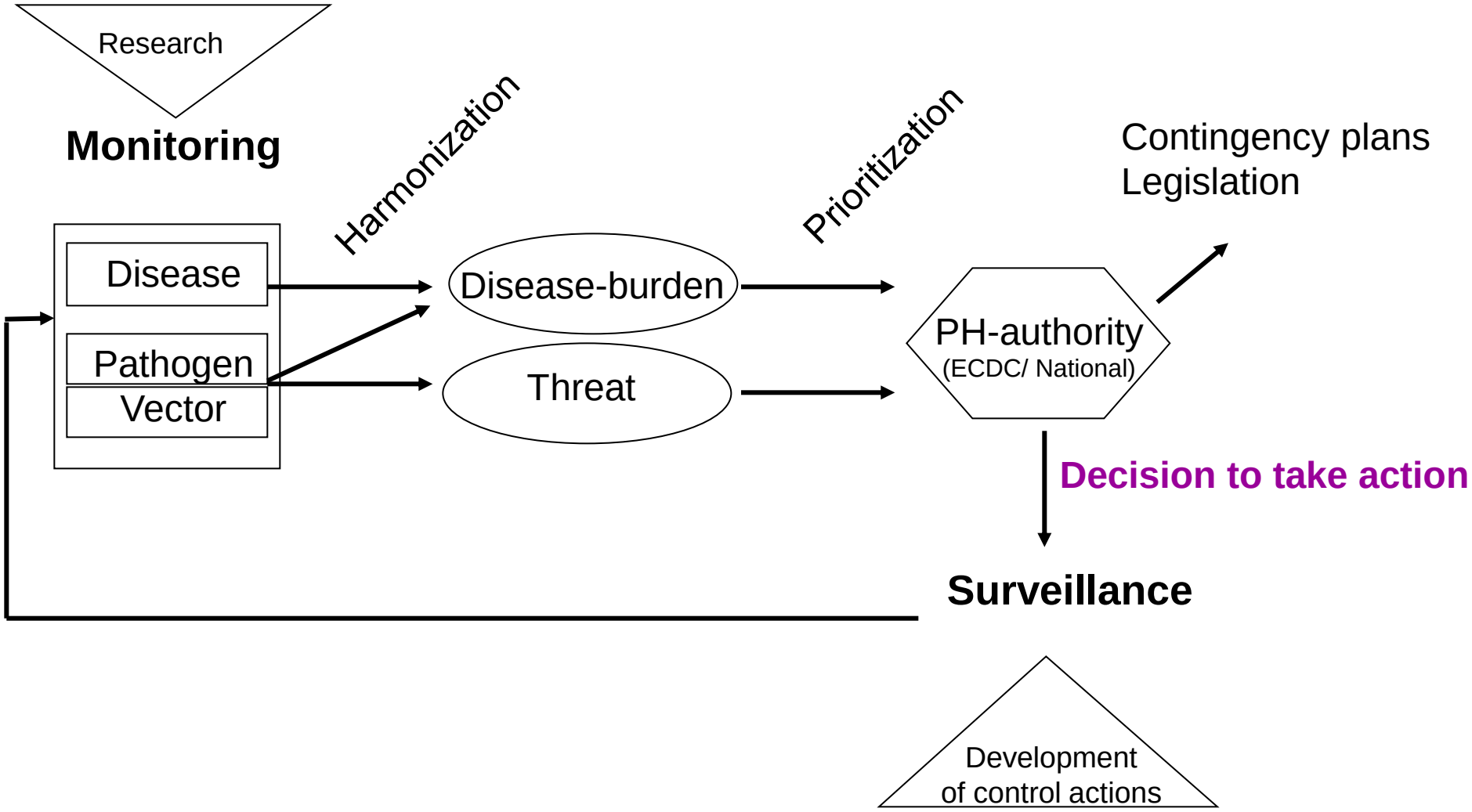
Prioritization
Contingency plans
Legislation
Disease
Pathogen
Vector
Disease-burden
Threat
PH-authority
(ECDC/ National)
Decision to take action
Surveillance
Development
of control actions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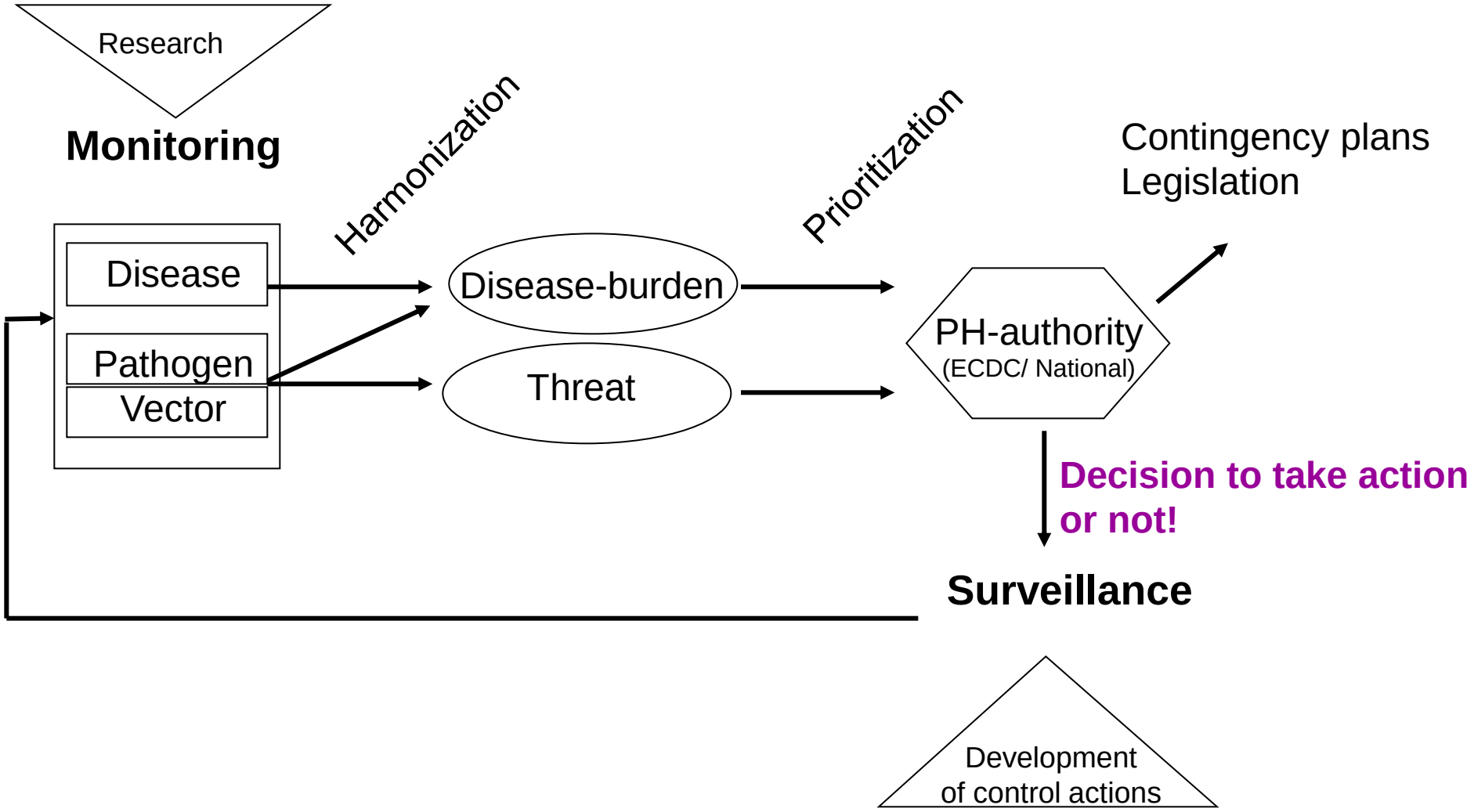
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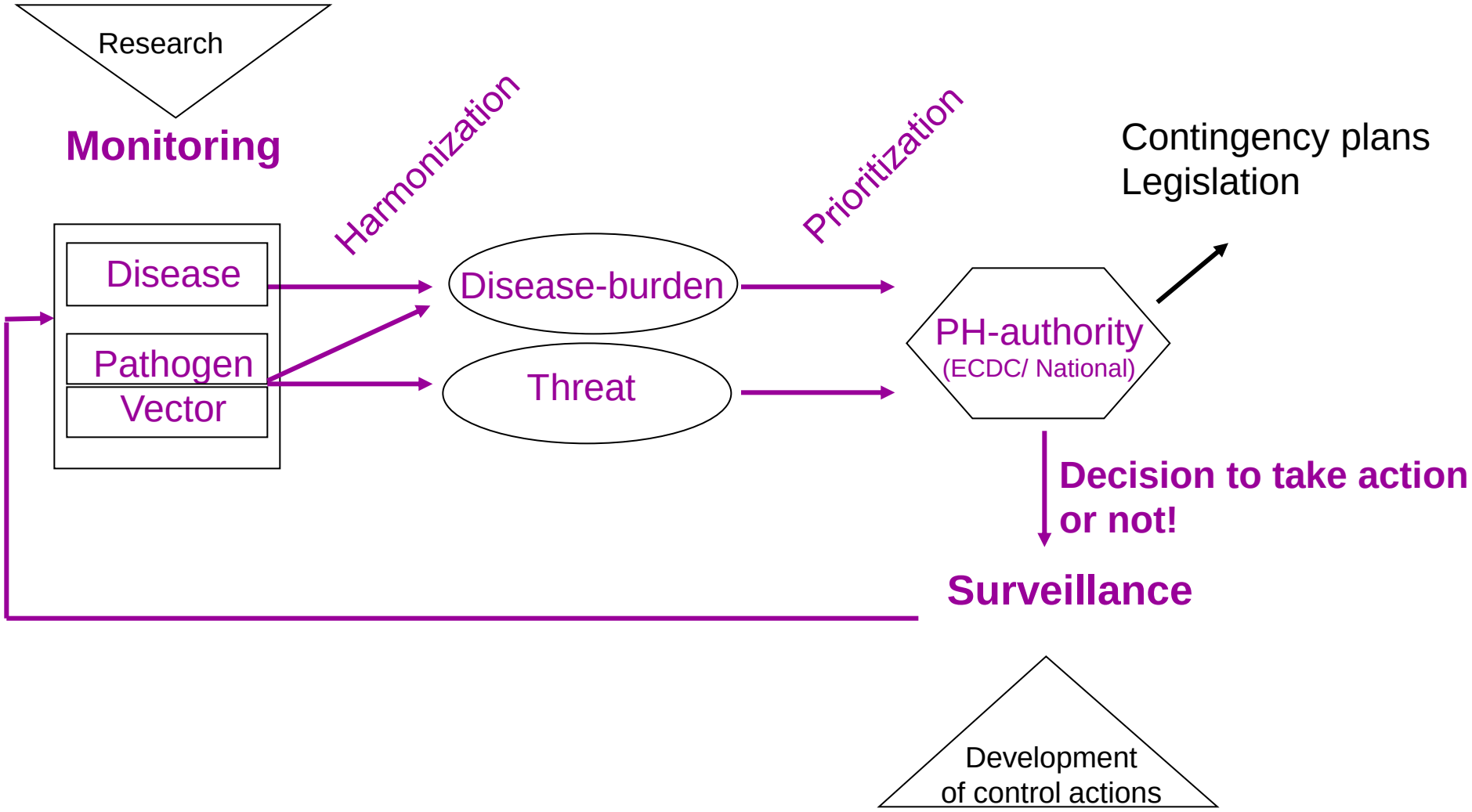
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Qualitative data per member state

Qualitative data per member state

Country x	**VBD**
	Context
Mosquito-borne diseases:	
Chikungunya	x
Dengue	.
West Nile Fever	.
Rift Valley Fever	.
Tick-borne diseases:	
Tick-borne encephalitis	.
Crimean-Congo haemorrhagic fever	.
Lyme borreliosis	.
Tularaemia	.
Rickettsiosis	.
Sandfly-borne diseases	
Leishmaniasis	.
Sandfly fevers	.

Context	Endemic disease	Pathogen	Vector
1	√	√	√
2	-	√	√
3	-	-	√
4	-	√	-
5	-	-	-

Questionnaire

Country X	**Monitoring**		
	human	**animal**	**vector**
Mosquito-borne diseases:			
Chikungunya			
Dengue			
West Nile Fever			
Rift Valley Fever			
Tick-borne diseases:			
Tick-borne encephalitis			
Crimean-Congo haemorrhagic fever			
Lyme borreliosis			
Tularaemia			
Rickettsiosis			
Sandfly-borne diseases			
Leishmaniasis			
Sandfly fevers			

Qualitative data per member state

Country X	Monitoring		
	human	animal	vector
Mosquito-borne diseases:			
Chikungunya			
Dengue			
West Nile Fever			
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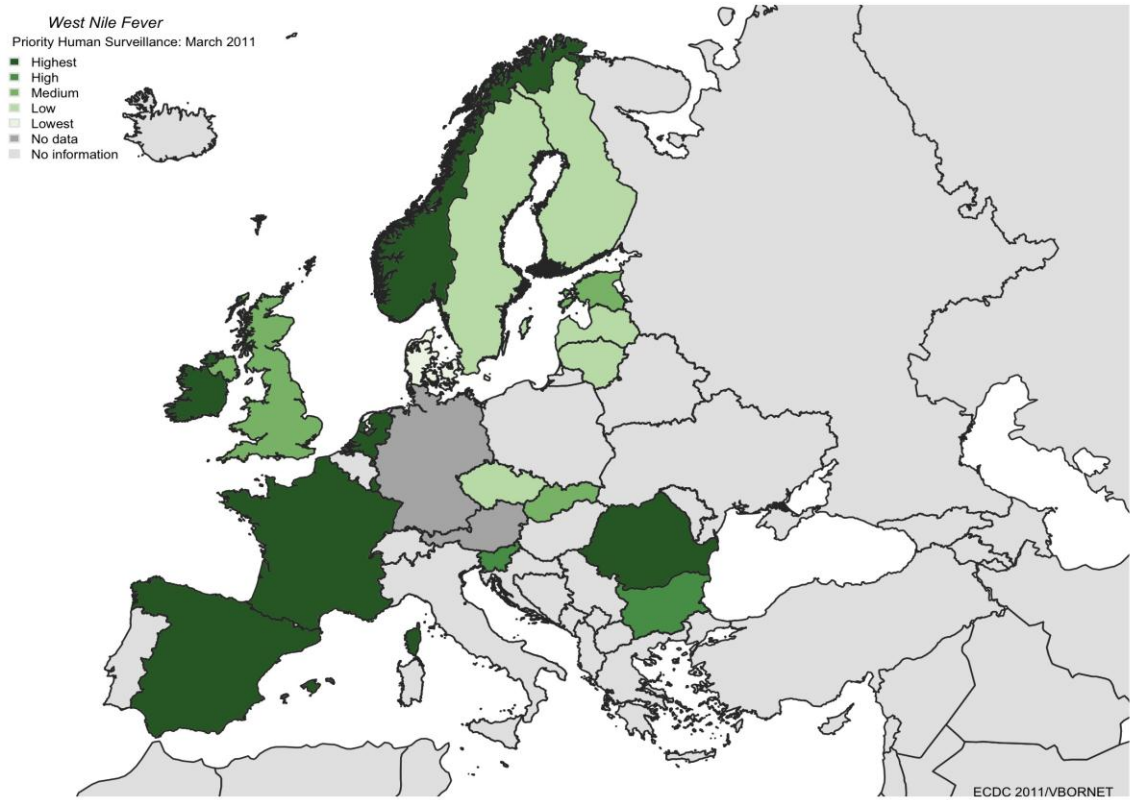
Tick-borne diseases:			
Tick-borne encephalitis			
Crimean-Congo haemorrhagic fever			
Lyme borreliosis			
Tularaemia			
Rickettsiosis			
Sandfly-borne diseases			
Leishmaniasis			
Sandfly fevers			

Context	Endemic disease	Pathogen	Vector	Priority setting based on
1	√	√	√	Disease burden
2	-	√	√	Threat
3	-	-	√	Threat
4	-	√	-	Threat
5	-	-	-	Threat

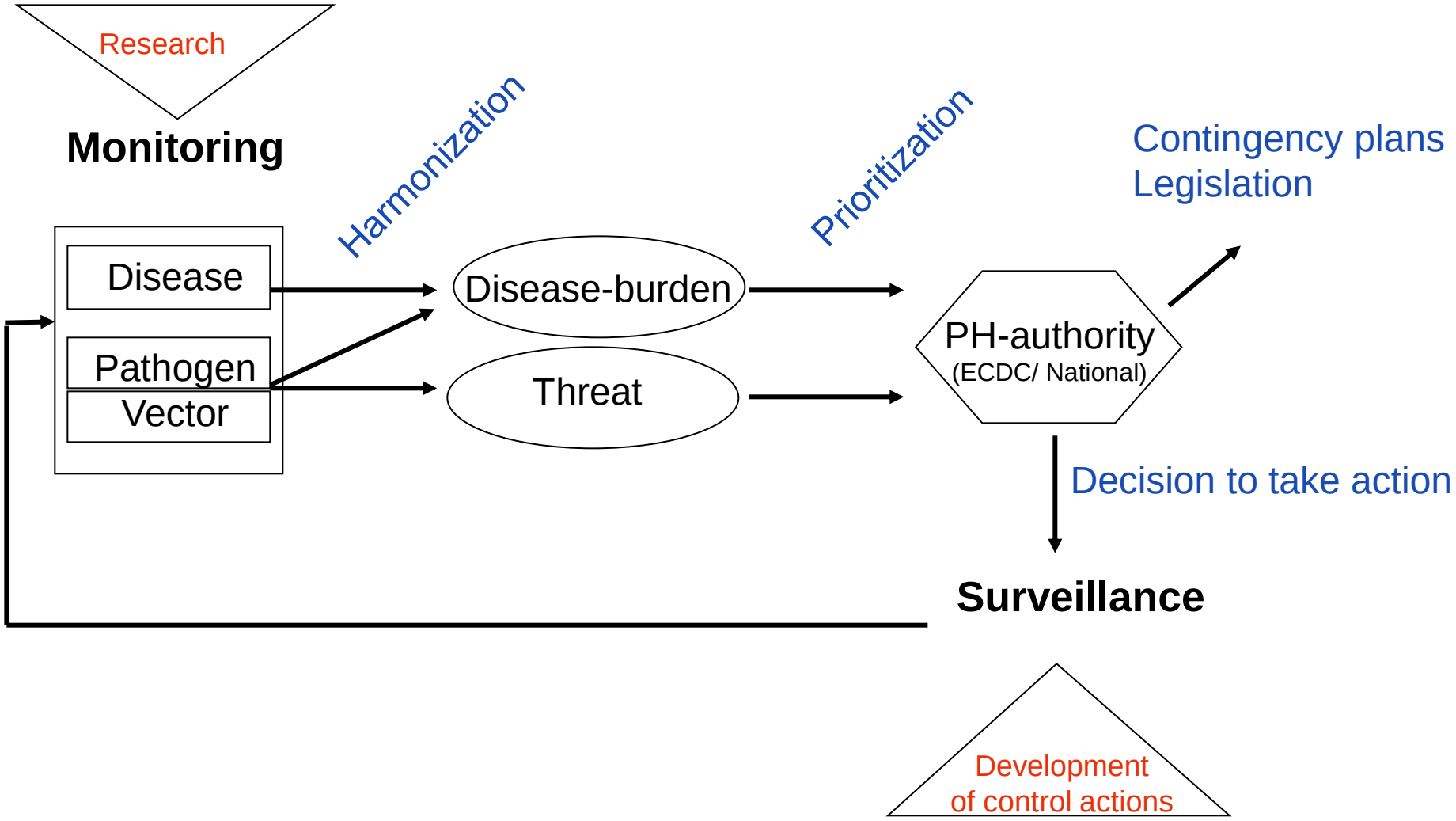
Qualitative data per member state

Netherlands	VBD
	Context
Mosquito-borne diseases:	
Chikungunya	4
Dengue	4
West Nile Fever	3
Rift Valley Fever	3
Tick-borne diseases:	
Tick-borne encephalitis	3
Crimean-Congo haemorrhagic fever	5
Lyme borreliosis	1
Tularaemia	3
Rickettsiosis	2
Sandfly-borne diseases	
Leishmaniasis	4
Sandfly fevers	5

Qualitative data per VBD per member state



Quantitative data per VBD per member state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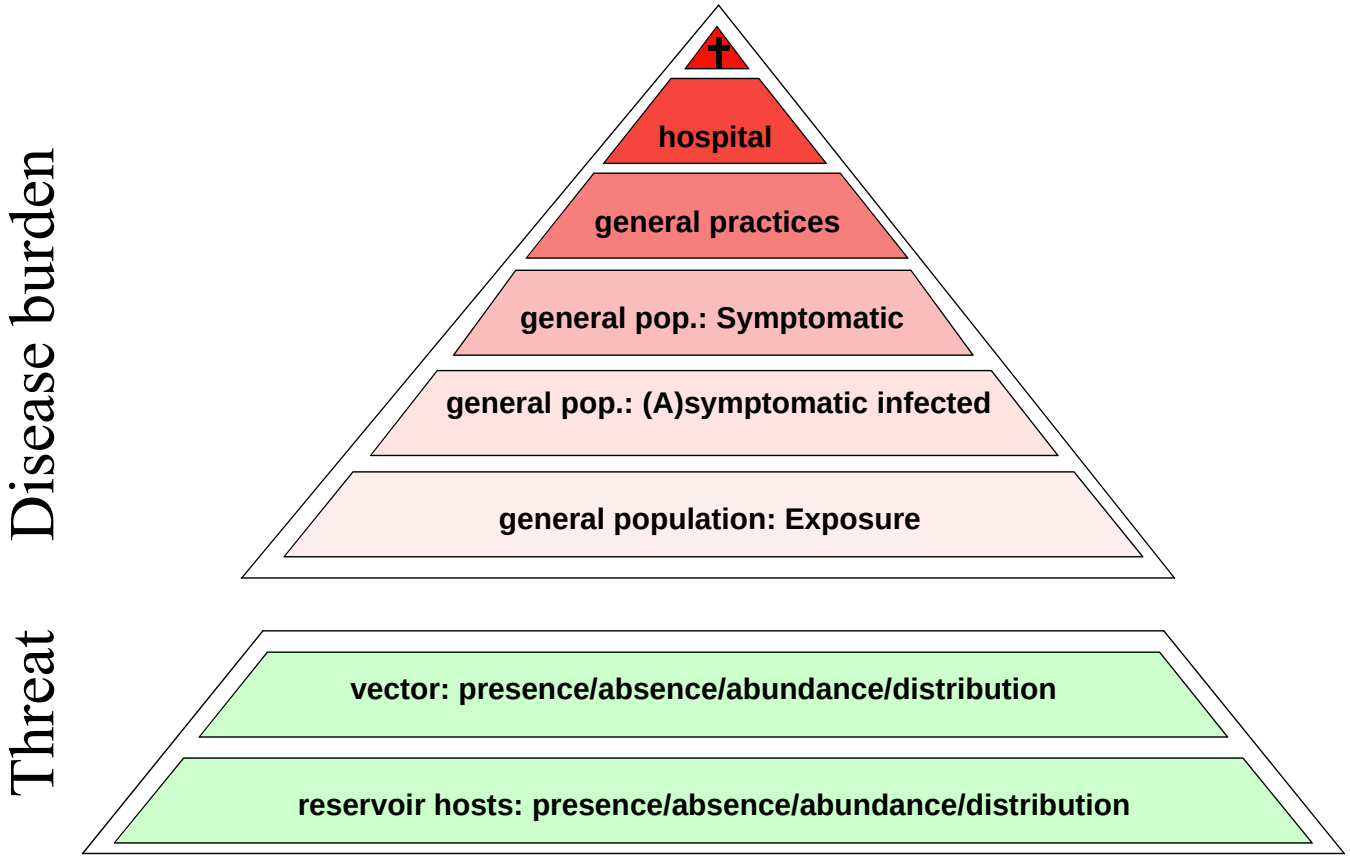
To generate, gather, harmonize and prioritize quantitative data of VBD's in Europe

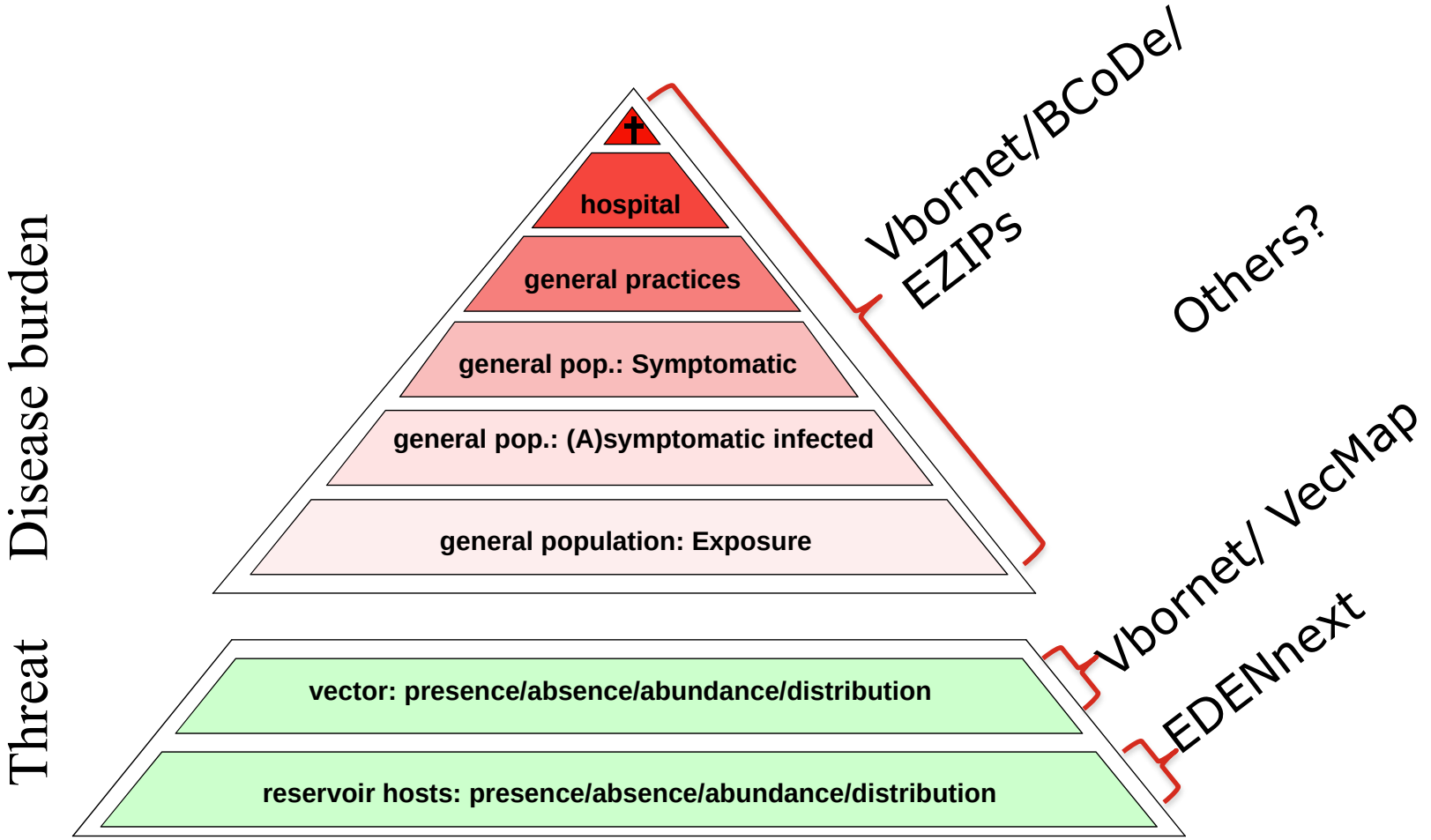
clear guidelines, description and 'formula' to calculate

1. Disease burden
2. Threat

are needed.

Role for National Public Health Authorities and/or ECDC?


Disease burden
Threat
hospital
general practices
general pop.: Symptomatic
general pop.: (A)symptomatic infected
general population: Exposure
vector: presence/absence/abundance/distribution
reservoir hosts: presence/absence/abundance/distribution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vector: presence/absence/abundance/distribution
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Vbornet/BCoDe/
EZIPs
Others?
Vbornet/ VecMap
EDENnext

Thanks

Acknowledgements

coauthors on the strategic paper:
Hein Sprong,
W. van Bortel,
J. van der Giessen,
M. Kretzschmar,
W. van Pelt,
E.J. Scholte,
C. Reusken

Vbornet consortium