World Organisation for Animal Health

Australian Government
Department of Agriculture, Fisheries and Forestry

UNIT 1. RISK ANALYSIS: KEY CONCEPTS

Department of Emerging Diseases and Global Health

Animal Health Research Centre (CISA)

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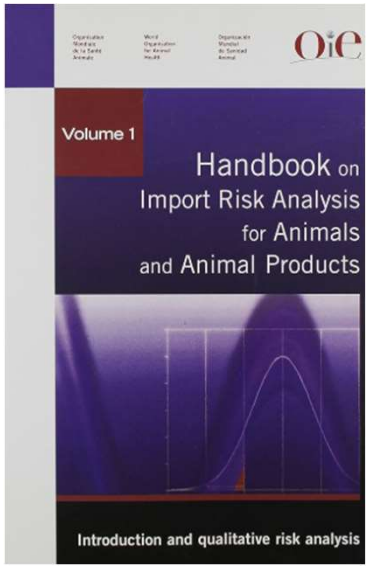
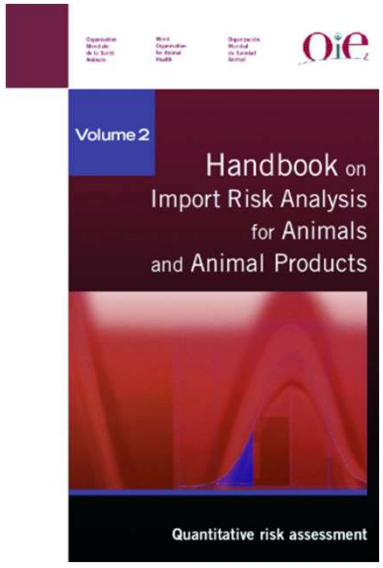
What is risk analysis in Veterinary Medicine?

"**Risk analysis** is a **tool** intended to provide decision-makers with an objective, repeatable and documented **assessment of the risks** posed by a particular course of action"





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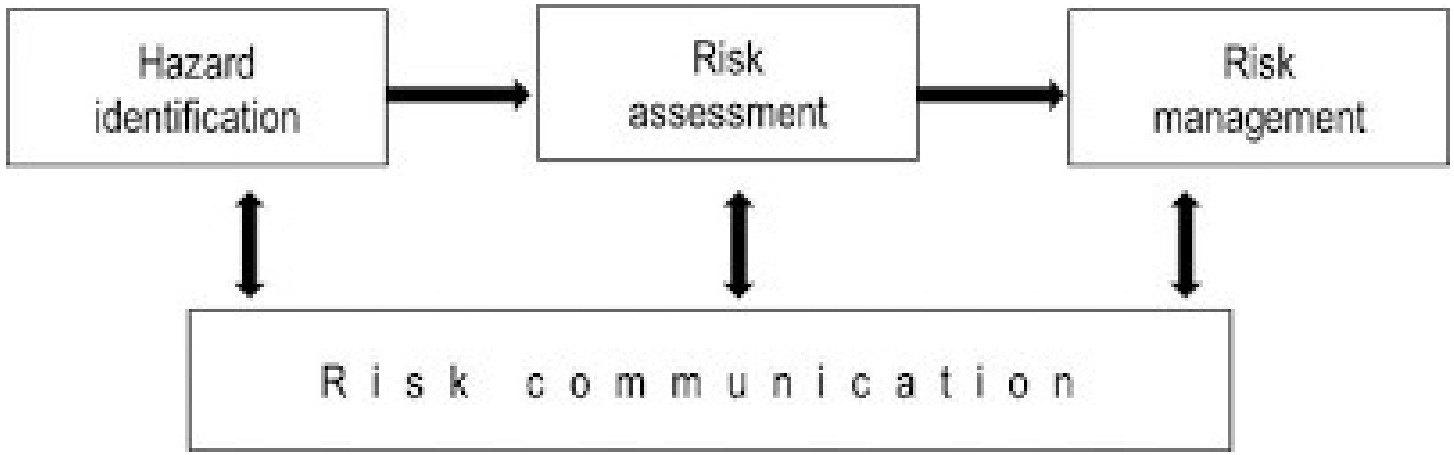
"**Risk analysis** is the process composed of **hazard identification**, **risk assessment**, **risk management** and **risk communication**"

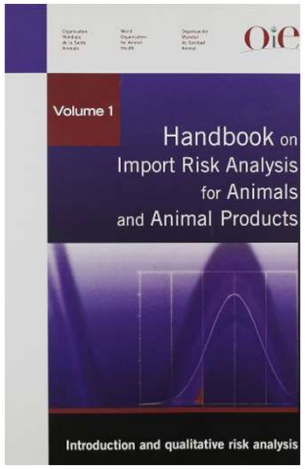
WOAH
Chapter 2.1.

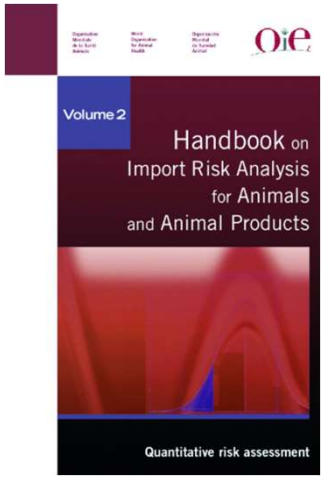


Applications of risk analysis in Veterinary Medicine: Import risk analysis

- For Veterinary Services and their stakeholders

- To assess the degree of **disease risk** involved in the **importation** of **animals** and their **products**





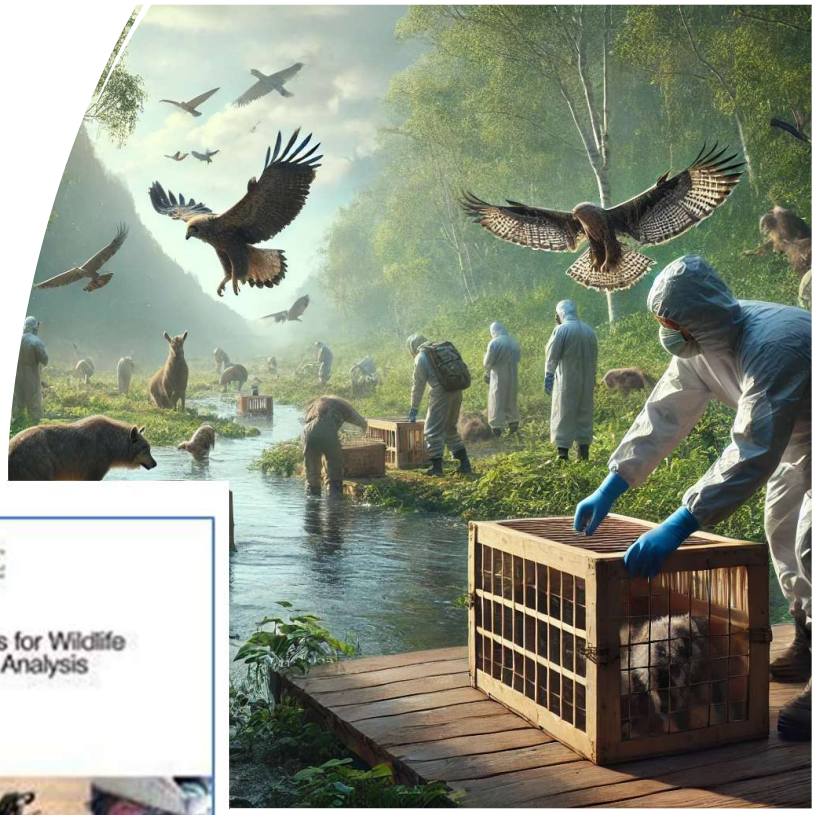
Applications of risk analysis in Veterinary Medicine: Foodborne risk analysis

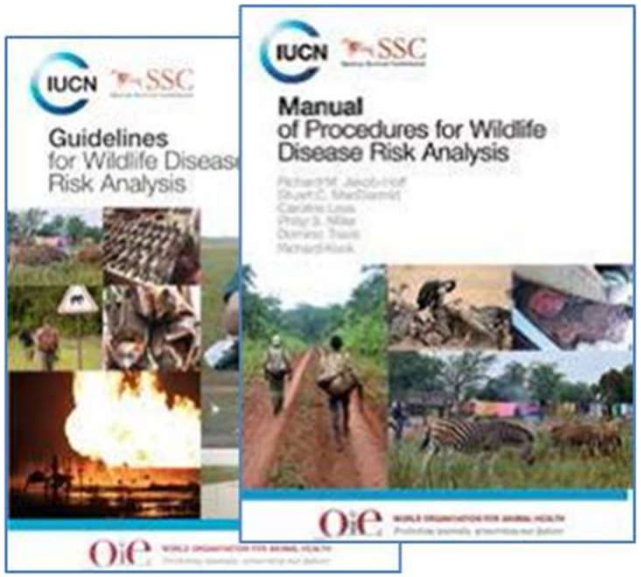
- Microbiological risk in food

- To assess the dose of microorganisms that poses a risk in food

Applications of risk analysis in Veterinary Medicine: Wildlife risk analysis

- Conservation purposes
- To assess the risk of **disease spill-over** among species
- To assess the risk of **disease introduction** following **species reintroduction** or **translocation**

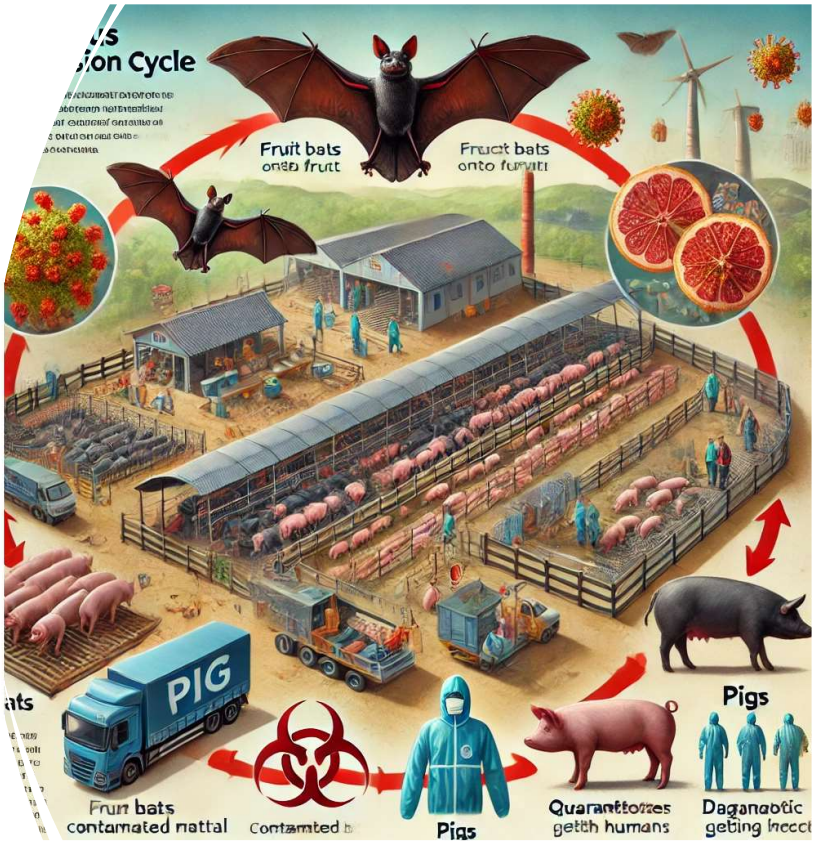




Applications of risk analysis in Veterinary Medicine:
One health risk analysis

Human-animal-environment interface

- *Contingency planning*
- *Zoonotic disease prioritization*
- *Emergency events*



Applications of risk analysis in Veterinary Medicine:
Animal health risk-based surveillance and control strategies for TADs

- Identify sub-populations at risk
- Disease situation and risk factors
- Optimization of resources

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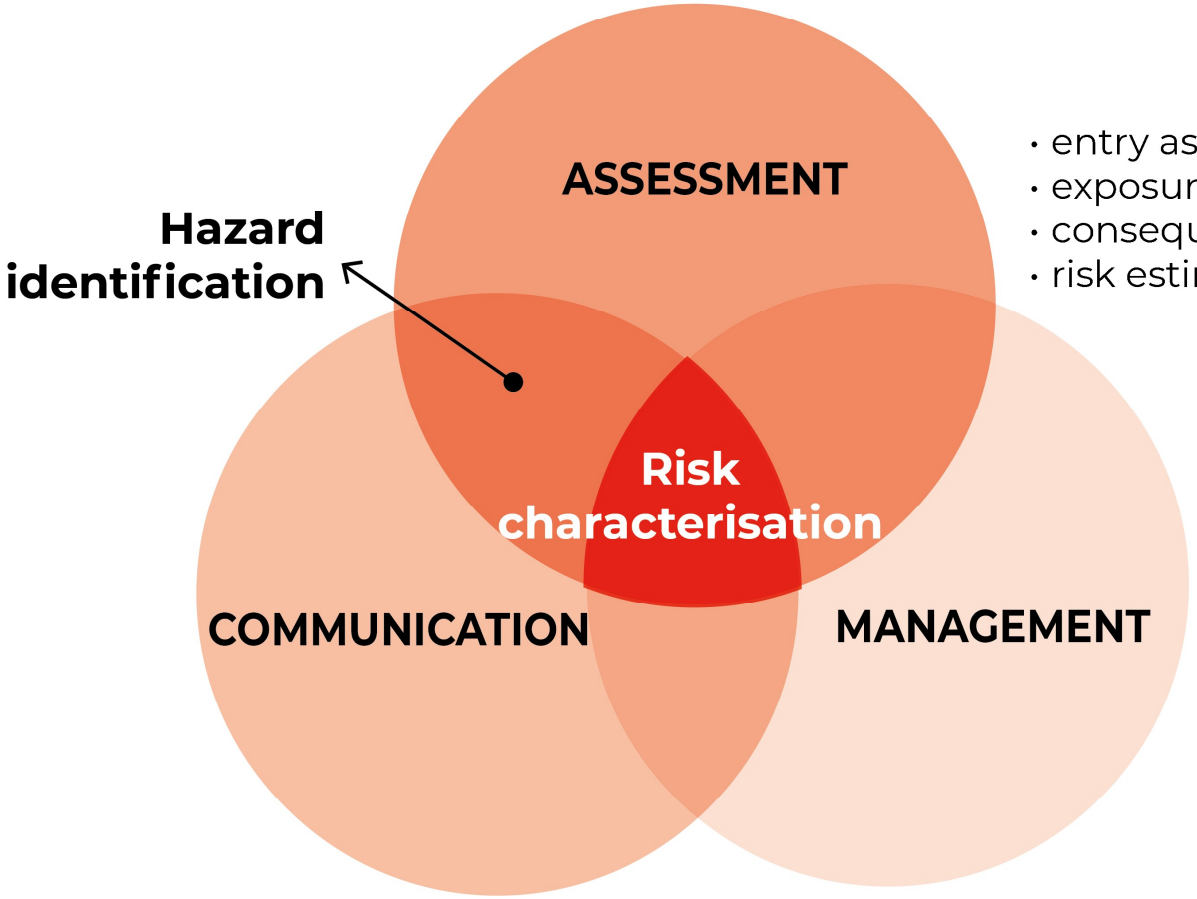
RISK ANALYSIS FRAMEWORK



- entry assessment
- exposure assessment
- consequence assessment
- risk estimation

- risk evaluation
- option evaluation
- implementation
- monitoring and review

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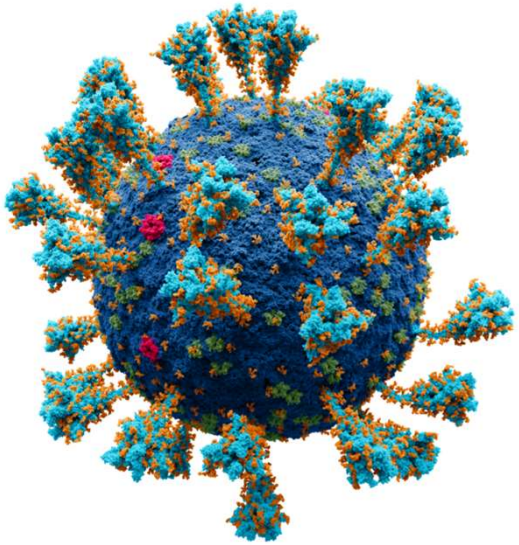
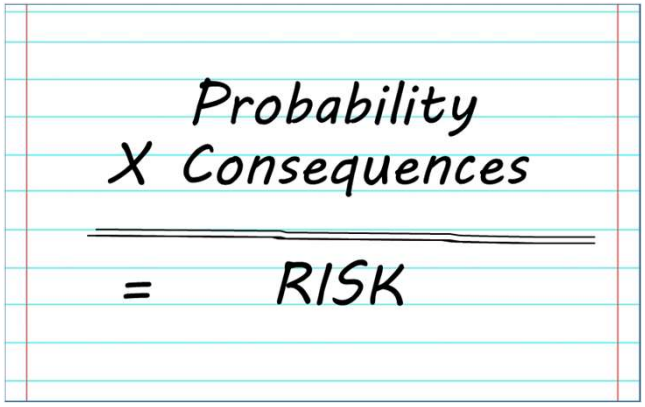
Introduction to hazard identification



- Disease distribution and evolution
- Pathogen characteristics: ways of transmission, infective doses, replication, environmental resistance
- Competent hosts and vectors: susceptibility, tolerance, reservoirs, amplifiers
- Potential risk factors
- Risk pathways

Introduction to risk assessment

Risk assessment is the evaluation of the **likelihood** and the biological **and** economic **consequences** of the *entry*, *establishment* and *spread* of a hazard within the territory of an importing country



Probability = chances or likelihood that ***outcome*** will happen

- The *outcome* could be: pathogen entry; spread; occurrence, perpetuation; endemicity…

Consequences = ***impact*** of a disease

- The *impact* could be: the effect on the economy, livelihoods, value chain, environment, welfare, disease severity, etc.…

This is a 3x3 **qualitative matrix** for risk assessment, based on qualitative likelihood

Likelihood

	Consequences		
	Slight	**Moderate**	**Extreme**
Low	Very low risk	Low risk	Medium risk
Medium	Low risk	Medium risk	High risk
High	Medium risk	High risk	Intolerable risk

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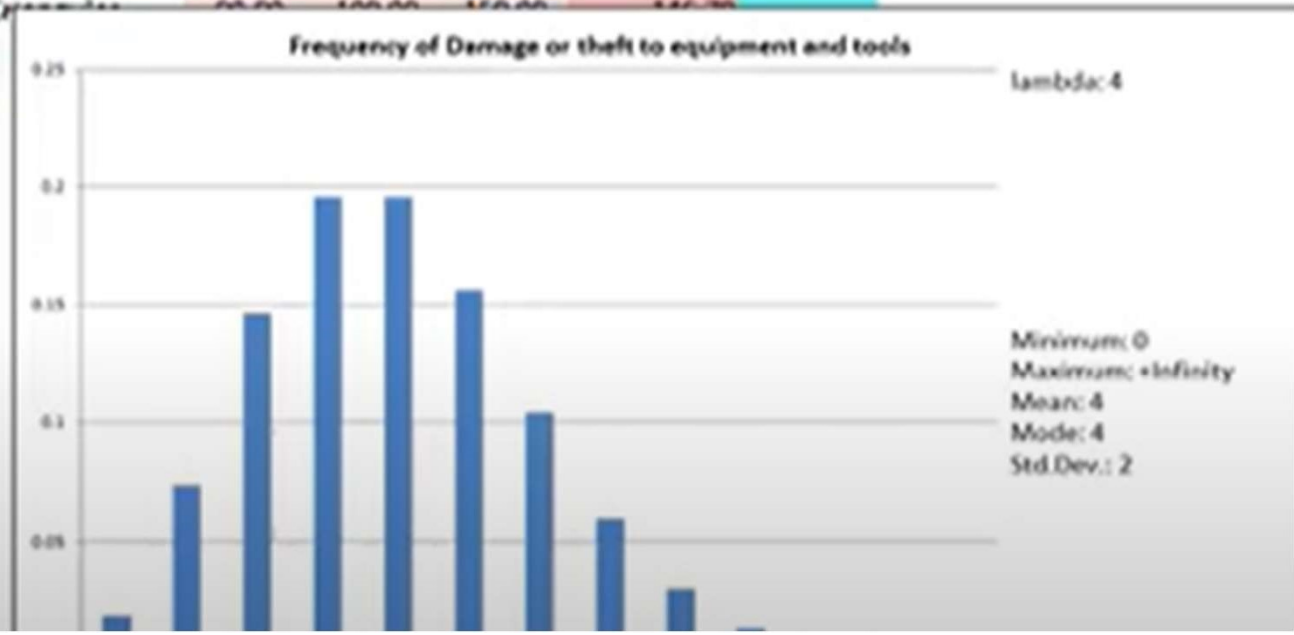
This is a 5x5 **semiquantitative matrix** for risk assessment

Consequences

Likelihood	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Extreme
1 Low	1	2	3	4	5
2 Unlikely	2	4	6	8	10
3 Possible	3	6	9	12	15
4 Likely	4	8	12	16	20
5 Certain	5	10	15	20	25

Category	Freqaency distribution	Param1	Param2	Frequency	Severity Distribution	Param1	Param2	Param3	Severity	Total	4	7
Technical Risk	Bernoulli	0.25		0	Uniform	400.00	800.00		757.94			
Technical Risk	Bernoulli	0.20		1								
Logistics Risk	Poisson	4.00		3								
Environmental Risk												
Logistics Risk												
Socio-political Risk												
Technical Risk												
Logistics Risk												
Logistics Risk												
Logistics Risk												
Logistics Risk												
Logistics Risk												
Environmental Risk												
Financial Risk												
Socio-political Risk												
Environmental Risk												
Management related Risk												



This is a **quantitative framework** for risk assessment, based on probability distributions of each event

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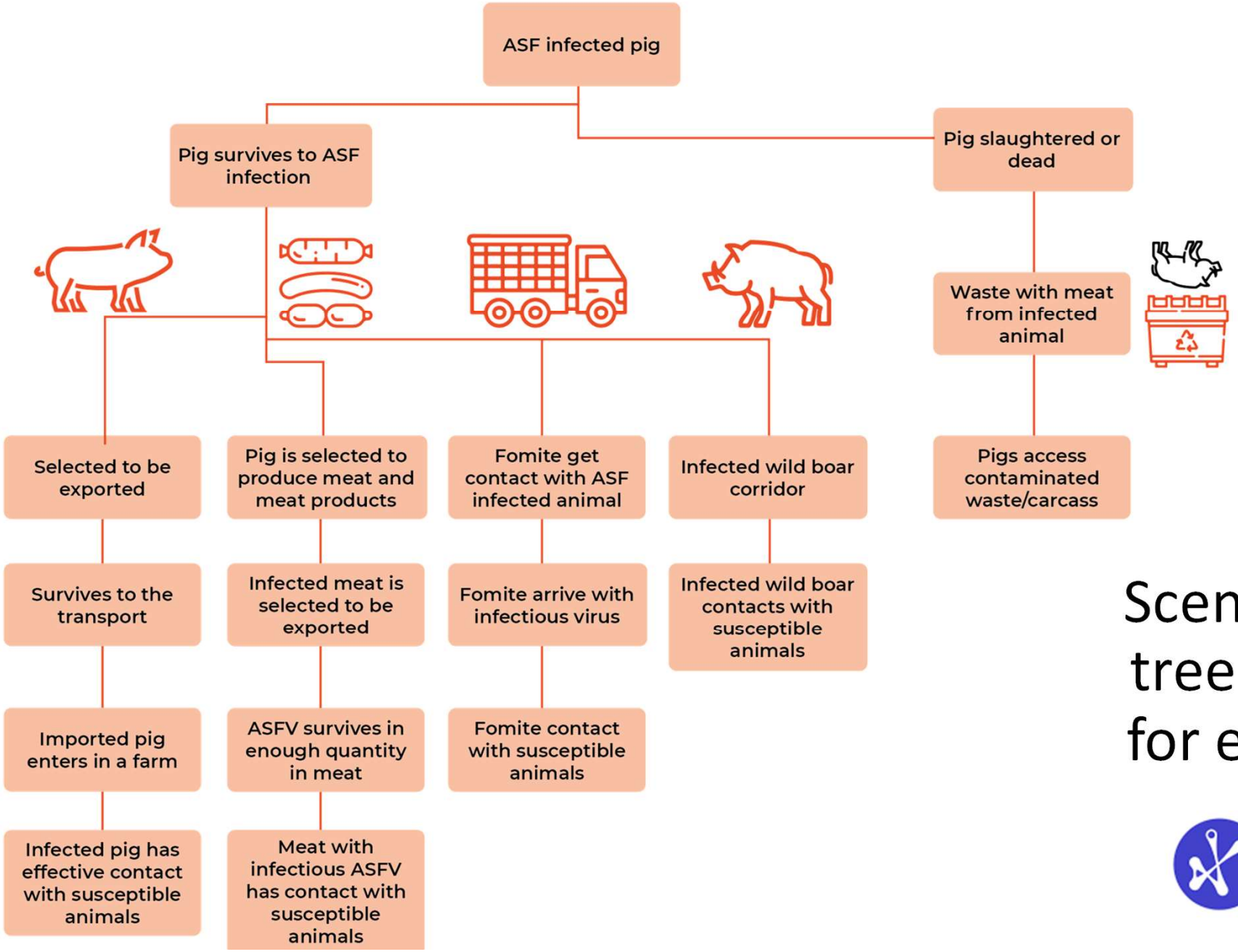

Scenario or event tree diagrammes for each pathway

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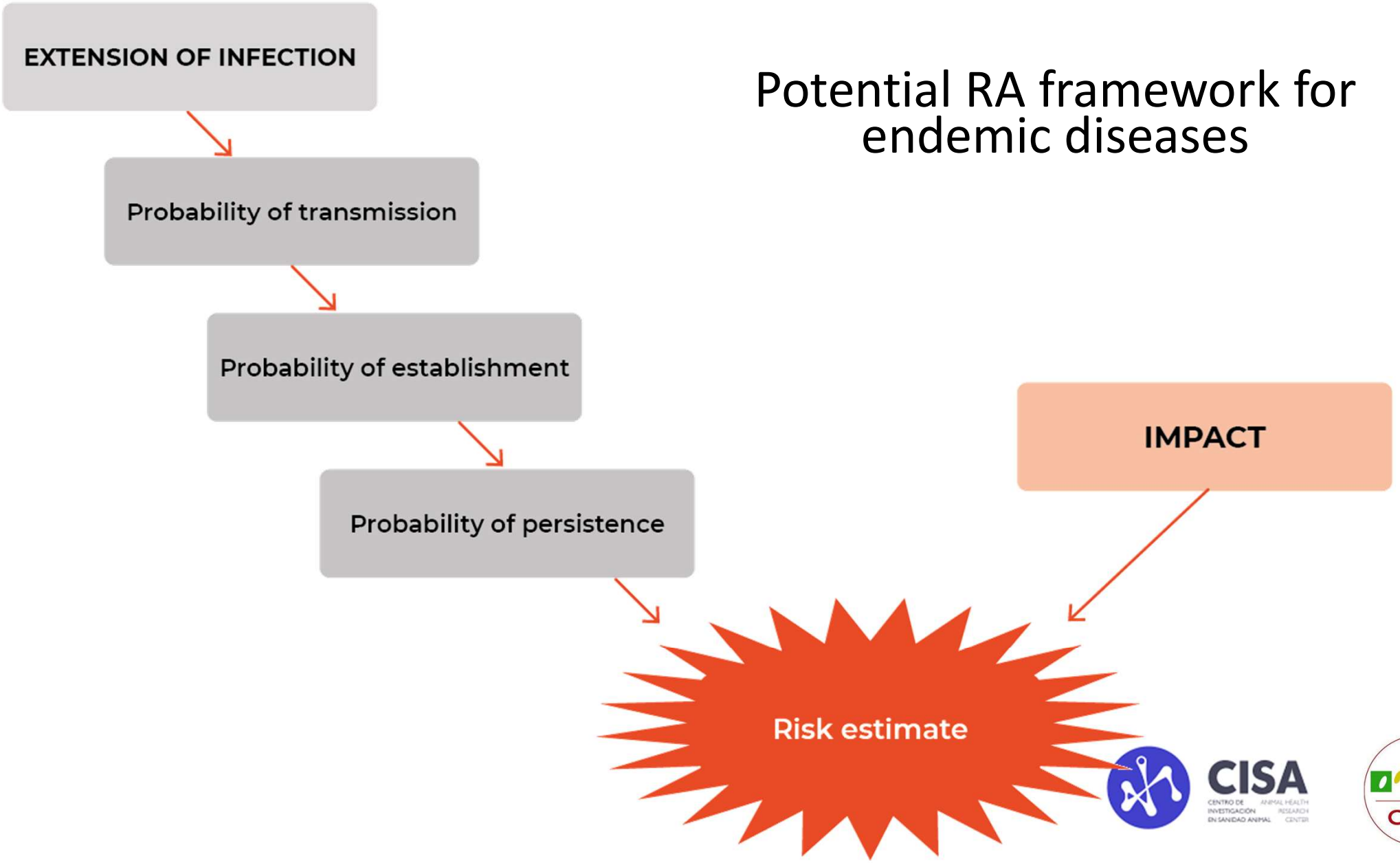
Potential RA framework for endemic diseases



Assessment of risk hotspots in an endemic setting

Risk ID	Risk Area	Probability of Outbreak (%)	Probability distribution	Impact ($)	Risk Score
R1	Region A	10	Normal Distribution (Mean: 10%, SD: 2%)	500000	50000
R2	Region B	15	Lognormal Distribution (Mean: 15%, SD: 3%)	300000	45000
R3	Region C	8	Triangular Distribution (Min: 5%, Mode: 8%, Max: 12%)	700000	56000

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VERY IMPORTANT: **risks vary with time!** The disease situation is constantly evolving, and numerous human activities can influence the progression of animal diseases, such as changes in land use, political shifts, or alterations in social habits. Therefore, it is crucial to specify a time frame when defining the risk analysis question, and the assessment of risk should be regularly updated.

Introduction to risk management

"The process of **identifying**, **selecting** and **implementing** measures that can be applied to reduce the level of risk"

Introduction to risk communication

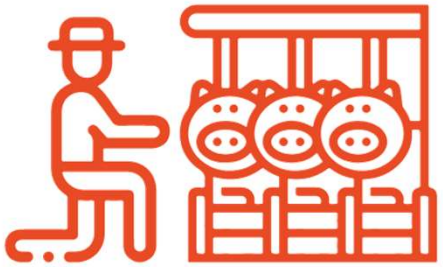
"The **interactive transmission and exchange of information and opinions** throughout the risk analysis process concerning risk, risk-related factors and risk perceptions among risk assessors, risk managers, risk communicators, the general public and other interested parties" (Glossary of the WOAH Animal Health Codes)

- **identify the stakeholders** involved,
- provide the opportunity for stakeholders to **participate**,
- provide stakeholders with **information**
- establish **experts** in risk communication to facilitate this process.

To enhance trust and confidence and strengthen the relationships among the participants of the risk analysis process.

Information targeted to the stakeholders' needs and level of understanding

STAKEHOLDERS' PERCEPTION



What ...

... they hear

... they think and feel

... they see

... they exchange information

... they trust

References

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2. Introduction to risk analysis in animal health. Dr Melissa McLaws. EUFMD. https://www.youtube.com/watch?v=P2IHRxHZQbU EUFMD Safe Trade and FMD control virtual workshop carried out in partnership with the OIE in March 2021.
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6. A. Conan, Y. Kim, D.A. Yang, T.T.Z. Win, O. Nekouei & D.U. Pfeiffer. (2022). - African Swine Fever Cross-border Risk Assessment Manual: South-East Asia. World Organisation for Animal Health (OIE) Sub-Regional Representation for South-East Asia, Bangkok, Thailand, 36 pp.
7. APCOVE Module *Introduction to Risk Analysis*: https://www.apcove.com.au/modules/english/D-01/#/

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