Risk Assessment – Entry Assessment, Exposure Assessment, Consequence Assessment in Aquaculture

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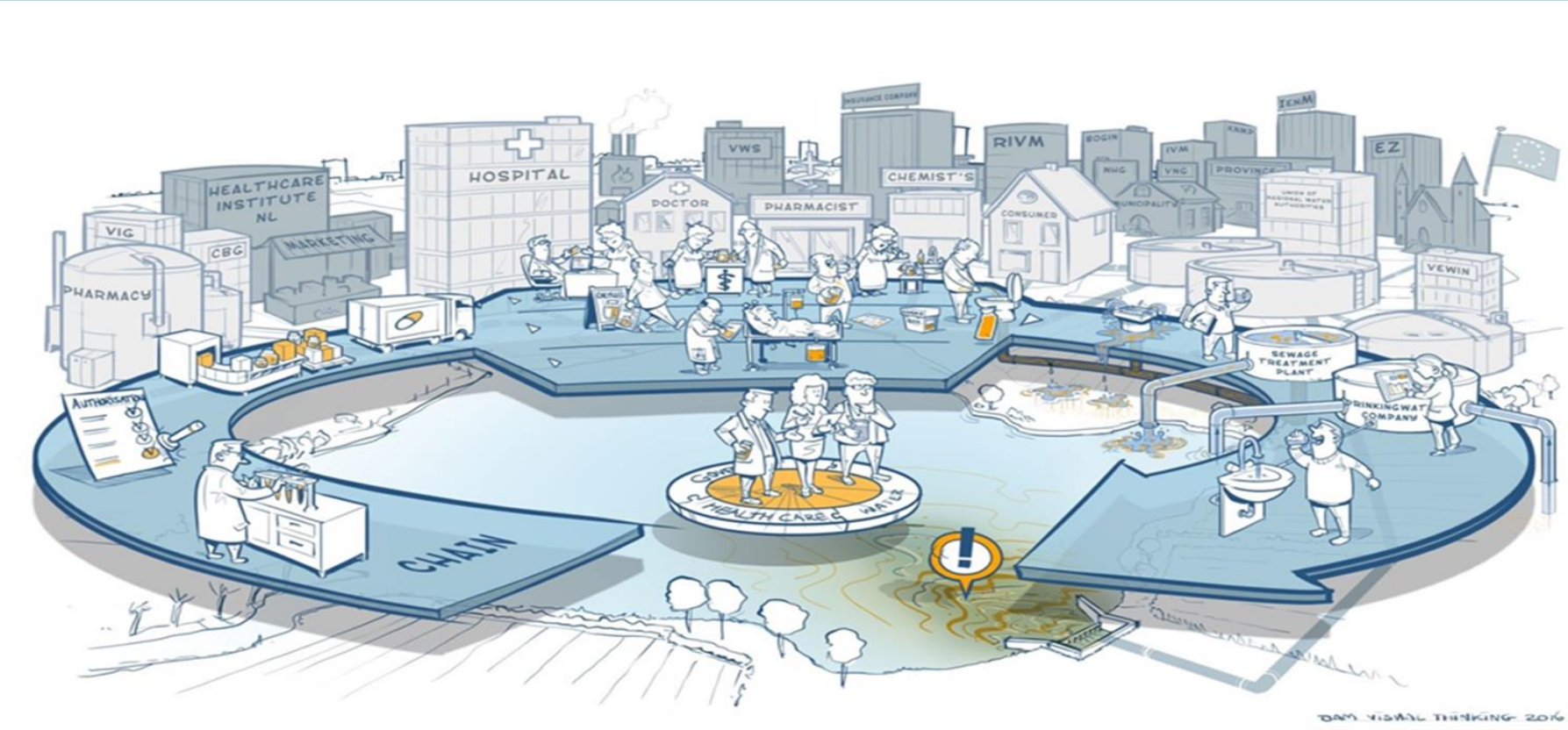**IEHConsulting**

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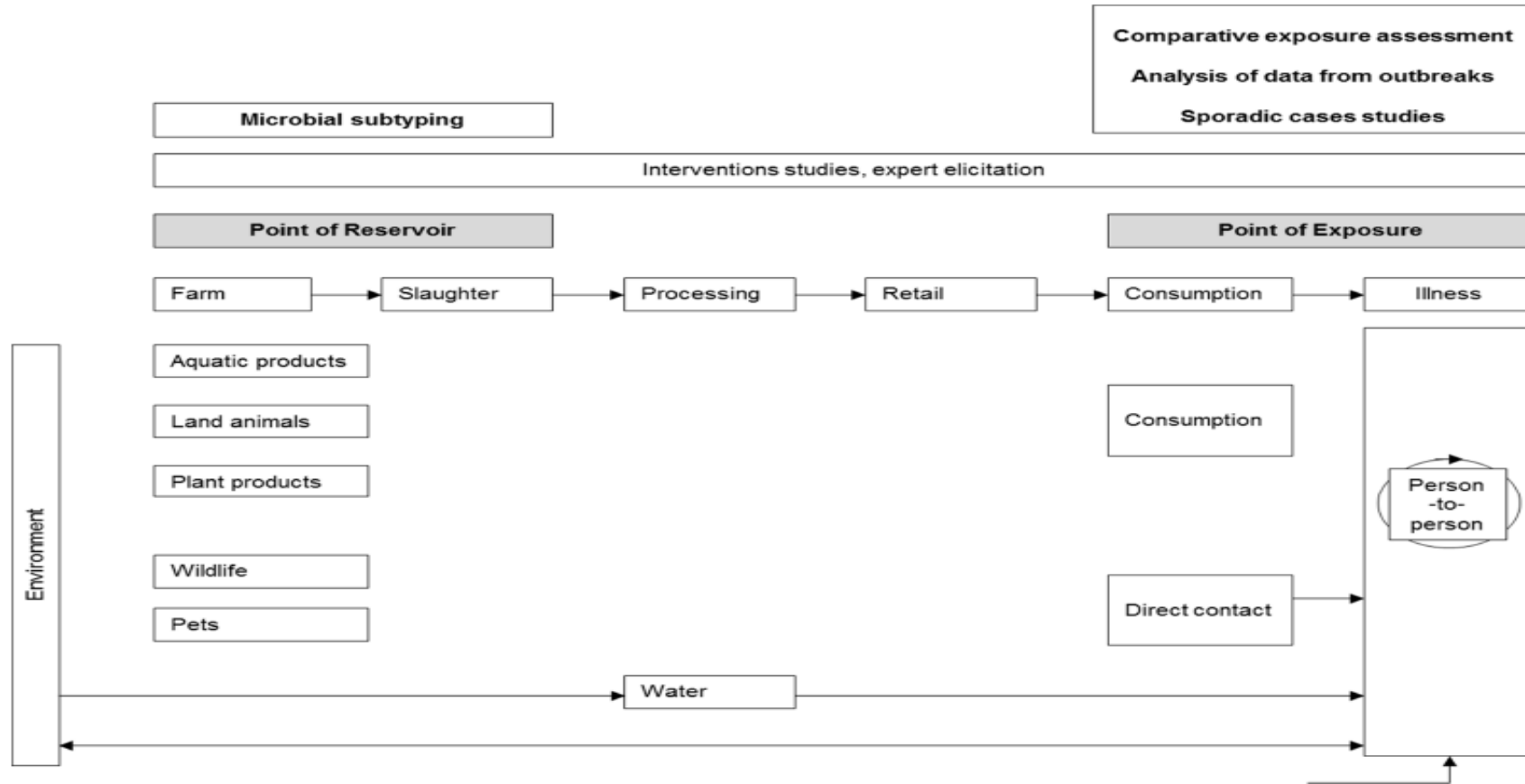# Supply Chain Risk Assessment: An approach
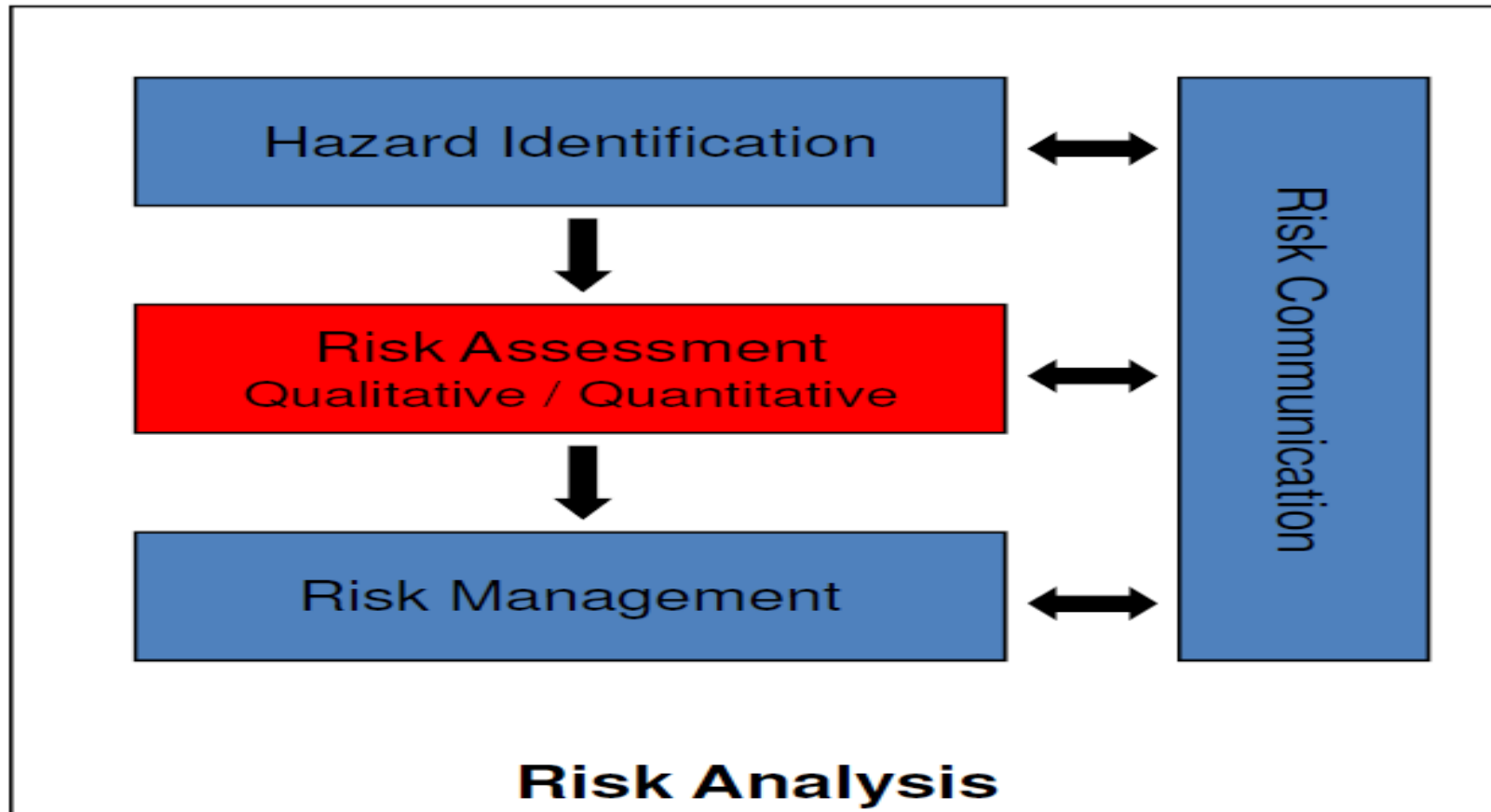

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Attributing source....

FIGURE 1 Routes of transmission of zoonotic pathogens and points of source attribution. Adapted from reference 7.

Risk Assessment

Approaches to Risk Assessment - OIE

- Main systems used for animal health, food safety, veterinary & public health:

- OIE International Animal Health Code

- Codex Alimentarius Commission

- Different systems developed to answer different types of risk questions:

- OIE: Versatile, used to address varying risk questions

- Codex: main focus on microbiological food safety assessment

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OIE - International Animal Health Code

- The RA includes the following steps:

- **Entry assessment**: description of biological pathways for release of hazard and estimation of its probability
- **Exposure assessment**: description of biological pathways necessary for exposure to humans/ animals to the hazards released and estimation of probability
- **Consequence assessment**: Description of the relationships between exposure to hazards and consequences of those exposures (biological and economic)
- **Risk estimation**: Integration of the results from previous 3 steps to produce an overall measure of the risk associated with the hazards

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Risk Analysis Components

(after OIE *International Animal Health Code*)

Risk Communication

Hazard Identification → Risk Assessment → Risk Management

Release Assessment → Exposure Assessment → Consequence Assessment
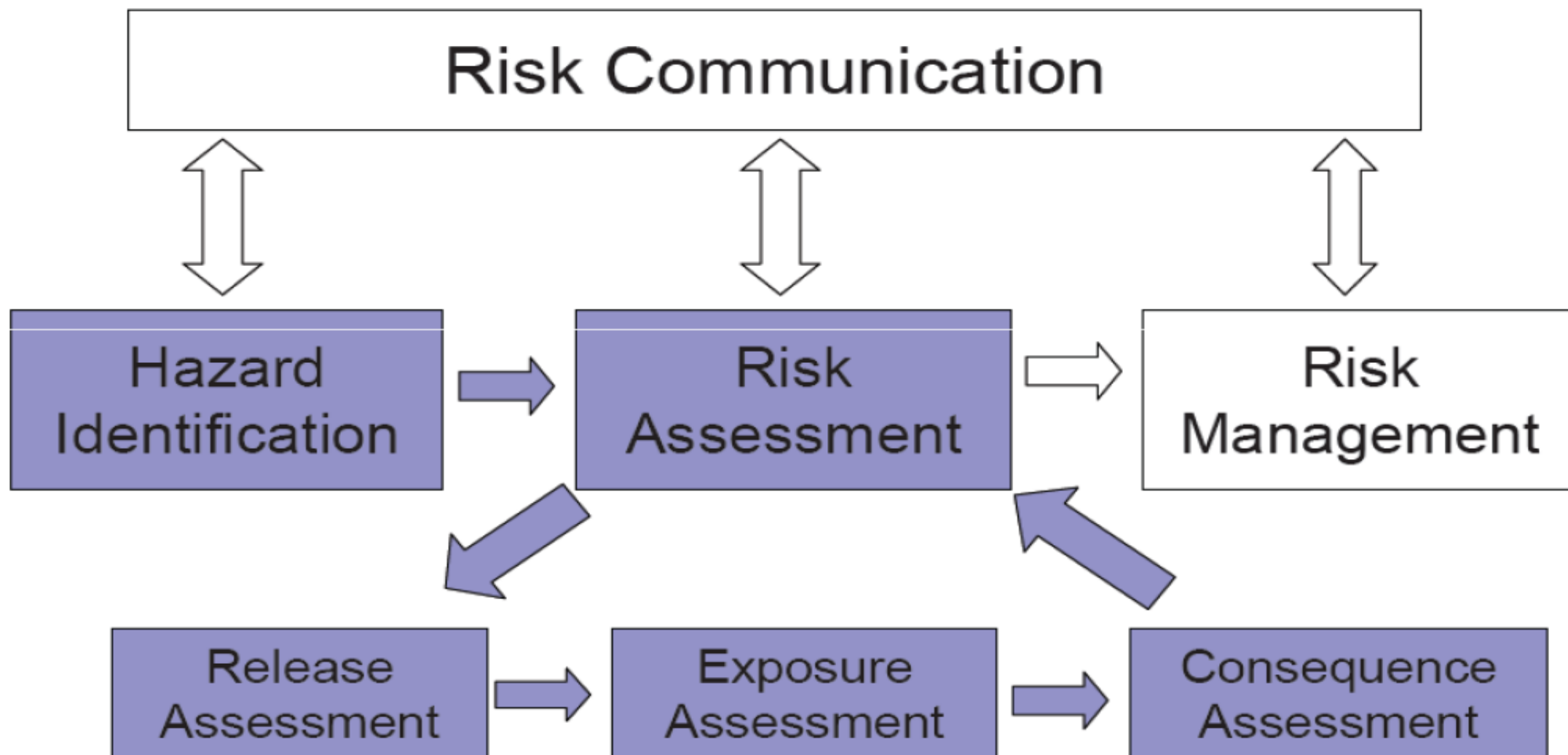
Approaches to Risk Assessment

- Qualitative vs. Quantitative

- When do we use a qualitative approach…?

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Main steps of a Risk Assessment

- Framing the question
- Identifying the hazard(s)
- Outlining the risk pathways
- Identifying data needs
- Collecting data
- Assessing the risk

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Aquaculture example

	Definition	Step of Pathway
Entry (Release) Assessment	Likelihood of entry	New infected fish introduced without quarantine
Exposure Assessment	Likelihood of target population to being exposed	Infected fish in pens with established fish population, Water running out of farm
Consequence Assessment	Consequences plus likelihood of occurrence and magnitude	All fish infected on the farm, Wild fish potentially infected and downstream farms impacted

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Aquaculture example

	Steps of Pathway	Data Needs
Entry (Release) Assessment	New infected fish introduced without quarantine	• Species • Disease diagnostic • Susceptibility
Exposure Assessment	Infected fish in pens with established fish population; Water running out of farm	Contact with other fish populations in different pens (infectivity) Impact on local populations Pathogen survival
Consequence Assessment	All fish infected on the farm, Wild fish potentially infected and downstream farms impacted	Type of contact, susceptibility, shedding etc.

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Data required for entry, exposure and consequence

Table : Data required and data obtained for each step of the release assessment

Risk pathway step	Data needed	Data obtained	Source
Risk of cattle from area X being infected	Prevalence data in cattle in area X	10 %	Xxxxx et al. 2008
Risk of cattle not being tested before importation	Control at importation ? Frequency ?	Serological test 0.1% animals tested	Expert opinion
Risk of a positive animal is not detected	Test characteristics	Se 99% Sp 95%	Xxxx et al. 2005

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Overall risk summarised as a probability of occurrence of the unwanted outcome

Example AI-RA EFSA migratory bird

Probability category	Interpretation
Negligible	Event is so rare that it does not merit to be considered
Very low	Event is very rare but cannot be excluded
Low	Event is rare but does occur
Medium	Event occurs regularly
High	Event occurs very often
Very high	Event occurs almost certainly

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Dealing with Uncertainty

Qualitative categories for expressing uncertainty in relation to qualitative risk estimates

| Uncertainty category	Interpretation
Low	Solid and complete data available; strong evidence provided in multiple references; authors report similar conclusions
Medium	Some but no complete data available; evidence provided in small number of references; authors report conclusions that vary from one another
High	Scarce or no data available; evidence is not provided in references but rather in unpublished reports, based on observations, or personal communication; authors report conclusions that vary considerably between them

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Qualitative Risk Assessment

Qualitative RA:

- Review information available and estimate risk for each step
- Combine risk estimates using pre-defined combination matrix
- Deduct the overall probability of occurrence of the risk of interest and of unwanted consequences
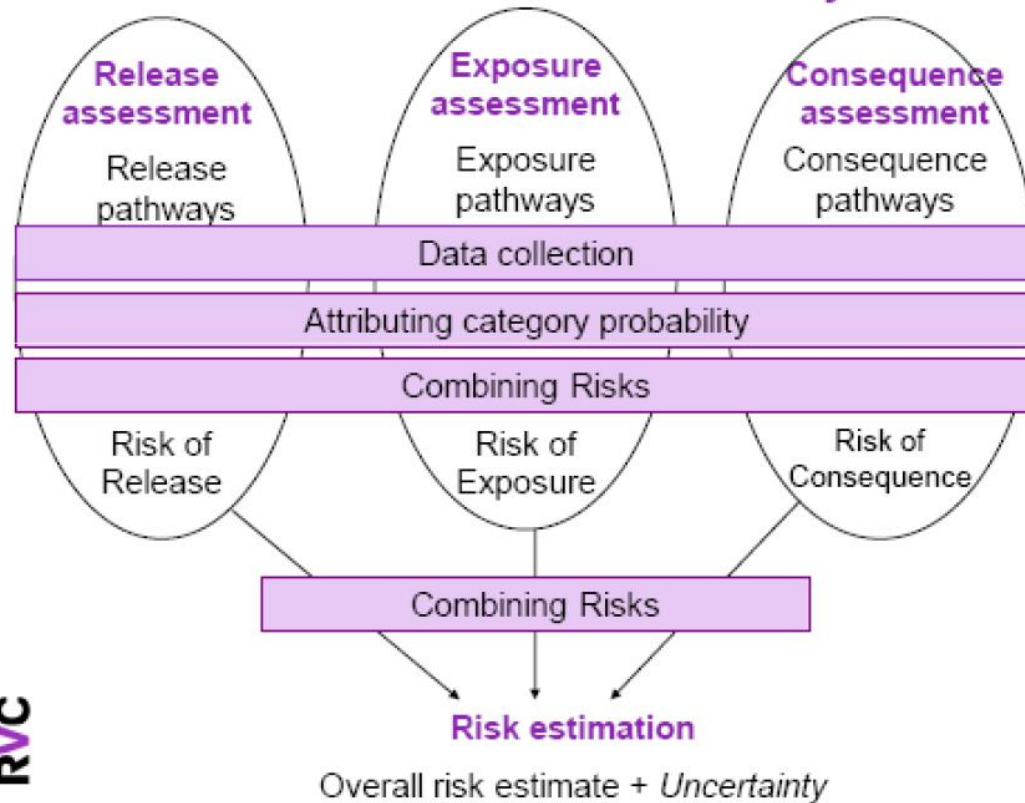- +/- decide whether this risk is acceptable or not

NB: "low" or "negligible" risk does not imply "acceptable risk" (e.g. when severe consequences for human population)

- OIE Framework

(Import risk analysis)
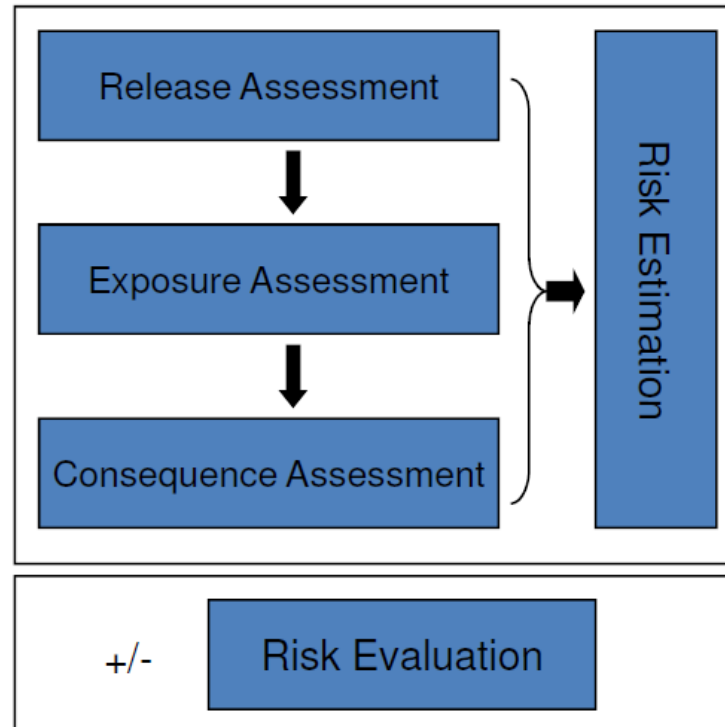
Risk Assessment Summary

Summary

- Estimation of overall likelihood of occurrence of the adverse effect considered
- Identification of the steps of the pathways having a high risk of occurrence or impact on an overall estimate
- What next – surveillance etc. and if so, where, aids to focus efforts

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Differences in managing AMR between Developed and LMIC Countries – the three As'

- Awareness

- Acceptance

- Action

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Thank you

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