# Informatics & Interoperability

Summary

Convention on
Biological Diversity

TERMS OF REFERENCE FOR THE AD HOC TECHNICAL EXPERT GROUP ON ADDRESSING THE RISKS ASSOCIATED WITH THE INTRODUCTION OF ALIEN SPECIES AS PETS, AQUARIUM AND TERRARIUM SPECIES, AND AS LIVE BAIT AND LIVE FOOD

"…In addition, the Ad Hoc Technical Expert Group will consider **ways to increase the interoperability of <u>existing</u> information resources** including databases and networks, of use **in conducting risk and/or impact assessments and in developing early-detection and rapid response systems**…"

**Convention on Biological Diversity**

# COP6 Decision VI/23

"**States** should assist in the development of **an inventory and synthesis of relevant databases, including taxonomic and specimen databases, and the development of information systems and an interoperable distributed network of databases** for compilation and dissemination of information on alien species for use in the context of any prevention, introduction, monitoring and mitigation activities. This information should include incident lists, potential threats to neighbouring countries, information on taxonomy, ecology and genetics of invasive alien species and on control methods, whenever available. The wide dissemination of this information, as well as national, regional and international guidelines, procedures and recommendations such as those being compiled by the Global Invasive Species Programme should also be facilitated through, *inter alia*, **the clearing-house mechanism of the Convention on Biological Diversity**."
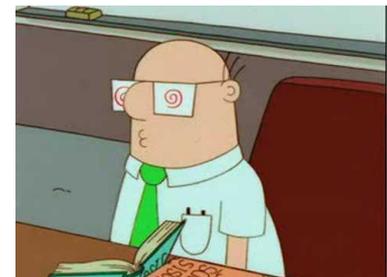
# Some definitions of interoperability…
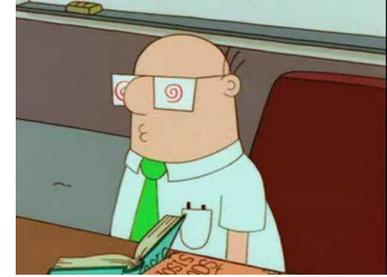
Interoperability is a property of a product or system, whose interfaces are completely understood, to work with other products or systems, present or future, without any restricted access or implementation.

the ability of two or more systems or components to exchange information and to use the information that has been exchanged.

Beyond the ability of two or more computer systems to exchange information, **semantic interoperability is the ability to automatically interpret the information exchanged meaningfully and accurately in order to produce useful results as defined by the end users of both systems**. To achieve semantic interoperability, both sides must refer to a common information exchange reference model. The content of the information exchange requests are unambiguously defined: what is sent is the same as what is understood.

# General principles: Interoperability



**Discovery System**

**Service Publishers**

**Others...**

**Registering**

**Discovering**

**Data Publishers**

**Searching Retrieving**

**Consumers**

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# Types of Information



Species

Observation data

Geographical scope

Register of experts

Early warning systems

Guidelines
and best practices

Risk assessments

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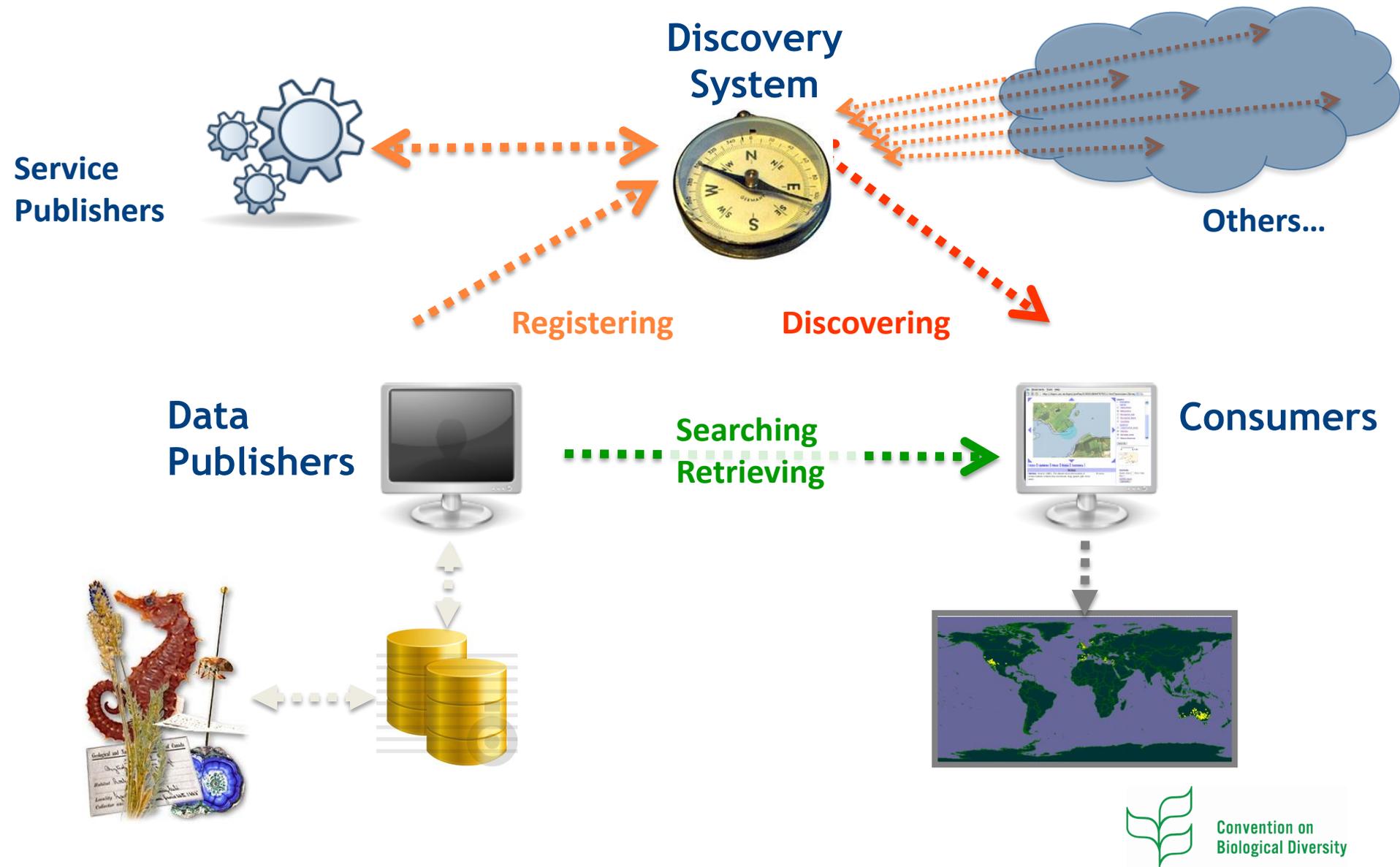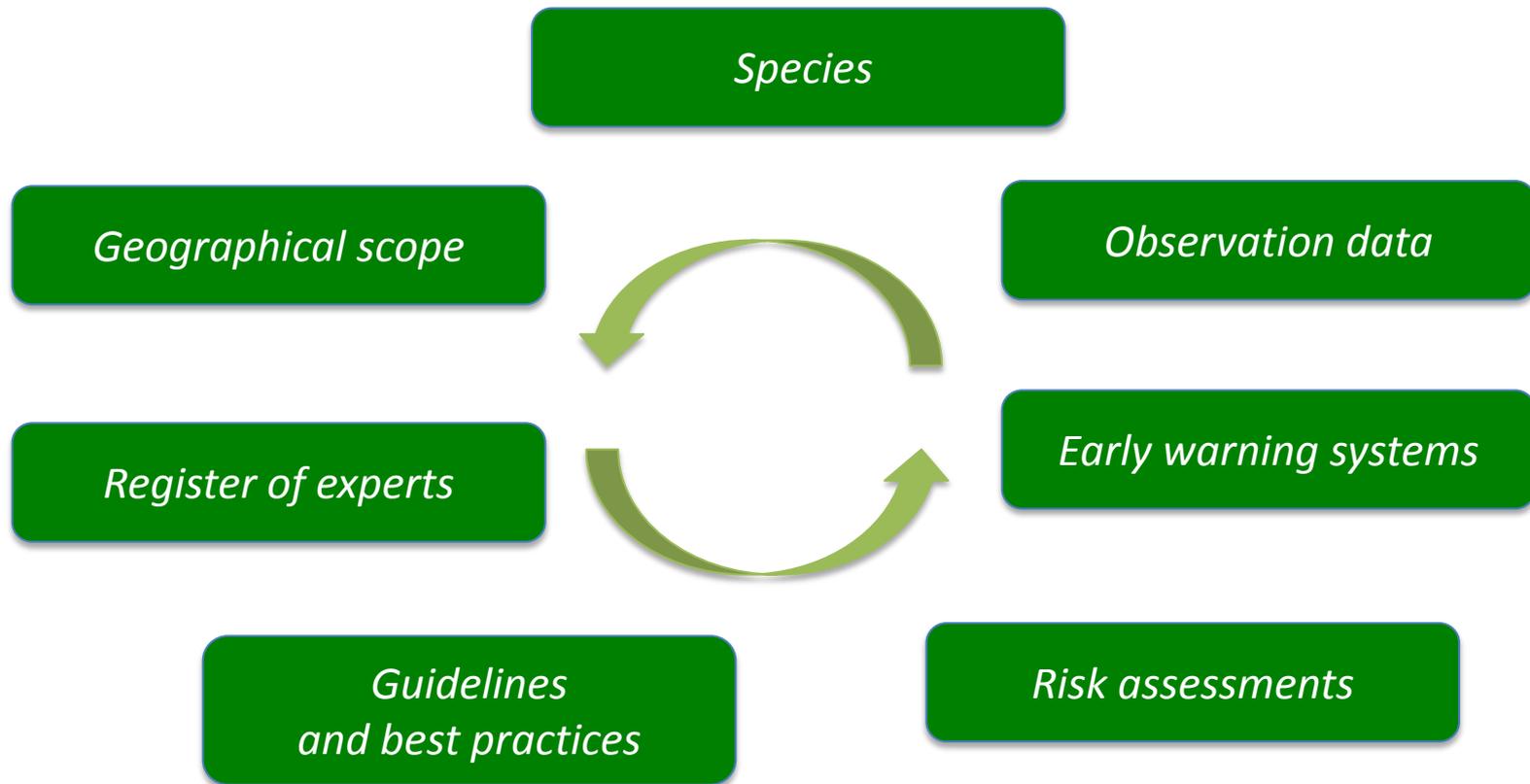
# Classification of Information datatypes



**Taxonomy**

**Geospatial**

**Temporal**

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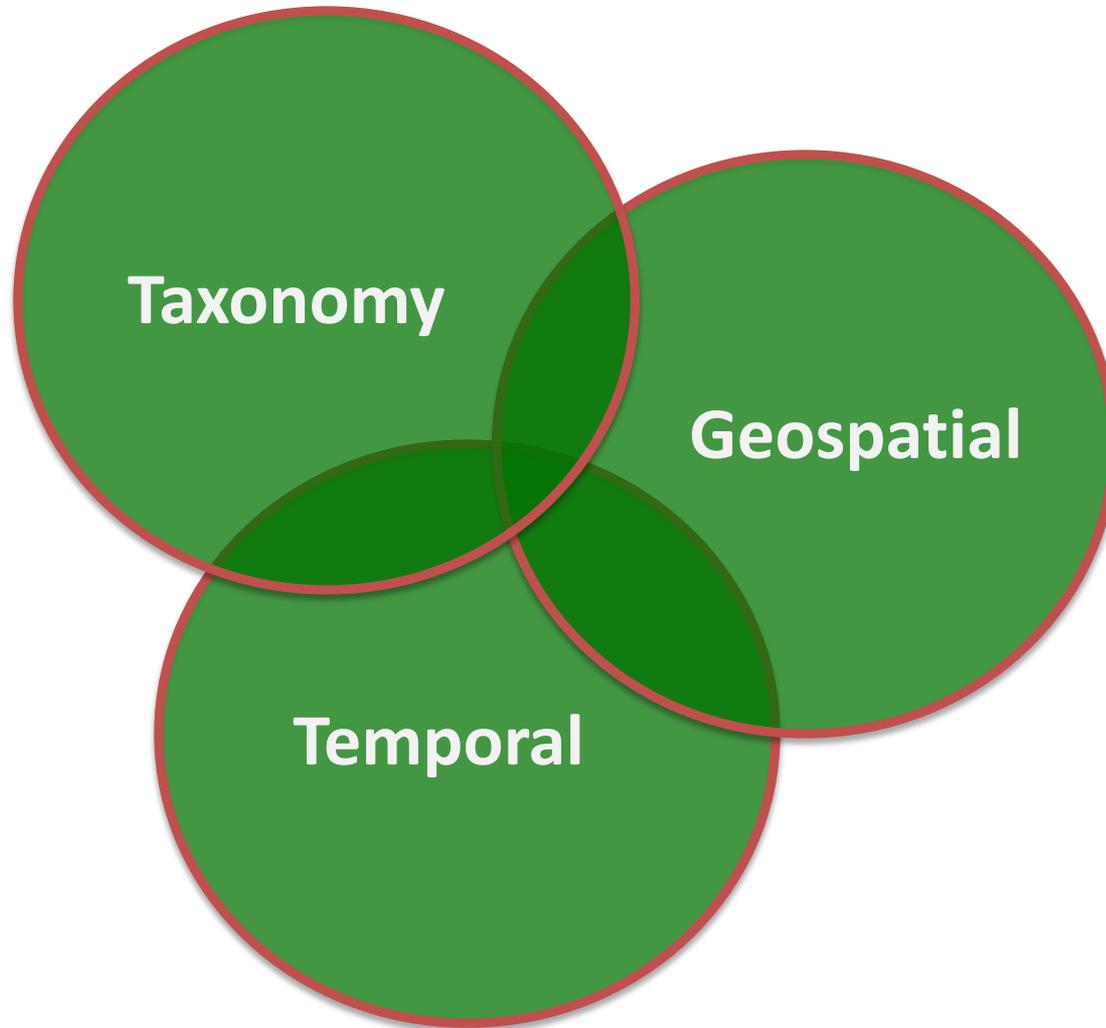
# Existing Information Systems

Global scale

Regional scale

*Identification tools*

Best practices for management options

Risk assessment tools

Domestic Animal Diversity Information System
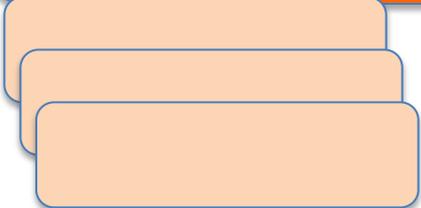
WIEWS

*CBD* clearing-house mechanism

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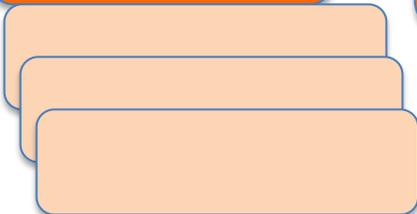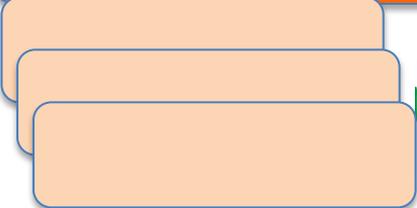
# Some examples: Species information

**Gymnocephalus cernuus,** ruffe, ballast/ contaminated live bait

# Some examples: Observation data

# Some examples: Experts data

# Findings *(purely informatics ones)*

- Most of the information if **'free' or even 'open source'**;
- **Data Quality/Accuracy** is an issue for some information systems;
- **Data curation** is a major concern for many information systems;
- **Persistent identifiers** are not yet widely used…
- **Annotation services** are not widely implemented…
- Some information sources (e.g. taxonomy, observations, etc…) are emerging as **'champions'** (e.g. ITIS/Catalogue of Life… for taxonomy, OBIS/Fishbase/GBIF… for observation data etc…)
- **Common Schemas/Standards** for exchange of information (Taxonomy*Geospatial*Temporal) exist, are well defined, and widely used (e.g. DarwinCore…).
- **Existing standards such as DarwinCore are extensible** and can incorporate additional extensions meeting the needs of the IAS community (e.g. media, literature, experts etc…).
- **Protocols and Tools for interoperability** exist, are maintained/sustained (e.g. GBIF IPT, BioCASe etc…) and widely used.

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# Findings *(non-informatics ones)*

- **Funding sustainability** is an issue for many existing information systems.
- **Expert contribution** is a major concern across most existing information systems.
- **Lifetime:** Many information systems in place were implemented as 'projects' with a fixed duration. There is concern about **future sustainability** for some of them.
- There is somehow a **competition** between existing systems.
- None of the existing systems can meet the full spectrum of needs.
- **Incentives/recognition/credit** is somehow addressed by various systems but do required to be considered if you envisage to inter-link these systems.
- Some initiatives are underway to **better integrate existing systems** (e.g. OBIS/FishBase/AquaMaps/GBIF… GISD/GBIF… GISD/IUCN… GISIN/GBIF/FishBase… DAISIE/GISD.GBIF).
- However the actual process of integration is too slow…
- By the way, what's the difference with the broader definition of Invasive and Alien Species?

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# Challenges

- Specificity in terms of **species coverage** (e.g. related to the mandate of the information systems);

- **Lack of sufficient and accurate information** on given species (e.g. references, observation data, etc.);

# Opportunities

- **Standards, Infrastructure and Inter-operability** are being addressed successfully by other global initiatives; Great potential to leverage from these experiences;

- **Socio-political barriers** are less problematic but do require some serious incentives (e.g. use cases showing the benefits at economical, policy and other levels, credit, endorsement, visibility, use by various bodies);

- **Lack of funding** is a problem at all levels but approaches or strategies to distribute the workload/costs (e.g. mergers, assigning responsibilities to champions) could be beneficial;

- Great opportunity to build/agree on a **global umbrella/consortium** (e.g. MEAs, Conventions, UN, IGOs…) to build an open-access and inter-operable global/regional/national network;

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## Next Steps

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Risk...

# General principles: Starting point



A circular diagram with "General Principles" at the center, surrounded by a cycle: Monitoring and evaluation → Assessing needs → Designing services → Sourcing providers → Delivering to users → (back to Monitoring and evaluation).

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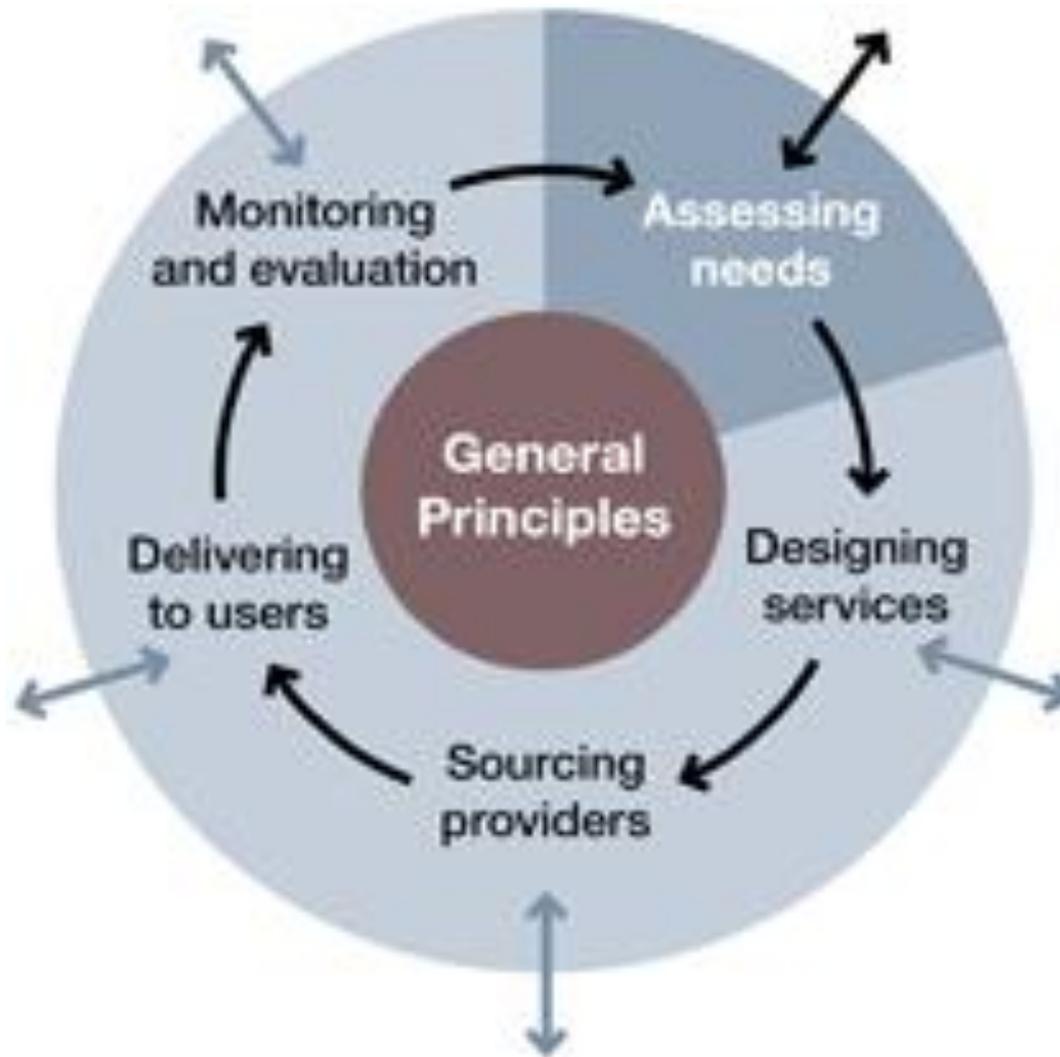
# Next steps
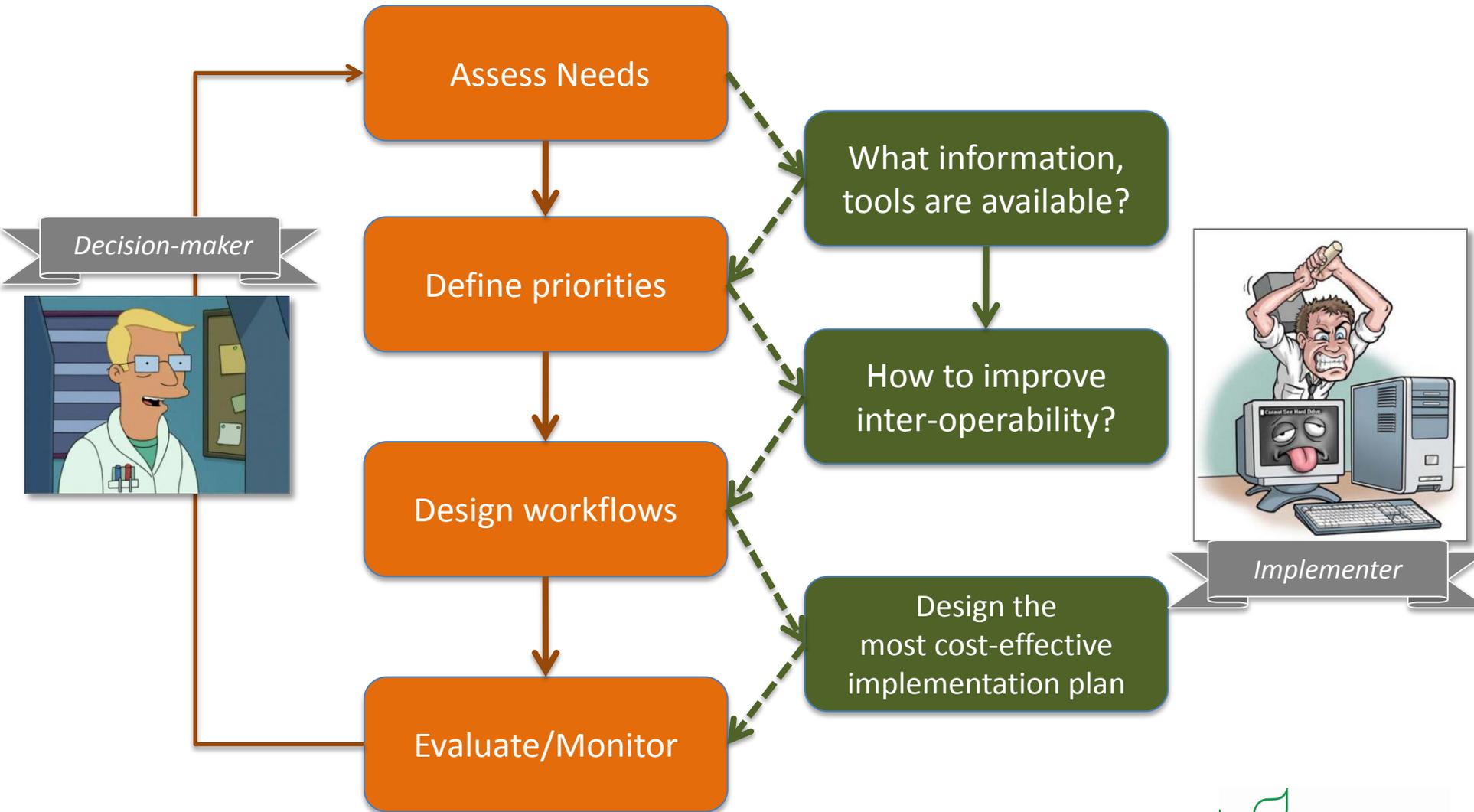
# A starting point... (Annex I)

*To be agreed with the relevant organizations in consultation with the AHTEG

| Group | Species name | Common name | introduction pathway | *suggestion on guideline/standard setting: |
|---|---|---|---|---|
| **FISHES** | *Channa argus* | snakehead | live food | 609 |
| | *Channa marulius* | great snakehead | live food | 92 |
| | *Corbicula fluminea* | asian clam | ballast/ bait/ aquarium trade | >2,000 |
| | *Ctenopharyngodon idella* | grass carp | food | 723 |
| | *Cyprinus carpio* | common carp | sport fishing/ ornamental purposes | >13,000 |
| | *Glyptoperichthys gibbiceps* | leopard pleco | pet/aquarium trade | 86 |
| | *Gymnocephalus cernuus* | ruffe | ballast/ contaminated live bait | >19,000 |
| | *Hypophthalmichthys molitrix* | silvercarp | aquaculture/ live food | 527 |
| | *Lates niloticus* | Nile perch | fisheries/ food | 651 |
| | *Limnoperna fortunei* | golden mussel | live food/ ballast | 43 |
| | *Littorina littorea* | common periwinkle | live food/ ballast | 9,390 |
| | *Lutjanus kasmira* | common bluestripe snapper | sport fishing/ food | 881 |
| | *Misgurnus anguillicaudatus* | oriental weatherfish | food/ aquarium trade | 8,391 |
| | *Molothrus bonariensis* | shiny cowbird | pet trade | 4,018 |
| | *Mytilus galloprovincialis* | Mediterranean mussel | live food/ ballast | 1,282 |
| | *Orconectes rusticus* | rusty crayfish | live bait | 163 |
| | *Orconectes virilis* | northern crayfish/ virile crayfish | live bait/ aquarium trade | 1,356 |
| | *Oreochromis mossambicus* | Mozambique tilapia | aquaculture/ aquarium trade | 767 |
| | *Oreochromis niloticus* | Nile tilapia | live food/ aquaculture | 1,823 |
| | *Phalloceros caudimaculatus* | dusky millions fish | aquarium trade | 230 |
| | *Poecilia reticulata* | guppy | aquarium trade | 861 |

# A starting point... (Annex II)

| Questions | Information and data needs | Capacity needs |
|---|---|---|
| **1.** What is the taxon, identified to the most detailed level possible? | Standardized Global Species Checklist or globally unique identifier | Taxonomic expertise; library resources or access to web-based taxonomic keys; identification tools |
| **2.** What are the circumstances of the proposed importation? | Importer declaration of intent and any proposed or potential mitigation of invasiveness risk | See Question 7 |
| **3.** What is the history of invasiveness of this taxon anywhere? <br><br> **3a.** . . . of its pathogens or parasites? <br><br> (Note: pathogens and parasites should be considered in subsequent questions but for purposes of brevity/simplicity this is not mentioned further in the table) | Information and data on invasiveness of taxon in other areas; occurrence of pathogens and parasites, and their invasiveness in other areas; data on whether the species has ever been imported anywhere before. | Experience interpreting scientific information on invasiveness; expertise in pathogens and parasites regarding possible shifts in hosts and vectors; data quality control; clear definition of invasiveness, |
| **4.** To what extent are the environmental conditions for persistence of this taxon present anywhere in the area of concern? | Maps of the occurrence of the taxon (or point data); at a minimum, maps of climatic match or other environmental attributes; ideally computerized data layers of climate and taxon occurrence | At a minimum, the ability to compare maps of climatic or other environmental information across areas; ideally the ability to apply computer-based models of climate or other environmental matching |
| **5.** What is the probability of establishment and spread of this taxon anywhere in the area of concern? | Biological information and data related to establishment and spread; ideally information on the traits used in available statistical models or models to be developed | Statistical models (and the ability to apply them, as above) built on history of establishment and/or spread of similar taxa in similar ecosystems; expert judgment |
| **6.** What is the potential impact of this taxon anywhere in the area of concern? | Biological information and data related to impact; ideally input data on the traits of the taxon for available statistical models or models to be developed; additional assessment data may include asset/land use maps and/or data within the potential range | Statistical models built on history of impact of similar taxa in similar ecosystems; expert judgment |
| **7.** What mitigation options are available and appropriate? Iterate throughout the risk assessment process considering how mitigation could change the answers to Questions 1-6. | Information on mitigation options and their feasibility and likely effectiveness based on past practices and the capacity within the country to apply them. | Experience with mitigation; infrastructure to assure feasibility and long-term maintenance of mitigation implementation; inspection, compliance and enforcement infrastructure (whether within a regulated or self-regulated framework), containment technology; surveillance and contingency planning |
| **8.** Provide results of the risk assessment to decision-makers. | Context of the proposed import together with answers to questions above and a concluding assessment of risk | Expertise in risk communication |