

Informatics & Interoperability

Summary

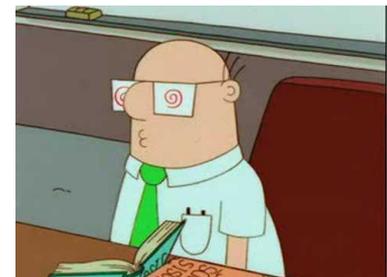
TERMS OF REFERENCE FOR THE AD HOC TECHNICAL EXPERT GROUP ON ADDRESSING THE RISKS ASSOCIATED WITH THE INTRODUCTION OF ALIEN SPECIES AS PETS, AQUARIUM AND TERRARIUM SPECIES, AND AS LIVE BAIT AND LIVE FOOD

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

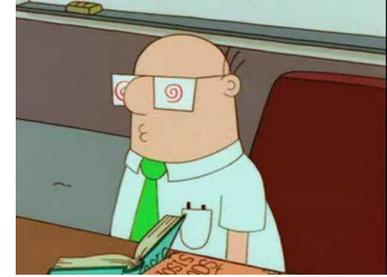


COP6 Decision VI/23

“**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...



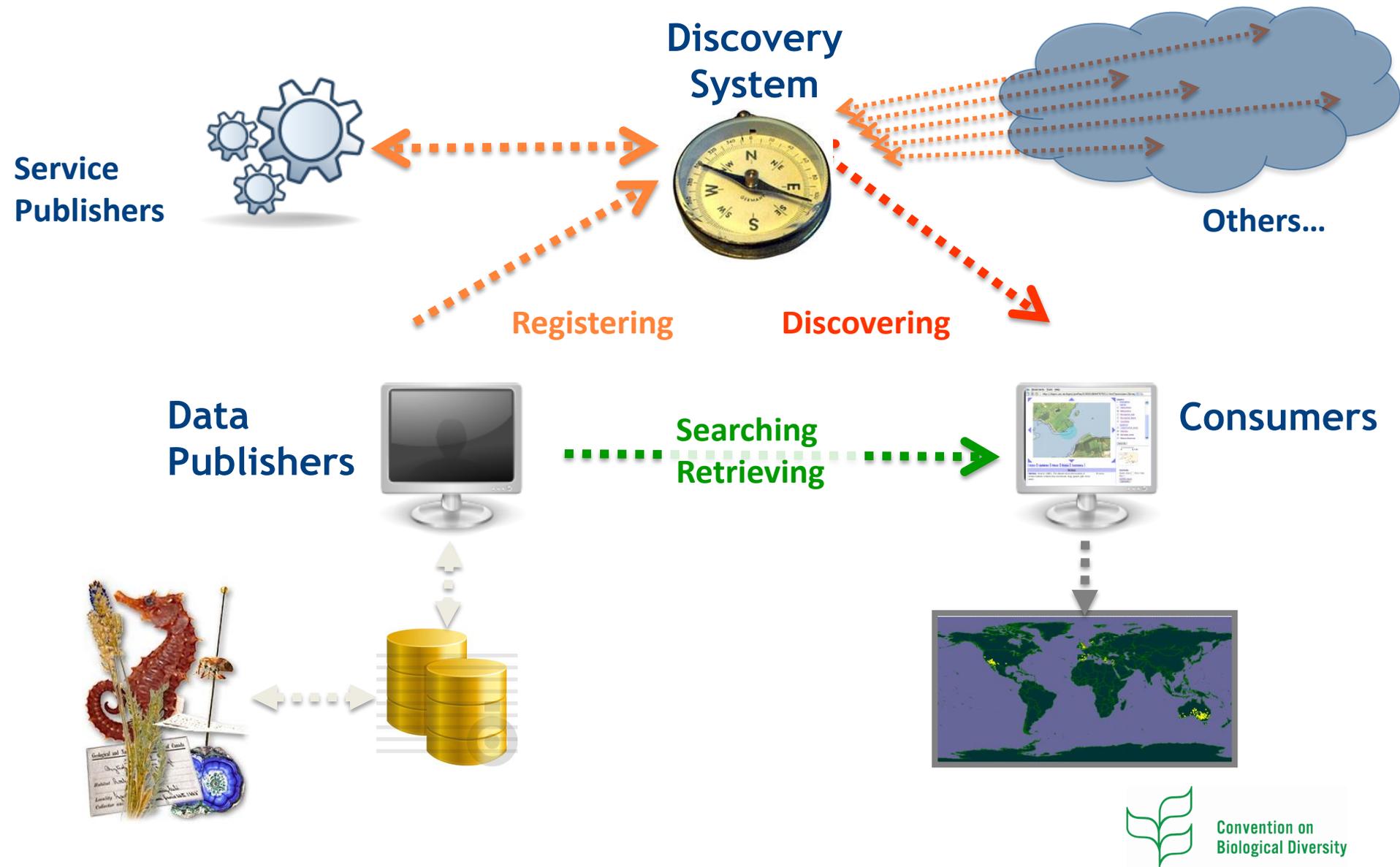
Interoperability is a property of a product or system, whose interfaces are completely understood, to work with other products or systems, present or future, without any restricted access or implementation.

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

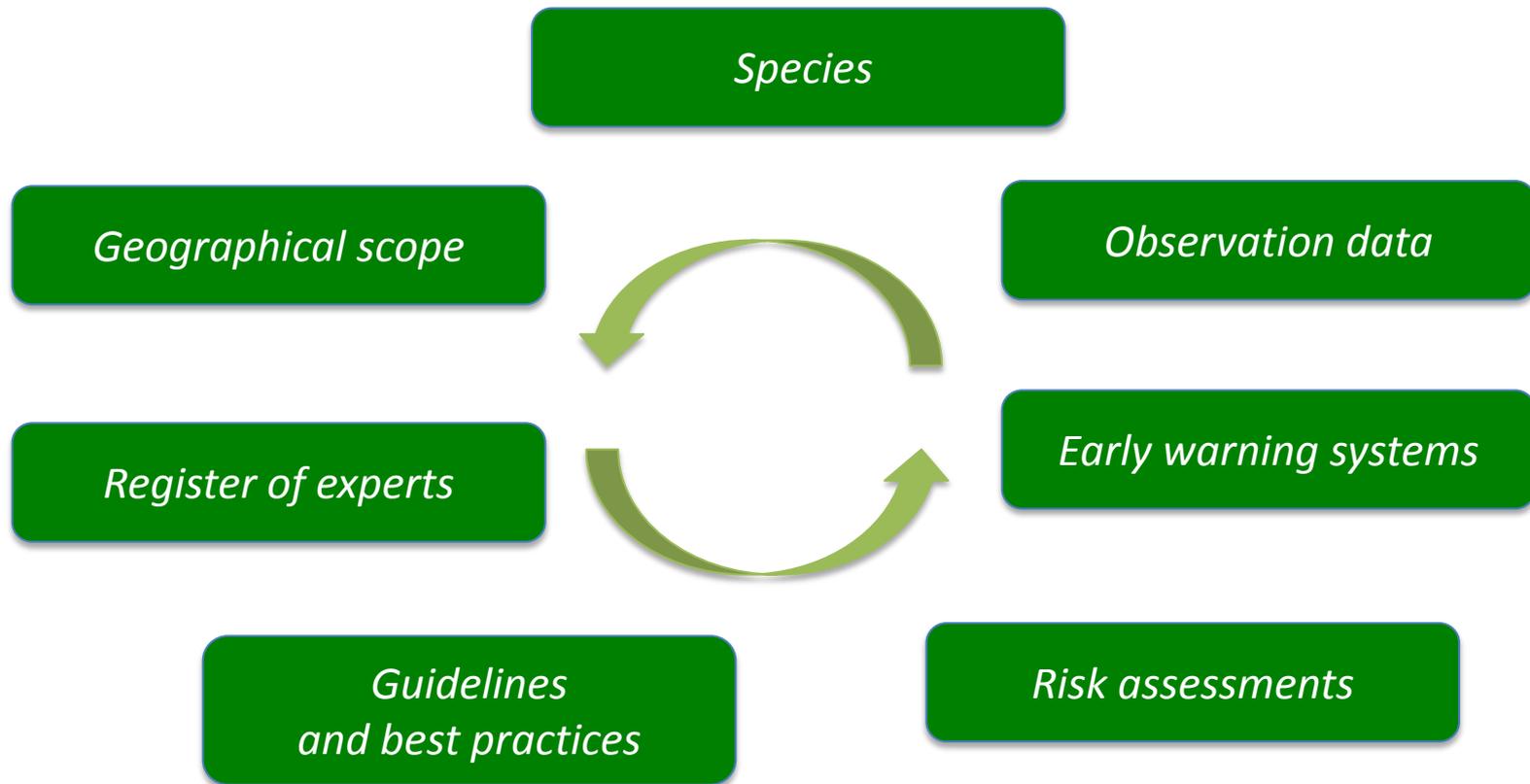
Beyond the ability of two or more computer systems to exchange information, **semantic interoperability is the ability to automatically interpret the information exchanged meaningfully and accurately in order to produce useful results as defined by the end users of both systems.** To achieve semantic 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.



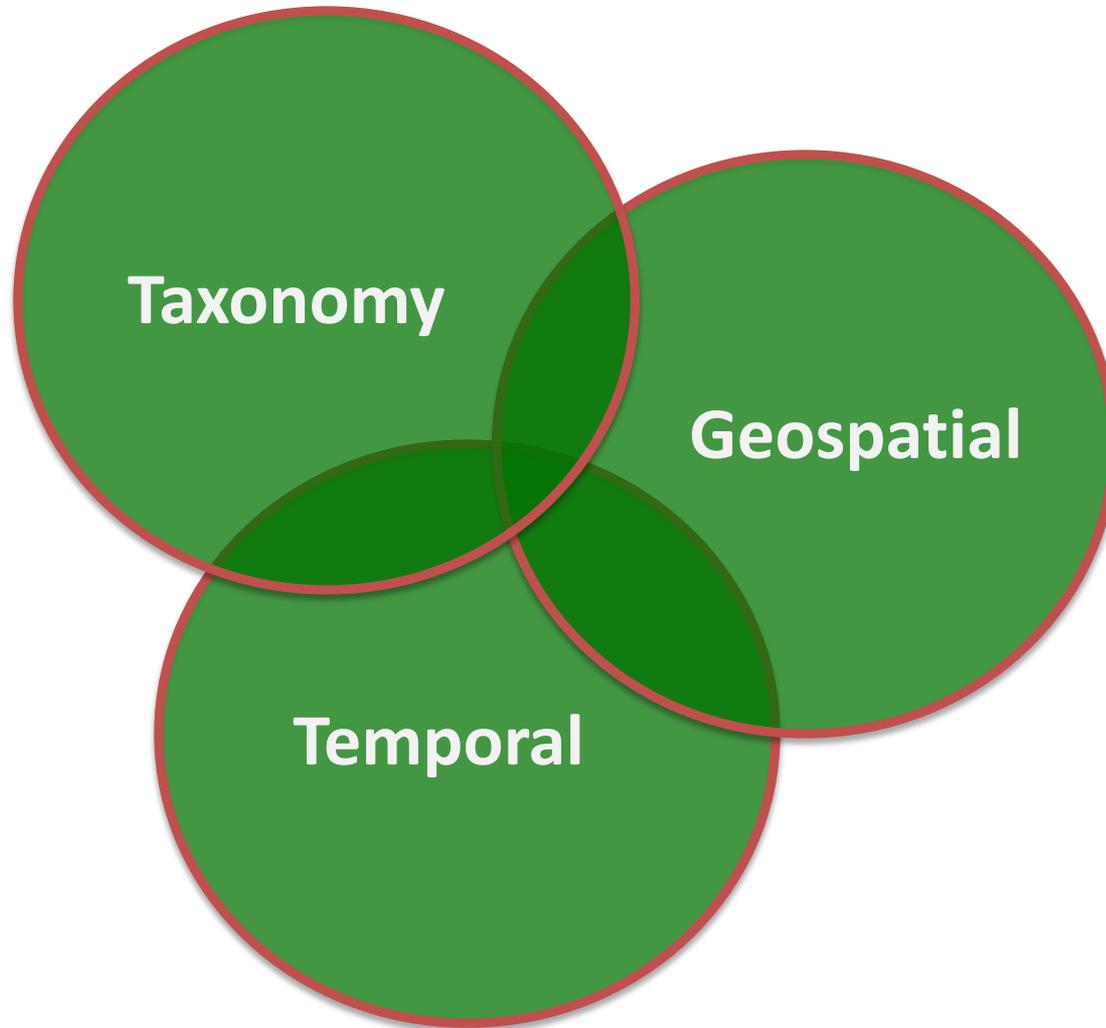
General principles: Interoperability



Types of Information



Classification of Information datatypes



Existing Information Systems

Global scale

Regional scale

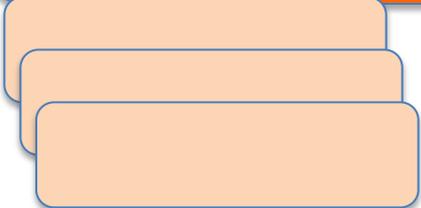
Identification tools

Best practices for management options

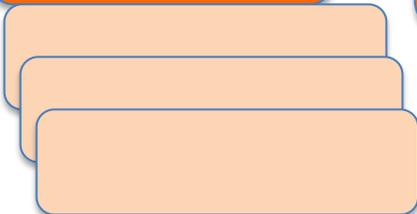
Risk assessment tools



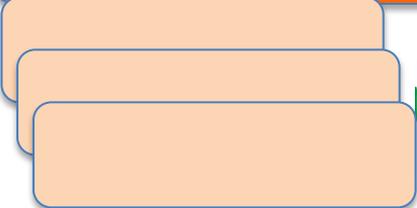
Domestic Animal Diversity Information System



WIEWS



CBD clearing-house mechanism



Some examples: Species information

Gymnocephalus cernuus, ruffe, ballast/ contaminated live bait

The screenshot shows the California Academy of Sciences Research Catalog of Fishes website. The page title is "SEARCH RESULTS FROM THE Catalog of Fishes". The search criteria are "GENERA" and "SPECIES". The search results for *Gymnocephalus cernuus* are displayed, including a detailed description and a list of references. The left sidebar contains navigation links and a classification tree. The top navigation bar includes "Academy Home", "Teachers", and "Research".

GLOBAL USD
About this page Lang

Star *Gymnocephalu*
Sp Ruffe
Classification
Gy

Academy Home Teachers Research GO

CALIFORNIA ACADEMY OF SCIENCES Research

CAS » Research » Ichthyology » Catalog of Fishes

Online Version, Updated 10 February 2011

Search the Online Catalog | Species by Family/Subfamily | Guide to Fish Collections | Journals in the Catalog | Browse the Classification | Glossary | About the Print Version

SEARCH RESULTS FROM THE
Catalog of Fishes

Select the database to search:
 GENERA SPECIES REFERENCES

Search Reset

Comments: weschmeyer@calacademy.org

Main reference
Kottelat, M. and J. Freyhof 2009:85 [ref. 30320].
Other references | Bibliography

Size / Weight / Age
Max length : 25.0 cm
weight: 400 g (Ref. 5845)

Environment
Demersal; potamodromous (Ref. 9696)

Climate / Range
Temperate; 10°C - 20°C

Distribution
Europe: Caspian, Black Sea; Arctic Ocean basin catchment areas
Countries | FAO areas

Short description
Dorsal spines (total): 12-14
Distinguished uniquely by the presence of a dark spot on the snout.

cernuus*, *Perca Linnaeus [C.] 1758:294 [Systema Naturae, Ed. X. v. 1; ref. 2787] European lakes. Syntypes: BMNH 1853.11.12.5 [Gronovius coll.] (1, skin), LS 2 (left half-skin). Type catalog: Wheeler 1958:219 [ref. 13434], Wheeler 1985:51 [ref. 20705]. Name *cernuus* is apparently a noun; *cernuus* should not be used -- see Kottelat & Freyhof 2009:85 [ref. 30320]. •Valid as *Acerina cernuus* (Linnaeus 1758) -- (Berg 1949:1046 [ref. 20662], Zhu 1995:172 [ref. 25213]). •Valid as *Gymnocephalus cernuus* (Linnaeus 1758) -- (Collette & Banarescu 1977:1453 [ref. 5845], Coad 1981:16 [ref. 22348], Lelek 1987:285 [ref. 22962], Page & Burr 1991:276 [ref. 18983], Coad 1995:27 [ref. 23608], Chereshev 1996:606 [ref. 24659], Kottelat 1997:172 [ref. 22952], Reshetnikov et al. 1997:749 [ref. 24702], Popova 1998:117 [ref. 23588], Scott & Crossman 1998:viii [ref. 24570], Fuller et al. 1999:385 [ref. 25838], Lyons et al. 2000:57 [ref. 26594], Bogutskaya et al. 2001:47 [ref. 26178], Chereshev et al. 2001:122 [ref. 26736], Bianco & Ketmaier 2001:201 [ref. 26728], Hanel 2003:64 [ref. 27894], Parin 2003:S3 [ref. 28536], Bailey et al. 2004:199 [ref. 27882], Nelson et al. 2004:136 [ref. 27807], Bogutskaya & Naseka 2004:205 [ref. 28183], Vassilev & Pehlivanov 2005:177 [ref. 28369], Hanel & Lusk 2005:362 [ref. 28804], Kottelat 2006:90 [ref. 28831], Fricke 2007:29 [ref. 30577], Fricke et al. 2007:81 [ref. 29533], Kottelat & Freyhof 2007:528 [ref. 29996], Kottelat & Freyhof 2009:85 [ref. 30320], Scharpf 2008:35 [ref. 30399], Geiger & Schliwen 2010:131 [ref. 30887]). **Current status:** Valid as *Gymnocephalus cernuus* (Linnaeus 1758). Percidae: Percinae. Distribution: Europe, introduced elsewhere. Habitat: freshwater, brackish.

OF THE W
SIE
mary
cernuus

Convention on Biological Diversity

Some examples: Observation data

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

The screenshot displays the Global Invasive Species Database (GISD) interface. At the top, the title "Gymnocephalus cernuus : Occurrence Records" is visible, along with navigation links for "Point data", "Species Summary", "FishBase", and "Close". Below the title, there is a refresh button and a count of records: "n = 15471 (FB = 15471)". The "Sort by" options include Country, Locality, Year, Depth, and Source.

The main content area is titled "Gymnocephalus cernuus (fish)" and features several tabs: Ecology, Distribution, Management Info, Impact Info, References and Links, and Contacts. A "PRINTER VERSION" button is also present.

The "Distribution" section contains the following text:

Countries (or multi-country features) with distribution records for *Gymnocephalus cernuus* in the Global Invasive Species Database.

Click a country or multicountry feature for distribution records:

Alien Range

- [Canada](#)
- [Croatia](#)
- [Europe](#)
- [France](#)
- [Germany](#)
- [Italy](#)
- [North America](#)
- [Norway](#)
- [Switzerland](#)
- [United Kingdom \(UK\)](#)
- [United States \(USA\)](#)

Native Range

- [Asia](#)
- [Europe](#)

On the right side of the screenshot, a map of Europe is visible, showing the distribution of *Gymnocephalus cernuus*. The map is overlaid with a grid and includes a "DAISIE" logo at the top right.

Some examples: Experts data



Deliverables
Alien Invasions
Species Invasions
for Europe

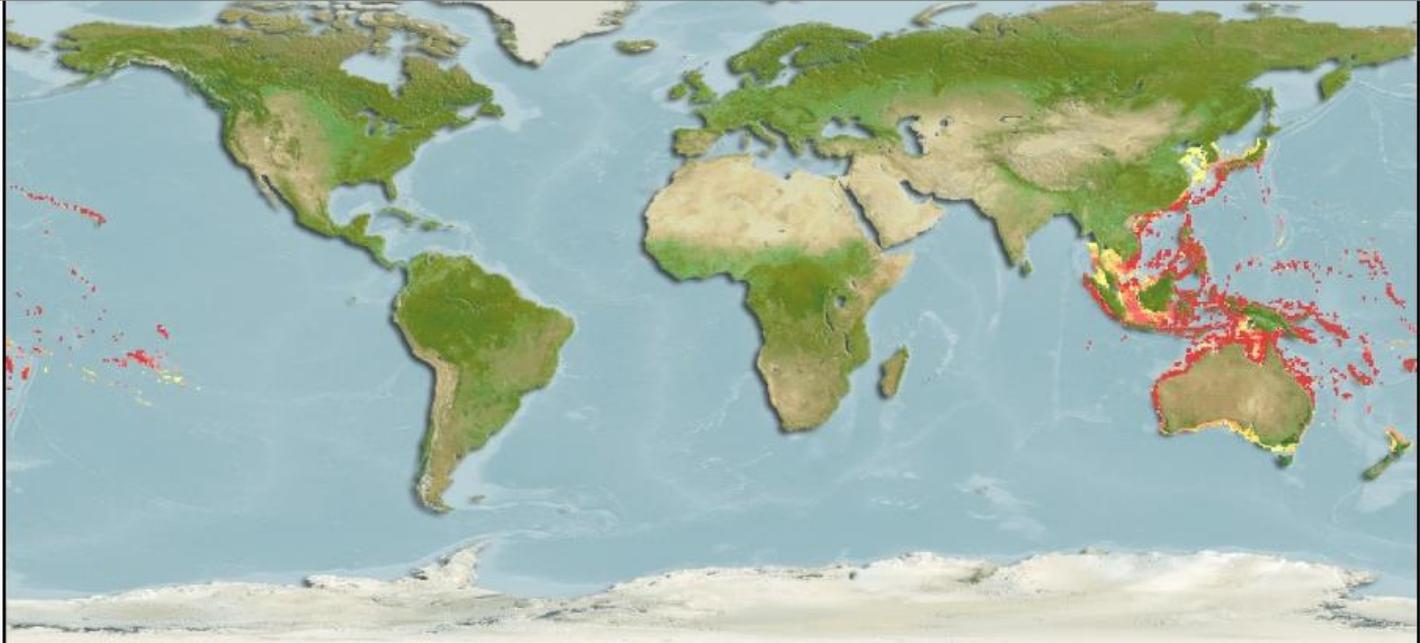
Home 100 of the Worst

Reviewed map for
Click on the map to proceed

Name	Date Map Saved
Kathleen K. Reyes	2009-04-02 00:00:00
FishBase	

Comments

Wolfgang Nentwig	Identification until 2010 (2005-2008)
----------------------------------	---------------------------------------



Data sources: [GBIF](#) [OBIS](#)

Relative probabilities of occurrence	Actions	Download data (as csv)	-Close window- Session no. 63
0.80 - 1.00	Explore range map Previous maps	About AquaMaps	
0.60 - 0.79	Explore all suitable habitat	Comments & Corrections	
0.40 - 0.59	Explore point map		
0.20 - 0.39	Show mapping parameters		
0.01 - 0.19	Create your own map		

Name	Date Map Saved	Type of Review	Remarks	Rating
Kathleen K. Reyes	2009-04-02 00:00:00	Checked	Adjusted species bounding box from 43°N/21°S/95°E/180°E to 43°N/40°S/95°E/130°W as species reported to reach south to New Zealand mainland (FishBase Ref. 5755) and east to Pitcairn (FishBase Ref. 1602).	☆☆

Findings *(purely informatics ones)*

- Most of the information is **'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.



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?



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;

Informatics & Interoperability

Next Steps

Risk...



What the customer wanted



How the customer described it.



How the project leader understood it



What the programmers delivered



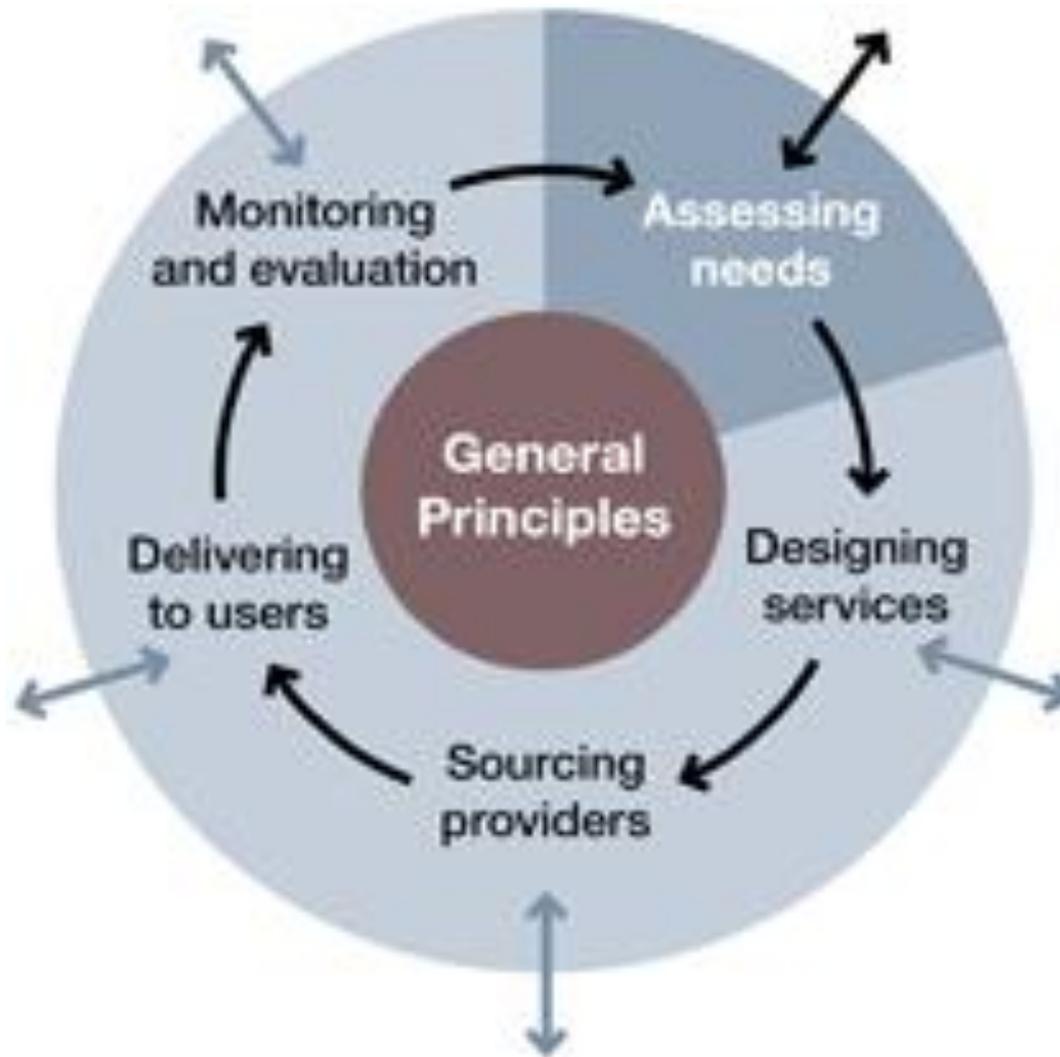
How the engineers installed it



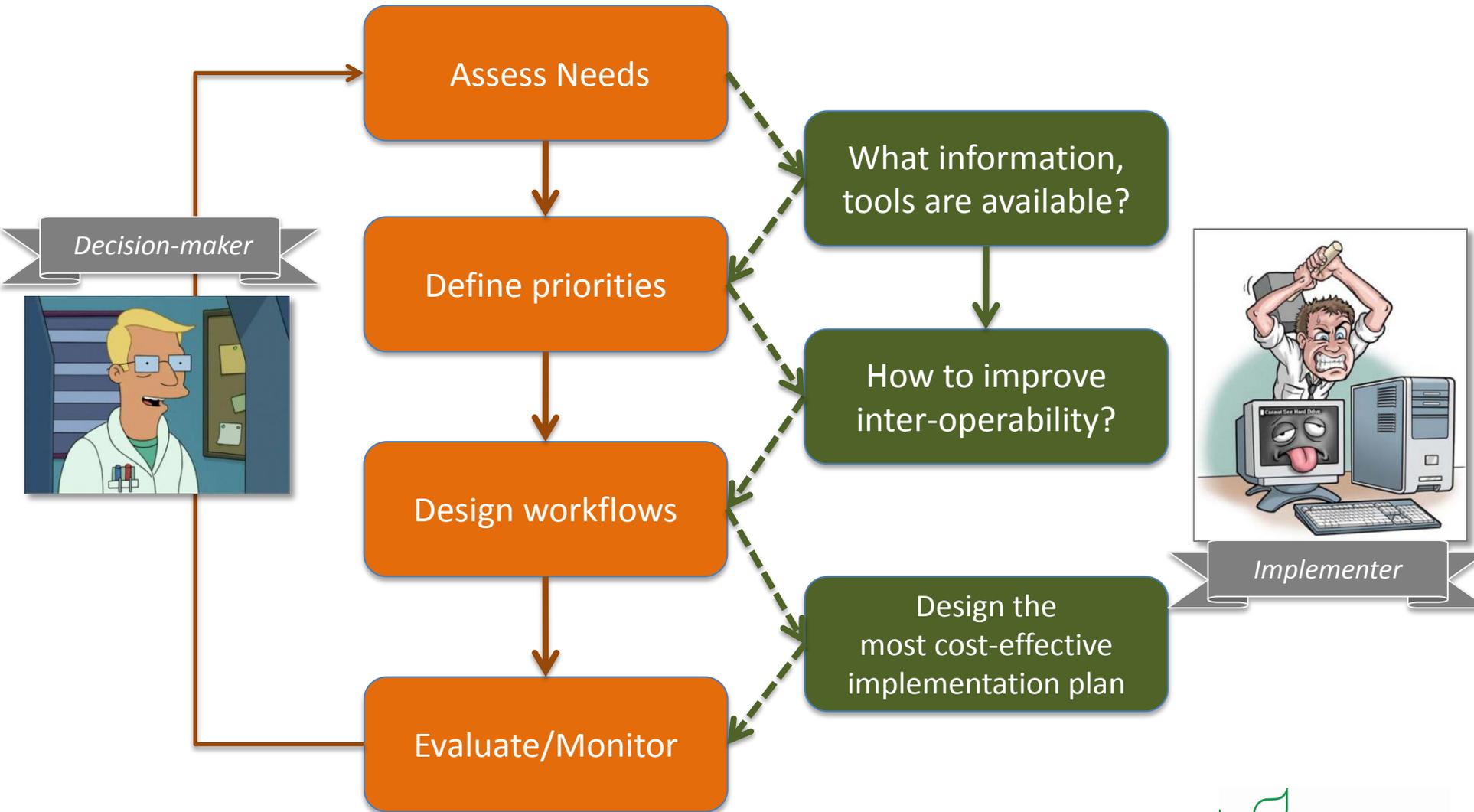
When it was delivered



General principles: Starting point



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	<i>Channa argus</i>	snakehead	live food	609
	<i>Channa marulius</i>	great snakehead	live food	92
	<i>Corbicula fluminea</i>	asian clam	ballast/ bait/ aquarium trade	>2,000
	<i>Ctenopharyngodon idella</i>	grass carp	food	723
	<i>Cyprinus carpio</i>	common carp	sport fishing/ ornamental purposes	>13,000
	<i>Glyptoperichthys gibbiceps</i>	leopard pleco	pet/aquarium trade	86
	<i>Gymnocephalus cernuus</i>	ruffe	ballast/ contaminated live bait	>19,000
	<i>Hypophthalmichthys molitrix</i>	silverbear	aquaculture/ live food	527
	<i>Lates niloticus</i>	Nile perch	fisheries/ food	651
	<i>Limnoperna fortunei</i>	golden mussel	live food/ ballast	43
	<i>Littorina littorea</i>	common periwinkle	live food/ ballast	9,390
	<i>Lutjanus kasmira</i>	common bluestripe snapper	sport fishing/ food	881
	<i>Misgurnus anguillicaudatus</i>	oriental weatherfish	food/ aquarium trade	8,391
	<i>Molothrus bonariensis</i>	shiny cowbird	pet trade	4,018
	<i>Mytilus galloprovincialis</i>	Mediterranean mussel	live food/ ballast	1,282
	<i>Orconectes rusticus</i>	rusty crayfish	live bait	163
	<i>Orconectes virilis</i>	northern crayfish/ virile crayfish	live bait/ aquarium trade	1,356
	<i>Oreochromis mossambicus</i>	Mozambique tilapia	aquaculture/ aquarium trade	767
	<i>Oreochromis niloticus</i>	Nile tilapia	live food/ aquaculture	1,823
	<i>Phalloceros caudimaculatus</i>	dusky millions fish	aquarium trade	230
<i>Poecilia reticulata</i>	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? 3a. . . of its pathogens or parasites? (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