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MOSAICS

Micro-organisms Sustainable use and Access regulation Integrated Conveyance System

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JBA Japan Bioindustry Association

www.belspo.be/bccm/mosaics

Addressing the ABS challenge
Tokyo 8-9 February 2007

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MOSAICS is a sector-based approach of ABS

Biological Resource Centres

World Federation for Culture Collections

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- **Life sciences**
- **Upstream and downstream biodiversity research**
- ***Ex situ* conservation of (micro) biological resources**
- **Sustainable biotechnology**
- **Knowledge based bio-economy**

Issues of an International Regime

in BRC perspective

- **Nature of biodiversity benefits and their value**
- **Nature, Scope, and elements of an Int'l Regime**
- **Effectiveness of existing measures and engineering of new ones when necessary**
- **"W" questions on implementation: what, who, when, how?**
- **Impact of IPR on ABS and *vice versa***
  Divergences between UNEP and other UN bodies
  Oversimplification of "providers" versus "users" scheme

Biological Resource Centres

are looking for a

- **simple**
- **inexpensive**
- **efficient, fast**
- **multipurpose, multi-users**

conveyance system

(in terms of transfer of material and property)

>> to preserve & to make available (micro)biological material

>> to manage & to exploit information

MOSAICS work on ABS solutions

1. **Bio-resources transfer >> Integrated Conveyance System** **ICS**
   - **Tracking or traceability**
   - **Source or origin of the biological item**
   - **Electronic thread or paperwork path**
   - **Built in conveyance system making** *ex ante* ***and*** *ex post* **checks possible**

2. **Legal framework >> Access & Distribution Management** **ADaM**
   - **MTA**
   - **Bundle of rights**

3. **Economic aspect >> Economic Valuation** **EVA**
   - **Methods of calculation**
   - **Transaction costs**

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UNIVERSITEIT GENT

Integrated **C**onveyance **S**ystem

ORGANISING THE SYSTEM

Virginie Storms - Belgian Coordinated Collections of Micro-organisms
Peter Dawyndt - University of Gent
Philippe Desmeth - Belgian Science Policy

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Sustainable use of micro**biological resources**

requires a system with :

Appropriate management of both resources and related information (conservation, authentication, documentation)

IT, data & metadata inseparable from the natural resources they are derived from

Quality, key to sound science, R&D; both for natural resources and for related information

Tracking system for Access and Benefit Sharing

Purpose of MOSAICS

Improve the existing CC system to facilitate ABS

- **System should also be usable or at least compatible for other kind of biological resources = look to comparable system (IPEN, …)**

- **System should not “reinvent the wheel” = look to existing solutions (DOI, LSID,…)**

>> Integrated Conveyance System

Properties of an Integrated Conveyance System (ICS)

- **Compatible with legal framework** (common law and civil law)
- **Easily applicable in all conditions = flexible**
- **Fulfilling the needs of all stakeholders, multipurpose**
- **Attractive system enforceable without constraints**
- **Cost-effective**

Features of an ICS

- **Minimal set of documents** (no paperwork overload)
- **Minimum data set to be registered in these documents** (minimum set of information necessary for science and management)
- **Standard procedures**
- **Decentralised management with unique rules of implementation**
  - Persistent identification linked to updated information
  - Information Technology based

Choice of options

Feasibility imposes

- Tracking rather than traceability
- Source rather than origin

Cost effectiveness requires

- Electronic thread rather than paperwork path

Flexibility needs

- Built in system, which allows *ex ante* and *ex post* checks

Technical solution

Use of Global Unique Identifiers (GUID) to convey the transfers of (micro-) biological items

Examples of **Unique Identifiers** from different fields:

- culture collections accession numbers
- IPEN numbers (international Plant Exchange network)
- barcodes
- patent numbers
- ISBN numbers

Examples of **Globally Unique Identifiers**

- Digital Object Identifier (DOI) http://doi.org
- Life Science Identifier (LSID) http://sourceforge.net/projects/lsid

…

Unique Identifiers

for microbiological resources

LABEL = local unique identifiers

(Strain number: collection acronym followed by number)

MUCL 11510 = Penicillium camembertii, Thom

Problem: synonym acronyms (homonym strains) and synonym strains

WDCM ID	acronym	country	institute
66	BTCC	Bulgaria	Bulgarian Type Culture Collection
632	BTCC	Indonesia	Biotechnology Culture Collection Institution Pusat Penelitian dan Pengembangan Bioteknologi-LIPI
117	CCDM	China	Culture Collection of Department of Microbiology
878	CCDM	Czech	Culture Collection of Dairy Microorganisms Laktoflora
770	CCF	Cuba	Colleccion de Cuttivos Finlay
182	CCF	Czech	Culture Collection of Fungi
95	CISM	Mexico	Verticillium dahliae from cotton
75	CISM	Thailand	NifTAL Rhizobium Collection (Asia Center)
805	IFM	Australia	IFM Quality Services Pty Ltd
60	IFM	Japan	Research Center for Pathogenic Fungi and Microbial Toxicoses, Chiba University
742	LCC	Canada	Labatt Culture Collection, Technology Development
231	LCC	Poland	University of Warmia and Mazury in Olsztyn

Persistent unique identifiers

Combination of unique identifier (Label) and globally unique and persistent location where to retrieve the information

Unique Identifier (Label)

+

Unique persistent location

=

Persistent Unique Identifiers

~

Globally unique Identifier (GUID)

Persistent unique identifiers

are

A name or an identifier for a resource that

- **uniquely identifies that resource**
- **is forever associated with that resource**
- **will not change**

Remark : Although persistent identifiers are technically feasible, persistence of identifiers is a social problem

Diana Dack, Persistence is a Virtue Information Online Conference, Sydney. January 2001

Persistent unique identifiers

are

Actionable	**with a single click from the identifier to a useful URL**
Persistent	**located in a namespace where they can be correctly identified, no matter what their current location may be**
Interoperable	**user can differentiate copies and choose the most appropriate one**

Persistent unique Identifier application

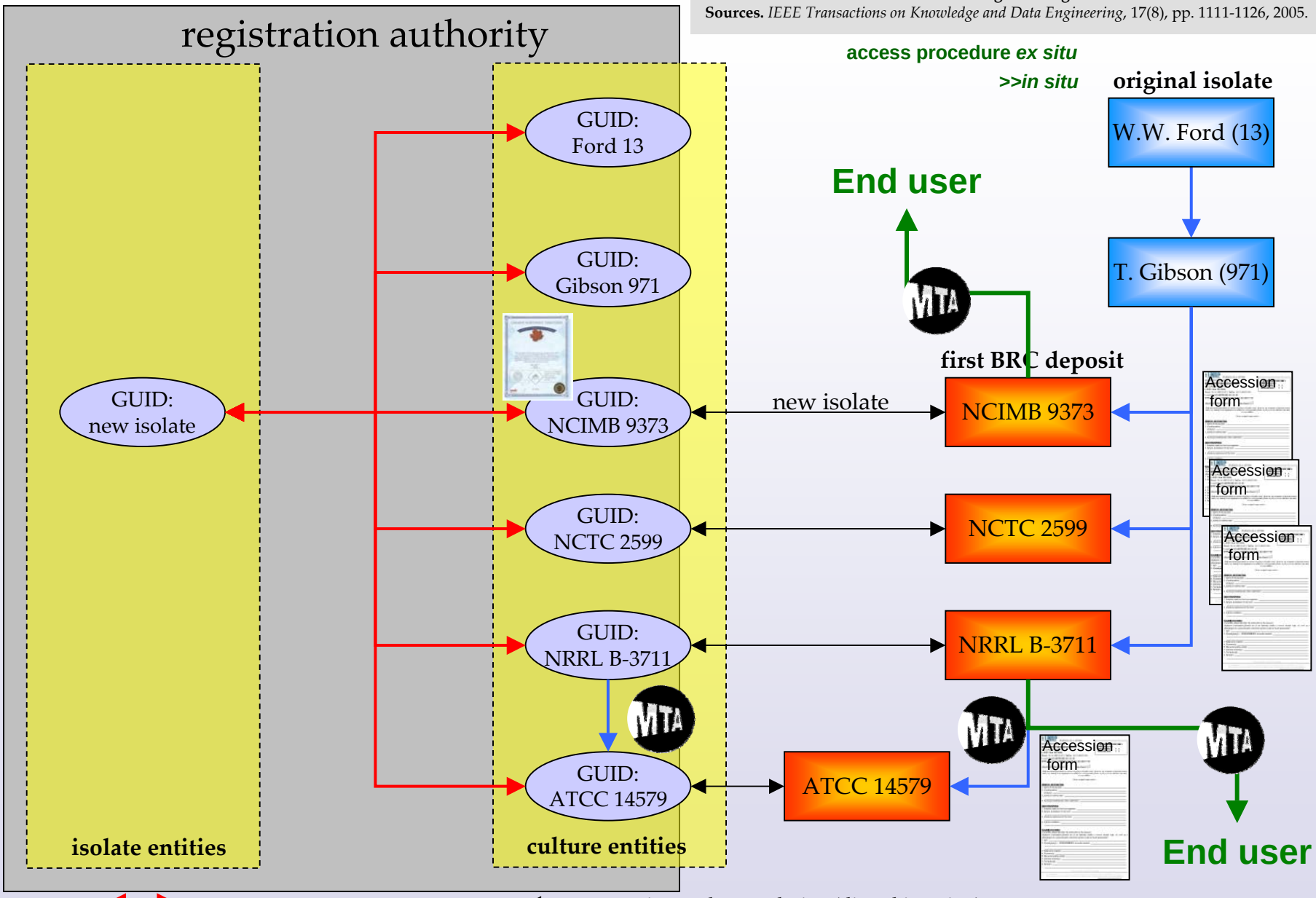
Retrieving (micro)biological items transfer history

Peter Dawyndt

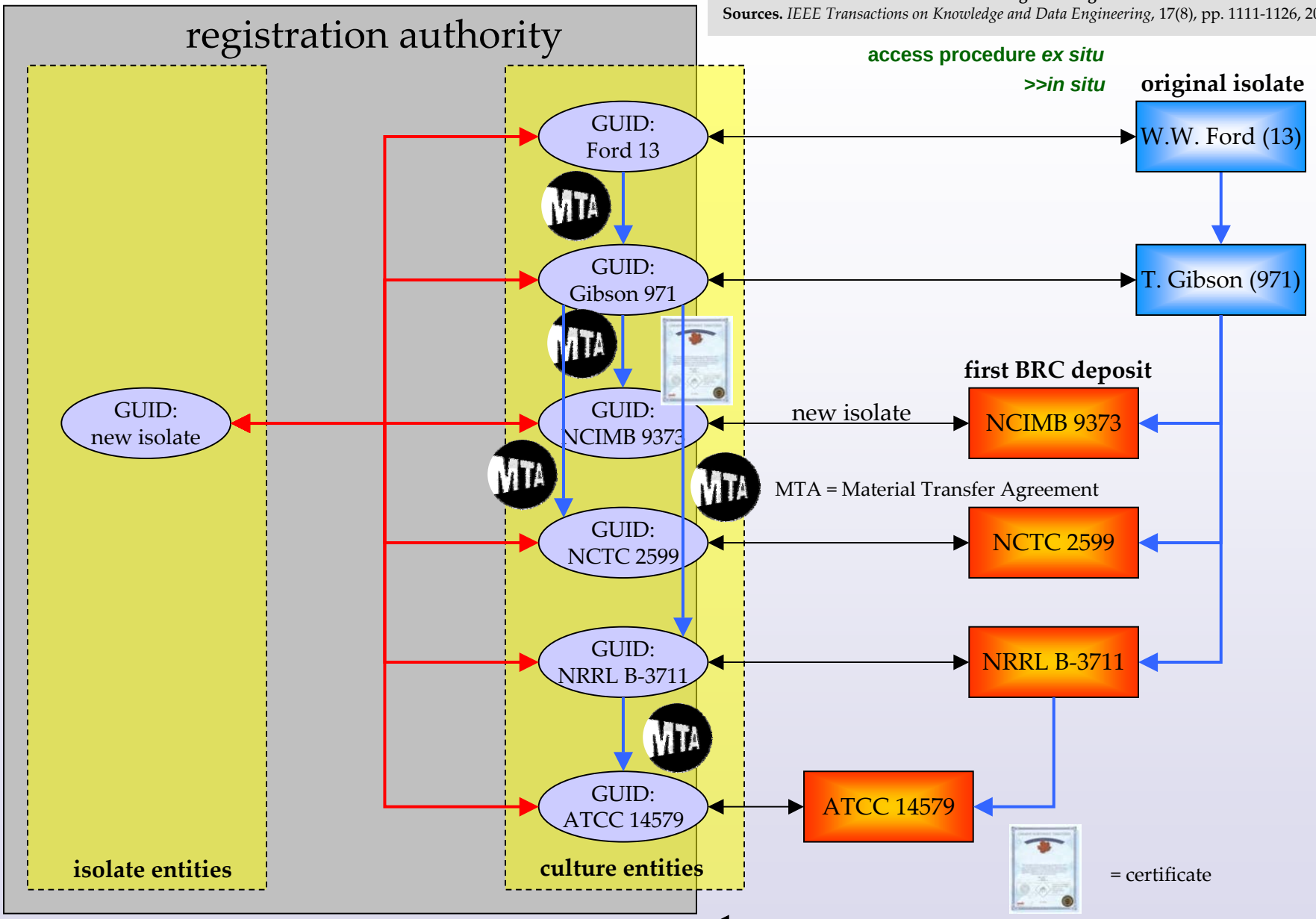
STRAININFO.NET

STRAININFO.BE

Dawyndt P, Vancanneyt M, De Meyer H, Swings J. **Knowledge Accumulation and Resolution of Data Inconsistencies during the Integration of Microbial Information Sources.** *IEEE Transactions on Knowledge and Data Engineering*, 17(8), pp. 1111-1126, 2005.



Dawyndt P, Vancanneyt M, De Meyer H, Swings J. **Knowledge Accumulation and Resolution of Data Inconsistencies during the Integration of Microbial Information Sources.** *IEEE Transactions on Knowledge and Data Engineering*, 17(8), pp. 1111-1126, 2005.



Recommended option

system of built in persistent unique identifiers

- **Is an electronic thread = flexible, powerful**
- **Does not intend to replace the traditional labelling**, but allow incorporating them in a larger namespace that provides an **extended unicity** and **interoperability**
- **Intend to reduce transaction costs, allows *ex ante* and *ex post* check = cost effective**

! cost effective does not mean without costs. For example, the cost to assign an identifier to an item in the DOI system® range from ~ 0.0063 € to ~ 2.24 €; processing and operational costs not included **!**

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Material Transfer Agreement

DEFINING THE RULES

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Setting up the rules of bio-resources exploitation

- **Setting the modalities of access, transfer and use of bio-resources and connecting all links of the chain**
  How to put theory into practice ? / What is possible?

- **Assigning the duties and rights of the stakeholders**
  Contracting parties instead of “stakeholders”

- **Defining the information needed to manage the ABS process**
  What information is relevant for ABS needs
  How to gather, to store and to retrieve this information

Functions of MTA

- Tell the parties how to operate in compliance with international, and national laws
  - concerning access and transfer of biological material
  - Concerning use of biological material
  - concerning technical safety and transport regulation
  - terms of liability, responsibility
- Protect the rights of customers and partners (intellectual property rights, ownership rights) >> bundle of rights
- Ensure the quality of biological resources

Options

- **Signed agreement versus implicit acceptance** (shrink wrap or click wrap agreements) **of general conditions of transfer**
- **MOSAICC check list and model MTA or standard MTA** (see http://www.belspo.be/bccm)
- **Source / origin / legal provenance of the biological item**
- **Differentiation between non-profit & for-profit use**

The concept of “bundle of rights” in knowledge based bio-economy

Bundle of rights is a set of

Operational rights

(who can decide upon the use that one can make of a resource)

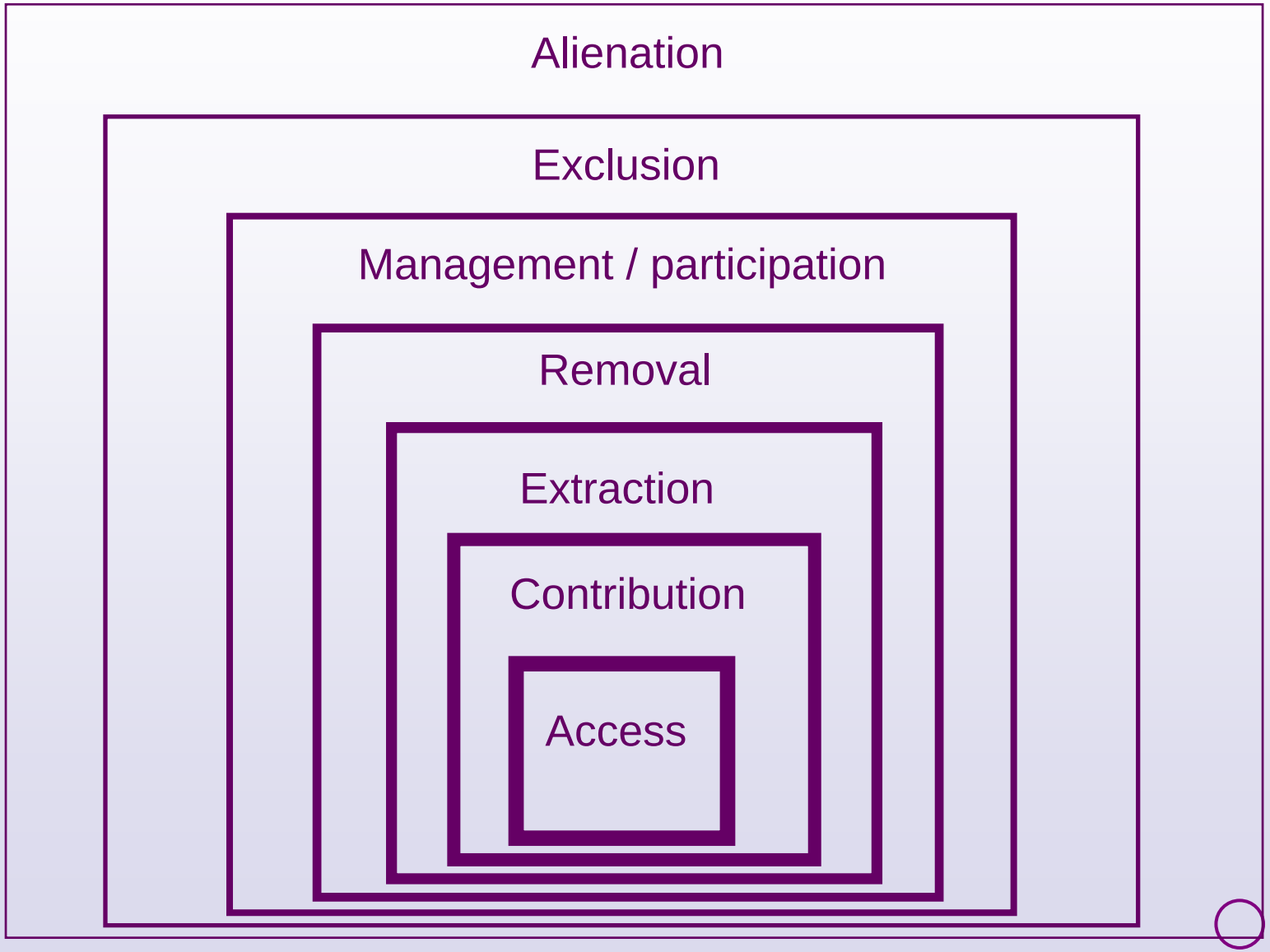
and

Collective choice rights

(who can decide upon the future exercise of the rights on the resource)

based on the work of
Prof. Tom Dedeurwaerdere - University catholic of Louvain

Bundle of rights concept



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Economic valuation of microbiological resources (MR)

based on

Report of Dr Mikyung Yun

Contribution of Dr Mikihiko Watanabe

Contribution of Mr Masahiro Myazaki

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Why assessing the value of MR?

- **Benefit-sharing needs reliable information about**
  - **what is the value of MR**
  - **what are the costs attached to its use**
  - **what benefits can be expected**

- **That needs reliable ways to value MR**

Questions

- **How much are microbiological resources (MR) worth?**
  - Usefulness of MR (before and after characterisation)
- **How to set the worth of MR?**
  - Can market mechanisms determine economic value of MR ?
  - Which are the common methods to evaluate the value of natural components?
  - Which of these methods can be used to ascertain the economic value of MR?

How much are MR worth?

The value of MR can be expressed in terms of

- **Ecological role (in the ecosystem, the environment)**
  via natural process discovery
- **Scientific information (useful arts)**
  via product and process discovery
- **Socio-economic / industrial application**
  via product and processes development
- **Biological commodities**
  via market development

To be translated into economic value

How to set the worth of MR in economic terms?

- **Microbiological resources have not the necessary features of goods to be traded properly in an existing market where supply and demand can adjust freely.**

  + There is no appropriate market

- **Alternative / complementary methods are necessary for "pricing" MR**

Based on "Pharmaceutical bio-prospecting: What conditions are needed for a North-South partnership?" Stéphanie FRIEBEL, Bachelor in Commercial and Consular Sciences

Remarks on Economic valuation

of (micro) biological resources

- **Necessity to develop:**
  - **Appropriate methods of evaluation of the resources, especially for MR, and to express the value in monetary terms**
  - **A framework to compare all the benefits available, regardless the framework is quantitative or qualitative**
- **Essential reduction of the transaction costs**

  >> to increase the ratio shared benefits / implementation costs

Based on Dr Mikihiko Watanabe contribution

Reduction of transaction costs

related to of (micro)biological resources exchanges

- **Transaction costs**

  - **bargaining costs :** the costs of reaching an agreement

  > standard or model MTA and determination of remuneration level to reduce bargaining costs

  - **search costs :** locating exchange partners, locating resources

  > system of identification of resources to lower search costs

  - **monitoring and enforcement costs:** monitoring the behaviour of the parties, and the cost of sanctioning violations of agreement

  > tracking system to lower monitoring costs

Based on Brahy, Nicolas. (2006) "*The property Regime of Biodiversity and Traditional Knowledge*" (2006) Louvain-La-Neuve: Faculty of Law, UCL

Thank you

See you at http://www.belspo.be/bccm/mosaics