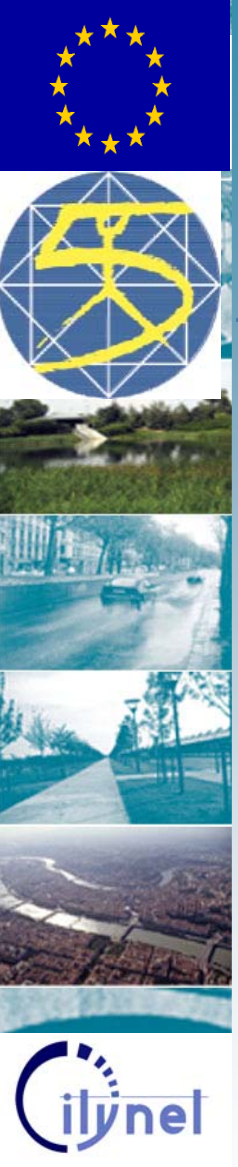


Public Utilities Board Conference

Singapore, 3 November 2006

Urban stormwater management : a challenge for a highly urbanised area! EU DayWater project

Centre d'Enseignement et de Recherche sur l'Eau, la Ville et l'Environnement (Cereve) ENPC, Paris 12, ENGREF

Daniel Thévenot

Singapore and great Paris

- Common **city features**
  - Highly urbanised area → high population density
  - Rivers and canals: water !
  - Separate sewer system

→ **Urban runoff management** issue for city centre & suburbs

Singapore and great Paris







- Significant **environmental difference**
  - Annual rain depth & climate
    - 2,360 vs. 750 mm / year
    - monsoons vs. summer storms & winter rains
  - Annual temperatures
    - 19 to 36°C vs -5 to 30°C → impact on kinetics
  - Water resource for domestic & industrial uses

→ Large difference in **hydrology** and **ecological conditions**

→ Nevertheless, **urban runoff** management remains an important and complex issue

→ **Space** is very limited and surface water **quality** is important for inhabitants & visitors !

Presentation outline







1. Research context

- **Sewer network** and **detention basin**
  - Traditional approach for stormwater management
    - Consume a large part of local financial resources
    - Renovation & maintenance ⇨ investment cost ⇗
  - **Single purpose systems!**
- **Stormwater source control**
  - Complex interaction with **urban dynamics**
    - Quality of life & urban development ⇨ difficult decision!
  - Allows a significant **cost reduction**
    - Reduction of peak flow & end-of-pipe WWTP capacity
  - Allows the promotion of **water in the city** :
    “day lightening” ⇨ amenity, aesthetic values

1. Research context : BMPs

- **Best Management Practices** (SUDS)

J.B Ellis, MU, 2001

C. Cogez, CG 93, 2002

1. Research context : climatic conditions...

- From **northern Europe**...
  - Norway **first rain events** at the end of winter
    - Frozen sewer network
    - Rain
    - Contaminated snow melting

1. Research context : climatic conditions...

- To **summer storms** in central Europe
  - Montreuil (Paris suburb)

Internet protest: 2001-07-27 storm

Département de la Seine-Saint-Denis
CONSEIL GENERAL

1. DayWater research context: general aims

- **Difficult** to select the best solution
  - Numerous involved **stakeholders**
  - **Needs** & **objectives** : often unclear !
  - **Regulation:** complex & diverse (local vs. national or European, WFD)
  - **Needed competencies:** numerous !
- European Research project (FP5)
  - « **Day Water** » = rain water in Swedish
  - Development of a prototype of an Adaptive Decision Support System (**ADSS**)

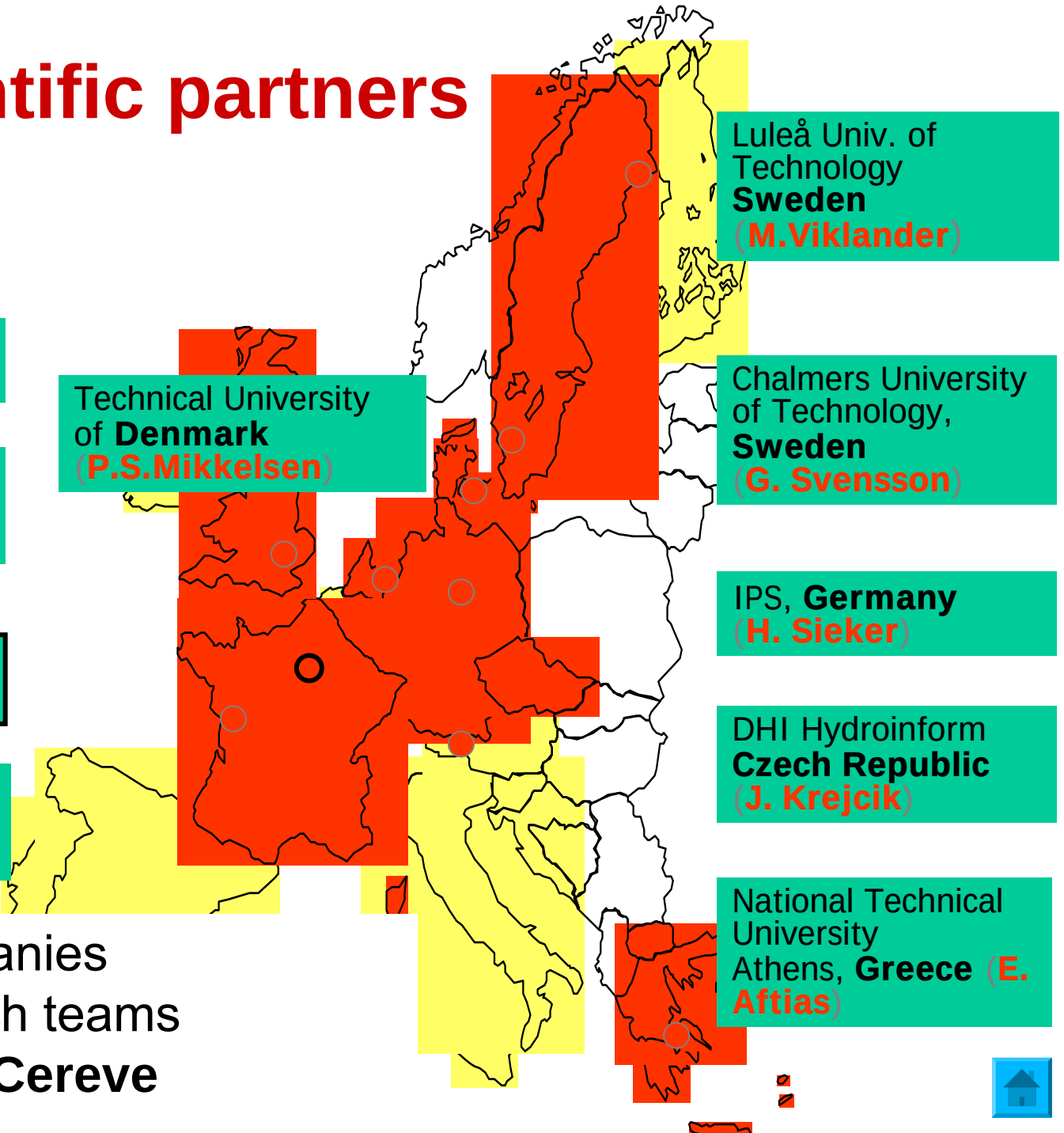
1. DayWater research context: general aims

- **DayWater** research project
  - **Decision Support System** for integrated **source control** of urban stormwater
  - **Integration of knowledge/problems** into a DSS
    - Scientific & technical knowledge (at different scales)
    - Operational tools for design, modelling, screening
    - Practical knowledge by practitioners
    - Final decision taken by involved stakeholders
      ⇨ **not an expert system!**
  - December 2002 - November 2005
  - Production of an **ADSS prototype** freely accessible at: www.daywater.cz

Presentation outline

- 1. DayWater project : research context
- 2. DayWater project : presentation
  - 2.1. Scientific partners
  - 2.2. Associated end-users
  - 2.3. Innovative method: scientists ⇔ end-users
- 3. Scientific achievements : ADSS
  - 3.1. Specificities : users, functions & operation
  - 3.2. Problem identification & analysis
  - 3.3. Problem & project construction
  - 3.4. BMP design and comparison of alternatives
  - 3.5. An effective source control option?
- 4. Conclusion

2.1. Scientific partners



Luleå Univ. of Technology **Sweden** (**M.Viklander**)

TAUW, **Netherlands** (**G. Geldof**)

Technical University of **Denmark** (**P.S.Mikkelsen**)

Chalmers University of Technology, **Sweden** (**G. Svensson**)

Middlesex University, **United Kingdom** (**M. Revitt**)

IPS, **Germany** (**H. Sieker**)

ENPC, **France** (**D. Thévenot**)

DHI Hydroinform **Czech Republic** (**J. Krejcik**)

Laboratoire Central des Ponts et Chaussées, **France** (**M. Legret**)

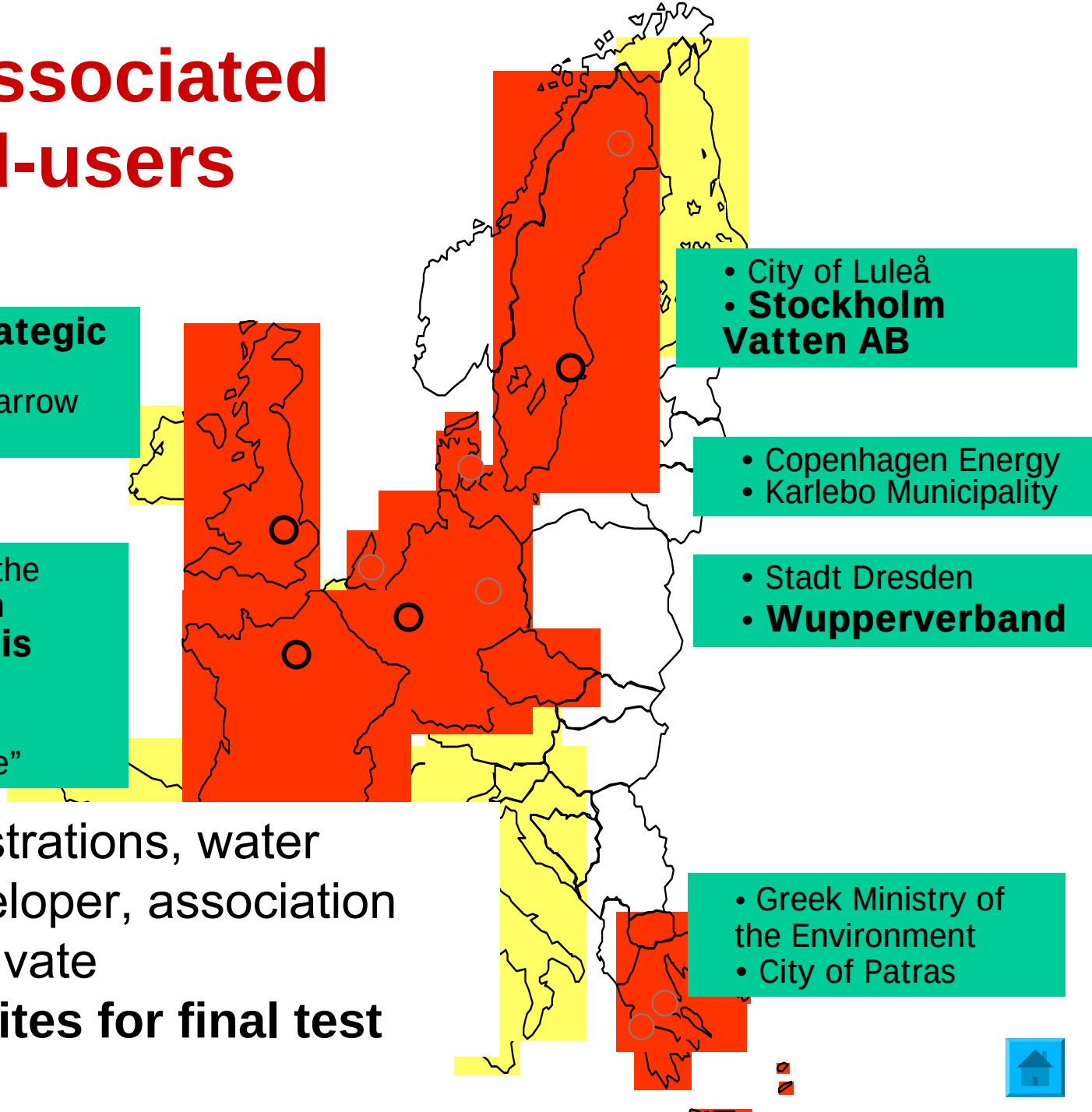
National Technical University Athens, **Greece** (**E. Aftias**)

- 3 private companies

& 7 public research teams

- **Co-ordinator**: **Cereve**

2.2. Associated end-users



- **Countryside Strategic Projects plc**
- London Borrow of Harrow Engineering Services

- City of Nijmegen

- Water Authority for the Seine-Normandy Basin
- **Seine Saint-Denis County Water Authority**
- Syndicat “Marne Vive”

- City of Luleå
- **Stockholm Vatten AB**

- Copenhagen Energy
- Karlebo Municipality

- Stadt Dresden
- **Wupperverband**

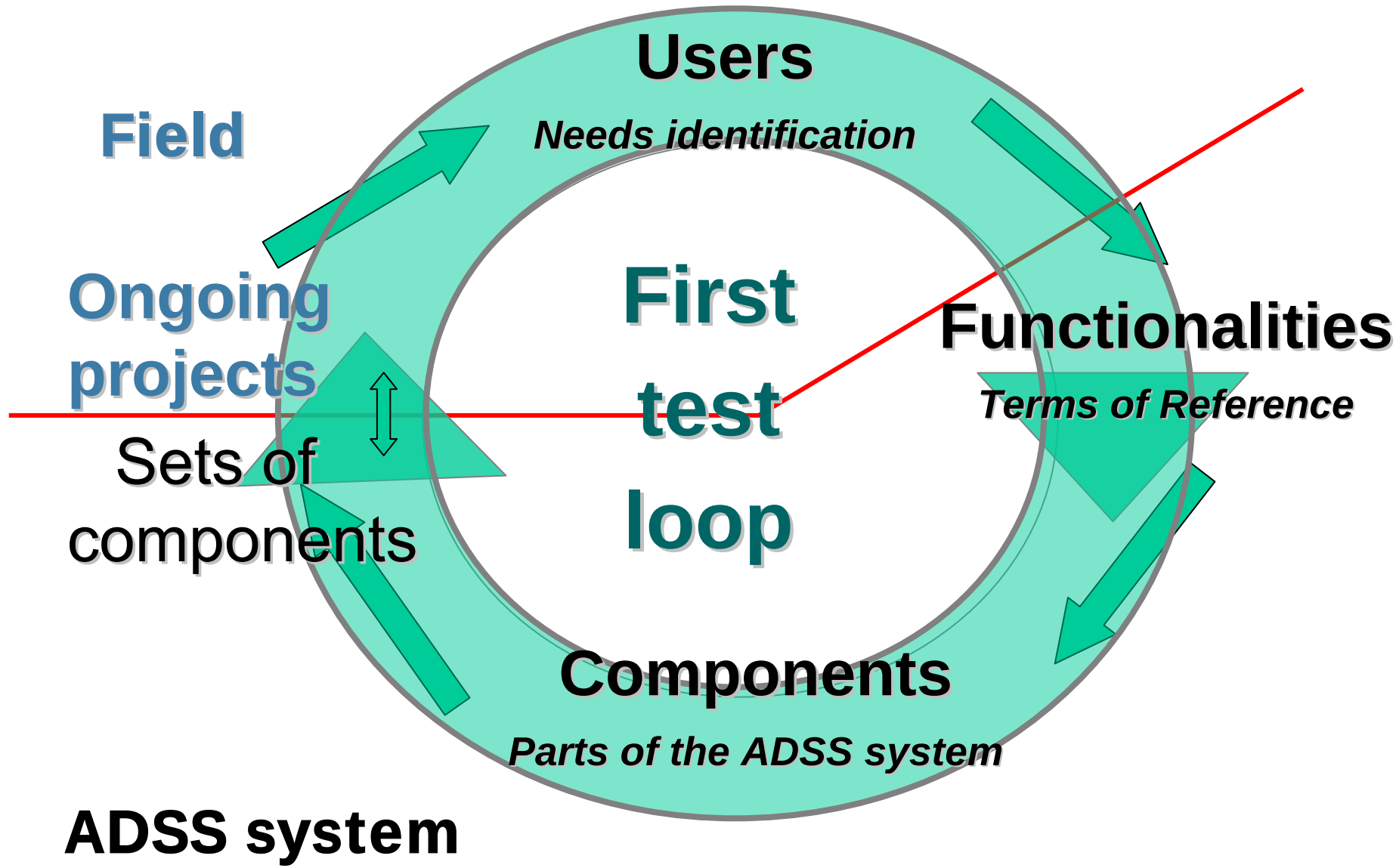
- Greek Ministry of the Environment
- City of Patras

- Local administrations, water authorities, developer, association
- Public and private
- **4 end-user/sites for final test**

2.3. Innovative method

- **Dual roles** in the prototype development : **scientists ⇔ practitioners (end-users)**
- **First loop** or interaction & test
  - **Needs** & **context** analysis : **14 end-users** associated to DayWater
  - **Terms of Reference** (ToR): **Cereve**
  - **Component** and software development: **scientific partners**
  - **Assessment** of functionalities & components by **end-users**
  - **Component modification** proposals : **Cereve**

2.3. Innovative method : first loop



2.3. Innovative method : second loop

- **Second loop** or interaction & test
  - **4 users/sites/projects** selected for their climatic, geographical, administrative diversity
    - **Contryside Properties** (**UK**): private company for urban development
    - **Conseil général de Seine St Denis** (**F**): county administration in charge of the county sewer network management
    - **Stockholm Vatten** (**S**): public service company for Stockholm
    - **Wupperverband** (**D**): association for Wupper river basin management
  - Validation by **practitioners**
    - **Integration** of all components
    - **Expected function & data present ?**
  - **Survey** of all comments and proposals

Presentation outline

- 1. DayWater project : research context
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  - 3.1. Specificities : users, functions & operation
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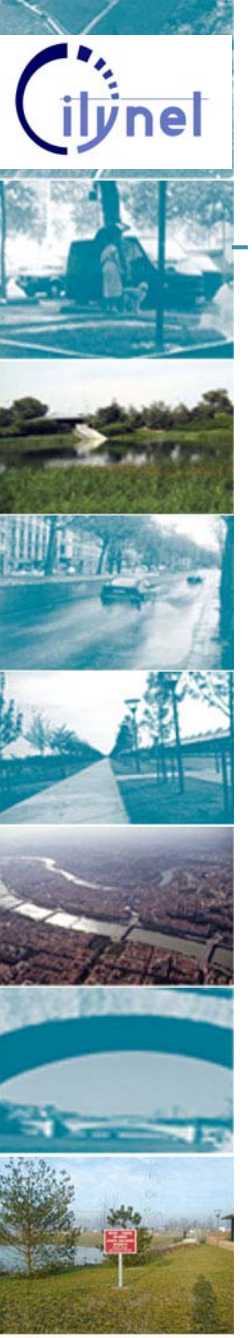
  - 3.4. BMP design and comparison of alternatives
  - 3.5. An effective source control option?
- 4. Conclusion

3.1. ADSS specificities: Internet & users



- **Software**
  - **Web** Interface : documentary portal & decision support tools (shared by Internet)
- Identified **users**
  - **Involved** in urban development
  - Qualified **technically**
  - Willing to **promote** urban stormwater source control

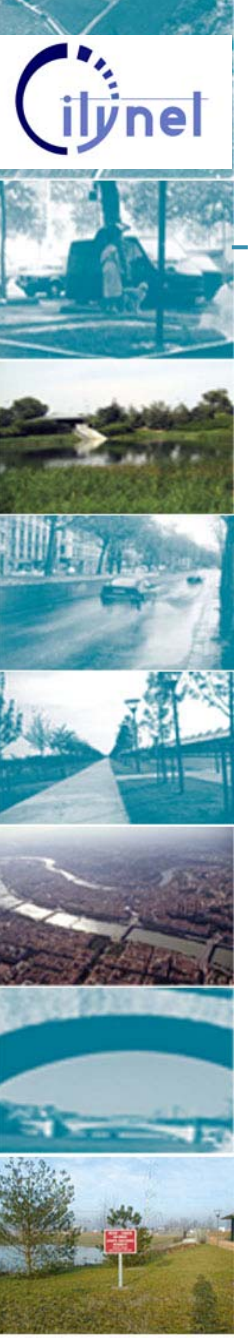
➔Characteristics needed for **convincing** all involved stakeholders

- Technicians, elected officials, developers, land owners, environmental associations…

3.1. ADSS specificities: Internet

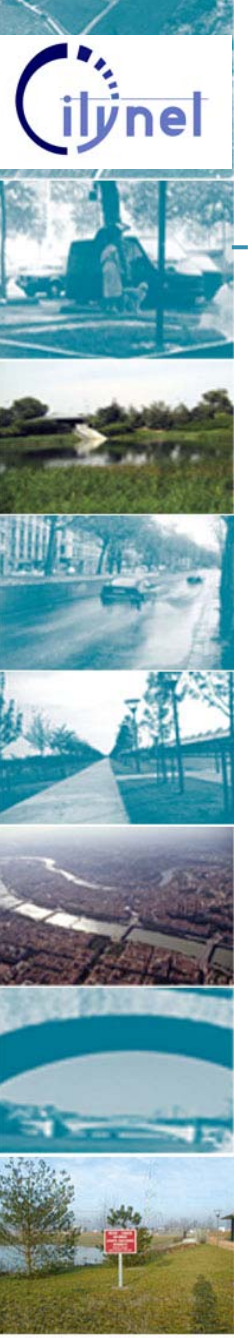
- Front page: **HYDROPOLIS**

3.1. ADSS specificities : 4 functions



- **Knowledge**
  - State of the art
- **Management**
  - Assistance to building a project & selecting all possible solutions
- **Analysis**
  - Stormwater problem identification
  - Consequences of each solution
  - Comparison of solutions
- **Communication**
  - Assistance to negotiation with stakeholders & to reaching a consensus (making a decision)

3.1. ADSS specificities : 2 operation modes

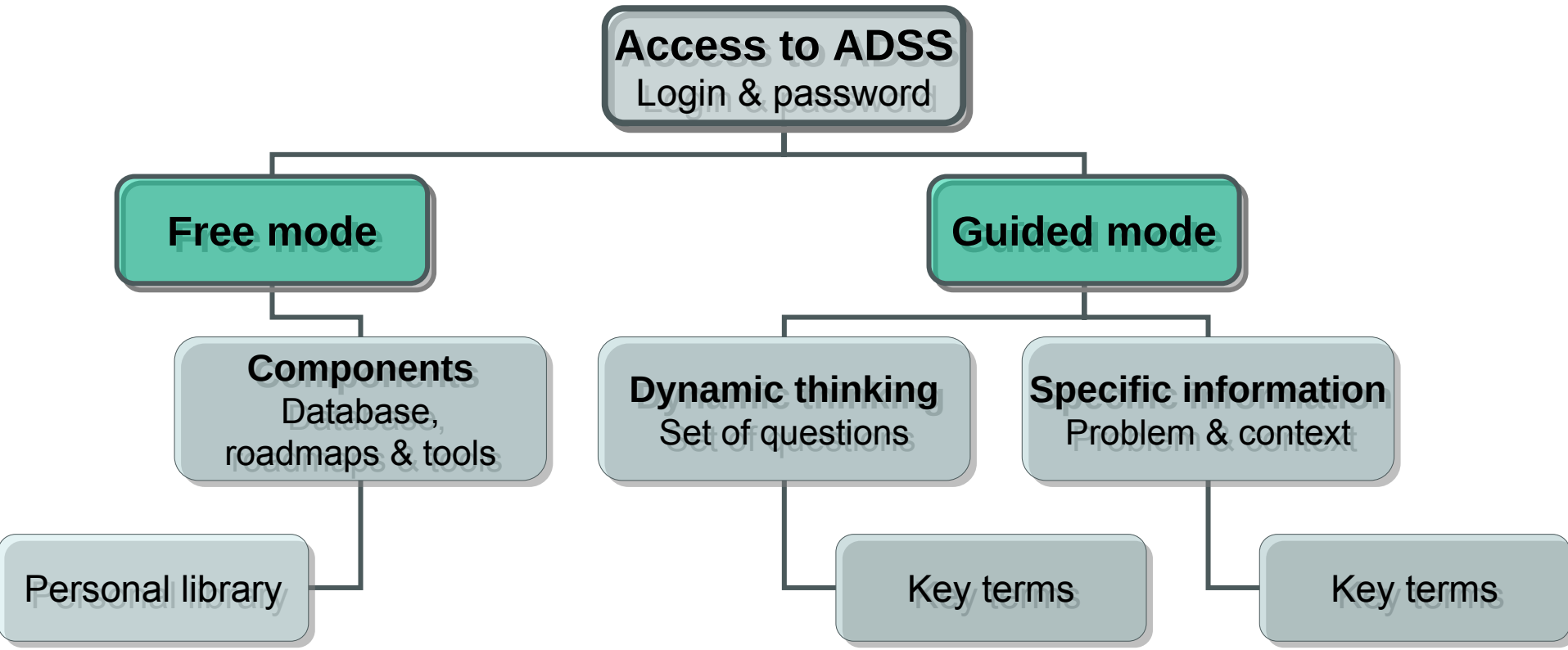


- **Free browsing** within components: documentary portal, roadmap, tools
  - **Awareness** building & information
  - Assistance to **problem identification**
- **Guided mode** using sets of questions & selecting appropriate answers ➔ data **filter**
  - Assistance to **project construction** and to **comparing** alternatives
  - Suggests pertinent data, cases, illustrations
  - Suggests pertinent **tools**

  ⇨ *The right information at the right time !*

3.1. ADSS specificities : 2 operation modes

- **Free** or **guided** operation modes



ADSS - modes of usage

Administration mode

Guided mode

Smart Guided mode

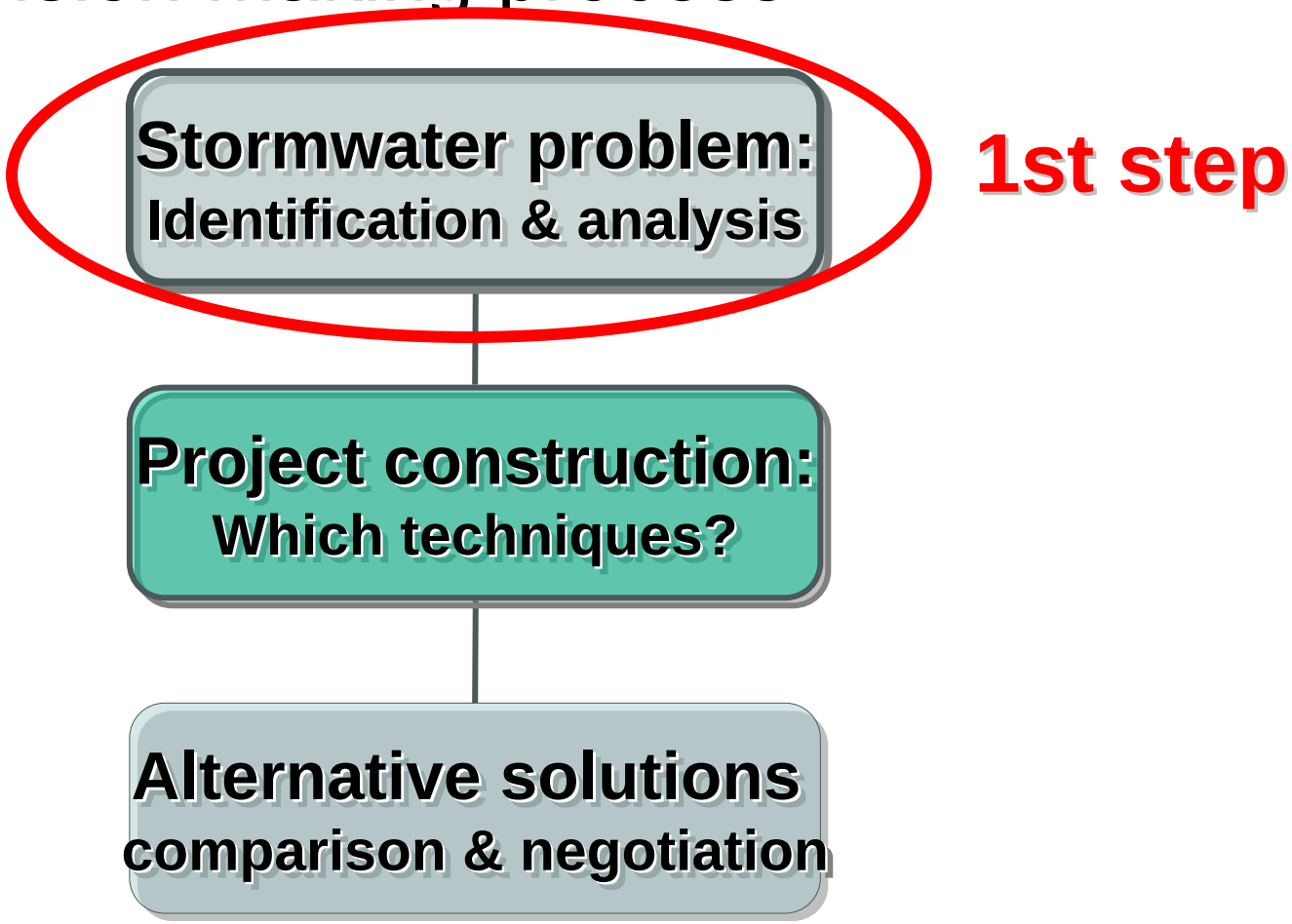
Free mode

3.1. ADSS specificities : user types

- **Access** to ADSS: www.daywater.cz
- **Visitor** (free access)
  - 'Login' & password: 'guest'
- Regular **user**
  - Invited by a user manager
  - Personal 'Login' & password
- User **manager** (within the same project)
  - Invited by a user manager
  - Personal 'Login' & password
  - Allowed to invite other users

3.2. Source control decision making process

- Decision making process



3.2. Assistance to problem identification & analysis



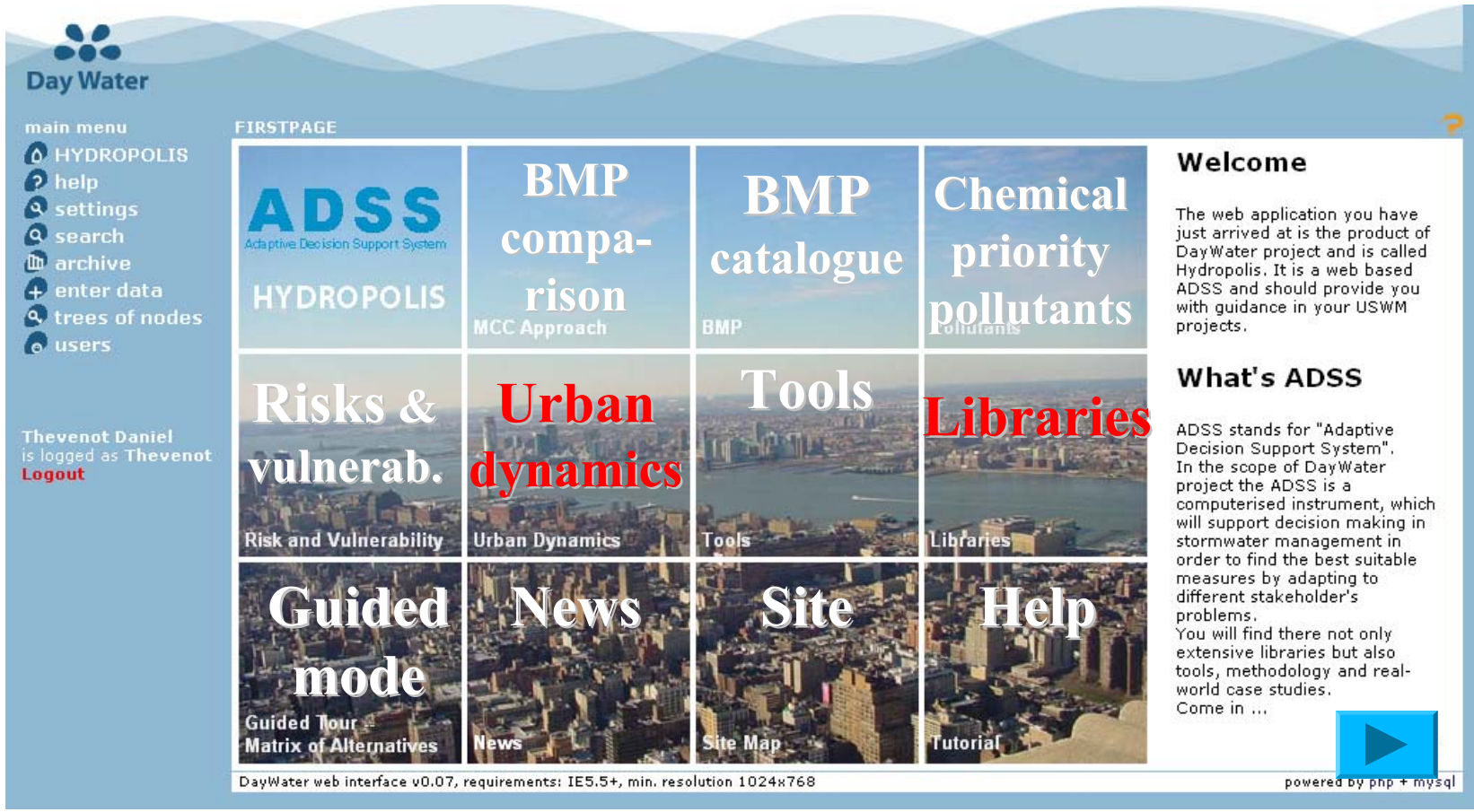




- Knowledge portal using **Hydropolis front page**
  - Different **aspects** and **values** of water: awareness building, road map
  - Different types of **involved stakeholders** and of **policy instruments** (regulation, incentives…)
  - **Case studies**: completed, ongoing or future projects
  - **BMP catalogue**
  - **Chemical potential priority pollutants** within urban stormwater

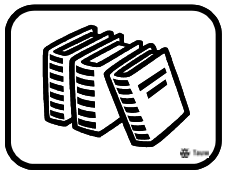
3.2. Assistance to problem identification & analysis

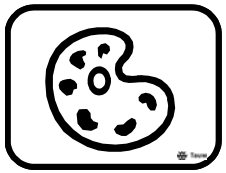
- Databases & roadmaps / assistance

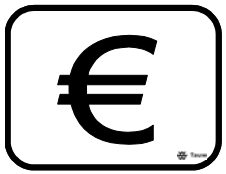


3.2. Urban dynamics: water aspects & values


Moral

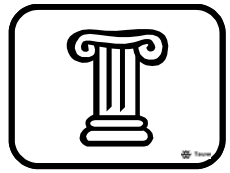

Legal

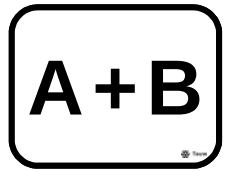

Aesthetic

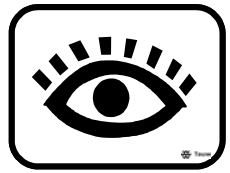

Economic

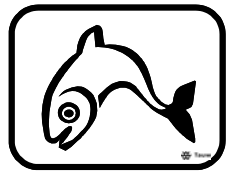

Social

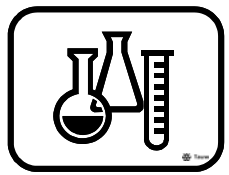

Linguistic

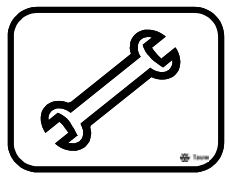
Historical


Logical


Psychological


Ecological


Chemical


Physical


3.2. Urban dynamics: water aspects & values

- Presentations of the various **Water aspects & values**
  - **Illustrations** for each aspect
  - **Indicators** and **criteria** suggested for each aspect

⇨ Enables taking into account the **context** of the project and **urban dynamics**

3.2. Libraries: Stakeholders type database







- **18 typical stakeholders** involved in urban stormwater source control
  - From the contractor to the landscape architect …
  - Including sewer office, road office…
  - Depends upon the project phase!
- Related to **actual stakeholders**
  - Using the **Case studies database**
- **Links** with other databases

3.2. Libraries: Stakeholders type database

- 18 **types**
  - 3 languages: English, French, Czech

Land owner
Propriétaire foncier (Fr)
Vlastník pozemku (Cz)

Equipement owner
Propriétaire de l'ouvrage (Fr)
Majitel zařízení (Cz)

Local government
Collectivités territoriales (Fr)
Místní vláda (Cz)

Developer
Aménageur (Fr)
Developer (Cz)

Project owner - Contracting authority
Maitre d'ouvrage (Fr)
Projektant (Cz)

Regulatory bodies
Structures publiques intervenant dans l
Řídící orgány (Cz)

Consulting companies
Bureau d'étude (Fr)
Konzultant (Cz)

Contractor
Maître d'oeuvre (Fr)
Smluvní partner (Cz)

Territory association
Association pour la qualité du cadre de vie (Fr)
Oblastní organizace (Cz)

Environnmental association
Association pour la défense de l'environnement (Fr)
Organizace pro životní prostředí (Cz)

Architect
Architecte (Fr)
Architekt (Cz)

Landscape architect
Architecte paysagiste (Fr)
Architekt krajinář (Cz)

Sewer manager
Gestionaire du réseau (Fr)
Správce kanalizace (Cz)

Sewer office
Service d'assainissement (Fr)
Úřad pro kanalizaci (Cz)

Road office
Services de la voirie (Fr)
Správce komunikací (Cz)

Open spaces office
Services des espaces verts (Fr)
Správce otevřených prostranství (Cz)

Environnment office
Services de l'environnement (Fr)
Úřad pro životní prostředí (Cz)

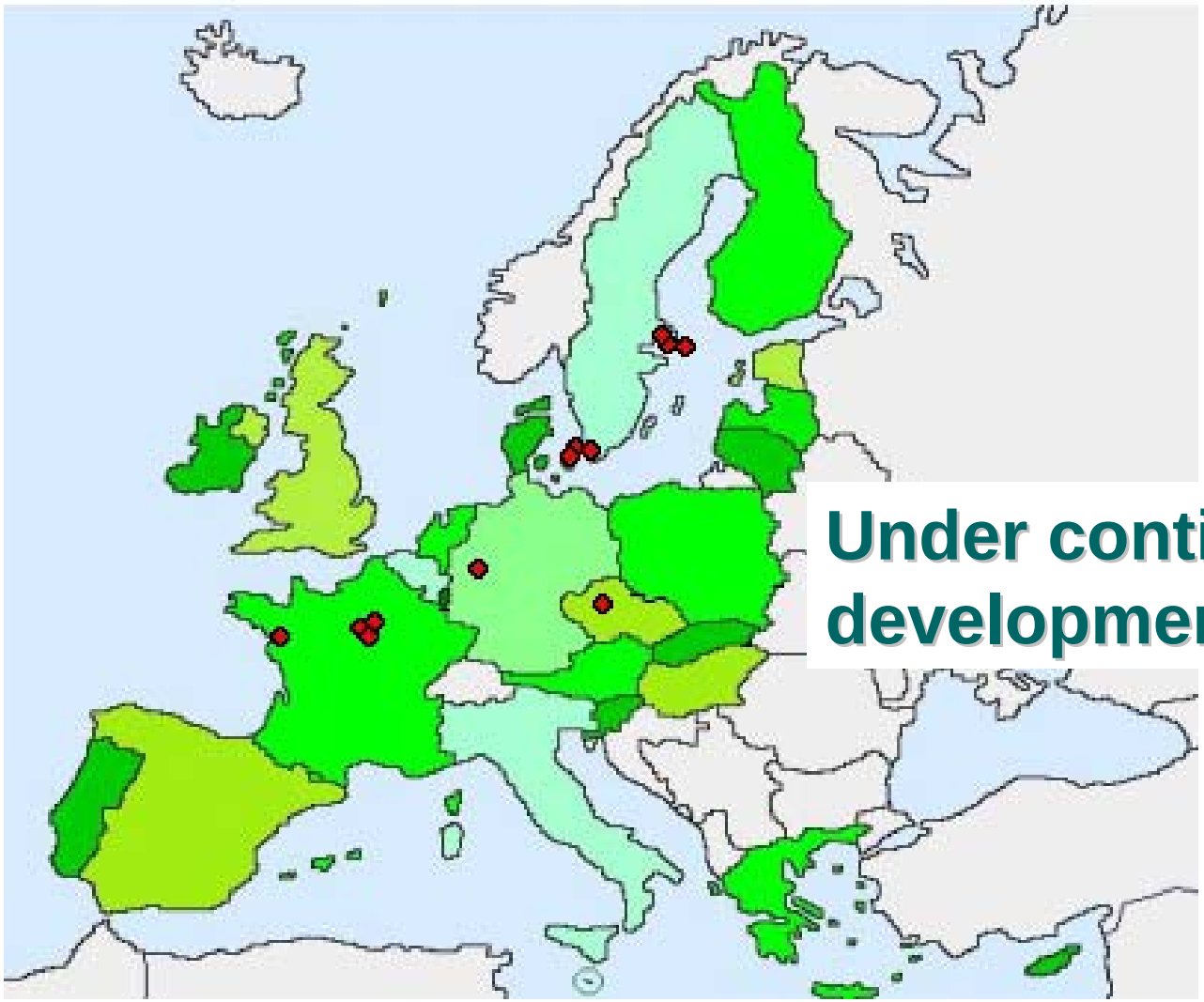
Urban planer
Services de l'urbanisme (Fr)
Uzemní planování (Cz)

Researcher
Chercheurs-laboratoires de recherche (Fr)
Výzkum (Cz)

3.2. Libraries: Case studies database

- **Description** of **actual projects**
  - Problem, solution, cost
  - Geographical, climatic & administrative context
- **Indexed** by country or type of project
- **Possible additions** by ADSS users : in **development** !
- **Link** with other databases using key terms

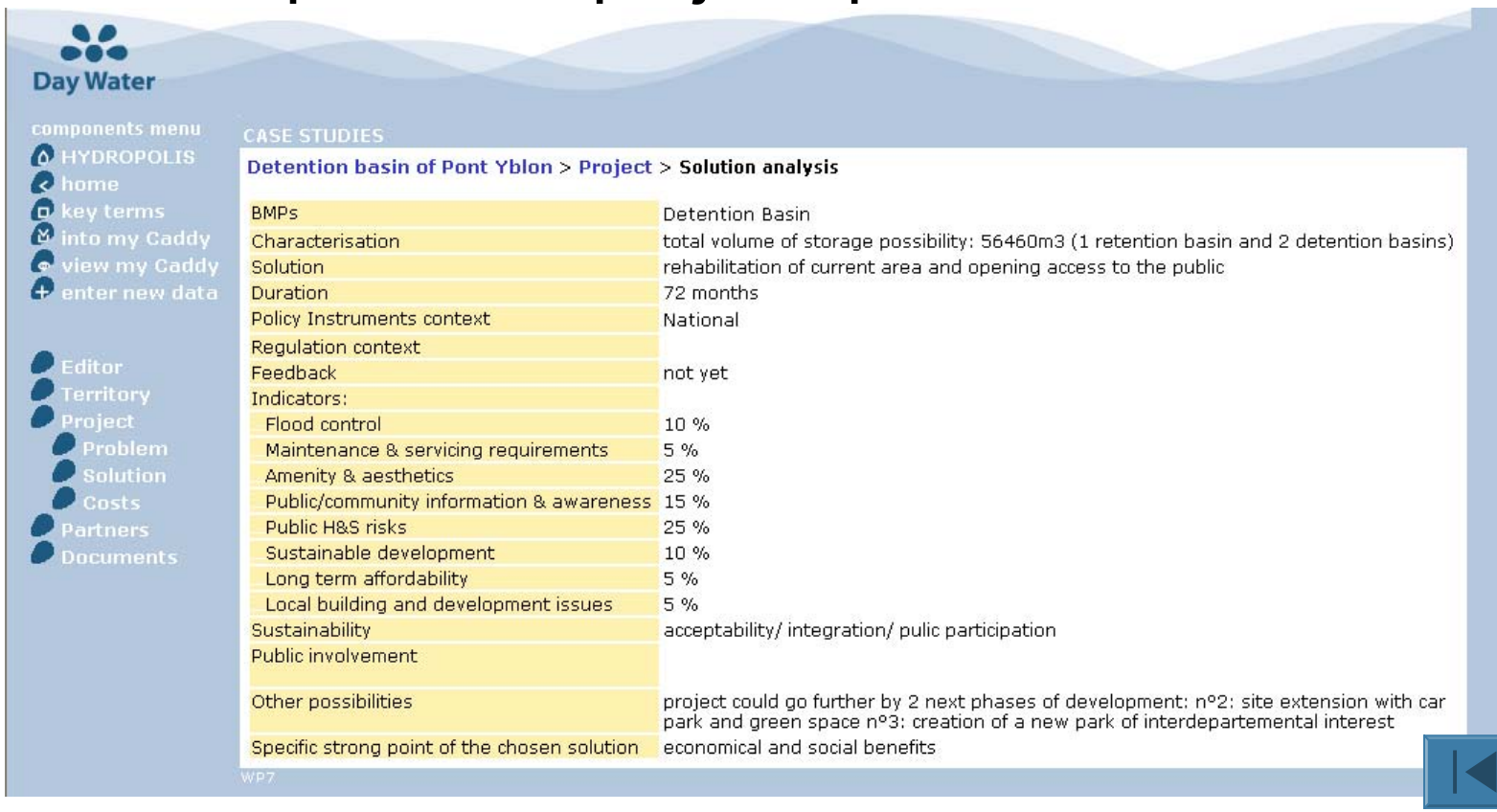
3.2. Libraries: Case studies database



Under continuous development!

3.2. Libraries: Case studies database

- Case en France: Pont Yblon
  - Responsible, project, partners, texts…



Day Water

components menu
- HYDROPOLIS
- home
- key terms
- into my Caddy
- view my Caddy
- enter new data

- Editor
- Territory
- Project
  - Problem
  - Solution
  - Costs
- Partners
- Documents

CASE STUDIES

Detention basin of Pont Yblon > Project > Solution analysis

BMPs	Detention Basin
Characterisation	total volume of storage possibility: 56460m3 (1 retention basin and 2 detention basins)
Solution	rehabilitation of current area and opening access to the public
Duration	72 months
Policy Instruments context	National
Regulation context	
Feedback	not yet
Indicators:	
Flood control	10 %
Maintenance & servicing requirements	5 %
Amenity & aesthetics	25 %
Public/community information & awareness	15 %
Public H&S risks	25 %
Sustainable development	10 %
Long term affordability	5 %
Local building and development issues	5 %
Sustainability	acceptability/ integration/ pulic participation
Public involvement	
Other possibilities	project could go further by 2 next phases of development: n°2: site extension with car park and green space n°3: creation of a new park of interdepartemental interest
Specific strong point of the chosen solution	economical and social benefits

WP7

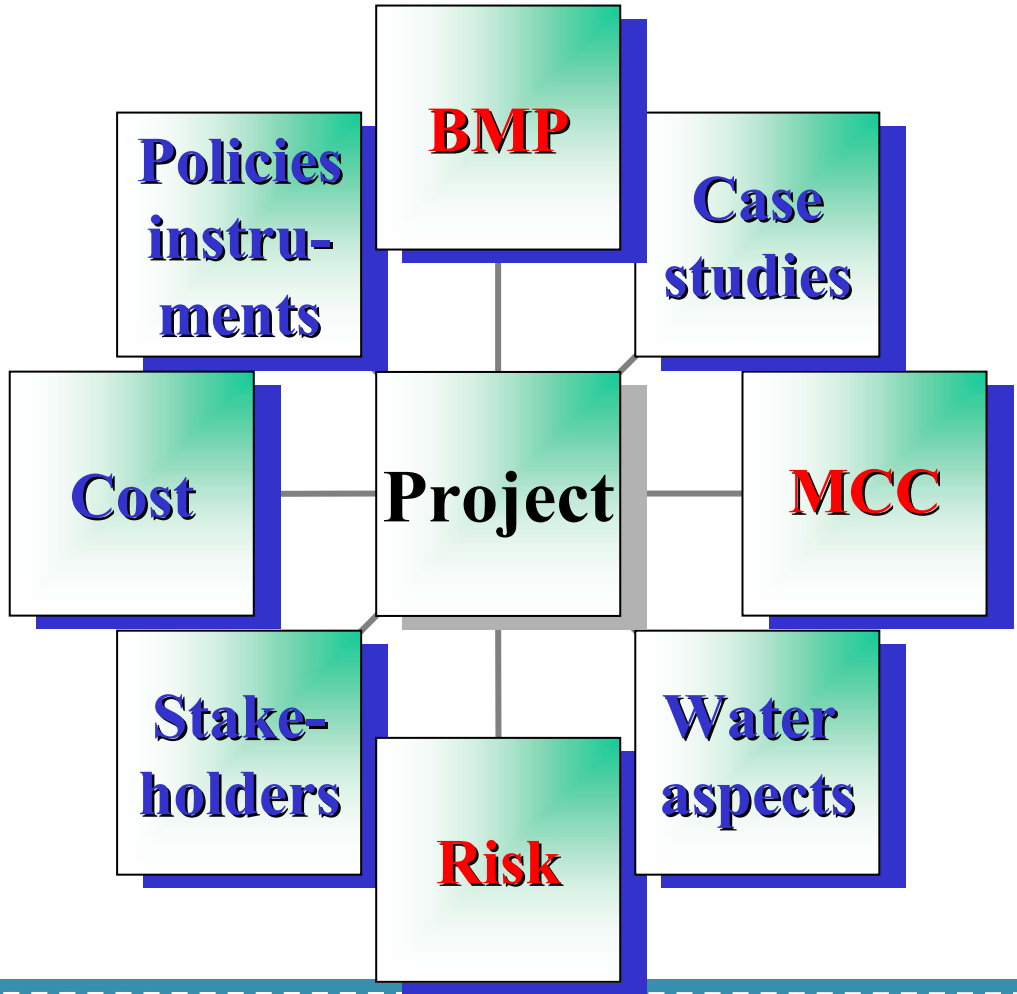
3.3. Source control decision making process

- **Decision making** process

2nd step

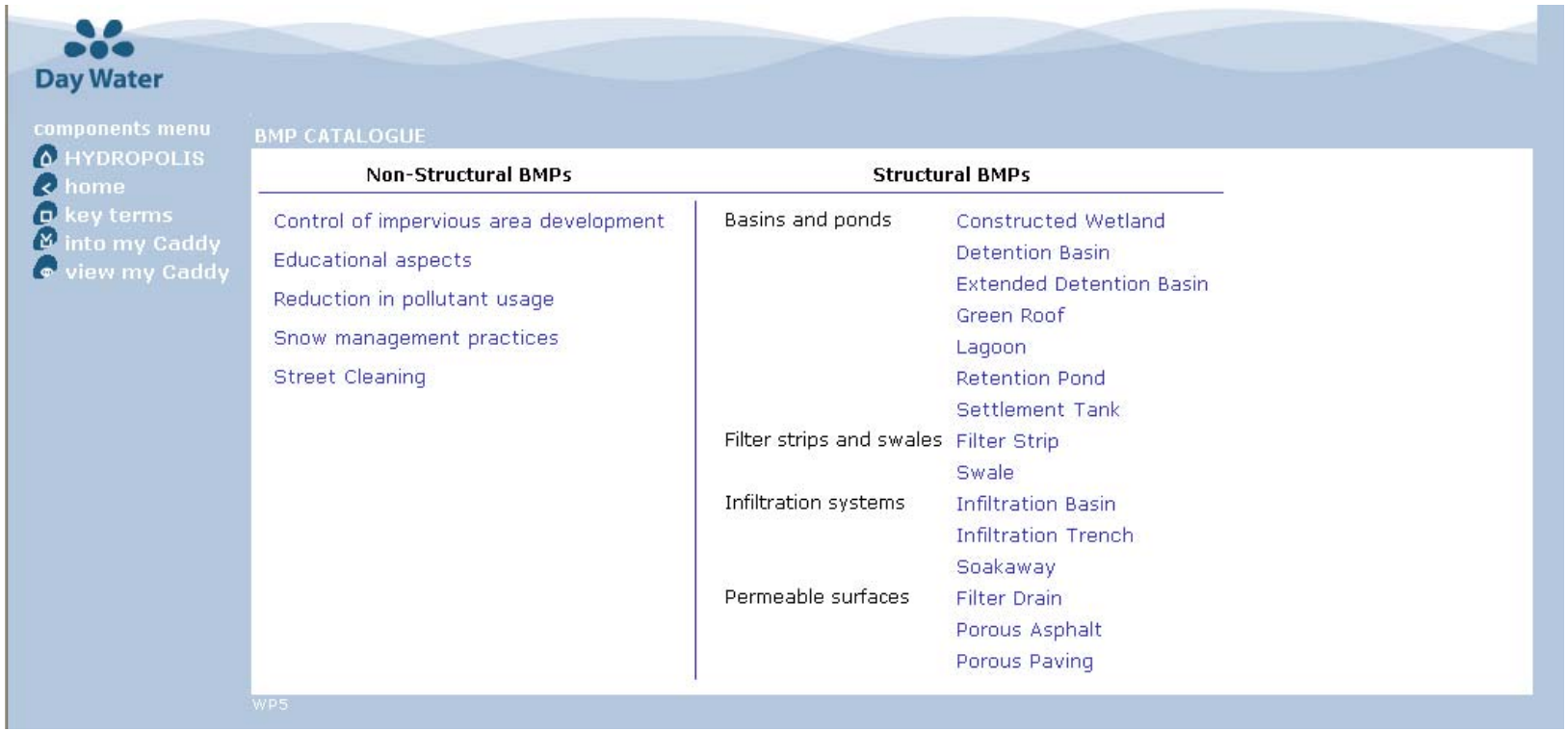
3.3. Assistance to problem & project construction

- Free mode



3.3. BMP catalogue

- **Two categories** of BMPs/SUDS
  - Non structural: regulations…
  - Structural: equipment



3.3. BMP catalogue

- **Non structural**
  - Control of impervious area development
  - Education
  - Reduction in pollutant use
  - Street cleaning
  - Snow management
- **Structural**
  - Basins & ponds
    - Wetland
    - Lagoon
    - Retention pond
    - Green roof
  - Infiltration
    - Swale, filter strip
    - Basins, trench
  - Porous surfaces
    - Asphalt, paving…

3.3. BMP catalogue

- **BMP characteristics** (for each type)
  - Photographs
  - Performance
  - Operation & maintenance
  - Examples types (case)
- **BMP tools** (common to all types)
  - Sources and loads
  - Costing assessment tool
  - Design tool

SUSTAINABLE URBAN DRAINAGE

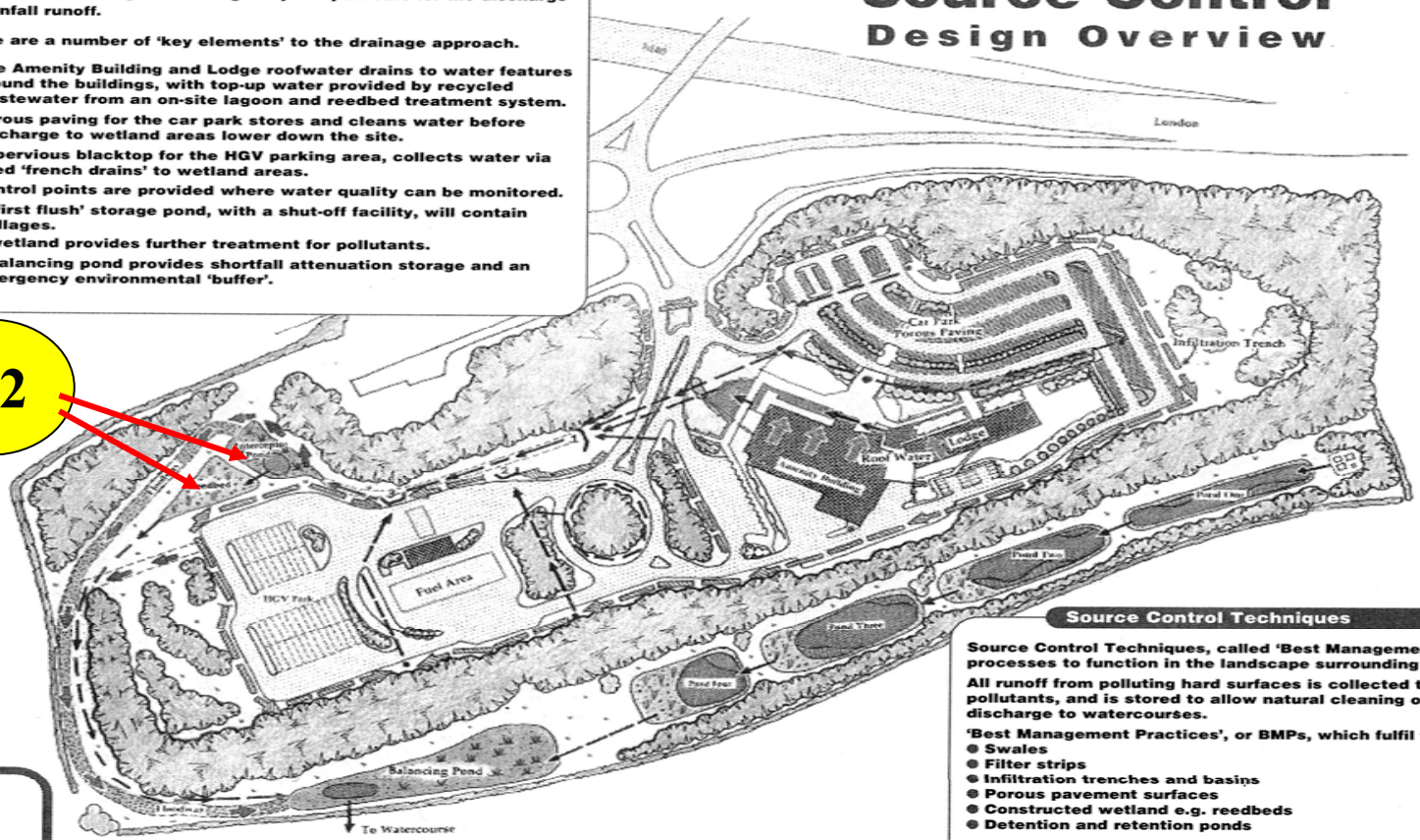
The Design Approach at Oxford

The Design Approach maintains the natural drainage pattern of the site with an existing ditch being the principal route for the discharge of rainfall runoff.

There are a number of 'key elements' to the drainage approach.

- The Amenity Building and Lodge roofwater drains to water features around the buildings, with top-up water provided by recycled wastewater from an on-site lagoon and reedbed treatment system.
- Porous paving for the car park stores and cleans water before discharge to wetland areas lower down the site.
- Impervious blacktop for the HGV parking area, collects water via lined 'french drains' to wetland areas.
- Control points are provided where water quality can be monitored.
- A 'first flush' storage pond, with a shut-off facility, will contain spillages.
- A wetland provides further treatment for pollutants.
- A balancing pond provides shortfall attenuation storage and an emergency environmental 'buffer'.

Oxford MSA M40
Source Control
Design Overview



1/2

Key

Landscape Character
- Woodland Planting
- Boundary Hedgerow
- Buildings
- Slopes
- Grassland
- Water

Source Control Elements
- Porous Paving
- Tarmac
- Infiltration/Collector Trench
- Roof Water
- Wetland
- Reedbed
- Floodway

Source Control Process
- Direction of Water Flow
- Storm Overflow
- Headwalls and Monitoring Sites

Source Control Techniques

Source Control Techniques, called 'Best Management Practices', allow natural processes to function in the landscape surrounding development.

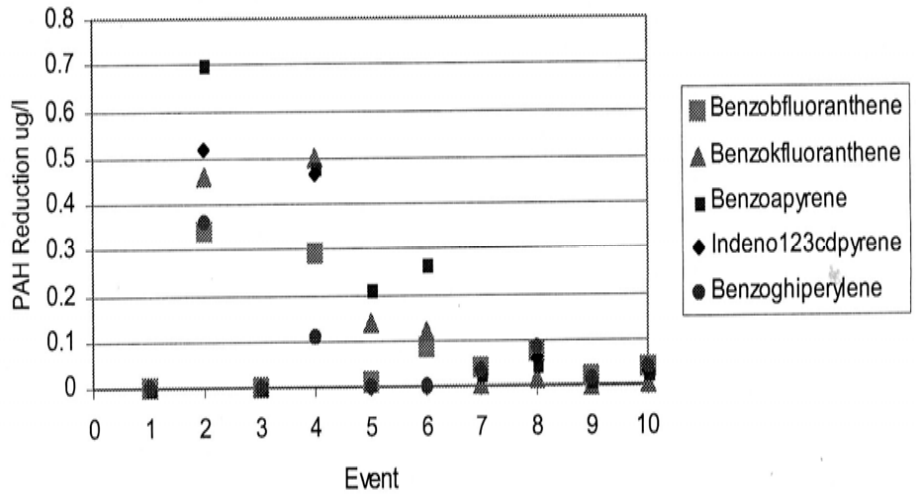
All runoff from polluting hard surfaces is collected to remove sediments, which trap pollutants, and is stored to allow natural cleaning of water prior to infiltration or discharge to watercourses.

'Best Management Practices', or BMPs, which fulfil this requ
- Swales
- Filter strips
- Infiltration trenches and basins
- Porous pavement surfaces
- Constructed wetland e.g. reedbeds
- Detention and retention ponds

The M40 Motorway Service Area at Oxford demonstrates a 's techniques to collect, clean and release water slowly to a r

Robert Bray Associates
Landscape Architects
Telephone: 01453 764885 Fax: 01453 765545

MIDDLESEX UNIVERSITY



M40 Oxford Service Station

3.3. BMP criteria & indicators

CRITERIA	INDICATORS
Technical	Flood control
	Pollution control
	System adaptability to urban growth
Environmental	Receiving water volume impact
	Receiving water quality impact
	Receiving water ecological impact
Operation	Maintenance and servicing requirements
	Maintenance and servicing requirements

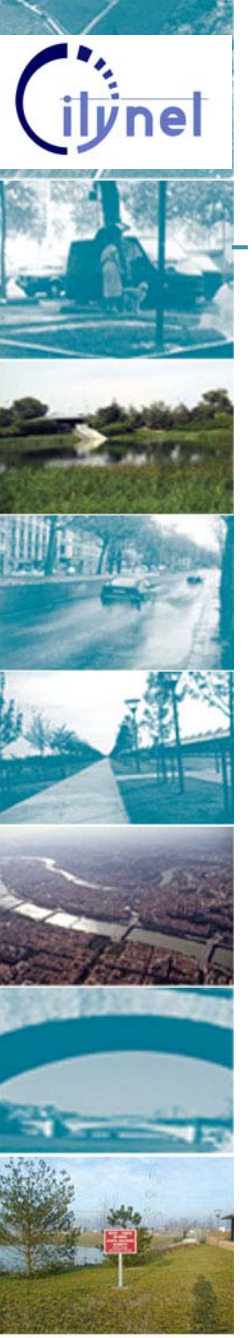
3.3. BMP criteria & indicators

CRITERIA	INDICATORS
Social &	Public heath and safety risks
Urban	Sustainable development
Community	Public/community information and awareness
Benefits	Amenity and aesthetics
Economic	Life cycle costs
	Long term affordability
Legal and Urban Planning	Adoption status
	Building development issues and stormwater regulations

3.3. BMP criteria & indicators

Criteria	Indicator	Benchmark	Units
Technical	Storage and flood control	Overflow frequency	1….n
		Design storm return interval	RI, years
		Peak runoff and storage volume	Volume, m^3; (effective contributing area, ha)
		Extreme event control	H/M/L
	Pollution control	Dissolved pollutant capture	%; H/M/L
		Solid(s) pollutant capture	%; H/M/L
	System adaptability	Ease of retrofitting; increased catchment imperviousness	Changes in R_c ; H/M/L
		Design freeboard	%; volume, m^3

3.3. BMP multi-criteria comparator (MCC)



- **Comparison** of individual BMPs
  - Performance **matrix** with criteria, indicators
    - Objectives default scores (or scored by user)
    - Chosen weight for each criteria
    - Output: ranking of BMPs
  - **Order of preference** of **individual BMPs**
    - Before being possibly associated
    - Before being designed and becoming actual solutions
    - Before the comparison of such solutions & negotiation with involved stakeholders

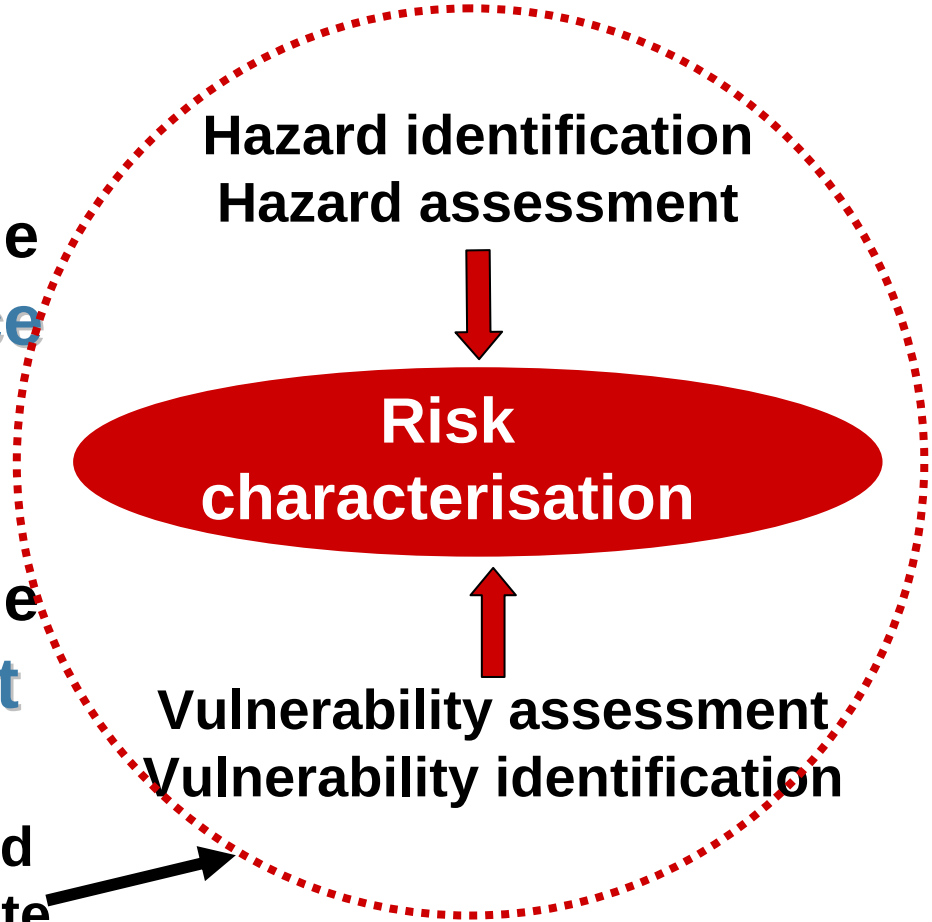
3.3. Chemical risk characterisation

- **Risk** and **vulnerability**

General focus on the **risk source**

Specific focus on the **risk object**

For a defined solution & site



3.3. Chemical risk identification & assessment

- **CHIAT**: 5 step procedure for priority pollutant

1.Characterisation of sources

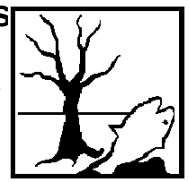
Observed and potential present pollutants

2.Identification of recipients, exposure objects and criteria

Case specific information
Legislation

3.Hazard identification

Potential Pollutants



Inherent properties

4.Hazard assessment

Potential Priority Pollutants

Measured/modelled data
Toxicity

5.Expert judgement

Priority Pollutants

Grouping
Addition
Subtraction

Selected Priority Pollutants

Institute of Environment & Resources
Technical University of Denmark

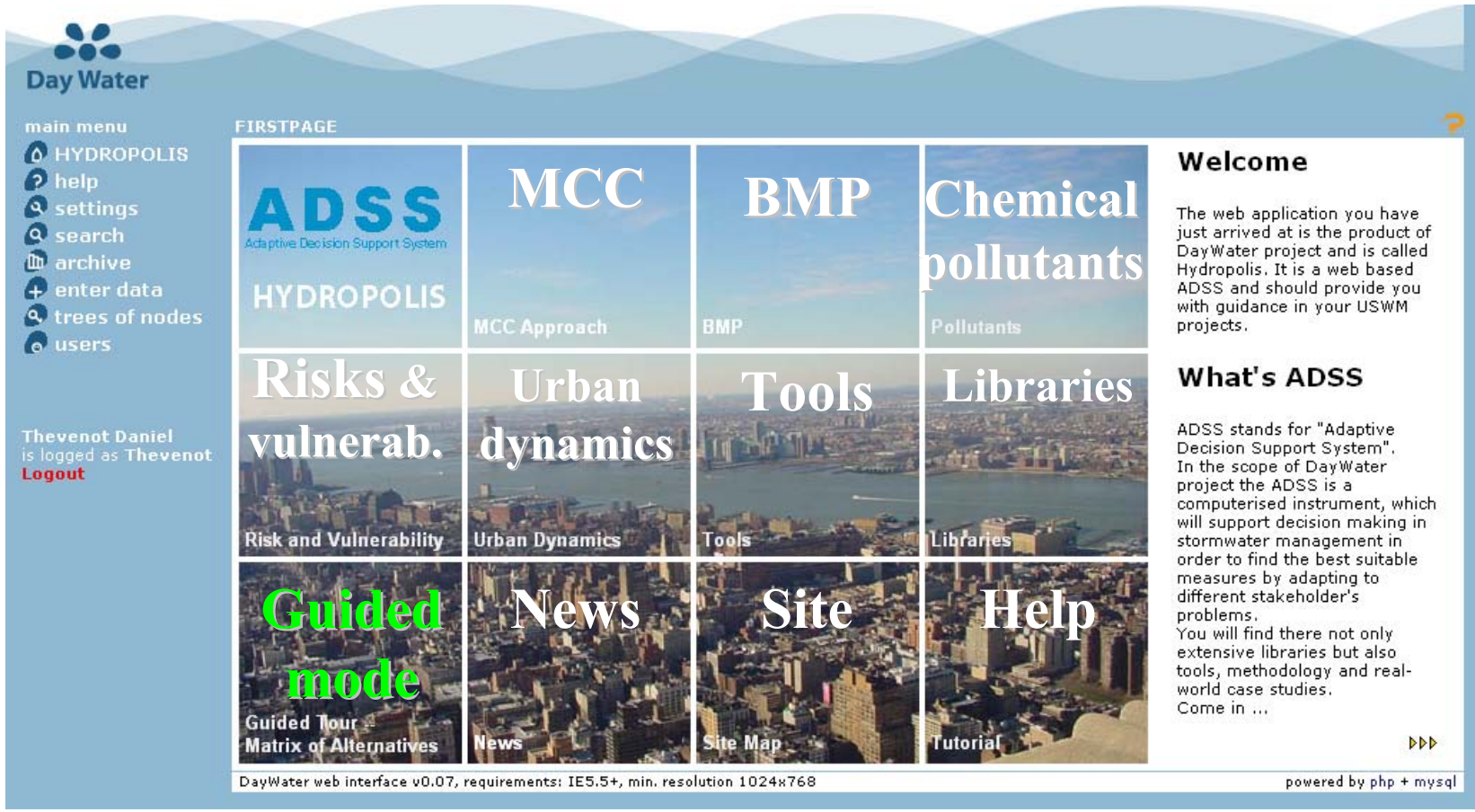
3.3. Chemical risk identification & assessment

- **Priority chemical pollutants** in urban stormwater
  - **Pollutants** characterised by their physicochemical properties, toxicity, stability, fixation on particles…
  - **Usual concentrations** or levels
  - Treatment efficiency requested by **the receiving bodies**
  - Connected to the **chemical priority pollutant database** (resulting from risk assessment)

Institute of Environment & Resources
Technical University of Denmark

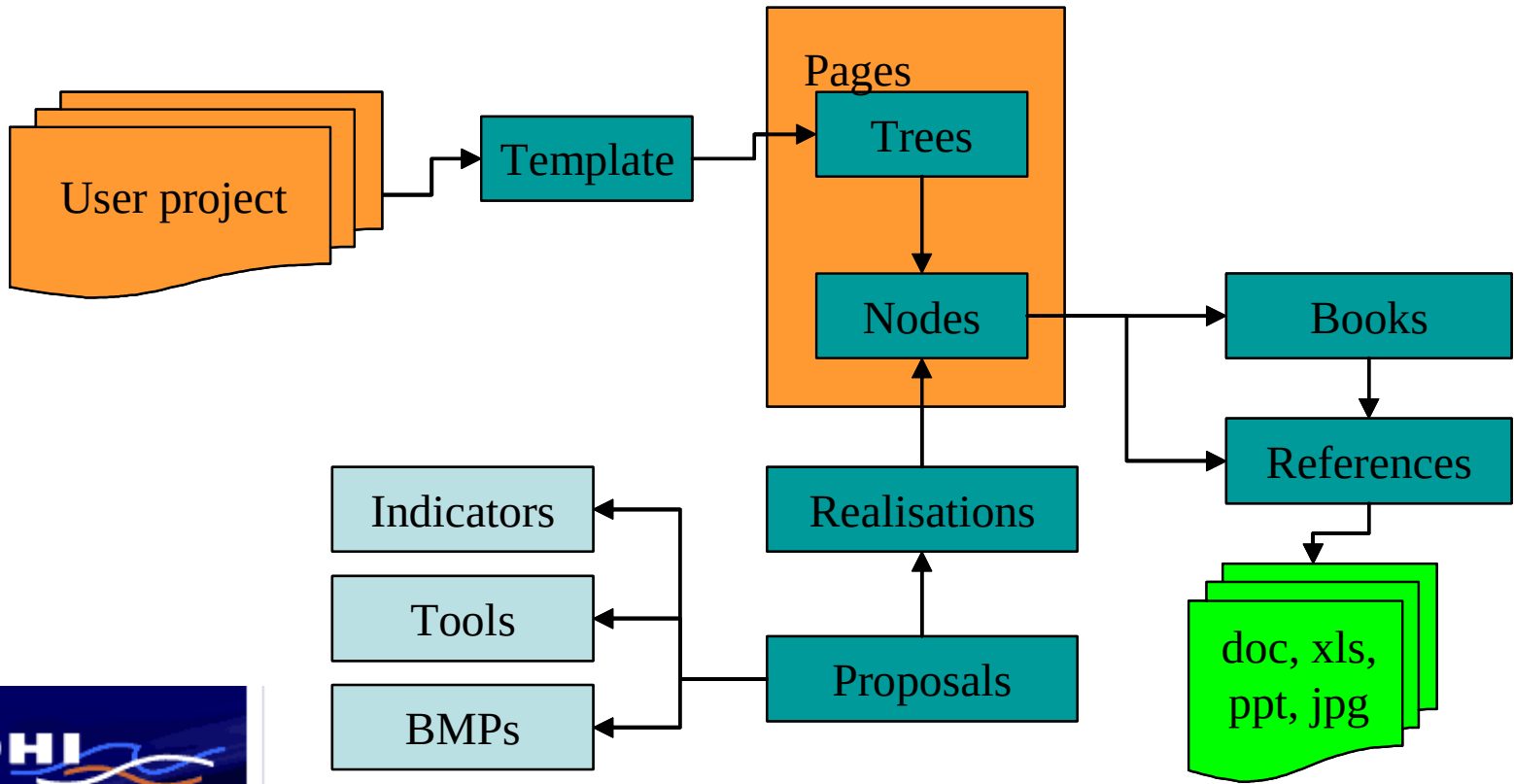
3.3. Assistance to problem & project construction

- **Guided** mode



3.3. Guided mode

- Answers to **questions** on project & user → key terms → smart filter

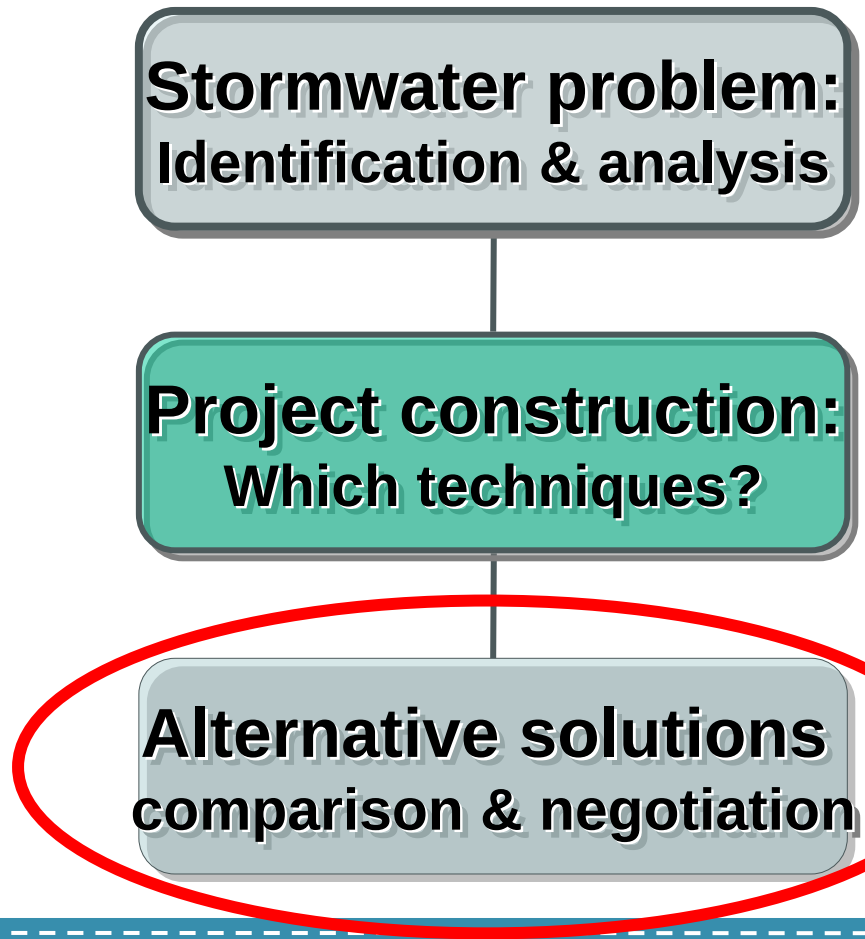


3.3. Guided mode

- **Initial questionnaire** to ADSS user
  - **Project** characterisation
    - Physical system, context, problem
  - ADSS **user** characterisation
    - Competence, interest…
  - **Key terms** values result from the answers
  - Key term values used to **suggest**
    - Possible techniques
    - Relevant cases,, stakeholder types, policy instruments…
    - Available tools
      ➔ **the right data at the right time!**

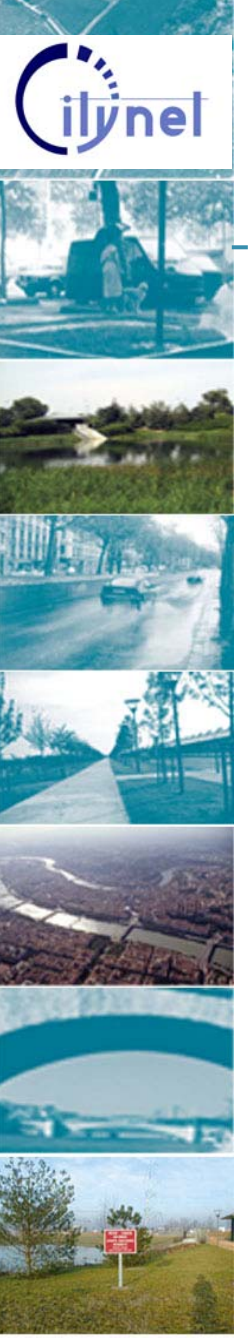
3.4. Source control decision making process

- **Decision making** process



3rd step

3.4. Assistance to building & comparing solutions



- Last step in **decision making**
- Possibly associates **several** BMPs or usages within a source control solution
- **Design** of selected solutions
  - Construction of possible **solutions**
  - **Comparison of these solutions** by each stakeholder: 'Matrix of alternatives' (MoA)
  - **Negotiation** between stakeholders → reaching a consensus necessary for the solution sustainability

3.4. Building possible solutions

- **Association** of several BMPs or usages
  - **Traffic slowing** device
  - Runoff **infiltration**
  - **Drainage** of exceeding runoff towards a creek
  - *Hoppegarten* (Berlin)

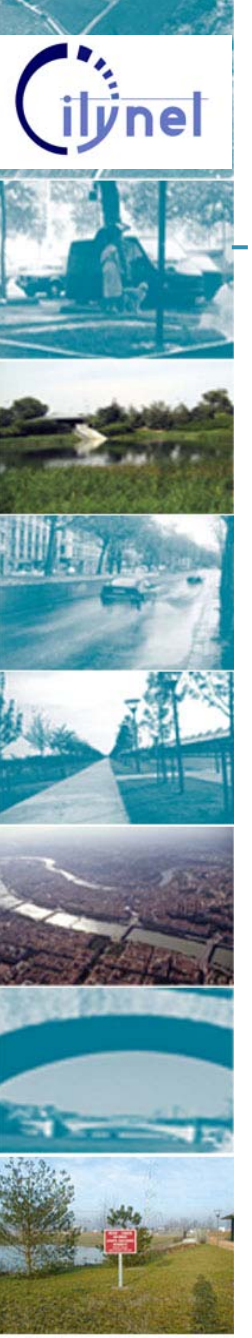
D. Thévenot, 2003

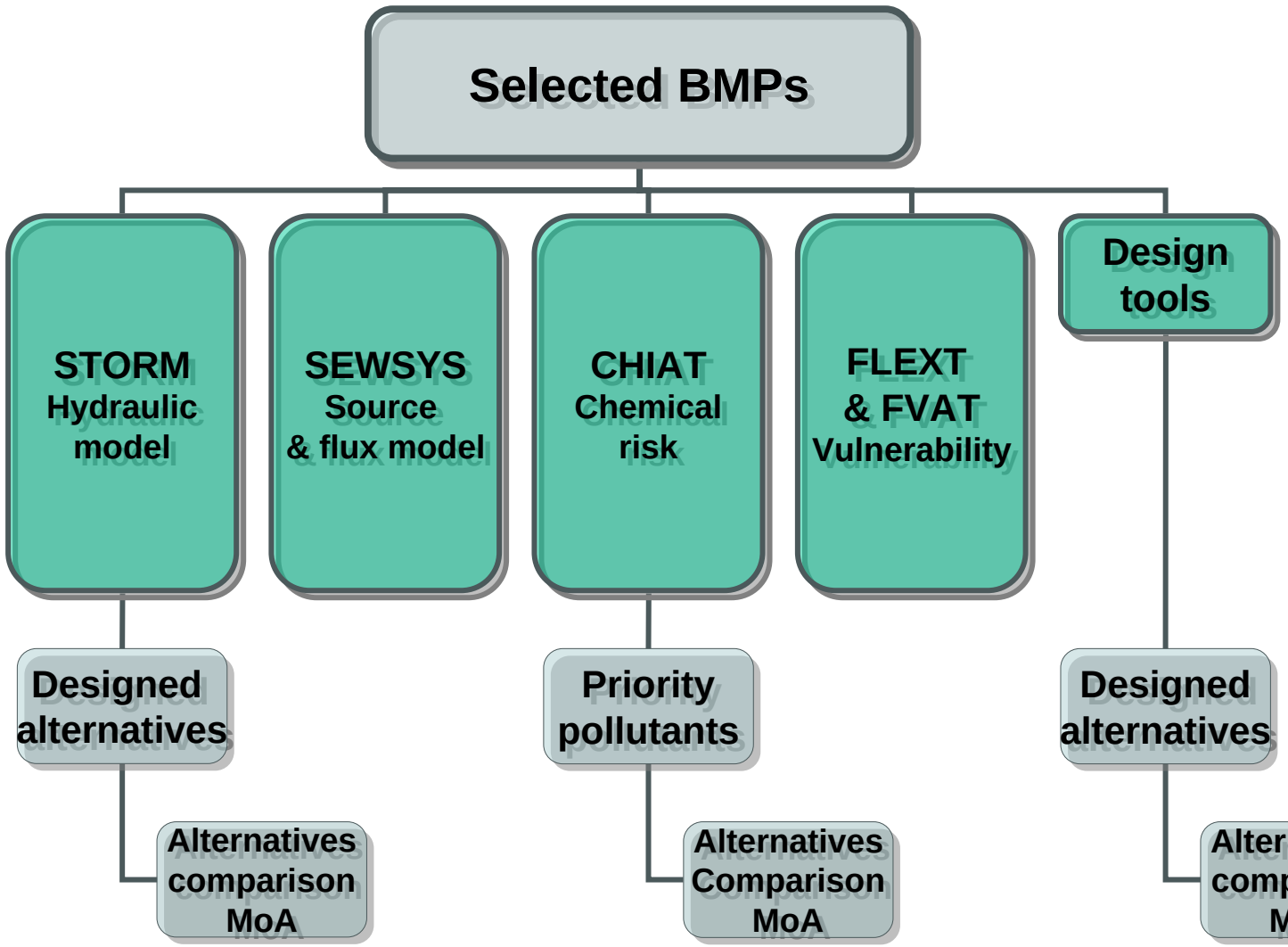
3.4. Building possible solutions

- **Association** of several BMPs or usages in a **dense urban district (**Clichy-sous-Bois)
  - **Sport track** & underground **basin** (Maurice Audin)

Département de la Seine-Saint-Denis
CONSEIL GENERAL

3.4. Assistance to building & comparing solutions: tools



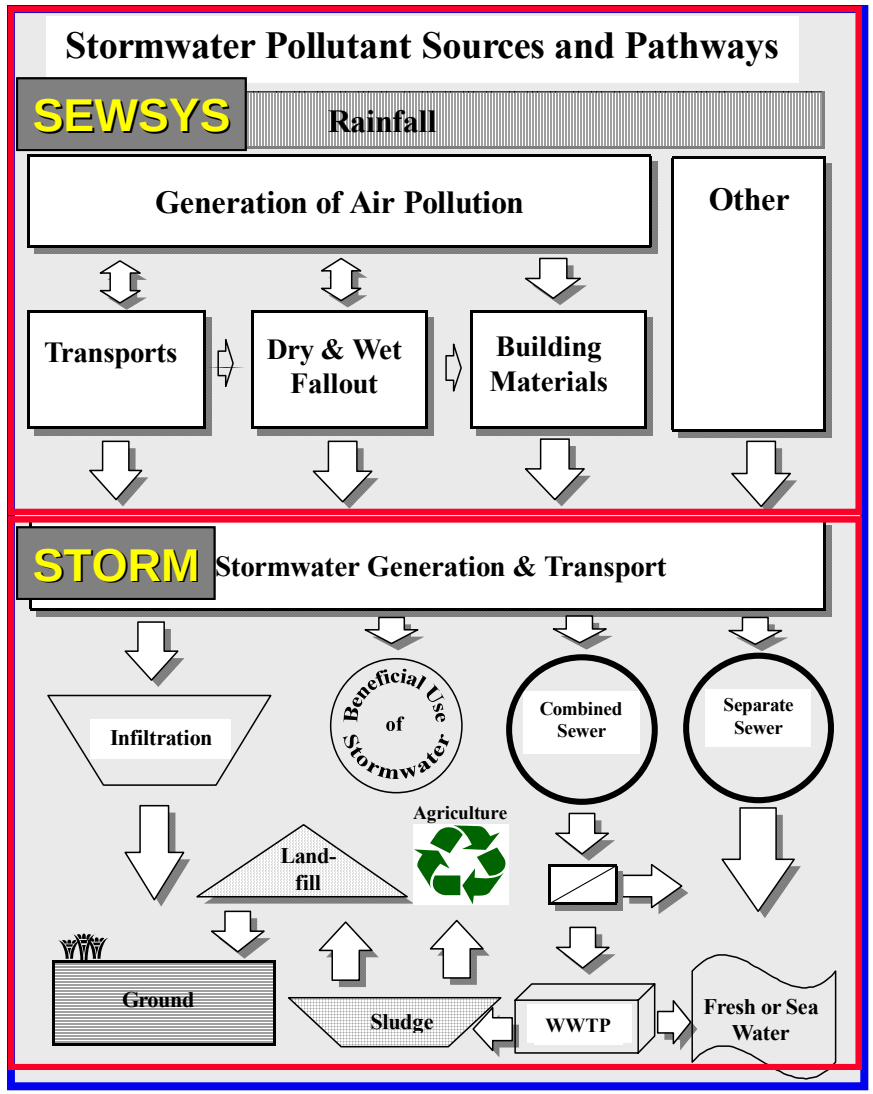


3.4. Assistance to building & comparing solutions: tools

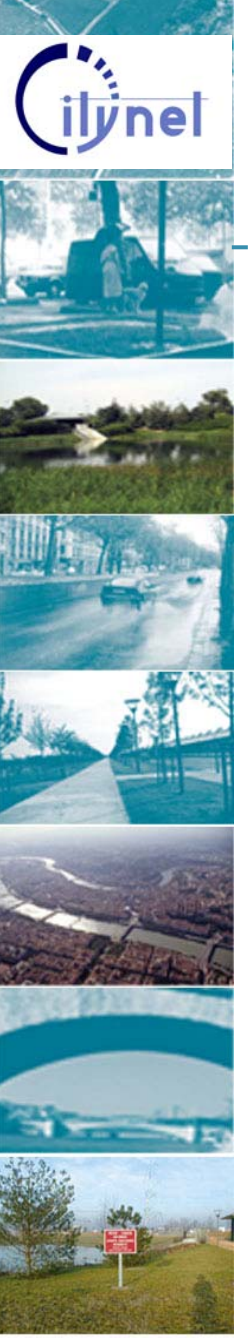
- **External** tools
  - **Flexibility** given to the ADSS user to continue using his **usual tools**
  - **Interfaced** to the ADSS for user friendly dialogue (XML files)
  - **Developed** by partners on their own Internet sites
    - Continuing development and enrichment (after the end of DayWater project)
    - Accessible through ADSS

3.4. Assistance to building & comparing solutions: SFM

- Urban stormwater **Source and Flux Model (SFM)**
  - SEWSYS: pollution sources
  - STORM: water & pollution fluxes (design)

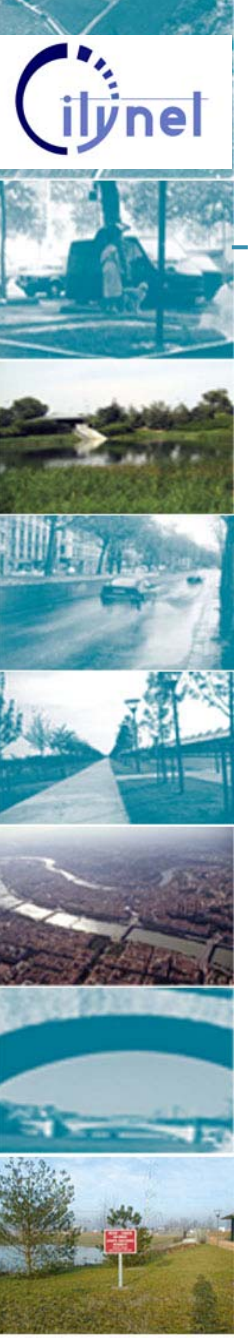


3.4. Matrix of alternative solutions



- **Objective**: facilitate **negotiation** with stakeholders
  - Common selection of **possible alternative solutions**
    - Designed individual or associated BMPs
  - Common selection of **criteria** and **indicators**
    - Using the criteria and indicators database
    - Discussion for selecting a common list

3.4. Matrix of alternative solutions



- Determination by each stakeholder of indicator **scores**
  - Either subjective scores: 1 to 5
  - Or **benchmarks values** resulting from quantified objective data
- Determination by each stakeholder of indicator **weights** (importance %)
- Building a **Matrix of Alternatives** → rank
  - **Comparison** of MoA for each stakeholder
  - Negotiation with stakeholders and **consensus reaching**

3.4. Matrix of alternative solutions : UK example

Indicator	Sewer (as usual)	Infiltr. trench	Swale	Wetland	Weights
Flood control	3	2	3	3	15
Pollution control	1	2	2	3	15
Environ impact.	2	2	3	4	25
Amenities & aesthetics	0	1	2	4	20
H&S, public risks	2	2	2	2	15
Cost	2	1	1	1	10
Σ score x weight	**160**	**170**	**230**	**310**	
Rank	**4**	**3**	**2**	**1**	

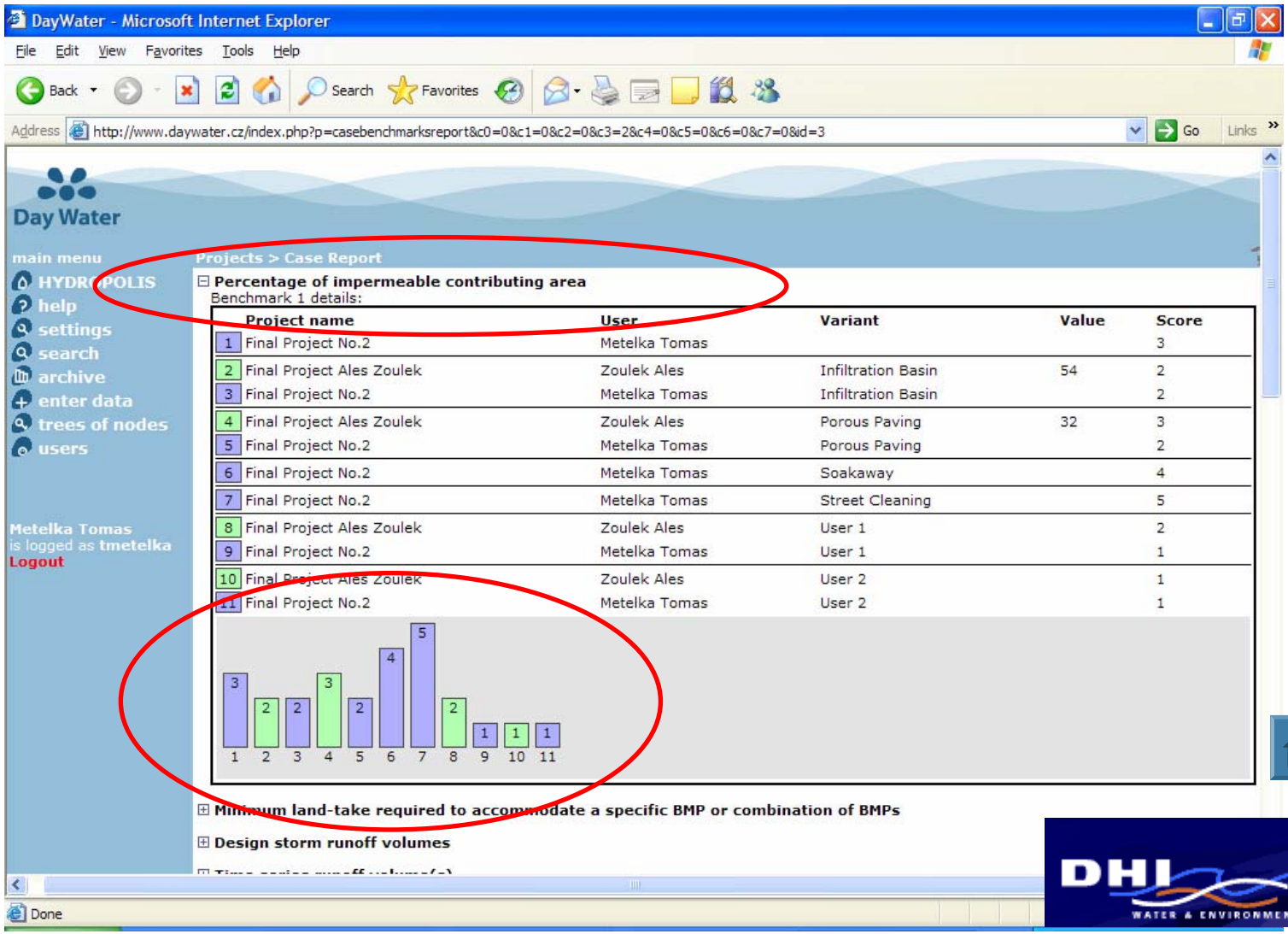
3.4. Matrix of alternative solutions: building

- ADSS: example of building a **MoA**

Matrix of Alternatives

	A	B	C	D	E	F	G	H	I	J	K	L
1				Street Cleaning		Soakaway		User 1		User 2		
2	Category	Indicators	Benchmarks	Value	Score	Value	Score	Value	Score	Value	Score	Weight
3			Pollutant concentration probability exceed		2		1		1		1	5
4			First-flush capture potential (10/15mm effe		3		3		1		1	5
5	Technical	Pollution co	%age pollution capture for given RI storms		2		5		1		1	1
6			Draw-down times		1		1		1		1	1
7			Downstream erosion		3		1		1		1	1
8			Groundwater recharge		5		4		1		1	1
9	Environmental	Impact on r	Downstream flow protection value		1		4		1		1	10
10			Contribution to urban sustainable develop		4		2		1		1	5
11			Role in Agenda 21		1		1		1		1	1
12			Role in Biological Action Plans (BAPs)		4		1		1		1	10
13			Additional benefits offered by different BM		1		2		1		1	5
14			Material use: aggregate/concrete/top-soil u		3		2		1		1	5
15	Social and Urban	Sustainable	Energy use: construction, operation and m		1		3		1		1	5
16			Design and capital costs		1		1		1		1	1
17			Operational & maintenance costs		3		4		1		1	10
18			Sediment disposal costs		2		1		1		1	20
19			Site decommissioning costs		1		4		1		1	1
20			Stormwater fees		2		1		1		1	0
21	Economic	Life Cycle C	O&M fees		2		3		1		1	1
22			Fulfilment of European regulations		2		1		1		1	5
23			Fulfilment of national regulations		1		1		1		1	1
24			Fulfilment of local regulations		1		1		1		1	1
25	Legal and Urban	Urban storn	Fulfilment of legislation relating to constru		1		1		1		1	5
26			Total score		2.23		2.07		1		1	100%

3.4. Matrix of alternative solutions: comparison



3.5. An effective source control option?

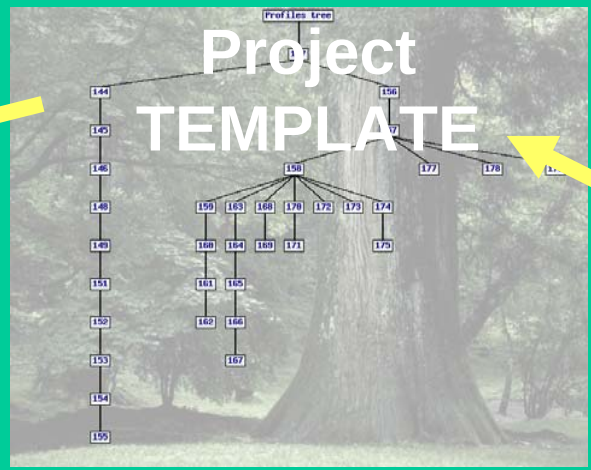
- BMPs are recognised as **efficient source control techniques**
  - Both for flooding and pollution
- **Failures** are known
  - Poor maintenance, lack of understanding
- Decision makers are often **reluctant to adopt source control measures**
  - Change of paradigm: end-of-pipe → source control
  - Numerous stakeholders, complex regulations, large competencies needed

ADSS negotiation concept

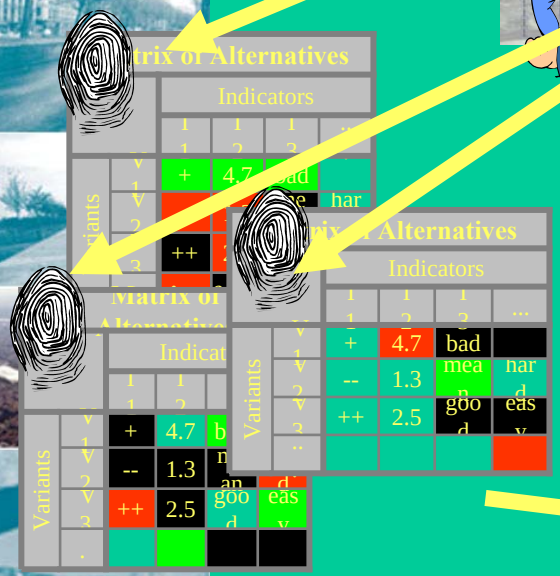
Users projects

Users

Project TEMPLATE



Manager



Negotiation of differences

Solution

3.5. An effective source control option?

- ADSS **awareness** building
  - Benefits of urban water '**day lightening**'
- **Knowledge base**
  - Up-to-date techniques, tools, regulations
- Addressing **sustainability issues**
  - Pollution control ➔ environmental acceptance
  - Cost & maintenance ➔ economical acceptance
  - Consensus reaching within all involved stakeholders ➔ social acceptance
- A **long-term procedure** involving
  - Engineers, elected officials, citizens…
  - Even children (Val de Marne county, F and Nijmegen, NL)

3.5. An effective source control option?

- Water weeks in Nijmegen, NL

3.5. An effective source control option?

- Nijmegen communication by its **water office**
  - **Cars or water ?**

Presentation outline







- **1.** DayWater project : research context
- **2.** DayWater project : presentation
  - 2.1. Scientific partners
  - 2.2. Associated end-users
  - 2.3. Innovative method: scientists ⇔ end-users
- **3.** Scientific achievements : ADSS
  - 3.1. Specificities **: users, functions & operation**
  - 3.2. Problem identification & analysis
  - 3.3. Problem & project construction
  - 3.4. BMP design and comparison of alternatives
  - 3.5. An effective source control option?
- **4.** Conclusion

4. Conclusion

- **Innovative method** for DayWater project
  - Continuous interaction between scientists and practitioners / end-users: example **Paris suburb counties**
- Components et system in **development** and **assessment**
  - Enrichment after the end of DayWater contract
- **Dissemination** of major results
  - **DayWater** book to be published by IWA (2007)
  - **Open** to PUB members & partners

Have a try at : www.daywater.cz

4. Conclusion

- DayWater team thanks you!

thevenot@cereve.enpc.fr

www.daywater.cz

4. Conclusion

- Any question related to…

Urban stormwater source control ?

Or DayWater project ?