Collaborative Networks for Biodiversity Domain Organizations

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Outline

- LifeWatch roadmapping project - focus on collaboration needs to support Biodiversity domain
- Characterisation of existing forms of collaboration
- Identification of limitation/drawbacks and requirements
- Suggestion of suitable collaboration networks, and their roadmap construction methodology

Roadmapping objective:

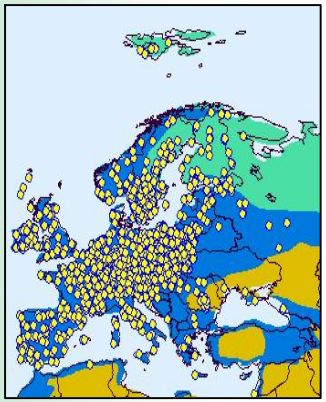
Development of a large-scale **European e-Science and Technology Infrastructure** to **support collaborative research on biodiversity data**, bringing together:

a) A system encompassing marine, terrestrial, freshwater and birds data

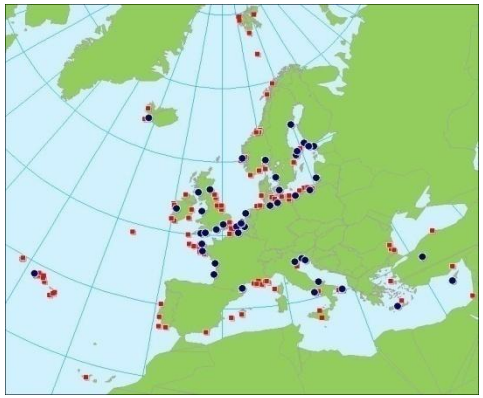
b) Common interoperable access to a huge amount of interlinked, distributed data from databases and monitoring sites

c) Services and computational facilities through virtual laboratories, supporting analytical and modelling tools

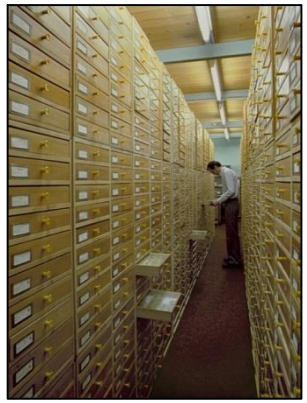
d) Targeting user and training support and a programme supporting public services



Terrestrial monitoring sites



Marine reference and focal sites



Natural science Collections & museums

http://www.lifewatch.eu

Based on [Wouter Los, PRO-VE'08, Poznan, Sept 8-10, 2008]

LifeWatch - multiple actors involved in biodiversity domain

Stakeholders from variety of Disciplines:
ecology, taxonomy, biology, environments, etc.

Scientific / Research Organizations

- Laboratories and their individual scientists
- Universities, research institutes and their scientists
- Industry organizations and their individual scientists

Data Providers

- Single data sites
- Networked data sites, e.g., LTER (Long Term Ecological Research) monitoring sites across Europe
- Sensor nets
- National natural history museums with collections of specimens
- Smaller museums with well curated collections of local flora and fauna (often representing time series)
- Projects - observation data from floristic and faunistic mapping projects gathered by national, state or local government;
- Datasets from studies for environmental risk assessments assembled by consultancies
- Amateur recorders (e.g., bird watching)
- An increasing amount of semi-verifiable multimedia data from individuals, especially digital images of organisms in the field
- Data aggregators
- Electronic data processing centres (e.g., VLIZ, Belgium)

Other interested organs

- **Governments**
  - European Commission
  - National governments
  - International agencies e.g., UN
- **Service suppliers**
  - IT industry
  - Telecom / network providers
  - Individual application developers / integrators / orchestrators
- **Networks of Excellence on Biodiversity**
  - Alternet
  - LTER
  - MarBEF
- **Global research infrastructures**
  - GBIF
  - GEOSS
- **"Community of Interest" groups**
  - Environmental protectionists / conservation groups
  - Real estate investors / developers
- **Policy & decision makers**
  - Public sector
    - Government agencies: on environment, highway, agriculture, forestry, etc.
  - Private sector / commercial
- **General public**
  - Press representatives
  - Political organizations
  - Communities
  - Educational organizations (e.g., school teachers, pupils)

Biodiversity collaboration Example

➢To perform biodiversity-related **monitoring and research & development** requires applying **expertise, recourses, and competencies** from a number of distributed organizations, either in a specific region, a country, an continent, or worldwide

FLYSAFE
Sixth Framework Programme

Objective: Continuous observation/prediction of **birds migrations** to decrease probability of aircraft accidents in European territories

36 partners from 14 European and other associated countries, including:

- universities
- research centres
- weather forecasting institutions
- aircraft manufacturers
- systems / equipment suppliers
- airlines (+individual pilots)
- SMEs
- specialised companies
- Austro control authorities

Main challenges for collaboration

- **Lack of knowledge** about potential partners to collaborate with
- **Lack of trust** among distributed organizations
- **Lack of methodologies** for effective collaboration
- **Lack of specialised tools** to support remote collaboration
- **Mostly failure cases from the past**, on collaborative research initiatives/projects in biodiversity

Focus of our research approach

1. Applying ECOLEAD* approach and methodologies developed for Collaborative Networks discipline to support the LifeWatch infrastructure and its organizational set up

2. Study and characterisation of existing forms of collaboration in LifeWatch environment

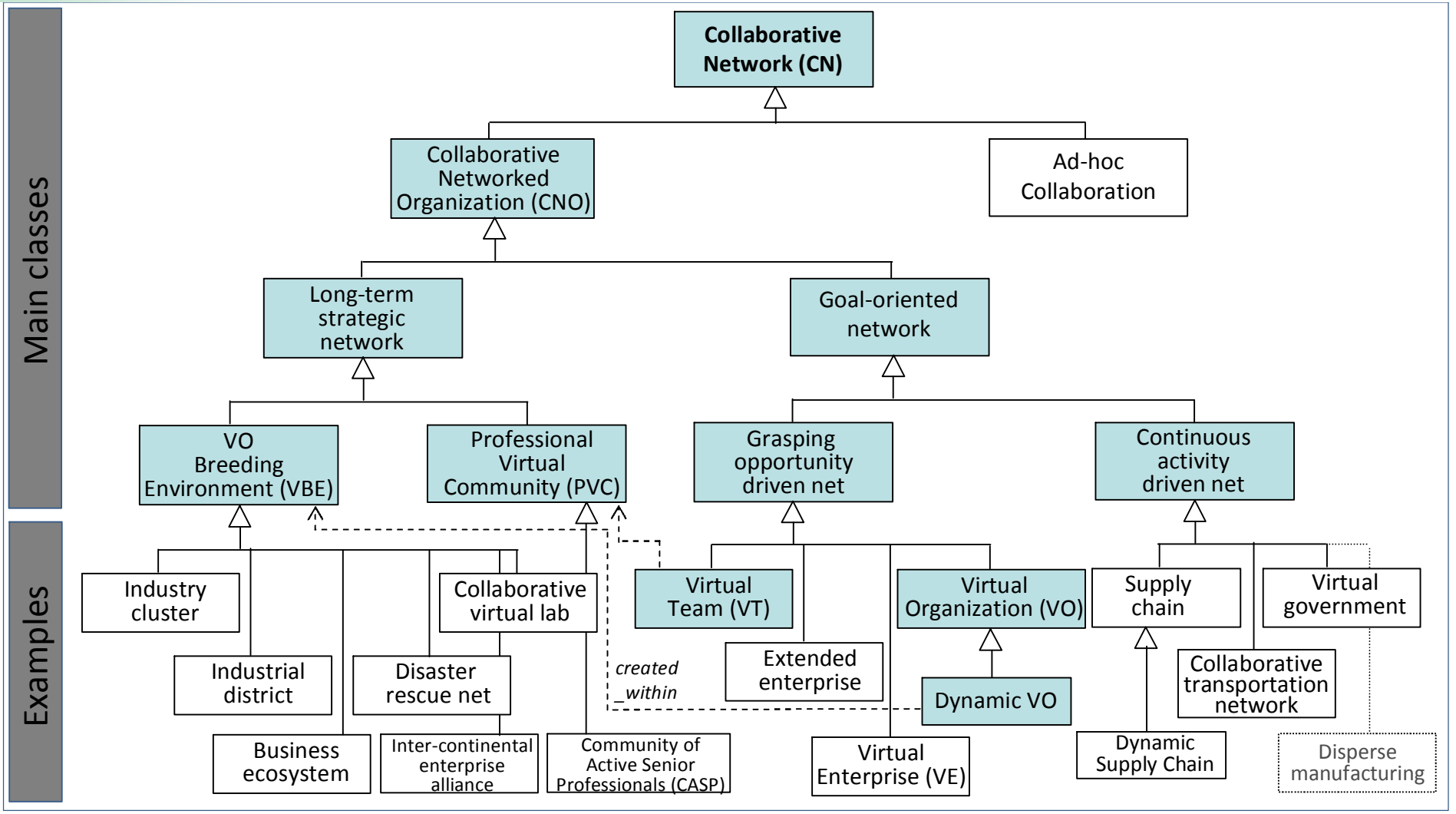
3. Identification of collaboration limitation/drawbacks and requirements

4. Suggestion of a suitable collaboration form and its construction methodology

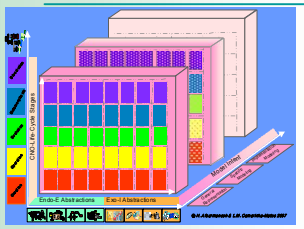
* ECOLEAD (EC project, FP6 IP 506958), 2004-2008, http://ecolead.vtt.fi

Application of ECOLEAD approach and results – CN taxonomy

Identifying the main existing collaboration forms



Application of ECOLEAD approach and result – ARCON reference models



Characterize comprehensively all aspects of existing collaborations - ARCON reference model of CNs

5. Market: stakeholders, marketing strategy

6.Support: training, insurance, banking, financing

Exogenous subspace

1.Structure: actors, roles, relationships

2. Resource components: human, ICT, physical, information resources

3. Functions: operations, processes, methodologies

Endogenous subspace

4. Behavioral regulations: norms, polices, bylaws, agreements

7.Society: governments, public

8. Potential members: attraction strategy

Study and characterisation of existing collaboration forms

➢ Requirement analysis through direct collection of information

- Designed a specialised **questionnaire** and involved 10 major European research organizations (LifeWatch project's biodiversity partners)

Objective 1: Identification and characterisation of existing forms of collaboration

Objective 2: Identification of limitations / drawbacks / weaknesses of current forms of practiced collaboration

Objective 3: Pinpointing further needs / requirements already identified for collaboration in existing networks

Long-term strategic Alliances (LAs) and Goal-Oriented consortiums (GOs)

* Please note that in this section all questions related to **LAs appear on the left hand side**, while all questions related to **GOs appear on the right-hand side** of the following tables.

Current state

Q.6: A) Are you a member of any **existing LA** or an **early form of LA"**? Please give the names and/or descriptions of such alliances/networks.	**Q.18:** ***A)*** Please give examples of (up to 3) **collaboration opportunities** *(COs)* to which your organization has responded within the last 3 years. What were the main **benefits** gained by your organization from these collaborations? *For these collaboration opportunities, please specify their **initiators / customers**.*		
Existing LA Names and Descriptions	**CO description**	**Benefits**	**Initiators/customers**
???			1. *Industry???* 2. *Governments???* 3. *Other???*

Q.6: B) Do you find it useful to have a **system for searching** for partners to collaborate with (in Europe or world-wide), which are needed for your activities (in terms of their resources and knowledge), but you do not know them directly?	**Q.18: B)** What are the main **benefits** that your own organization may gain from collaboration with others in order to respond to emerged collaboration opportunities? Please **rank** the following types of benefits (e.g. 1, 2, etc.). Specify other types of benefits.	
Answer	**Type of benefit**	**Rank**
???	Prestige	*???*
	Finances	*???*
	Leading position in area	*???*
	Excel your research results	*???*
	Innovation	*???*
	Others (please specify)	

Identified existing collaboration forms

1- Resembling short-term goal-oriented networks

*Members intensively **collaborate** to achieve tasks*

- **Example:** For initiating and performing an R&D project

- **Creation form:** Traditional creation process from the past network of contacts ("who knows who")

2- Resembling Long-term strategic networks

*Members loosely **cooperate***

- **Example:** Some national research networks, or topics-based networks of excellence

- **Main Purpose:** homogenization of potential partners – *for accessing general common information, sharing infrastructure and assets, etc.*

Limitations / drawbacks of existing goal-oriented networks

Distance from an effective goal-oriented network:

- **Low level of dynamism** in creation of these networks
- **Limitation in finding opportunities** to collaborate (expertise / recourses of organizations could be used more effectively)
- **Limitation in the network of contacts** needed to effectively initiate projects (more suitable partners are needed to respond to emerging opportunities)
- Heterogeneity in organizations' size, locality, and contacts causes **lack of equal chances for organizations to participate** in collaboration
- **Lack of specialised ICT tools and methodologies** to initiate and support collaboration

➢ Need for pre-establishment of breeding environments

Limitations / drawbacks of existing strategic networks

Distance from effective collaborative network:

- Insufficient size/coverage

- Insufficient administration and provision of support to their members

- Minimal connections among members (not having enough information about each other)

- Lack of awareness and experience in applying advanced collaborative networks approaches

- Lack of involvement of support providing organizations (ICT, training, etc.) and opportunity brokers

➢ Insufficient for serving as breeding environments

Identified requirements for effective establishment of collaborative networks in LifeWatch

Requirements to support involved organizations include:

- ✓ Establishing a **common ICT infrastructure**
- ✓ Enforcing a **governance system** (for sharing, contracting, co-working, etc.)
- ✓ Establishing common **bag of assets**
- ✓ **Competency management**
- ✓ **Trust management**
- ✓ Establishing **common understanding** (terminology, concepts, etc.)
- ✓ Inclusion of **support providing organization**
- ✓ Support for dynamic and **agile creation of goal-oriented networks**
- ✓ Increasing **identification of more opportunities** and the number of configured goal-oriented networks
- ✓ **Increasing** organisation's **chances for involvement** in collaboration (also for smaller ones)
- ✓ **Decreasing risks of failure** for goal-oriented networks

Benefits that can be offered through pre-establishment of LifeWatch **breeding environments (VBEs),** which support dynamic creation of **VOs**

Proposed collaborative networks to support LifeWatch

- We propose to **establish VBEs (BTCNs)** as *new long-term strategic network*

- *BTCNs* **support dynamic/fluid formation and establishment of VOs (TCNs)** involving the most-fit organizations in response to emerging opportunities

BTCN - Breeding environment for TCNs

- A number of competency clusters exist as biodiversity sub-domains in LifeWatch, so **several BTCNs can be established, one per sub-domain**

TCN - Temporary Collaborative Network

Benefits of BTCN for involved organizations (1)

1. Facilitate getting to know and work with others

- Members enrolment and membership management
- Profile collection and circulation
- Enforcing governance system
- Establishing and adapting the core BTCN terminology
- Interoperation through common ICT infrastructure

2. Increasing homogeneity among organizations

- Uniform profiling
- Establishing common culture and principles

3. Strengthening relationships

- Trust management
- Improve reliability

Benefits of BTCN for involved organizations (2)

4. Supporting self-development

- Involvement of support institutions
- Sharing properties of common interest through the Bag of assets
- Performance measurement
- Promotion possibility for active organizations
- Acquiring and maintaining competencies

5. Finding emerging opportunities and their effective fulfilment with most suitable organizations

- Management of competencies
- Finding collaborative opportunities
- Opportunity decomposition towards planning and formation of most effective TCN
- TCN partners search and suggestion
- Partners negotiation in TCN

Example creation of TCNs from a BTCN

Opportunity initiated by the government or industry

Opportunity initiated by a museum

TCN-2

TCN-1

- **Dynamic**
- **Low-cost**
- **Low-risk**
- **etc.**

LifeWatch BTCN

- Membership management
- Profiling and homogeneous representation
- Competency cataloguing and management
- Trust management
- Support provision
- Decision support management
- Value system management
- Governance management
- **TCN formation**
  - Opportunity finding/generation
  - Opportunity characterisation
  - Partners selection
  - Negotiation
- Performance management

Government

Industry

Data provider

Research centre

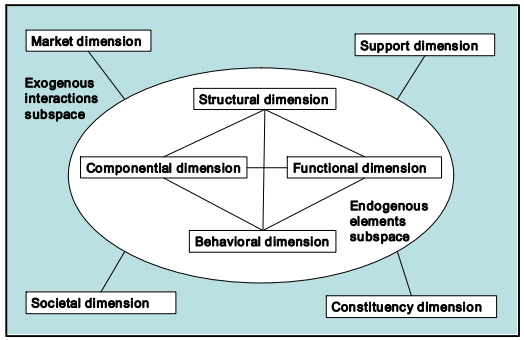
ICT

Heterogeneous distributed organizations in the biodiversity domain

BTCN roadmap construction plan – exogenous subspace

Stage 1. Market analysis, positioning, and strategy

- BTCN-market analysis, development of BTCN mission, strategy, and profile
- identification of & relationship establishments with BTCN-market stakeholders, and collection of their collaboration references & testimonials



Stage 2. Support institutions and support providers

- specification of the needed support for BTCN from the private sector
- discovering and involving private sector support providers and establishment of interaction channels

Stage 3. Societal relationships

- specification of societal nature, legal status, and BTCN values & principles towards society
- identification and involvement of public / governmental beneficiary / funding agencies and establishment of interaction channels

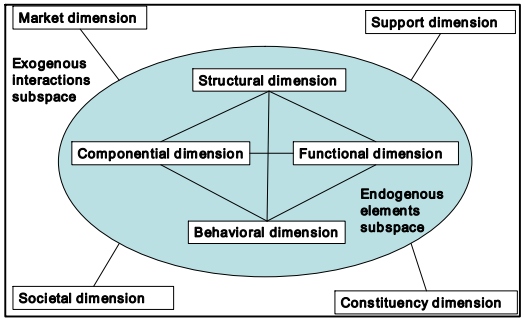
Stage 4. Potential member organizations

- identification of potential BTCN members and development of the attracting and recruiting strategy
- preparation of BTCN members for collaboration activities

BTCN roadmap construction plan – endogenous subspace

Stage 5. Structure & topology

•transition of existing network topologies in LifeWatch to BTCN
•specification of the suitable network topology and assignment of roles to the variety of actors



Stage 6. Resource components

•specification and acquisition of human, ICT, physical, and domain/application-related (HW/SW) resources
•construction of the variety of collaboration-related information and knowledge resources

Stage 7. Functionality and processes (business and others)

•specification of collaboration-related functionalities and processes, and their related methodologies
•adaptation and/or development of BTCN management subsystems: ODMS, PCMS, TrustMan, MSMS, BAMS/VIMS, DSS, and for TCN creation – COfinder, CO characterisation/planning, PSS, Negotiation

Stage 8. Governance and behavioral regulations

•specification of prescriptive and obligatory behavioural regulations
•development of BTCN contracts and agreement, and specification of constraints and conditions

BTCN roadmap construction plan – 5 year time plan (2011-2016)

Issue	mm	k euro	2011						2012						2013						2014						2015						2016					
			F	M	J	A	O	D	F	M	J	A	O	D	F	M	J	A	O	D	F	M	J	A	O	D	F	M	J	A	O	D	F	M	J	A	O	D
Issue-1.1. BTCN-market analysis, development of BTCN mission, strategy, and profile	10	83.5	1 P	1 P	1 P	1 P	1 P																													
Issue-1.2 Identification of & relationship establishments with BTCN-market stakeholders, and collection of their collaboration references & testimonials	12	133.5						1 P	1 P	1 P	1 P																						1 P	1 E				
Issue-2.1. Specification of the needed support for BTCN from the private sector	6	50	1 P	1 P	1 P																																
Issue-2.2. Discovering and involving private sector support providers and establishment of interaction channels	12	133.5				1 P	1 P	1 P	1 P																								1 P	1 E				
Issue-3.1. Specification of social nature, legal status, and BTCN values & principles towards society	12	100	1 P	1 P	1 P	1 P	1 P	1 P																													
Issue-3.2. Identification and involvement of public / governmental beneficiary / funding agencies and establishment of interaction channels	10	116.5							1 P	1 P	1 P																						1 P	1 E				
Issue-4.1. Identification of potential BTCN members and development of the attracting and recruiting strategy	12	100	1 P	1 P	1 P	1 P	1 P	1 P																													
Issue-4.2. Preparation of BTCN members for collaboration activities	12	133.5 **760.5**							1 P	1 P	1 P																						1 P	1 P	1 E			
Issue-5.1. Transition of existing network topologies in LifeWatch to BTCN	12	116.5	1 P	1 P	1 P	1 P	1 D	1 D																													
Issue-5.2. Specification of the suitable network topology and assignment of roles to the variety of actors	6	66.5							1 P	1 D	1 D																											
Issue-6.1. Specification and acquisition of human, ICT, physical, and domain/application-related (HW/SW) resources	12	116.5										1 P	1 P	1 P												1 D							1 P	1 D				
Issue-6.2. Construction of the variety of collaboration-related information and knowledge resources	24	250										1 P	1 P	1 P	1 P	1 P	1 P	1 P	1 P	1 P						1 P							1 P	1 P				
Issue-7.1. Specification of collaboration-related functionalities and processes, and their related methodologies	20	200					2 P	2 P	2 P	2 D	2 D																											
Issue-7.2. Adaptation and/or development of **BTCN management subsystems:** *ODMS, PCMS, TrustMan, MSMS, BAMS/VIMS, DSS*, and for **TCN creation** – *COfinder, COC characterisation/planning, PSS, Negotiation.*	144	1766.5										1 S	1 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	4 S	1 S	1 S	1 P	1 P	1 P	1 P
Issue-8.1. Specification of prescriptive and obligatory behavioural regulations	10	100																	1 D	1 D	1 P	1 P	1 P														
Issue-8.2. Development of BTCN contracts and agreement, and specification of constraints and conditions	14	133.5 **2633**																			1 P	1 P	1 P	1 P	1 P	1 D	1 D										
mm	**328**	**3393.5**	**56**						**62**						**64**						**66**						**36**						**32**					
mm - UvA			**20**						**42**						**64**						**66**						**36**						**14**					

Conclusions

1. Existing forms of collaboration in LifeWatch environment are studied and characterised

2. Collaboration limitation/drawbacks & requirements are identified

3. ECOLEAD approach and methodologies for CN support are applied to LifeWatch infrastructure and its organizational set up

4. Suitable collaboration forms (BTCN and TCN) and their construction methodology and time plan are specified for LifeWatch