



Project no. SSPE-CT-2003-502329

PANDA

Permanent network to strengthen expertise on infectious diseases of
aquaculture species and scientific advice to EU policy

Coordination Action

Scientific support to policies

Final plan for using and disseminating the knowledge

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Revision [1.0]

1. Exploitable knowledge and its use

None of the deliverables have specific commercial applications, but all are designed to provide the Commission with information on exotic disease threats to European aquaculture and how to prepare for them. Some deliverables may also be exploitable by practitioners in aquaculture and aquatic animal health. All will be made available via the project website and through other channels as appropriate.

Exploitable knowledge (description)	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use	Patents or other IPR protection	Owner & Other Partner(s) involved
1. Project website (deliverable 1)	Website for networking and dissemination of information relating to aquatic animal health.	All aquatic animal health practitioners	None	N/A	Partner 1 and other project partners
2. Platform of experts for risk analysis of aquatic animal diseases (deliverable 2)	List of experts names, contact details and fields of expertise.	Policy developers	None	N/A	Partner 8
3. Identification of the most significant exotic disease hazards (deliverable 3).	List of most significant disease hazards to European aquaculture	All aquatic animal health practitioners	None	N/A	Partner 8
4. Database of network members (deliverable 4).	List of experts in aquatic animal diseases	Policy developers	None	N/A	Partner 1 and other project partners
5. Database of training opportunities in Europe for aquatic animal disease research and diagnosis (deliverable 5).	List of training opportunities	All aquatic animal health practitioners	None	N/A	Partner 6
6. Database of epidemiological characteristics of the identified disease hazards (deliverable 6).	Epidemiological information suitable for risk analysis compiled and reviewed	All aquatic animal health practitioners, particularly epidemiologists and risk analysts	None	N/A	Partner 5
7. Recommendations for prevention, vigilance and contingency plans for the identified disease hazards (deliverable 7).	Suggestions for surveillance etc for the identified disease hazards	Policy makers, regulators	None	N/A	Partner 5

8. Report on the best detection methods for the identified hazards and requirements for improvement, standardisation and validation (deliverable 8) with recommendations on how to achieve harmonised implementation (deliverable 9).	Identification of the most suitable methods for detecting the identified disease hazards and plan for how diagnostic methods for identified disease hazards should be implemented in the EU	Diagnostician s, regulators, policy makers, reference laboratory networks	None	N/A	Partner 4
9. Report on current best control and containment methods and assessment of their environmental impact with recommendations for a strategy of improvement (deliverable 10).	Information on control methods for the identified disease hazards collected and reviewed	All aquatic animal health practitioners, particularly producers	None	N/A	Partner 7
10. Report on training needs and strategies for increasing opportunities where necessary (deliverable 11).	Review of the training situation in the EU	All aquatic animal health practitioners, particularly training providers	None	N/A	Partner 6
11. Permanent network of experts in aquatic animal diseases (deliverable 12).	List of experts names, contact details and fields of expertise.	Policy developers	None	N/A	Partner 1 and other project partners

1. Project website (deliverable 1).

The website is a major channel for the dissemination of project findings and networking activities, and will continue to be so as long as it is maintained. It has been developed by and is currently hosted by partner 1. No commercial or intellectual property issues are associated with this deliverable.

2. Platform of experts for risk analysis of aquatic animal diseases (deliverable 2)

The list of risk analysts may be of future use to the Commission (or EFSA) in recruiting suitable expertise for contributing to risk analyses. It has been developed by partner 8. No commercial or intellectual property issues are associated with this deliverable. The list does contain contact details of network members and so cannot be made public.

3. Identification of the most significant exotic disease hazards (deliverable 3).

This directly advises the Commission of the most significant exotic disease hazards to European aquaculture in a transparent and defensible manner. It has been developed by partner 8. No commercial or intellectual property issues are associated with this

deliverable. It will not be put into the public domain until peer reviewed scientific manuscripts arising from this work have been published.

4. Database of network members (deliverable 4).

The database of experts in aquatic animal health may be of future use to the Commission (or EFSA) in recruiting suitable expertise for contributing to policy advice, and contains sufficient expertise to answer the majority of questions which may arise. It has been developed by partner 1. No commercial or intellectual property issues are associated with this deliverable. The database does hold personal details of network members and so cannot be made public.

5. Database of training opportunities in Europe for aquatic animal disease research and diagnosis (deliverable 5).

The database provides a comprehensive list of links to European training provider in aquatic animal health, and will be of use to practitioner of aquatic animal health seeking specific training. It has been developed by partner 6. No commercial or intellectual property issues are associated with this deliverable.

6. Database of epidemiological characteristics of the identified disease hazards (deliverable 6).

This provides comprehensive information on the epidemiological characteristics of the identified disease hazards, which will be of great use to risk analysts as well as those wanting to find information on these diseases quickly (e.g. in the event of an outbreak). It also has the potential to be expanded to include other diseases of aquatic animals, and tentative plans are in place for doing this and converting the database to a peer reviewed online journal. It has been developed by partner 5. No commercial or intellectual property issues are associated with this deliverable.

7. Recommendations for prevention, vigilance and contingency plans for the identified disease hazards (deliverable 7).

This advises the Commission of the principles of surveillance and readiness for the identified disease hazards. It is also of interest to national regulatory authorities and producers. It has been developed by partner 5. No commercial or intellectual property issues are associated with this deliverable.

8. Report on the best detection methods for the identified hazards and requirements for improvement, standardisation and validation (deliverable 8) with recommendations on how to achieve harmonised implementation of the best diagnostic methods (deliverable 9).

This advises the Commission of the state of the art regarding diagnosis of the identified disease hazards. It also advises the Commission of what actions are required to ensure member states have the capacity for the diagnosis of the identified disease hazards. It is of interest to national regulatory authorities and the reference laboratory networks who will be responsible for the implementation. It has been developed by partner 4. No commercial or intellectual property issues are associated with these deliverables.

9. Report on current best control and containment methods and assessment of their environmental impact with recommendations for a strategy of improvement (deliverable 10).

This provides specific advice on available control methods for the identified disease hazards, as well as providing an assessment of the state of the art of current disease control methods for aquaculture in general. It is of interest to the Commission and producers. It has been developed by partner 7. No commercial or intellectual property issues are associated with this deliverable.

10. Report on training needs and strategies for increasing opportunities where necessary (deliverable 11).

This assesses the state of the art with regard to training provision in the field of aquatic animal health, and identifies areas requiring additional capacity. It is of interest to all practitioners in aquatic animal health, and training providers in particular. It has been developed by partner 6. No commercial or intellectual property issues are associated with this deliverable.

11. Permanent network of experts in aquatic animal diseases (deliverable 12).

The database of experts in aquatic animal health may be of future use to the Commission (or EFSA) in recruiting suitable expertise for contributing to policy advice, and contains sufficient expertise to answer the majority of questions which may arise. It has been developed by partner 1. No commercial or intellectual property issues are associated with this deliverable. The database of members details does hold personal details of network members and so cannot be made public.

2. Dissemination of knowledge

All project deliverables will be disseminated as indicated in the contract document. These deliverables were primarily produced for the provision of scientific advice in support of policy to the Commission, but nevertheless information about the project and its findings has been disseminated as widely as possible, mainly to an audience of scientists, regulators and producers. These additional dissemination activities, both past and future, are listed in Table 1.

Table 1. Overview of PANDA dissemination activities

Date & venue	Title	Type	Presented at	Audience type	By	Outcomes
March 2004, Åbo, Finland	Overview of the PANDA project	Oral presentation	ICES Working Group on Pathology and Diseases of Marine Organisms	Small group of international scientists	Partner 1: CEFAS (Steve Feist)	Increased awareness of the project for members of the ICES Working Group on Pathology and Diseases of Marine Organisms.
June 2004, Brussels	Overview of the PANDA project	Oral presentation	Annual meeting of the National Reference Laboratories for fish diseases	Large group of European scientists and technicians	Partner 1: CEFAS (Barry Hill)	Increased awareness of the project for members of the Reference Laboratory Network.
June 2004, Brussels	Overview of the PANDA project	Oral presentation	Annual meeting of the National Reference Laboratories for mollusc diseases	Large group of European scientists and technicians	Partner 1: CEFAS (Barry Hill)	Increased awareness of the project for members of the Reference Laboratory Network.

March 2004, Budapest	The PANDA principle, and WP5 objectives	Oral presentation	FEAP Presidents meeting.	Small group of key European industry reps	Partner 7: FEAP (Panos Christofilogiannis)	Increased awareness of the project for members of the Federation of European Aquaculture Producers.
October 2004, Greece	The PANDA principle, and WP5 activities	Oral presentation	Meeting of the Fish Health Commission of Greek Maricultures	Small group of Greek scientists	Partner 7: FEAP (Panos Christofilogiannis)	Increased awareness of the project for members of the Fish Health Commission of Greek Maricultures.
25/10/04, Barcelona	Overview of the PANDA project	Oral presentation	ASEM workshop in Aquatic Animal Health Improvement	Large group of Asian scientists	Partner 1: CEFAS (Barry Hill)	As well as a general recommendation in the workshop report to support the development of cooperative networks in this field, it was recommended that ASEM members should be encouraged to join the PANDA network
February 2005, Ljubljana, Slovenia	Presentation and discussion of PANDA networking activities	Oral presentation	TAIEX seminar on Networking on Aquatic Animal Health in Adriatic Countries	Eastern European scientists and technicians	Partner 1, 2 & 3: CEFAS (Barry Hill), DFVF (Ellen Ariel), IFREMER (Isabelle Arzul)	Increased awareness of the project and networking methods amongst Adriatic nations.
March 2005, La Tremblade, France	Presentation on the project and leaflet distribution & WP4 workshop	Oral presentation & leaflets	Meeting of the National Reference Laboratories for mollusc diseases	Large group of European scientists and technicians	Partner 3 & 4: IFREMER (Isabelle Arzul & Jean-Pierre Joly) and CIDC (Olga Haenen)	Increased awareness of the project and network recruitment of experts on molluscan diseases
March/April 2005, Nairn, Scotland	Poster on the PANDA project	Poster presentation	Society for Veterinary Epidemiology and Preventative Medicine	Large group of international epidemiologists	Partner 5: NVI (Edgar Brun)	Increased awareness of the project for epidemiologist attending the conference.
April 2005, Philadelphia, USA	Poster on the PANDA project and leaflet distribution	Poster presentation, leaflets	National Shellfish Association Congress	Large group of international shellfish growers and scientists	Partner 3: IFREMER (Isabelle Arzul)	Increased awareness of the project by experts in molluscan and crustacean diseases
May 2005, Hydra, Greece	Presentation on the PANDA principle, and WP5 activities	Oral presentation	FEAP AGM, Hydra, Greece	Large group of European producers	Partner 1: CEFAS (Barry Hill)	Increased awareness of the project for Federation of European Aquaculture Producers
May 2005, Hydra, Greece	WP5 PANDA workshop	Oral presentations	Associated with FEAP AGM, Hydra, Greece	European producers and scientists	Partner 7: FEAP (Panos Christofilogiannis)	Environmentally safe disease control strategies. Attracted an audience of 45 scientists and aquaculture technical managers
May 2005, Hydra, Greece	WP5 PANDA workshop	Workshop report	Circulated to FEAP member associations	Large group of European producers	Partner 7: FEAP (Panos Christofilogiannis)	Circulated to all (23) FEAP member associations in Europe – Dissemination of WP5 PANDA workshop proceedings.
June 2005, Arhus, Denmark	Pilot of WP6 Survey	Questionnaire	Annual meeting of the National Reference Laboratories for	Large group of European scientists and technicians	Partner 6: NUIG (Maura Hiney)	Increased awareness of the project for members of the Reference Laboratory

			fish diseases			Network.
May 2005, The Netherlands	Het EU PANDA project	Printed article	Published in Aquacultuur, the branche bulletin (in Dutch)	Large group of Dutch scientists and producers	Partner 4: CIDC-Lelystad (Olga Haenen)	Increased awareness of the project for the Dutch Aquaculture branch and related persons
June 2005, Arhus, Denmark	Presentations at session on risk analysis and epidemiology	Oral presentations	Annual meeting of the National Reference Laboratories for fish diseases	Large group of European scientists and technicians	Partner 8 & 5: IRTA (Chris Rodgers) and NVI (Edgar Brun)	Increased awareness of the project for members of the Reference Laboratory Network.
June 2005, Arhus, Denmark	Presentation at session on QA and training in disease diagnosis	Oral presentation	Annual meeting of the National Reference Laboratories for fish diseases	Large group of European scientists and technicians	Partner 1: CIDC (Olga Haenen)	Increased awareness of the project for members of the Reference Laboratory Network.
July 2006, Minneapolis, USA	Leaflet distribution	Leaflets	American Fisheries Society Eastern Fish Diseases workshop	Large group of international scientists and technicians	Partner 1: CEFAS (Peter Dixon)	Increased transatlantic awareness of the project, network recruitment.
September 2006, Copenhagen, Denmark	Promotional stand, leaflets and newsletters	Exhibition, posters presentation, leaflets	European Association of Fish Pathologists Conference	Large group of mainly European scientists and technicians	All partners PANDA consortium	Recruitment of a large number of experts to the network.
October 2006, Brest, France	Poster presentation	Poster presentation	8th International Conference on Shellfish Restoration	Large group of international scientists and shellfish growers	Partner 3: IFREMER (Isabelle Arzul)	Increased awareness of the project, network recruitment.
October 2006, Colombo, Sri Lanka	Presentation on the PANDA project and circulation of leaflets	Oral presentation, leaflets	Symposium on Diseases in Asian Aquaculture	Large group of mainly Asian scientists and technicians	Partner 1: CEFAS (Barry Hill)	Increased Asian awareness of the project, network recruitment.
December 2005	Survey on Training needs and opportunities	Questionnaire	Web-based survey	Distributed to 1600 European scientists, regulators, veterinarians, biologists and aquaculture practitioners	Partner 6: NUIG (Maura Hiney)	Increased awareness of the project for a wide range of stakeholders.
La Tremblade, France, March 2006	Diagnostic methods for mollusc diseases	Oral presentation	Meeting of the NRLs for mollusc diseases	Large group of European scientists and technicians	Partner 4: CIDC (Olga Haenen)	Increased awareness of the project for members of the Reference Laboratory Network.
Lelystad, Netherlands, April 2006	Preliminary WP6 Survey Data	Oral presentation	PANDA coordinators and Task force members meeting, Lelystad, Netherlands	Small group of European scientists	Partner 6: NUIG (Maura Hiney)	Increased awareness of the project for members of WP2-5 Taskforces and appraisal of PANDA coordinators.
May 2006, Aarhus, Denmark	Results of survey of training opportunities	Oral presentation	Meeting of the NRLs for fish diseases	Large group of European scientists and technicians	Partner 6: NUIG (Maura Hiney)	Increased awareness of the project for members of the Reference Laboratory Network.
May 2006, Aarhus, Denmark	Diagnostic methods for fish diseases	Oral presentation	Meeting of the NRLs for fish diseases	Large group of European scientists and technicians	Partner 4: CIDC (Olga Haenen)	Increased awareness of the project for members of the Reference Laboratory Network.
August 2006, Cairns, Australia	Promotional stand, leaflets and newsletters	Exhibition, posters presentation, leaflets	International Symposium for Veterinary Epidemiology and Economics	Large group of international epidemiologists	Partner 2,3 & 5: IFREMER (Isabelle Arzul), DFVF (Ellen Ariel), NVI (Edgar Brun)	Increased awareness of the project for epidemiologist attending the conference and recruitment of experts to the network.

August 2006, Cairns, Australia	Database of Epidemiological characteristics	Oral presentation	International Symposium for Veterinary Epidemiology and Economics	Large group of international epidemiologists	Partner 5: Aristotle University, Thessaloniki (Marios Georgiadis)	Increased awareness of the database amongst epidemiologists attending the conference, with useful feedback from some experts.
August 2006	An assessment of the risk of introducing the fish parasite <i>Gyrodactylus salaris</i> to infected territories in the European Union with the movement of live Atlantic Salmon (<i>Salmo salar</i>) from coastal waters	Journal article	Aquaculture, 258(1-4): 187-197	Scientists and regulators	Partner 8: E. Peeler, M. Thrush, L. Paisley and C. Rodgers. (CEFAS and IRTA)	Dissemination of risk analysis work package outputs
October 2006, Bregan, Norway	PANDA assessment of training needs and opportunities in aquatic animal health.	Oral presentation	OIE Global Conference on Aquatic Animal Health	International group of scientists and policy makers	Partner 6: NUIG (Maura Hiney)	Increased awareness of the project for a broad range of stakeholders internationally
December 2006	Entry submitted to Marine Institute list of Marine Environmental research projects in Ireland	Research projects register	Will be included in European Directory for Marine Environmental Research Projects	Public	Partner 6: NUIG (Maura Hiney)	Increased awareness of the project for a broad range of stakeholders internationally
March 2007	The PANDA project	Advertisement	Parliament magazine research supplement	EU Politicians, public	Partner 1: CEFAS (Barry Hill)	Awareness of the PANDA principle in political circles.
March 2007, Weymouth, UK	Final PANDA workshop 'Progress report and future perspectives'	Conference / workshop	Entire workshop devoted to PANDA	International group of scientists, regulators and policy makers	All PANDA consortium members and also representatives of associated organisations	Dissemination of project results to key stakeholders, development of relationships with associated organisations, useful feedback on scientific findings
May 2007	The PANDA project	Advertisement	House magazine	UK Politicians, public	Partner 1: CEFAS (Barry Hill)	Awareness of the PANDA principle in political circles.
May 2007	Update on the PANDA project	Advertisement	Parliament magazine	EU Politicians, public	Partner 1: CEFAS (Barry Hill)	Awareness of the PANDA principle in political circles.
February 2004 onwards	Project website	Website	europanda.net	Public	All partners: PANDA consortium	Dissemination of project objectives and outputs, newsletters (4), database of experts, discussion forums etc.
October 2007	Summary reports on the outputs of the scientific work packages	Electronic reports (5)	Available from the website	Public	All partners: PANDA consortium	Dissemination of project scientific outputs
2008?	Electronic journal based on epidemiology database (Aquatic Risk Reviews)	Electronic journal	Available from the website	Public	Partner 5: WP3 task force	Provision of epidemiological information to risk analysts and regulators
2008?	Peer reviewed publication detailing the hazard scoring system	Journal article	Appropriate journal	Scientists	Partner 8: IRTA (Chris Rodgers et al)	Dissemination of project scientific outputs
2008?	Peer reviewed publication on the application of the	Journal article	Appropriate journal	Scientists	Partner 8: IRTA (Chris Rodgers et al)	Dissemination of project scientific outputs

	Delphi technique					
2008?	Peer reviewed publication on the epidemiology database	Journal article	Appropriate journal	Scientists	Partner 5: NVI Norway (Brun & Georgiadis)	Dissemination of project scientific outputs
2008?	Peer reviewed publication on surveillance schemes	Journal article	Appropriate journal	Scientists	Partner 5: NVI Norway (Brun et al)	Dissemination of project scientific outputs

3. Publishable results

This section provides a brief summary of each exploitable result.

3.1 Project website (deliverable 1)

The website was intended to be the communications hub of the PANDA network, and was designed with this in mind. Also, it is an important dissemination tool, and it is recognised that the more interesting and informative it is, the better it will be for stimulating interest and participation among network members. It has been improved, revised and maintained throughout the project lifetime. It contains the following features:

- general information on the project and scientific workpackages
- online registration and searchable database of members
- discussion forums for the consortium, Steering Group, general members, each work package and for associated organisations
- online document editing facility
- selected publications (reports, newsletters etc)
- 'Whats new' page
- online calendar for consortium use
- links to related websites
- list of meetings
- online help form

Statistics of website usage are only available from 1st May 2006 when the website was reprogrammed using a different computer language. From this date to June 6th 2007, the site has attracted an average of 435 hits and 100 visits per day. Average visit time was 2 minutes and 35 seconds. Visits to the site originated from a total of 7476 unique IP addresses.

It was envisaged that scientific discussions on the online forums would gather momentum as the network membership reached a 'critical mass'. Usage of these forums has been very low despite the continual improvements to the system, and this method of seeking scientific opinion and feedback has been unsuccessful on the whole. The reasons for this are unclear.

Website maintenance requirements are minimal, but as Microsoft are constantly updating their platforms further changes to the website structure may be needed at some point in the future to integrate properly into new technologies. Additionally, ongoing vetting of new members is required.

2. Platform of experts for risk analysis of aquatic animal diseases (deliverable 2)

Five risk analysis experts were selected to form a task force to initially identify the most significant exotic/emerging and re-emerging disease hazards. Once a list of candidate diseases had been identified, a wider network of experts associated with work package 2 was established in order to provide a risk analysis platform. The network was initially formed from the database of registered PANDA members, but was subsequently augmented by a proactive invitational approach. The platform was used to provide specialised input to the hazard scoring exercise and to provide background data on specific disease hazards.

3. Identification of the most significant exotic disease hazards (deliverable 3).

Initially a dialogue document was drawn up to address the deliverables and milestones of the work package. This document formed the basis of a series of discussions and four group meetings based on the available data. Subsequently, the task force used the information for the identification of most aquatic disease hazards (i.e. fish, shellfish, crustacean and amphibian) from a European perspective. Each hazard was assessed by susceptible host species, geographical distribution, its disease listing (EC/91/67 and OIE) and exotic status (relevant to the EU). In addition, the hazards were subjected to a pre-filter related to whether they satisfied the OIE disease listing/notification criteria for consequences and spread. In order to prioritise the hazards that satisfied the criteria, a scoring system based on 29 questions divided into five sections was developed. This system considered each hazard by presence or absence in the EU and its regulatory status, the potential pathways of introduction, establishment, consequences, and risk mitigation measures. The resulting hazard scores and their uncertainty estimates were used to identify the list of the most significant disease hazards to the EU. This was then made available to the other work packages.

4. Database of network members (deliverable 4).

An access based database with a custom front end was created to allow experts to join the network online. This stores personal information (name, address, email address etc) as well as information on their fields of expertise (e.g. species of interest, workpackage of interest and a free text field where several paragraphs describing their skills and experience can be entered. Other tables (linked to the members details table via the primary key) store information relating to forum permissions and privileges. It is searchable, has appropriate security features, and is hosted at the same domain as the project website.

5. Database of training opportunities in Europe for aquatic animal disease research and diagnosis (deliverable 5).

A desk study of useful training and other internet links was undertaken. As anticipated, there was a significant amount of repetition between searches and web sites. Taskforce members, PANDA coordinators and subscribed experts were also invited to suggest additional links to training information and opportunities going forward. An initial database of training sites was uploaded to the PANDA website in February 2006, and was significantly enhanced over 2006. This database is now in its third iteration and contains over 60 links, most of which are portals, which in turn provide comprehensive information on and links to other relevant sites. The Database now contains sections on Training Information Portals, Specific Training Sites, General Resources for aquaculture and fisheries research and diagnostics and other useful links (e.g. to relevant industry and academic associations and reports). Additions to the database are ongoing.

6. Database of epidemiological characteristics of the identified disease hazards (deliverable 6).

The database was constructed in Microsoft® Access (Microsoft Corporation, Redmond, WA, USA) with a custom front end. Information concerning the diseases identified by WP2 was compiled, pre-reviewed by experts of the different diseases before being entered into the database. Data is recorded by pathogen, with seven sections for each one (Agent properties, host susceptibility and pathogenicity, related diseases, transmission, diagnostic tests, sanitary policies and bibliography). It contains hyperlinks to supporting information (e.g. study conditions). It is structured in a way which is suitable for expanding its contents to include any pathogen of aquatic animals.

It includes all relevant available information in such detail that it can be used as the scientific basis for activities such as risk analysis, surveillance, surveys to assess freedom from disease as well as design and implementation of disease prevention and control schemes. It is also anticipated that the database will be useful in supporting actions in emergency situations.

7. Recommendations for prevention, vigilance and contingency plans for the identified disease hazards (deliverable 7).

Recommendations for prevention, vigilance and contingency plans for the main disease hazards identified in WP 2 have been developed. The Directive 2006/88/EC focuses on risk based surveillance

as both cost-effective and cost-efficient method to reveal the status of specific diseases in aquatic animal production. This implies the use of methods such as risk assessment and mathematical disease modelling which are generally well established in animal disease science. Risk profiling the specific disease threats should be a part of the different members/regions basic awareness.

As much as these methods focus on defined diseases there is also a need for a continuous flow of basic information to establish a general awareness of the unexpected as well as baseline knowledge of diseases both in aquaculture and in the wild. We suggest such information to be gathered by making use of the people in the closest contact with the animals. These are field operators in the industry, fishermen etc. Possible psychological and social barriers for reporting should be identified and overcome. By encouragement and a systematic flow of information to inform the public of diseases in aquatic animals (campaigns) also emphasising the society's need for this information, interest and necessary competence may then be established to fulfil data collection to an adequate level of accuracy.

A technological platform facilitating data collection needs to be made easily available for reporting. Adequate scientific competence should then analyse the input data and through a communications system within EU linking competent authorities and laboratories, an alert could be flagged with the appearance of diverging results from base line in time and space. Such a system at EU level could facilitate a rapid coherent response involving specialized (outbreak) investigating teams for evaluation of the situation.

8. Report on the best detection methods for the identified hazards and requirements for improvement, standardisation and validation (deliverable 8) with recommendations on how to achieve harmonised implementation (deliverable 9).

For fish diseases, especially for the recently EC-listed aquaculture diseases, acquisition of expertise into the EC, and training in screening and diagnostic techniques on the viruses Epizootic Haematopoietic Necrosis (EHN), Koi Herpes Virus Disease (KHVD), Epizootic Ulcerative Syndrome (EUS) was recommended. The Community Reference Laboratory on Fish Diseases currently organizes workshops and ring tests for important and current EC listed viruses (Viral Haemorrhagic Septicaemia Virus (VHSV), Infectious Haematopoietic Necrosis Virus (IHNV) and Spring Viraemia of Carp Virus (SVCV)). Extension of the training and ring tests with the fish pathogens EHN, KHV and EUS is advised, apart from with Infectious Salmon Anaemia Virus (ISAV). For the three mentioned fish bacteria, fast and accurate additional tests are needed for confirmation. For the four fish parasites, expertise lacks in Europe, to screen for these parasites, and type them. However, as these parasites are not listed yet by EC or OIE, they have a lower priority.

The mollusc diseases and pathogens are well covered in expertise and training via the CRL for Mollusc Diseases, which organizes workshops on endemic and exotic important diseases and pathogens for NRL's. Furthermore, they already take the exotic pathogens into account in their ring test.

For crustacean diagnosis, appointment of a CRL by the EC is necessary, and training on clinics and diagnosis of Yellowhead disease, White Spot Disease, and Taura syndrome is recommended. The task force furthermore recommended to acquire expertise and testing for the non-WP2 listed Crayfish plague by *Aphanomyces astaci*, as this disease is a threat for crustaceans all over Europe.

The amphibian diseases/pathogens RANA virus and *Batrachochytrium dendrobatidis*, a fungus are new to most laboratories. Appointment of a CRL by the EC is necessary, after which certain laboratories should get expertise and skills in testing via training.

Many of the internationally available tests are non validated, but as they are in daily use at some laboratories they are well established. However, these tests need validation and ring testing, after they have been implemented into European laboratories.

Several bodies are responsible for achieving harmonised implementation throughout Europe of the best diagnostic methods for the identified disease hazards: The European Commission, Community Reference Laboratory, and the National Reference Laboratories will have to put much effort and money, using the PANDA network and world wide experts, to get the expertise into Europe and to the CRL's, NRL's and regional labs. *Ad hoc* expert advisory groups will need to be appointed to prioritise these tasks. In this way, the PANDA network can be further used.

9. Report on current best control and containment methods and assessment of their environmental impact with recommendations for a strategy of improvement (deliverable 10).

Disease cards (or chapters) were created individually for each of the disease hazards identified by WP2. These incorporate some summary text giving background information on the disease, in particular that of relevance to treatment and avoidance. They also list available treatment methods under four headings (vaccines, chemotherapy, immunostimulation and resistance breeding) with a fifth section detailing general husbandry practices of use in preventing or mitigating against the disease.

In addition to this, further chapters were researched and compiled on treatment methods (antimicrobial chemotherapy, biosecurity considerations, vaccination strategies, alternative treatments, antiparasitic treatments, advances in genetic resistance). These discussed the state of the art of these treatment methods in a general manner rather than with specific attention to the identified disease hazards. From these knowledge gaps were identified, and a comprehensive list of recommendations for future research and for the practical application of control measures was developed.

10. Report on training needs and strategies for increasing opportunities where necessary (deliverable 11).

A survey on training needs and participation among aquatic animal health professionals was carried out over 2005/06. The focus of the survey was training in disease diagnosis, method validation and quality assurance, epidemiology, risk analysis and environmentally sustainable practices. The survey objectives were to:

- identify current uptake of training opportunities
- identify primary stakeholders
- identify primary delivery methods for training
- seek stakeholder experience on utility of, and access to, training (both for themselves and other stakeholder groups)
- seek stakeholder experience on current training deficits
- seek stakeholder opinion on best methods of training delivery.

The survey was primarily distributed in Europe and responses were received, in order of number, from researchers and regulatory personnel, aquaculture and allied services companies and professional associations.

Analysis of the data revealed that in terms of training participation, over 65% of responders had participated in training within the previous 6 months and this training consisted predominantly of short courses or conferences. However, 20% of responders had not participated in training in the previous 3 or more years, with time and money being the major reasons cited for non-participation. Occupation and location in Europe would also appear to have an impact on frequency of training and on the type of training undertaken. Responders own organisations played a key role in training provision, while International training bodies were an important applied training provider. Universities did not play an important role in training.

In terms of training needs, newer diagnostic methods for bacterial and viral diseases were the principle training needs identified. Epidemiology and risk analysis were also identified as training needs that are not been fulfilled at the moment. The majority of responders felt that the EU should have more involvement in training provision and formulation of policy around training. A fuller analysis of the data, along with input on training needs identified by other work package coordinators confirmed the preliminary findings.

11. Permanent network of experts in aquatic animal diseases (deliverable 12).

Recruitment of experts to the network started as soon as the database was constructed and has been ongoing throughout the project. All consortium members have contributed to network recruitment activities. Major initiatives to this end include promotional stands at relevant conferences, oral/poster presentations and circulation of promotional leaflets at relevant meetings/conferences, and articles and

advertisements in relevant publications. Experts have also been encouraged to join through word of mouth by consortium and network members. The development of good relationships with associated organisations has also helped publicise the project and its aims.

Currently the network has 345 members. The majority (67%) are resident in Europe, but overall over 50 countries are represented from all inhabited continents. A wide range of primary specialisms are reported, covering all disciplines relevant to aquatic animal health. Although most work with fish diseases, molluscs and crustaceans are also well represented. There is little expertise in diseases of amphibians however, particularly within Europe. Overall, it is concluded that the network contains sufficient expertise to effectively answer most questions concerning aquatic animal health in the EU. In the event that suitable expertise is not available within the network, it is likely that it could be sought from outside the network through contacts of existing network members.

The ultimate aim was to establish a permanent network by the end of the project lifetime. Any mechanism for its continuation would need to provide ongoing support for co-ordination of the network and maintenance of the website, and provide travel and salary costs to any experts attending scientific discussions. A useful network has been established, but no mechanism for its continuation has been established at present.