**FP6-016039**

# CILIA

## Customized Intelligent Life-Inspired Arrays

Integrated Project

Information Society Technologies
Future & Emerging Technologies
Proactive Initiative BIO-I3

## DELIVERABLE: D2.3.2 – Executive Summary

# NEURONAL MODEL FOR THE EXTERNAL AND CANAL LATERAL-LINE SYSTEM OF FISH TO DETERMINE THE POSITION OF AND DISTANCE TO MOVING OBJECTS

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| **Actual submission date:** | November 30, 2008 | |
| **Start day of project:** | September 1st, 2005 | **Duration:** 48 months |



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## EXECUTIVE SUMMARY

Fish acquire information about their aquatic environment by means of their mechanosensory lateral-line system, which consists of surface and canal neuromasts sensing perturbations in the water surrounding them. Based on a hydrodynamic model presented here, we propose a mechanism through which fish can localize the source of these perturbations. In so doing we include the curvature of the fish body, a realistic inter-pore distance for the lateral-line canals, and the surface boundary layer. Furthermore, on the basis of dipolar stimulus data we suggest that surface and canal neuromasts function by means of the same mechanism, in this way providing the same type of input to the underlying neuronal system. The analytic predictions comply with spike responses of primary lateral-line nerves recorded in experiment. Finally, taking into account how the primary input to the brain is organized in the lateral-line system we present a simple biophysical model for determining the distance to a source.