i-maestro

i-Maestro: Interactive Multimedia Environment for Technology Enhanced Music Education and Creative Collaborative Composition and Performance

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Introduction

The i-Maestro project explores innovative solutions for technology-enhanced music education with a particular focus on bowed string instruments.

Music performance is not simply to play the right note at the right time. Among the many challenging aspects of music education, we are particularly interested in linking music practice and theory training, looking at interactivity, expressivity and accessibility.

Guided by an analysis of pedagogical needs, the project develops enabling technologies to support music performance and theory training, including tools based on augmented instruments, gesture analysis, audio analysis and processing, score following, symbolic music representation, cooperative support and exercise generation for tuition, self-learning, and collaborative work scenarios.

i-Maestro offers a flexible, interactive multimedia framework and supporting tools which builds on recent innovations resulting from the development of computer and information technologies.
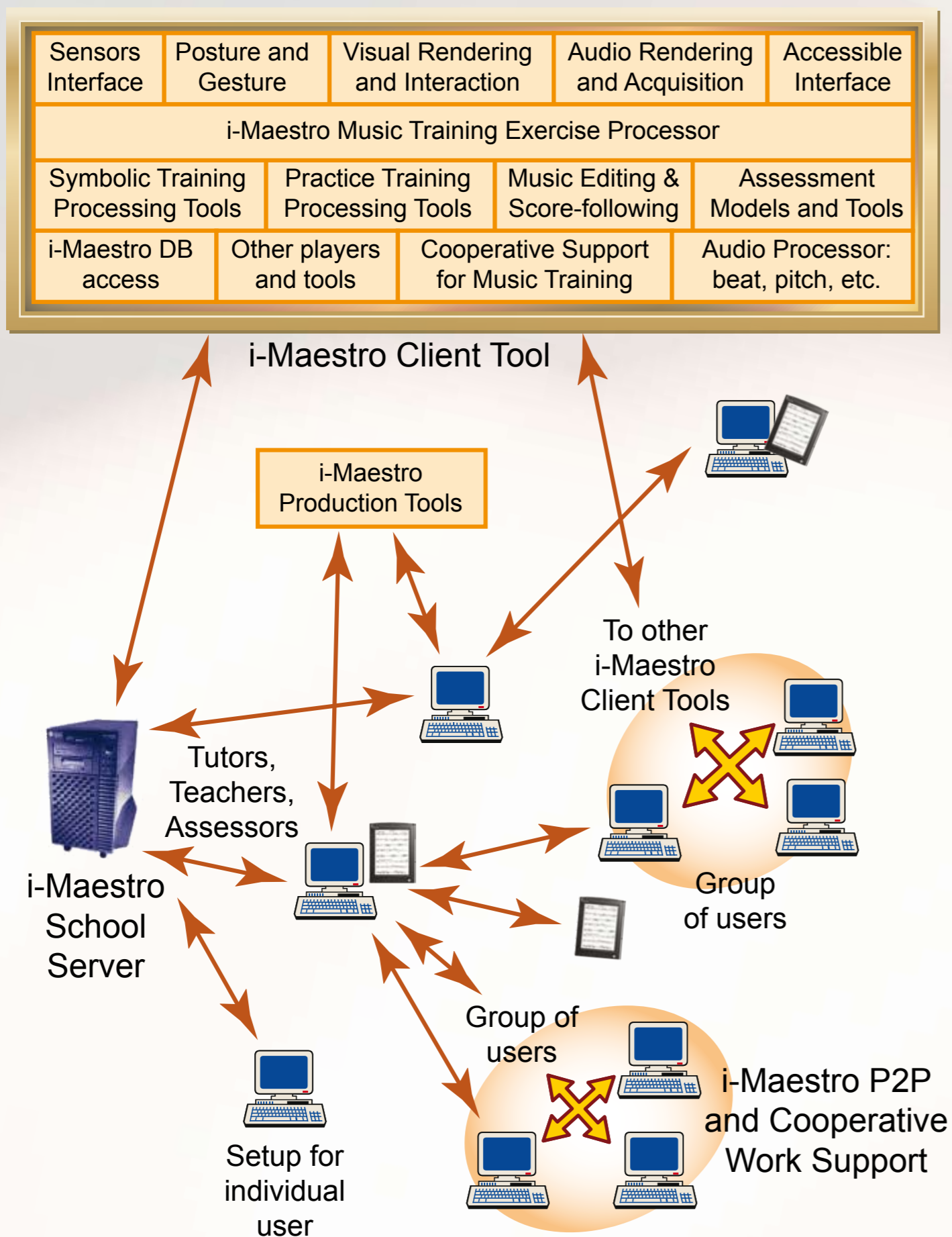
Key Objectives

- Basic research and development to support and enhance music learning and teaching
- Exploration of new pedagogical approaches in music education to improve access to musical knowledge
- Enhancement of the connection between practice and theory training
- Creation of an interactive multimedia environment with tools and services for technology-enhanced music education

i-Maestro Components

- Production and authoring tools:
  for designing personalised music exercises, lessons and courses
- Client tools and applications:
  with gesture analysis, augmented instruments, audio processing, and score following for interactive performance and theory training
- Cooperative work support:
  for setting up collaborative exercises on music based applications including cooperative work on MPEG Symbolic Music Representation
- School server:
  for sharing learning material at home and in the classroom.

Overall Architecture

Sensors Interface	Posture and Gesture	Visual Rendering and Interaction	Audio Rendering and Acquisition	Accessible Interface
i-Maestro Music Training Exercise Processor				
Symbolic Training Processing Tools	Practice Training Processing Tools	Music Editing & Score-following	Assessment Models and Tools	
i-Maestro DB access	Other players and tools	Cooperative Support for Music Training	Audio Processor: beat, pitch, etc.	

i-Maestro Client Tool

i-Maestro Production Tools

To other i-Maestro Client Tools

Tutors, Teachers, Assessors

i-Maestro School Server

Group of users

Setup for individual user

Group of users

i-Maestro P2P and Cooperative Work Support

i-Maestro Contacts

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## Acknowledgement

i-Maestro Tools

Here we highlight several i-Maestro tools that support different aspects of music learning and teaching.

Music notation is fundamental to music education. i-Maestro is promoting MPEG *Symbolic Music Representation* (*SMR*), an ISO standard for the representation of music notation with advanced multimedia features.

The i-Maestro *Sound and Gesture Lab* includes advanced audio analysis, gesture- and score-following algorithms that provide feedback and accompaniment allowing new kinds of musical interaction.

The Augmented Violin allows bowing gestures to be tracked and studied. The *Gesture Follower* can track a performed gesture in real time and compare it with pre-recorded gestures for a variety of pedagogical applications.
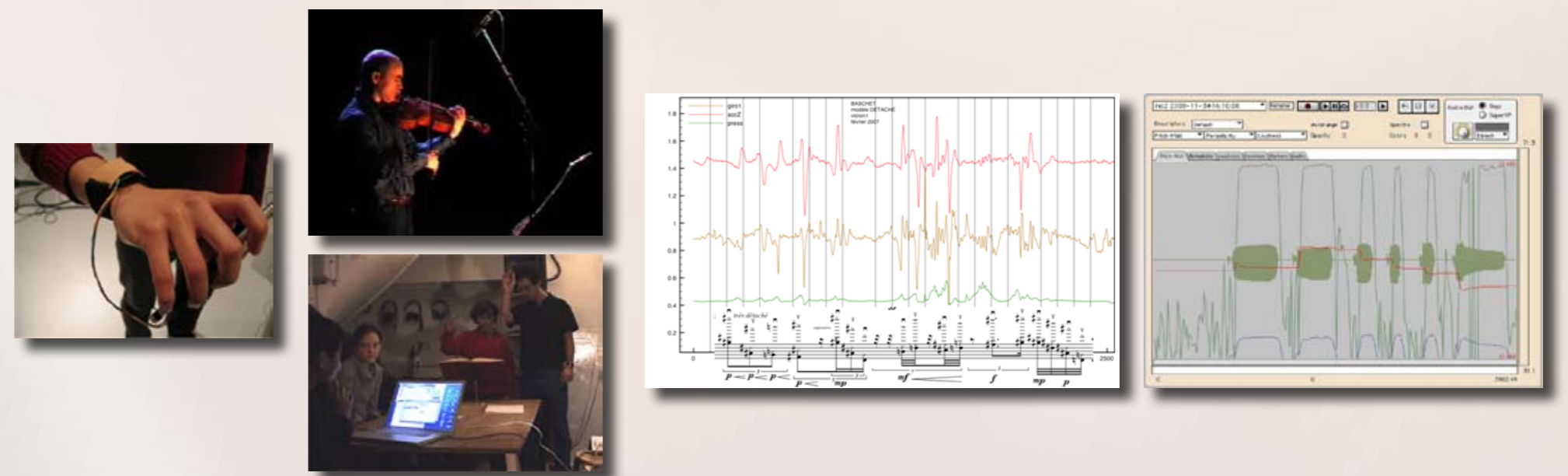
The i-Maestro *3D Augmented Mirror* (*AMIR*) captures and visualises the performance in 3D. It offers a number of different analyses to support the teaching and learning of bowing technique and body posture. The tool provides interactive multimodal feedback, online and offline with visualisation and sonification.

The SDIF format is being used for the storage of 3D motion and other sensor data allowing data exchange between the i-Maestro gesture analysis tools.

Cooperative work is another key area of music education. The i-Maestro *Cooperative Environment* allows different components of the i-Maestro framework to be used across a network.

The i-Maestro *Exercise Generator* supports (semi-) automated creation of exercises and variations of music material using an extensible set of algorithms and templates.
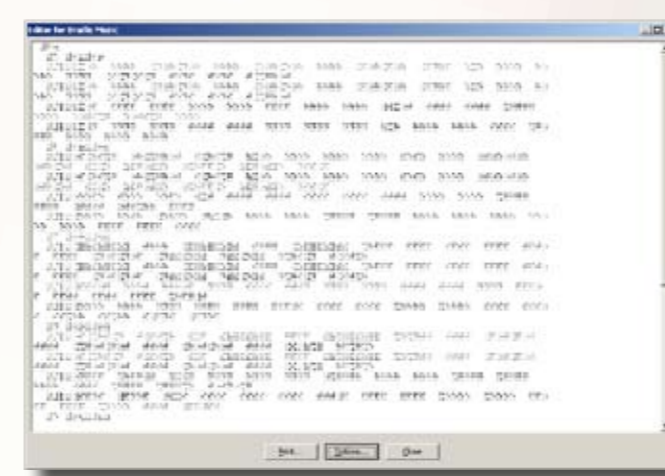
To improve accessibility to musical knowledge and offer wider participation, guidelines for accessibility in technology-enhanced music training have been developed and accessibility support has been added to the *SMR* tools.

The i-Maestro *School Server*, offers online access to stored lesson material.
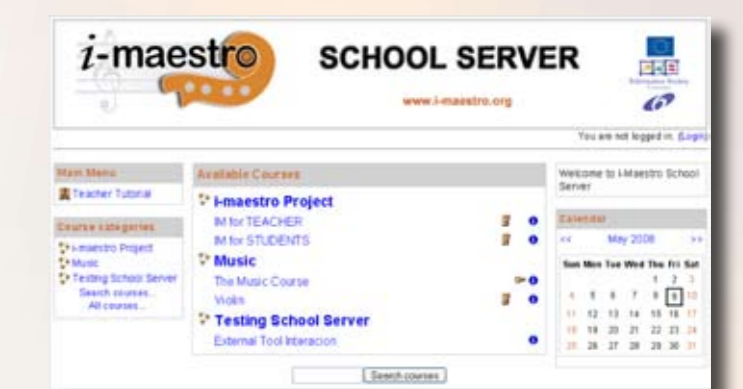
The i-Maestro tools are validated by several European institutions including Accademia Nazionale di Santa Cecilia (Rome), the Fundación Albéniz (Madrid) and IRCAM (Paris).

Further Information

Further details of these tools are available on the project website, together with free prototypes, demonstration videos and additional resources.

If you are interested in i-Maestro, or if you have any questions about the project please email us at info@i-maestro.org or write to the i-Maestro contacts.

i-Maestro Consortium

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