



**Interactive Music Science Collaborative Activities
Team Teaching for STEAM Education**

**Deliverable 5.11
Intermediate Demonstrators of iMuSciCA workbench
toolkits**

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Description:	This deliverable reports on the intermediate implementation of sample items from the lesson plans developed in WP2 using the workbench toolkits of D5.7-D5.10.



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Executive Summary

This deliverable reports on the new features integrated into the intermediate version of the iMuSciCA workbench, iMuSciCA management platform (IMP) and learning management system (LMS). It is aimed to work with the corresponding iMuSciCA deliverables [D5.7-Intermediate 3D musical instrument interactive design kit](#), [D5.8-Intermediate music activities based on mathematical equations and geometric curves](#), [D5.9-Intermediate Pen-enabled canvas for music and audio co-creation and interaction](#) and [D5.10-Intermediate Gesture and VR tools for music interaction and co-creation](#).

The intermediate version of the workbench can be accessed at:

<http://platform.imuscica.eu/v2/workbench.html>

The current stable version of the workbench (not versioned) can be accessed at:

<http://platform.imuscica.eu/workbench.html>

Example of the workbench following a lesson plan:

http://platform.imuscica.eu/v2/workbench.html?clmc=https://platform.imuscica.eu/imuscica/activity/d2.6/scenario-1_lesson-2_en.clmc

The learning management system (LMS) is ready since deliverable [D5.5-Initial Demonstrators of iMuSciCA workbench toolkits](#) and hence doesn't show any new features.

New features of the iMuSciCA management platform (IMP) include:

- List files in the learning record score (LRS),
- Retrieve tracking information,
- Save the content of the Clipboard,
- Save/load binary files,
- Improve error handling and logging.

Version Log			
Date	Version No.	Author	Change
27-03-2018	0.1	Laurent Varin (CABRI)	Initial document (w/ Workbench part)
28-03-2018	0.2	Manuel Bouillon (UNIFRI)	LMS and IMP changes
29-03-2018	0.3	Laurent Varin (CABRI)	Small updates
06-04-2018	0.4	Laurent Varin (CABRI)	Updated executive summary
23-04-2018	1.0	Vassilis Katsouros (ATHENA)	Finalize and submit to EU

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LIST OF ABBREVIATIONS

Abbreviation	Description
2D, 3D	2-dimensional or 3-dimensional space
AJAX	Asynchronous JavaScript And XML
API	Application Programming Interface
LMS	Learning Management Platform
LRS	Learning Record Store
RESTful web services	Representational state transfer (REST) ful web services
STEAM	Science, Technology, Engineering, Art, Mathematics
UI	User Interface
WP	Work Package
ATHENA	ATHENA RESEARCH AND INNOVATION CENTER IN INFORMATION COMMUNICATION & KNOWLEDGE TECHNOLOGIES
UCLL	UC LIMBURG
EA	ELLINOGERMANIKI AGOGI SCHOLI PANAGEA SAVVA AE
IRCAM	INSTITUT DE RECHERCHE ET DE COORDINATION ACOUSTIQUE MUSIQUE
LEOPOLY	3D FOR ALL SZAMITASTECHNIKAI FEJLESZTO KFT
CABRI	Cabrilog SAS
WIRIS	MATHS FOR MORE SL
UNIFRI	UNIVERSITE DE FRIBOURG

1. Introduction

The Workbench has been updated to integrate the current work (still in progress) done on the iMuSciCA graphic charter and UI guidelines.

Work has also been done to manage the common audio context (used by the tools producing or visualizing sound), as well as the messaging system for logging and tracking.

2. Workbench

2.1 User Interface update

The intermediate version of the workbench (see Figure 2-1) implements the following elements from the graphic charter:

- The toolbar is completely redesigned to give a direct access to the different tools with new icons, grouped by fields. The field names are explicitly displayed for a direct understanding of the tools organization inside the workbench and the current tool name is displayed in the field color.
- Field colors follow the new graphic charter with 1) orange for Music field, 2) purple for Engineering/Technology field, and 3) blue for Maths and Science field. This leaves grey as a neutral color and red and green as meaningful colors (can be used inside the tools of any field to emphasize button action - e.g. delete for red and validate/play for green).
- Tools aimed to be used in conjunction with the main creation/edition tools, called utility tools, are available through neutral color tabs on the right (see Figure 2-2). Those tools are 1) visualizations (Analyzer) 2) general music tools (metronome, tuner, notes wheel, recorder) and 3) the clipboard.
- The tools accessible via tabs on the right are displayed next to the current main creation/edition tool (see Figure 2-3). The screen is then divided in two parts, the main tool on the left and a utility tool on the right. One can easily navigate between the utility tools using the tabs. This is a very important feature which was also requested by the pedagogical team: indeed this allows the user to create sound with a creation/edition tool and at the same time to visualize/measure the sound produced.
- The tools now use the full width of the browser window (the previous version had margins which are now removed), so each tool has to resize dynamically according to the available space to take advantage of this feature.

An important addition of this intermediate version is the clipboard. This tool on its own, developed by WIRIS, is made available as one of the utility tools on the right part of the workbench (see Figure 2-4). Since it is included as a tool, it's management is not different from the other tools.

To take advantage of the clipboard, each tool will have to implement a copy/paste feature (some tools already have implemented it in their intermediate version).

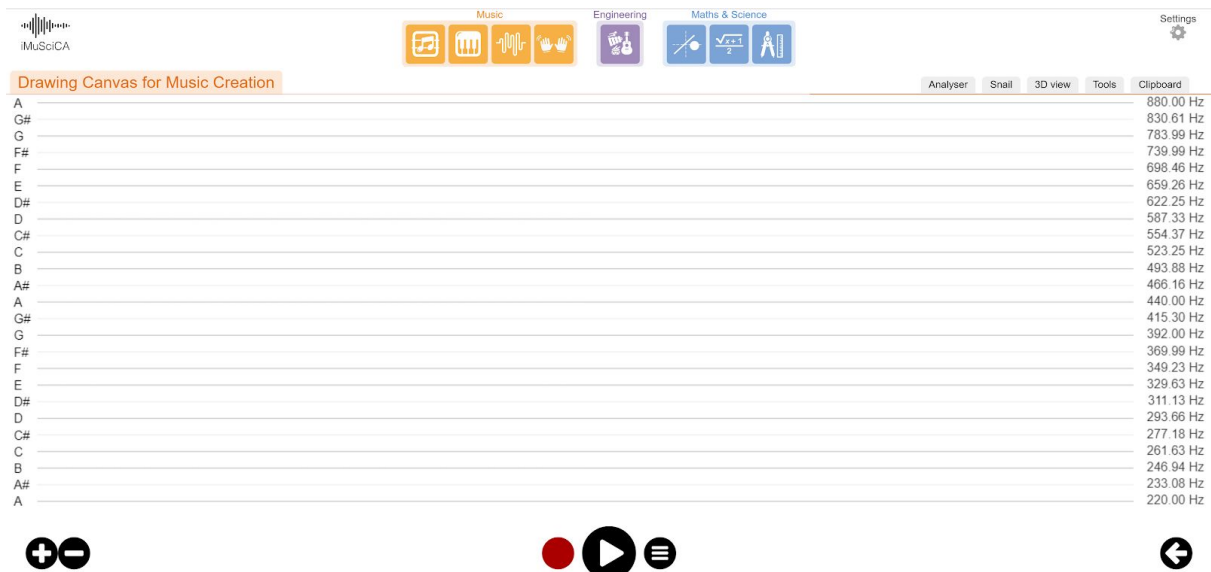


Figure 2-1: Workbench user interface. With DrawME tool displayed.



Figure 2-2: Utility tools can be displayed next to the current tool using the grey tabs on the right.

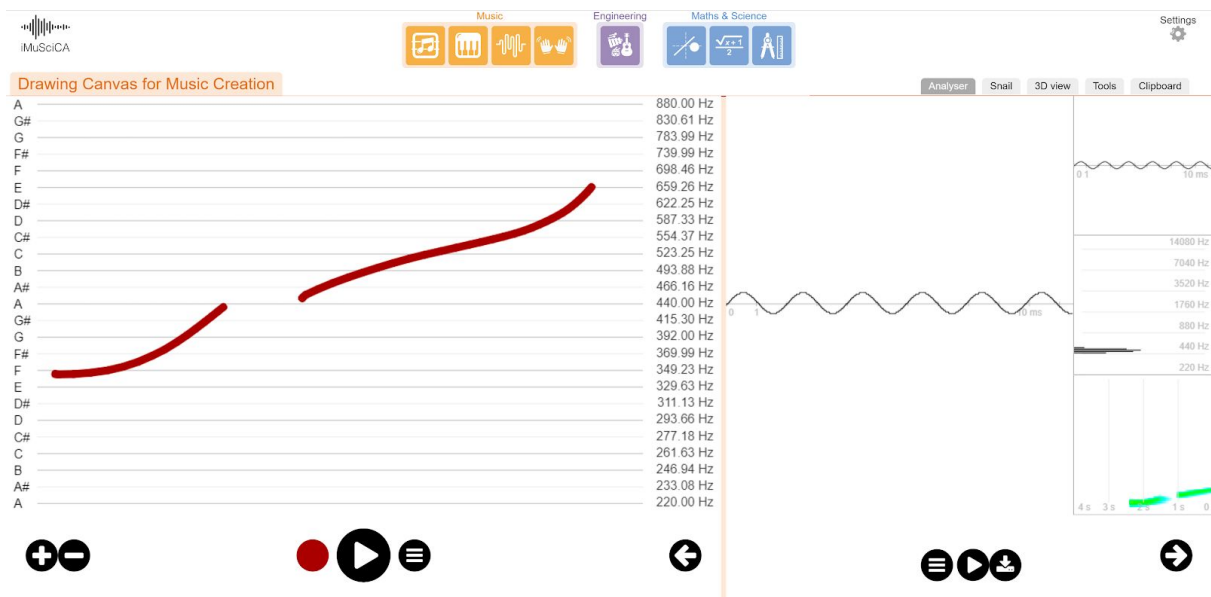


Figure 2-3: Workbench with DrawME tool in use on the left, and a visual analyser on the right.

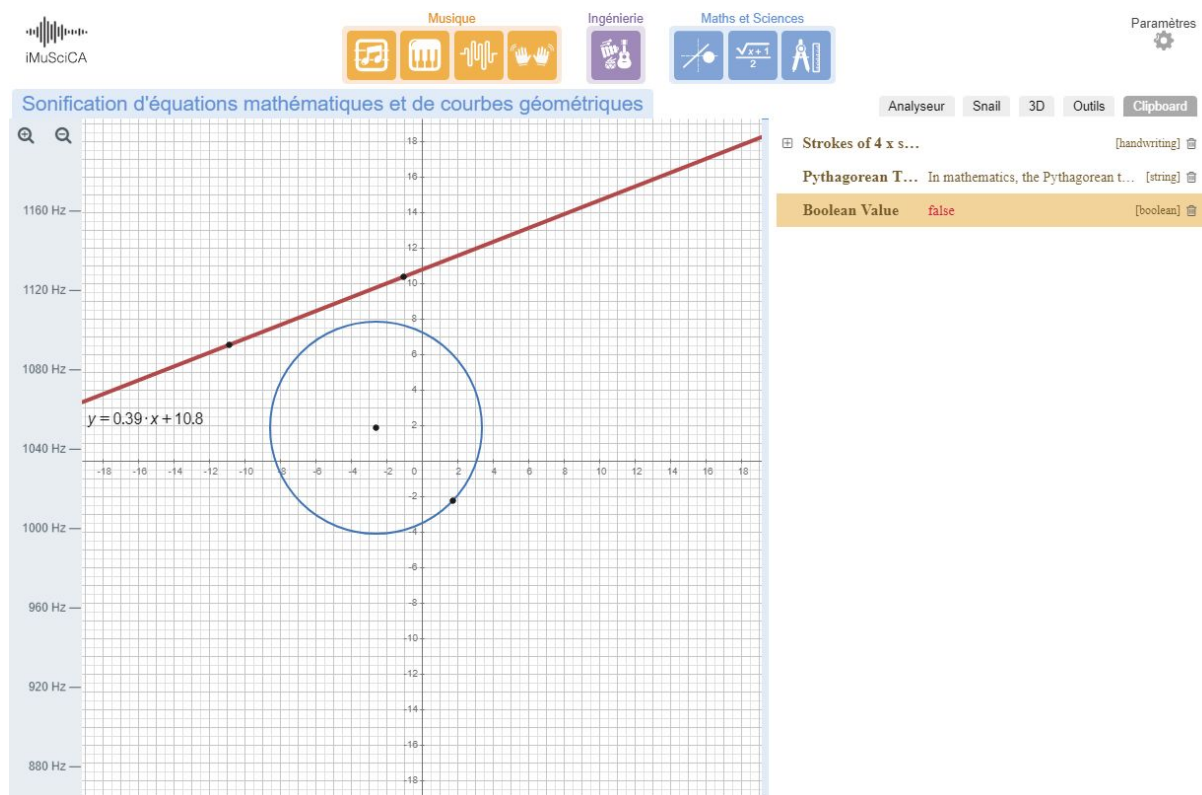


Figure 2-4: Workbench with Sonification tool on the left and Clipboard on the right.

2.2 Workbench engine update

This version has the following changes and improvements:

- Overall performance gain (workbench has less impact on the tools performance).
- For a better user experience, when a tool is not displayed, it is completely unloaded to save memory and CPU usage. In the final version, this will be linked to an automatic tool state loading and saving feature.
- A new tools URLs list implementation facilitates the management of tools versions, including development version, stable version, and the different releases.
- An internal communication protocol has been set up to allow all tools to communicate with each other and with the iMuSciCA management platform (IMP).
- A common audio context, created when the workbench is loaded, is shared among all the tools. This way, the tools do not behave in isolation: a sound produced inside a tool can be visualized in another one. This is also more efficient in term of resources usage.
- A “clipboard” has been implemented to easily share content between different tools. A common data format has been developed and implemented by the different tools.
- The workbench is now loading Modalys so that any tool can access it via the internal communication protocol.
- The workbench now detect automatically the language setting of the user browser and load the different tools with the correct language option.

3. Learning Management System (LMS)

The moodle installation that we use as learning management system is already up and running. It can be accessed at the following URL: <https://lms.imuscica.eu>

4. iMuSciCA Management Platform (IMP)

The intermediate implementation of the iMuSciCA management platform (IMP) API is located at the following URL: <https://platform.imuscica.eu/api/v2/> (**API for AJAX requests, not to be accessed with a browser**).

Changes in this version:

- List files in the learning record score (LRS): the API now includes a GET request to fetch the list of elements currently in the LRS of the user.
- Retrieve tracking information: the API now includes a GET request to fetch all tracking information that has been recorded for the user.
- Save the content of the Clipboard: Clipboard content is now automatically saved on the platform.
- Save/load binary files: the API now includes POST and GET request to save and load binary files on the platform (previously only JSON content could be transferred).
- Improve error handling and logging: any input/output error is now properly handled and logged.