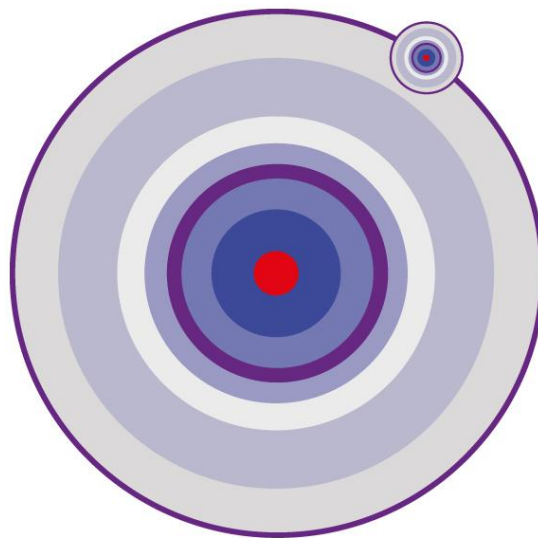


## D5.3 Final summary of contributions



MIRÉS

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## 1 BACKGROUND

This document collects all events organized within WP5 Community Co-creativity and New Knowledge Generation (Hubs and Spokes) until end of November 2012. The tasks included in this WP are designed to build better and tighter bridges between the MIR academic, industrial and artistic communities on one hand, and other relevant complementary communities on the other hand, such as e.g. hackers/freelancers, artists and students.

The conferences and events in WP5 include both special sessions in already consolidated conferences and new and disruptive event formats where several MIR research topics and questions are identified and shared between the participants who do not only write a position statement, but also imagine future MIR research directions which are valuable input for the roadmap in process.

## 2 INTRODUCTION

WP5 has been conceived specifically in view of generating new knowledge which aid the roadmapping process, through a series of events specifically design to achieve MIReS results. The main objective of this WP is to gather information from experts in various fields that can be relevant for writing the MIR Roadmap.

We aim at accomplishing this by organizing events with different types of communities, in different formats and addressing different topics related to the Roadmap. The main goal of the events has been to promote interdisciplinary discussions around MIR among people coming from very different backgrounds and interests.

Another important goal of this WP is to promote networking between the different communities related to MIR and the promotion within them of the key concepts of the Roadmap. These activities allow the MIReS working team to evaluate and consider what these communities are expecting from MIR research and development now and – more importantly – what will be the worth of MIR in the future in terms of relevant values (scientific, technological, economic, artistic, etc.) and enable to consequently identify future directions for MIR research topics.

### ***2.1 Expected outcomes***

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The main results to be obtained at the end of the project through the events and activities within WP5 are:

- High quality contributions to the key thematic areas of the MIR roadmap which are collected in this document;
- Awareness and understanding of identified communities' key actors with respect to MIR research topics and
- Networking and community building between MIReS partners and external stakeholders in the field (which is valuable input for WP6).

## 2.2 List of events due November 2012

The list and categorization of WP5 events is as follows. All contributions gathered from different communities involved in conferences, workshops, roundtables and other events are being collected into a summary which is directly influencing the MIREs roadmap.

Event title	Dates	Location	Organizer*	Partners attending	Target
Workshop on Computational models for Music Information ReSearch (MIREs) with multicultural focus in the frame of the KIIT-Gurgaon Festival	Jan 20 <sup>th</sup> , 2012	India	UPF-MTG	-	Academic and artistic
AdMIRE 2012: 4th International Workshop on Advances in Music Information Research	Apr 17 <sup>th</sup> , 2012	Lyon	OFAI	UPF-MTG	Academic
Music Tech Fest, including Music discovery and creativity workshop, 3D Hack Camp and Industry trendspotting event	May 17 <sup>th</sup> - 19 <sup>th</sup> , 2012	London	STRO, BMAT	QMUL, INESC PORTO	Artists and musicians, end users and Industry representatives
MIREs panel discussion 'Technological challenges for the computational modeling of the world's musical heritage' at INFLA / FMA 2012	May 20 <sup>th</sup> , 2012	Seville	IRCAM, UPF-MTG	STRO, QMUL	Academic
MIREs roundtable 'MIR and creation'	Jun 2 <sup>nd</sup> , 2012	Paris	IRCAM	UPF-MTG	Academic and artistic
MIREs Panel 'Make, Play, Share: the Future of Music Tech' at Sonar Festival	Jun 14 <sup>th</sup> , 2012	Barcelona	BMAT, STRO, UPF-MTG	QMUL	Industry representatives and outsiders
Music Hack Day at Sonar Festival	Jun 14 <sup>th</sup> - 15 <sup>th</sup> , 2012	Barcelona	UPF-MTG	STRO, BMAT, QMUL	Industry representatives and future users
MIREs Panel 'The Future of Music Information Research' in the frame of CMMR 2012	Jun 17 <sup>th</sup> , 2012	London	QMUL	UPF-MTG	Academic
2 <sup>nd</sup> CompMusic Workshop	Jul 8 <sup>th</sup> - 12 <sup>th</sup> , 2012	Istanbul	UPF-MTG	-	Academic and artistic
Music Tech Talks launch evening – London Cultural Olympiad	Jul 26 <sup>th</sup> , 2012	London	STRO	-	Industry representatives
ISMIR 2012 - MIRrors	Oct 11 <sup>th</sup> , 2012	Porto	UPF-MTG	All	Academic

ISMIR 2012 – Evaluation Initiatives in MIR	Oct 12 <sup>th</sup> , 2012	Porto	IRCAM	All	Academic
ISMIR 2012 – Music Information ReSearch Challenges	Oct 12 <sup>th</sup> , 2012	Porto	STRO	All	Academic
Music Tech Talks	Nov 15 <sup>th</sup> , 2012	London	STRO	QMUL	Industry representatives

\*The partner organizing the event is always attending it, so it would be not included in the raw 'Partners attending'



### 3 EVENT CLIPPING

This section details the feedback and input gathered during the events organised within WP5. All these contributions serve as a basis to gain insights into the currently ongoing roadmap writing.

#### ***3.1 Workshop on Computational models for Music Information ReSearch in the frame of the KIIT-Gurgaon Festival***

EVENT INFORMATION	
<b>Event title</b>	KIIT-Gurgaon Festival
<b>Dates</b>	January 20th 2012
<b>Location</b>	Kamrah International Institute of Technology, KIIT Campus, Sohna Road, Near Bhondsi, Gurgaon, Haryana, India
<b>Tags</b>	Multiculturalism
<b>Proceedings URL</b>	<a href="http://compmusic.upf.edu/node/111">http://compmusic.upf.edu/node/111</a>
<b>Other remarks</b>	satellite event of FRSM 2012

FRSM is an annual event with 20 years of history. It focuses on speech and music and has a strong emphasis on young researchers. The main person behind the conference is Prof. Ashoke Datta, a very senior and active researcher that has been collaborating with ITC-SRA and doing research in Indian music for a long time.

In the opening talk of the workshop Xavier Serra covered some of the initial research efforts in the CompMusic project which are fully aligned with the concerns about multiculturalism included in MIReS roadmap. Within CompMusic project we are working on the computational modeling within five main topics: intonation, melody, rhythm, on-line communities, and music discovery tools. These topics have to be understood within each particular music culture and each one requires a specific research approach. The work team has realized that most of the definitions of relevant music concepts, like melody and rhythm, found in the literature have a western bias and they are trying to redefine them within our particular cultures and for their research goals. In the talk Xavier Serra also showed a mock up and a very preliminary version of the CompMusic Browser, a tool for exploring the music collections of the different repertoires. The Browser's intended functionality is quite indicative of their research objectives and it will be used as the major demonstrator of their technological results.

Preeti Rao, who leads the research team at IIT-Bombay, gave a talk on "Computational modeling for Hindustani music". She talked about some of the tools that can be used to analyse Hindustani music and then she described the use of pitch contours to understand the melodic characteristics of the music. She presented her team's work on melodic transcription.

Hema Murthy, who leads the research team at IIT-Madras, gave a talk on "Carnatic Music: Signal Processing Perspective". She started by introducing the structure of a Carnatic music concert and then focused on the issue of pitch analysis of Carnatic music. She presented her team's work on the analysis and synthesis of pitch contours, specifically on Gamakaas. She also introduced their first results on time-frequency representations aimed as separating the voice from the accompaniment instruments, work that could be used to better analyse the gamakaas and phrases sung by the lead voice.

Pandit Buddhadev Das Gupta, a well-recognized Hindustani musician and sarod maestro, gave a talk about how technology has been used in Hindustani music. He talked about electronic shruti boxes, synthesizers and proposed the use of computers for education, generating melodies to be learned or for slowing down audio recordings so details of a performance are better perceived.

T. M. Krishna, one of the leading Carnatic music vocalists, gave a talk on Carnatic music from a historical perspective, focusing on melodic issues. He pointed out that the Indian music of the early times, around 2nd and 3rd century AC, did not use a fixed pitch (fixed tonic), and instead, the common practice was to use fixed frequencies for the notes, which is the inverse of what is used now. From this view he argued that the use of 22 shrutis as a way to divide an octave is not relevant today, that it is a concept of the past. He also emphasized that a note is not a specific frequency position, instead it is a frequency region. Also he made the point that the original ragas were collections of motives, or melodic phrases and that it was later when new ragas started to be defined as collections of notes, scales. This is why we currently find both phrase-based and scale-based ragas. Another topic that he covered was the issue of gamakas and their importance in defining ragas and he also talked about the different compositional forms used in Carnatic music. He finished his presentation by talking about the treatise "Sangita Sampradaya Pradarshini" by Subbarama Dikshitar, published in Telugu in 1904. He has been involved in the rendering of the compositions notated there following the descriptions included in the treatise, thus following to the performance practice of the time.

Bariş Bozkurt, invited expert in Turkish-makam music, gave a talk on "Distribution Based Computational Analysis of Makam Music". His talk was mainly an introduction to the makam music of Turkey and to the work that his team has done on the analysis of that music. He made special emphasis on the issues of notation and tuning and on his signal processing work to automatically describe intonation and to recognize the makam used in a given piece. This work is quite relevant for a number of the issues that the study of Indian music is faced with.

The last talk of the workshop was given by Joan Serrà, a post-doc researcher working in Barcelona. His talk was entitled "Machine Learning for Music Discovery" and he gave a quick overview of the field of machine learning as it is used for music description, currently applied to western music. He made a lot of emphasis on how to best use of the different machine learning methods in specific problems. Most of the presented methods and approaches should be of relevance to indian music.

The workshop ended with a panel discussion with the participation of Preeti Rao, Hema Murthy, Bariş Bozkurt, T. M. Krishna, and Mallika Banerjee (a Hindustani vocalist from Delhi). The aim of the panel was to talk about melodic and rhythmic characteristics of both Hindustani and Carnatic music, trying to focus in the differences between the two cultures. It was clear that is very difficult to formalize the characteristics of such rich musical cultures; there are many styles, approaches to improvisation and many factors that influence a given musical performance.

Organised by:



### 3.2 AdMIRe 2012: 4th International Workshop on Advances in Music Information Research

EVENT INFORMATION	
<b>Event title</b>	AdMIRe 2012: 4th International Workshop on Advances in Music Information Research: "The Web of Music"
<b>Co-organisers</b>	Markus Schedl, Department of Computational Perception, Johannes Kepler University, Linz, Austria Peter Knees, Department of Computational Perception, Johannes Kepler University, Linz, Austria Óscar Celma, Gracenote, Emeryville, CA, USA
<b>Dates</b>	4/17/2012
<b>Location</b>	Lyon, France
<b>Tags</b>	Music Information Systems, Multimodal User Interfaces, User Modeling, Personalization, Music Recommendation, Context-aware and Mobile Music Information Retrieval, Music in the Cloud, Web Mining and Information Extraction, Collaborative Tags, Social Media Mining, (Social) Network Analysis, Semantic Content Analysis and Music Indexing, Hybrid Approaches using Context and Content, Large-Scale Music Similarity Measurement, Scalability Issues and Solutions, Evaluation, Mining of Ground Truth and Data Collections, Semantic Web, Linked Data, Ontologies, Semantics and Reasoning, Mining and Analysis of Music Video Clips, Music-Related Images and Artwork
<b>Proceedings URL</b>	<a href="http://www2012.wwwconference.org/proceedings/forms/companion.htm#8">http://www2012.wwwconference.org/proceedings/forms/companion.htm#8</a> <a href="http://www.cp.jku.at/conferences/admire2012/">http://www.cp.jku.at/conferences/admire2012/</a>
<b>Other remarks</b>	The event has been organised by Schedl, Knees and Celma with partial financial support by OSGK-OFAI through MIReS project

The workshop brought together world-class researchers in Music Information Research (MIR) to discuss topics highly relevant for the future of MIR. In particular, the following short-term objectives of MIReS have been addressed in AdMIRe:

- Formulate research evaluation standards (paper presentations by Urbano and by Bertin-Mahieux)
- Assess emerging contexts, such as web mining (paper presentation by Hauger)
- Engage researchers from outside the EU (paper presentations by Bertin-Mahieux and by Hankinson, participation of Fujinaga)
- Major challenges of MIR (multiculturalism in the keynote by Serra, semantic gap in the paper presentation by Sordo, multimodal information in the paper presentation by Hankinson, personalized and context-aware music retrieval and recommendation in the keynote by Ricci, scalability in the paper presentation by Bertin-Mahieux)

Organised by:



Partners attending:



### 3.3 Music Tech Fest

The Music Tech Fest was organised in an attempt to bring the entire music technology ecosystem under one roof for an exchange of knowledge and ideas. This included large music industry publishers and media, innovative SMEs, scientific researchers, artists, performers and hackers.

The Music Tech Fest gathered:

- 52 contributors
- 77 workshop participants
- 30 hackers
- over 10,000 users visited the website during May only
- the live streaming broadcast was seen by over 700 viewers from 40 countries
- the festival generated 830 minutes of video footage on each of the 3 cameras

The success of the Music Tech Fest has been to ensure long-term impact through regular involvement of the community of industry, SMEs, artists and researchers and regular gatherings and exchange of ideas, thus forming a research-to-industry network. The stakeholders have agreed to continue recording Music Tech Talks on a regular basis for inclusion on the Music Tech Talks channel. The festival generated several articles in the technology press and blogs, and was reported as a series of interviews on the BBC radio and podcast in a special report on “the future of music”.

#### 3.3.1 Music Tech Fest: performance, demos and talks

EVENT INFORMATION	
<b>Event title</b>	Music Tech Fest
<b>Dates</b>	18-19 May 2012
<b>Location</b>	Ravensbourne, London
<b>Tags</b>	music, information festival, talks, demos, performances, speakers, SMEs, artists, performers
<b>Proceedings URL</b>	<a href="http://www.musictechfest.org/">http://www.musictechfest.org/</a>
<b>Other remarks</b>	The core festival event includes and expands on the aims and objectives of the music industry trend spotting event planned for the WP5 and the proposal for a research-to-industry network in WP6.

**Mutidisciplinary cooperations:** Several talks and performances highlighted the need for multidisciplinary cooperations, focusing particularly on the collaborations between researchers, innovators, industry and performers. One session was devoted entirely to the impact research can have on commercial companies. The live panel conducted by Tom Cheshire, the Associate Editor of Wired Magazine, with Shazam, Soundcloud, RjDj and Stromatolite, focused entirely on research-to-industry topics and the importance of integrating academic research within industry innovation

**Rights clearance for researchers:** A cluster of talks and demos focused on new systems which use the results of research from research institutions like Fraunhofer to create industry standard digital music recommendation and licensing tools for inclusion in commercial platforms. Availability of collections for research and testing was discussed, as well as legal and availability implications. The prevalent consensus seems to indicate a change in the attitude of the music industry who are becoming more willing to work with researchers and make their collections available.

**SME research and commercial innovation:** There was strong evidence from participants that innovative music technology SMEs employ academic MIR researchers to ensure competitiveness in music technology innovation. Eight talks presented tools which were developed by teams of researchers who have come from some of the top music tech research units in Europe, including those from MIRÉS partner organisations.

**The importance of music data for performance tools:** Several innovative performance platforms were presented which generate music by using information generated by music or sound environments, crowd-sourced applications, or custom built installations or platforms. The BBC radio programme and podcast reporting on the festival labelled this “the future of music”.

**The importance of music data for art installations:** Four art installations used music data to generate sound-driven sculptural kinetic sound objects or audiovisual environments, thus showing the importance and potential of music data in the visual and kinetic arts.

The feedback was assembled from the following contributors:

Funded speakers: Frederic Rousseau (IRCAM, research - partner), Christian Blom (artist), Matthew Davies (INESC - research, partner), Oscar Paytavi (BMAT - SME, partner), Avi Ashkenazi (artist), Adam Place (Alphasphere - artist), Bruno Zamborlin (Mogees - artist and IRCAM/Goldsmiths research), Carles Lòpez (Reactable - artist).

Non-funded speakers: Matt Balck (Ninjatune - music industry, and Coldcut - artist), Nicole Yershon (Ogilvy Digital Labs - media industry), Estefania Caño (Fraunhofer / Songs2See - research), Saoirse Finn (QMUL - research, partner), Patrick Bergel (Animal Systems - SME, research), Ben Lawrence (Mixcloud - SME), Evan Stein (Decibel - SME), Kim de Ruiter (Noise Inc - SME), Matthew Sherett (Last.fm - SME), Tim Hadley (rara.com / Omnifone - SME), Philippe Perreaux (Right Clearing, SME), Cliff Fluett (Lewis Silkin - legal, music industry), Ed Averdieck (Cue Songs - SME), Will Page (PRS - music industry), Michela Magas (Stromatolite - SME and research, partner), Daniel Lewington (MPme / Apsmart - SME), Michael Breidenbrücker (RjDj - SME), Peter Kirn (Create Digital Music - research), Martin Ware (Illustrious - SME and music industry), Tom Cheshire (Wired - media industry), Jason Titus (CTO Shazam - music industry), Dave Haynes (VT Soundcloud - SME and music industry), DJ Ham (Ninjatune - music industry), Martin Macmillan (Soniqplay - SME), Paul D (artist), Olivier de Simone (webdoc - SME), Johann Waldherr (Spectral Mind - SME), Stephen O’Reilly (Mobile Roadie - SME and music industry), Ariel Elkin (London Music Hackspace - research), Jake Williams (artist and Goldsmiths music research), Daniel Jones (artist and Goldsmiths music research), Cassiel (artist), Jason Singh (artist / Victoria and Albert museum resident sound artist and music researcher)

The following challenges have been identified from the feedback:

#### 3.3.1.1 Collaboration among the wider music tech community

- Create closer connections between the creative industries, the music industry, researchers and innovators: fostering collaboration between these communities
- Create the opportunity for young digital composers/artists to work with top-class orchestras and recording environments

#### 3.3.1.2 Multimodality

- Multimodality as of great importance (like many contributors in the workshops)

#### 3.3.1.3 Tangible, gestural and environmental interfaces

- Encourage Tangible and gestural interfaces creation (which were found to be the most exciting challenge by panellists)
- Address Immersive soundscaping (see extensive entry by Martyn Ware in the MTF Event Fiche)
- Challenge of being torn between creating music performance technologies and playing them. Without being the user the task of innovating would be impossible (see Alphasphere entry in the MTF Event Fiche within D5.2)

- Desire to turn ordinary objects into instruments
- Allowing musicians and performers to take full advantage of electronic music without losing the feeling of touching a real surface
- Developing music technologies to aid vocalists
- Can we put data anywhere there is sound?
- Can we enable new kinds of audio communication between simple devices, not just smartphones?

#### 3.3.1.4 Research and education

- Bridging the gap between music technology and music education
- Using hack days as starting points for explorations. The value of these ad hoc collaborations
- Lies not in the work that is produced, but in the process of the collaboration itself. (see Vincent Akkermans entry in the MTF Event Fiche)
- Methods for fusing music analysis based research and creative music applications.
- Can we go further still, and create new classes of audible machine language?

#### 3.3.1.5 Licensing

- Frustration by lack of pan-European music licensing for recorded music rights
- how can good data reduce piracy and re-valorise the digital music product?
- Rights holders need to find new revenue streams from their existing digital assets, especially
- where they are additive and non-cannibalizing to their other revenue channels.

#### 3.3.1.6 The importance of data to industry

- how much can good data lead to extra revenue for the record industry?
- how can good data improve industry processes and reduce inefficiencies?
- making the the recording industry start to understand the actual value of a piece of data to their business, both in reducing costs, increasing efficiencies and generating extra revenues
- real-time data collection

#### 3.3.1.7 The importance of engaging users

- allowing users to engage and interact in a meaningful way with the research we produce.
- Brand and media owners are trying to engage their audiences through music and empower them to become content creators around their brands.
- Consumers are showing a greater propensity to want to interact with music rather than just listen to it.
- now is a great time to be doing stuff because the tools are better, audiences are getting more into interactivity, and the possibilities are still limitless
- Multi-user applications

### 3.3.2 *Synaesthesia Workshops*

EVENT INFORMATION	
<b>Event title</b>	Music Tech Fest
<b>Dates</b>	17 May 2012
<b>Location</b>	Ravensbourne, London
<b>Tags</b>	music, information, creative, sound, colour, artists, designers, animators, film makers, music makers
<b>Proceedings URL</b>	<a href="http://www.musictechfest.org/">http://www.musictechfest.org/</a>
<b>Other remarks</b>	This workshop fulfils the scope of the planned music discovery and creativity workshops as listed in the WP5 programme. The first day of the festival was devoted entirely to this workshop.

Ideas on "seeing music" we're used as a trigger for an investigation into the relationship between music data and the visual arts. Peter Kirn, author of Create Digital Music (<http://createdigitalmusic.com/>) and of Synaesthesia workshops at Parsons School of Art in New York was invited to conduct the workshop. Tutorials were focused on methods in Processing and digital media, and examples drawn from digital ways of visualising music. The outcome showed a strong correlation between the interpretation of music and visual triggers. A collaborative application translating visual data to music data was used to generate music by drawing.

The final results were presented on the main stage to festival audiences and will be uploaded on the new Music Tech Fest / Music Tech Talks channel on YouTube.

#### 3.3.2.1 Issues concerning artists building tangible interfaces

- Realizing new hardware ideas means finding more access to local production, so that more of our supply chain can be near us and our customers rather than in Europe. "Digital" now often means "physical," too.
- We need local production knowhow that's both skilled and open to small-batch runs as we introduce new designs.

#### 3.3.2.2 Issues concerning music rights

- As publishers and small businesses, we have to learn to navigate the regulatory landscape in Europe.

#### 3.3.2.3 Issues concerning exchange of data / knowledge

- With such rich developer talent in places like Germany and the UK, and across Europe, we urgently need ways to help connect developers with each other. Rather than a concentrated startup scene like Silicon Valley, we feel it's the diversity throughout the EU that offers cultural, technical, and creative depth.

Organised by:



Partners attending:





### 3.3.3 3D Hack Camp

EVENT INFORMATION	
<b>Event title</b>	Music Tech Fest
<b>Dates</b>	18-19 May 2012
<b>Location</b>	Ravensbourne, London
<b>Tags</b>	music, information, hacking, APIs, tangible interfaces, the Internet of Things (IoT)
<b>Proceedings URL</b>	<a href="http://www.musictechfest.org/">http://www.musictechfest.org/</a>
<b>Other remarks</b>	This event has covered most of the planned activity from the WP5 hacking event with EU Associate Countries.

This section presents the whole list of hacks built together with a description.

#### 3.3.3.1 KaleidoSound

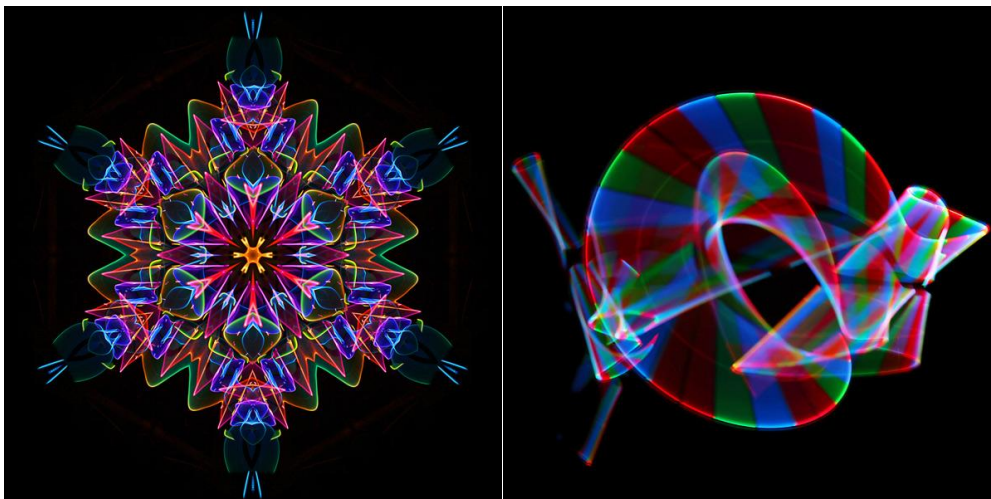
Description: Kaliedosound is a music visualizer which transforms the light from LEDs into a kaleidoscopic visual which is synchronized to a synthesizer.

Creators: Patrick O'Neill - inSilico - Soundcloud / tricktronix.com

About the hack: An iPad with MidiTouch sends midi note data to Ableton to play a digital synthesizer and trigger midi clips with automation envelopes modulating VoidGrabber (MaxForLive), which sends OSC data to Quartz Composer to control parameters of kaleidoscopes.

#### Technology

- Quartz Composer
- Ableton Live
- Max for Live + VoidGrabber & Grabber Sender
- iPad + MidiTouch





### 3.3.3.2 Casio Hack

Description: We hacked into an old Casio synthesizer and did some circuit bending.

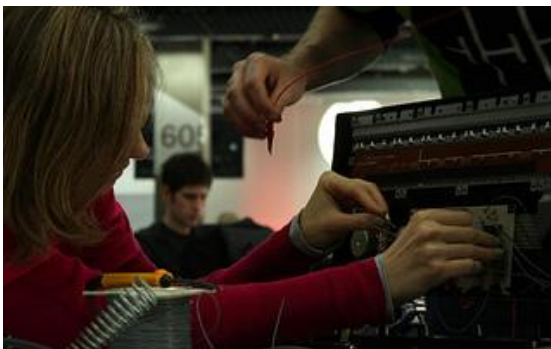
Creators: Patrick O'Neill - inSilico - Soundcloud / tricktronix.com

Nela Brown (QMUL, G.Hack) with Patricia and Kacper

<http://nelabrown.blogspot.co.uk/>

<http://ghack.eecs.qmul.ac.uk>

About the hack: Patrick brought in an old Casio which had some 80's piano/ organ / drum machine sounds as well as Rick Astley 's song Never Gonna Give You Up as demo (still going on in my head as I write ha ha ha ha). Kacper was working on his Touch Sensitive Hacked Echo Unit on the table next to us so we asked him what we should do with it. He gave us crocodile clips and told us to explore connecting different electronic parts until we find something interesting. We opened the synth and found the main board with 2 chips housing the sounds and some others controlling the octaves etc. We played around with crocodile clips to find where the sounds are coming from and rewired some of those points to contact mics (as we didn't have any switches) so these can be triggered. We tried to rewire to a switch we got from the light sabre but this was a bit 'temperamental' so decided to instead fire up Ableton Live Demo and record the output of the synth into the laptop, create some loops and make a composition. Patrick went back to work on his other hack KaleidoSound and Patricia came by to check out what was going so got spooled into 'performing' the synth whilst I was recording and then we swapped (performing=holding a piece of wire stripped at both ends and touching different parts of the board looking for interesting sounds and trying not to trip it up/blow the circuitry). We passed the loops through some Ableton presets (Reverbs etc.) and played that back to demo what sort of stuff you can get out of the synth (that manufacturers did not know about)



### 3.3.3.3 Social Glitch

Description: Twitter controlled sequencer/sound and visuals generator. Not the most innovative idea, but it does generate some nice beats. It makes complex sounds and if you keep tweeting at it sort of feels like music is evolving without ever changing too abruptly. Oh, and it also displays details of the last person who sent in a command for each track individually.

Creators: Rimas Krivickas

About the hack:

1. Install and launch the app
2. enter a tag you want to use to control the playback ('s\_glitch' by default)
3. Click 'OK'
4. Start tweeting commands following by targets like so (be a little patient, twitter isn't the fastest "remote control" in the world):

#s\_glitch hit bass hit snare hit vox

...then maybe...

#s\_glitch hit beat hit synth mix vox

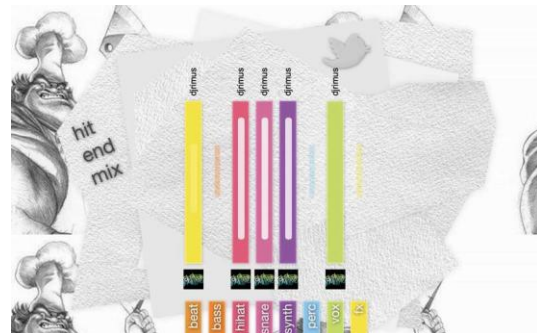
...and then maybe...

#s\_glitch end beat end bass end snare mix vox hit hihat

there are only 3 commands:

- hit - launches a randomly generated loop
- end - self explanatory
- mix - regenerates a loop without stopping it's playback

There are 8 tracks to be played, each track holds multiple one shot samples: beat, bass, hihat, snare, synth, perc, vox, fx

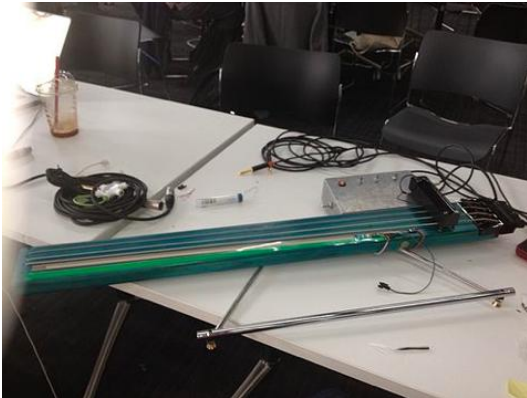


#### 3.3.3.4 不格好5K

Description: 不格好5K (Pronounced "bukkakō 5000") is a bass guitar that is equipped with additional position and pressure sensors to enable the control of additional expressive elements while playing.

Creator: Adam John Williams

About the hack: I built the bass guitar in the two days before Music Hack Camp began, since I didn't want to go hacking apart any of my other instruments to attach the sensors until I was sure the idea would work. Currently I have it set up so that the thumb-activated pressure sensor controls the pitch and amplitude of the PFFT-based pitch shift effect in Max MSP, and the pressure sensor along the neck controls the amplitude and cutoff frequency of a low pass filtered sawtooth oscillator with the position of your finger controlling the pitch.



### 3.3.3.5 This Is My Chord

Description: This Is My Chord is an online repository for guitar chords, Github for guitar chords if you will. Shameless influence from thisismyjam.com

Creator: Arthur Carabott - @acarabott / <http://www.codenotes.co.uk>

About the hack: This is a prototype for an online repository for guitar chords. This is github for guitarists. Chords are a nice little nugget of music to share, fork and learn from. For now it has chord playback via HTML5 and recall via historyState.



### 3.3.3.6 Shynsilysaber

Description: A shiny sound controller which looks like a saber. Now make some noise with your sabers. Move it to change the sounds. Hold it high up to start playing your favourite StarWars monologues. And it shines mysteriously while doing all this.

Creator(s):

- Jordi Hidalgo Gomez
- Hector Parra
- Varun Jewalikar

Technology:

1. Dismantle saber
2. Put in an arduino (controls all the i/o) and an accelerometer.
3. Send and receive data to and from the saber through zigbee which connects via usb with the laptop.
4. Use pure data for processing everything on the computer and send osc/midi to Ableton live
5. Profit!



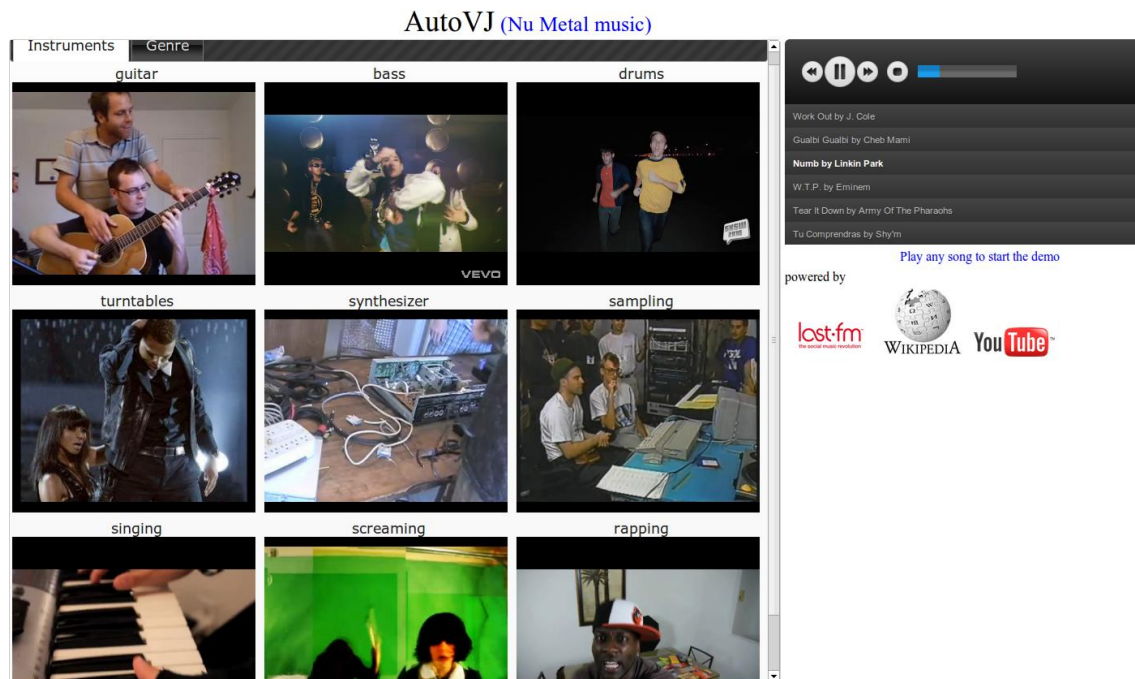
### 3.3.3.7 AutoVJ

Description: Web app that showcases how an automatic video dj tool can be created to help club managers to display videos related to the music currently playing, in an automatic fashion.

Creators: Mohamed Sordo

Technology:

- Last.fm: Get Tracks Top Tags from Last.fm, and then filter the tags to get the most representative Genre.
- Wikipedia: From the Wikipedia Infobox, get the most typical instruments for the music genre selected in the previous step
- YouTube: Get the first YouTube video related to each instrument.





### 3.3.3.8 SoundscapeDJ

Description: We made a real-time Soundscape DJing program aimed to play environmental sounds from [Freesound.org] with a tangible interface. It is possible to retrieve your soundscapes and manipulate them by changing their rate and applying filters.

Creator(s):

- Gerard Roma - [mtg.upf.edu/people/groma]
- Anna Xambó - [users.mct.open.ac.uk/ax22]

Technology:

- [Freesound.org]: Freesound 2 API
- [SuperCollider]: Freesound2 Quark, SETO Quark
- [ReactIVision]



### 3.3.3.9 DelHands

Description: Banging a table lets you play a marimba running on your iPhone. The rhythm you play to comes from your environment's sounds. The environmental sounds around you are EQed and sent through an LFO. Vary the frequency of the LFO to get a rhythm you're comfortable with. Hold the device close to a surface you fancy doing percussion with. Hit the surface, the device recognises hits and turns them into marimba sounds. Control the marimba's frequency by tilting the device.

Creator: Ariel Elkin

Technology:

- The Synthesis Toolkit in C++
- MoMu Toolkit





### 3.3.3.10 TapOrShake

Description: Smartphone app for get music recommendation by tapping or shaking your mobile.

Creator(s):

- Xavi Francisco - @srxavi
- Pau Capella - @paucm
- Sara Gozalo - @sara\_sgm

Technology:

- Ella BMAT API
- PhoneGap



### 3.3.3.11 TripPong

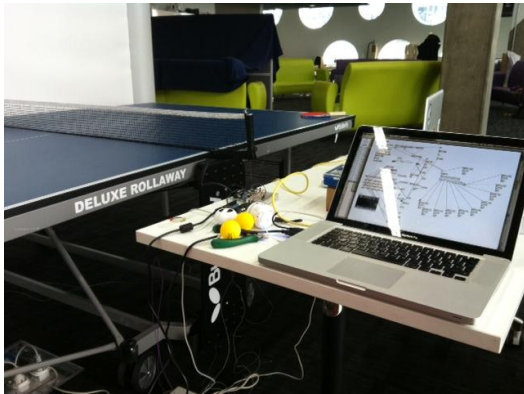
Description: Have you ever dreamed of playing ping pong while listening to your favourite music? Everyone can do that with a ping pong table a portable audio device, but with TripPong the experience goes way beyond this! In TripPong, music follows the game, if you don't play well, music punishes you and will sound weird. Moreover, TripPong features an amazing set of inspiring sound effects that will make your game unique. TripPong is DA HACK!

Creator(s):

- Sebastian Mealla
- Frederic Font

Technology:

Piezoelectric sensors => arduino => serial port => pure data (to capture the ball hitting the table) - Laptop camera => open cv for processing => pure data (for tracking the ball while in the air) - Pure data (trigger sounds, process music) Sound FX have been downloaded from Freesound.



### 3.3.3.12 Shaker ++

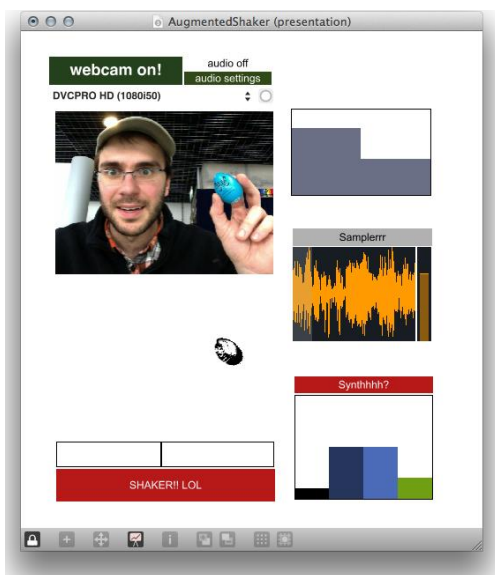
Description: Arriving at the hack day this morning I found a blue shaker. I thus made a system that uses a webcam to track colour and generate sound from that colour. By playing the shaker in front of the camera it will trigger and modulate either a sampler or an FM synth, based on the location and distance of the shaker in relation to the camera. It's fun! And ridiculous. It lets you create all sorts of crazy sounds based on a very simple input

Creator(s):

- Yann Seznec - @amazingrolo / theamazingrolo.net

Technology:

- Max/MSP/Jitter
- cv.jit library
- a shaker (blue)



### 3.3.3.13 Ce n'est pas un dictateur

Description: Charlie Chaplin's final speech in "The Great Dictator" is an extraordinary performance; using face tracking we wanted to mask the emotions with pop culture icons, then cartoon-like characters. We also used the voice amplitude, stress and face features tracking as MIDI input in order to overlay the discourse with instruments, again to see how it will influence the perception of the message.

We processed one of the Charlie Chaplin's final speech in "The Great Dictator" videos available on YouTube with Adobe AfterEffects (scaling, sharpen, timecode insertion, cue mark/cigarette burns synchronization). The video was played as coming from a camera (via CamTwist OS X app), processed via FaceOSC that sent the events to our Processing application. The face detection events were serialized on disk and replayed later directly on the video (using cue mark/cigarette burns we embedded in the video). At this point we parallelized the work, Alex replayed the events in order to construct the MIDI output. Arran and me were replaying them to add shapes to the face tracking points.

Creator(s):

- Laurian Gridinoc - @gridinoc / namebound.com
- Arran Ross-Paterson - @arranrp / eventhandler.co.uk
- Alex Roche - @Zenmaster13
- Mikolaj Banasik - @D1SoveR

Technology:

- FaceOSC
- Processing and various libraries: MIDI bus, oscP5, ddf for Fast Fourier Transform
- Adobe AfterEffects and Illustrator (SVG editing)
- git as safety net (local versioning)



Organised by:



Partners attending:



### **3.4 MIReS panel discussion 'Technological challenges for the computational modeling of the world's musical heritage' at INFLA / FMA 2012**

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EVENT INFORMATION	
<b>Event title</b>	III Interdisciplinary Conference on Flamenco Research – INFLA and II International Workshop on Folk Music Analysis - FMA
<b>Dates</b>	April 19th-20 <sup>th</sup> , 2012
<b>Location</b>	Seville, Spain
<b>Tags</b>	Folk music analysis, computational ethnomusicology, interdisciplinary
<b>Proceedings URL</b>	<a href="http://congreso.us.es/infla3/en/index.html">http://congreso.us.es/infla3/en/index.html</a>

The panel was organized around three main questions.

#### **How to foster collaborations between researchers from different disciplines (including musicologists, musicians, engineers, and others)?**

Over the discussions following this question, it appeared that there is a lack of communication between computer-scientists and musicologists. A special effort has to be made to learn the language of the other. It was mentioned that it is difficult to be both specialist in computer-science and musicology. Strengthening collaboration between both worlds should be favoured. It was proposed to initiate these collaborations by defining small projects that involve people from different backgrounds. Tzanetakis journal on multi-disciplinary works, the AAWM conference, and the new inter-disciplinary of music studies (Parncutt), were cited as good initiatives in this sense. Currently, musicologists are not using the computer-scientists software's (the so-called M.I.R. tools). Several reasons have been proposed for that: - the tools are not easily available (not documented or difficult to use), - the generation-gap (young students in musicology are computer-educated but less the old ones who teach), - description provided by M.I.R. tools does not feed the needs of musicologists and are not 100% accurate. Concerning this last point, some participants believe that the software should provide 100% accurate descriptions to be trusted by musicologists; other believe that software should only provide suggestions and that it is the role of the musicologist to make the final decision. Finally, a proposal for "quantitative" musicology (as opposed to "qualitative" musicology) was made in order to move closer the two worlds.

#### **Is it right to focus on single culture studies rather than approach musical phenomena cross-culturally?**

Pros and cons of being single-culture-centered or cross-culturally were discussed. Single-culture-centered: It seems that for (a large) part of musicologists being cross-cultural doesn't make any sense since each culture has its own needs of descriptions and models. From a M.I.R. point-of-view, required tools are different and performances of dedicated M.I.R. tools are much better than universal tools. Cross-culturally: At the beginning of the 20th century, ethno-musicology was called "comparative" musicology. Also in musicology, many books deal with

Baroque music, whatever coming from France, England, Spain or Italy. It was mentioned that cross-cultural studies are positive because they offer a perspective. Even for simple computational music analysis tools, comparing classical music analysis with other cultures allows to realize that all the representations used depend on the particular culture and that something more abstract is needed. According to the participants, both approaches are interesting but involve different questions, methodologies and lead to different results.

**Which should be the next step in establishing ethno-music-information-retrieval?  
How do we organize our-self?**

The questions on whether or not the FMA workshop should continue, should be more opened or in the opposite restricted to selected people, should the FMA be integrated as a special session inside ISMIR, inside the "inter-disciplinary musicology" conference or other conferences were discussed. The difficulty of integrating ethno-MIR in an external conference was also discussed: are reviewers able to review such multi-disciplinary papers? can this subject be mixed with other subjects (sociology)?

It was also proposed to better promote ethno-MIR: stimulate people to participate to FMA (reducing the 4 pages submission to abstract-only), creating datasets, MIREX tasks, doing tutorials, educating MIR people.

Organised by:



Partners attending:





### 3.5 MIREs roundtable 'MIR and creation'

EVENT INFORMATION	
<b>Event title</b>	Workshop on "M.I.R. and Creation"
<b>Dates</b>	June 2 <sup>nd</sup> , 2012
<b>Location</b>	Paris, France
<b>Tags</b>	M.I.R., audio features, music creation, real-time, installation, interaction, sensors, captures
<b>Proceedings URL</b>	<a href="http://recherche.ircam.fr/anasyn/peeters/pub/workshop_mir_creation/">http://recherche.ircam.fr/anasyn/peeters/pub/workshop_mir_creation/</a>

The goal of this workshop was to invite key actors to give their view on the use of M.I.R. technologies for creation. The goal was to answer the question - what uses for creation can we do with the Information a-la-ISMIR (audio-descriptors, source-separation, chords, beats, auto-tags)? - What other Musical Information could be used for creation (symbolic, sensors ...)? The speakers were invited according to their skills and representation of a given field: representing research on music technologies (Assayag, Schnell, Schwarz, Jordà), composition (Manoury) or industry (Jehan, Pachet). The workshop was made up of 7 keynotes of 1 hour each followed by a round-table of 1 hour.

Gerard Assayag mentioned the early use of audio-content information for music creation such as the spectral approach of Gerard Grisey or Marco Stroppa and which is today related to the research on automatic orchestration (Carpentier, Tardieu, Esling) used by Jonathan Harvey. In these approaches, information contained in an audio signal (chords or timbre) is used to generate a score, which is then played by an orchestra. Another kind of approach relates to the learning of language models (LZ, Factor Oracle) to represent a performer style. Example of automatic improvisation by a computer using this model trained on Coltrane solo or trombone-solo (using the O-Max system) were demonstrated. As said, it was the first time a computer was applauded on stage.

According to Norbert Schnell, nowadays, music creation involves less and less the body; while music listening tends to involve more and more it through interaction. This interaction with music is performed by "re-liquifying" the audio. Many examples of this re-liquifying process of audio were given: - using gestural control to perform direction of pre-recorded music (collaborations with atelier feuillantine), - controlling video beat-boxing segments using a gambling machine (mind-box project), controlling synthesis using a ball within a game (Urban musical game). Many of the paradigms used here for creation are based on "breaking and remaking time". Two possibilities are derived from it: "respect and readapt" or "eliminate and recreate from scratch".

Diemo Schwarz illustrates this paradigm of "eliminate and recreate from scratch" with the CATaRT system. In this system sounds, segmentation and audio descriptors are used to inform a real-time concatenative synthesis system allowing re-creation of any type of sounds or texture from pre-recorded audio or live-recording of audio in real-time.

Philippe Manoury, one of the main composers of today, gave its view from the creation side. He first emphasizes on the difference between composition and improvisation, which involves different time-scale (long and short-term). He then emphasizes on the importance of acquiring knowledge of the sound. Since sounds are always in evolution (from Rameau, Webern to Grisey) audio descriptors are particularly important for a better understanding of sounds. He then provided examples of the use of music information in its pieces: score-following in "Partita-1" and audio-descriptors in "Tensio". He finished by recommending the development of audio descriptors closer to the way we ear and create music.

Tristan Jehan (EchoNest) presented the EchoNest platform, which is possibly the largest content-based M.I.R. recommendation system; used today by record-labels (EMI) and online-

music-providers (Spotify). The EchoNest platform is organized around a set of APIs some of which are public. Through the use of these APIs, he illustrates how to make creation with audio-features computed on the millions of songs EchoNest have, using their Remix Python API: wubmachine, videolizer, the swing thing, the walzify, the global sampler. Some of these creative applications are developed during the Music Hack Days, which appears as a very productive place for M.I.R. based creation.

Francois Pachet (Sony-CSL) presented works related to style. For him music is texture and structure. Study of style has been performed in the MIROR project where Constrained Markov Model is used to create for example improvisations or generate blues grid based on Parker chords. In a recent project, Virtual Bands are created. This is done by analysing musicians separately, extracting features and then modeling them using CMM. The system can then be used in real-time to accompany a musician while following its intentions.

Works of the MTG in M.I.R. started with what Sergi Jordà name "traditional M.I.R." (Canoris API, BMAT or Song-Explorer using the Reactable to navigate over a music collection) dealing more with consuming than producing. According to him, we can distinguish: - micro-MIR for Music Creation (such as plunderphonics, mashup, concatenative synthesis, mosaicing, beat-mash/ loop-mash of Steinberg), - meso-MIR for Music Creation (Freesound.org and its proposed taxonomy of sound, Freesound radio and the possibility to create graph connection between samples, sound-scape modeling) - macro-MIR for Music Creation (expert system such as the LaDiDa app, auto-tune for the news). He then illustrated how M.I.R. and creation does not only concerns music creation. The "Magic Fountain of Montjuic" uses a system developed by the MTG. In this, content-description (audio features extracted from music tracks) drives the light-choreography of the fountain. To conclude, he stresses that "playing music is not the same as playing with music" and that applications should "keep things as simple as simple but not simpler".

Organised by:



Partners attending:





### 3.6 Music Hack Day at Sonar Festival

EVENT INFORMATION	
<b>Event title</b>	Sonar Festival, within SonarPRO (Professional area of the music festival)
<b>Dates</b>	14-15 June 2012
<b>Location</b>	CCCB, Barcelona <a href="http://www.cccb.org/en/">http://www.cccb.org/en/</a>
<b>Tags</b>	Art technology, technological innovation, creative industries, ideas debate, experiences sharing, exhibition, live experimentation, demos, showroom
<b>Proceedings URL</b>	The main outcomes of this session (basically hacks submitted) are available here <a href="http://wiki.musichackday.org/index.php?title=Barcelona_Hacks_2012">http://wiki.musichackday.org/index.php?title=Barcelona_Hacks_2012</a>
<b>Other remarks</b>	Sonar webpage <a href="http://sonar.es/en/2012/">http://sonar.es/en/2012/</a> All (non-personnel) expenses related to the MHD at Barcelona have been funded through private sponsorship coming from the companies involved in the event.

Music Hack Day at Barcelona <http://bcn.musichackday.org>, organised as satellite event of the Sonar Festival (inside Professional space of the Festival) as 'live experimentation' activity. The audience comprised 30 people representing 18 companies and other entities in the music technology field plus 90 hackers and 10 artists who were in charge of creating applications using involved entities' resources (APIs, SDKs, etc.). About 50 more people attended to the public presentations (companies and hacks' presentations and prize giving session). So the total number of the audience was about 180 people.

The main contributions of these kind of hands-on sessions for the project are (i) knowledge of the user needs, (ii) discovery of new use cases for market technologies and (iii) the understanding of current development trends in the music technology field.

This section presents the whole list of hacks built during the session together with a description.

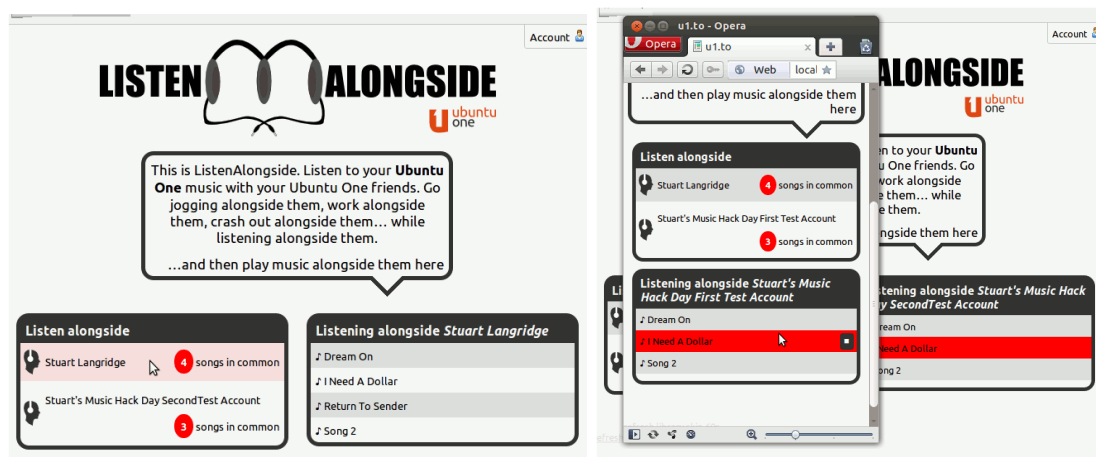
#### 3.6.1.1 Listen Alongside

Description: Sign in at the same time as other friends using Ubuntu One and play the music that you share! For when you're jogging together, or for silent discos: listen alongside your friends to music that you both have in Ubuntu One.

Creator(s): Stuart Langridge

Technology:

- Built with Python, Django, JavaScript, PubNub, and Ubuntu One's APIs
- Implemented as an extra part of u1.to, the Ubuntu One labs project

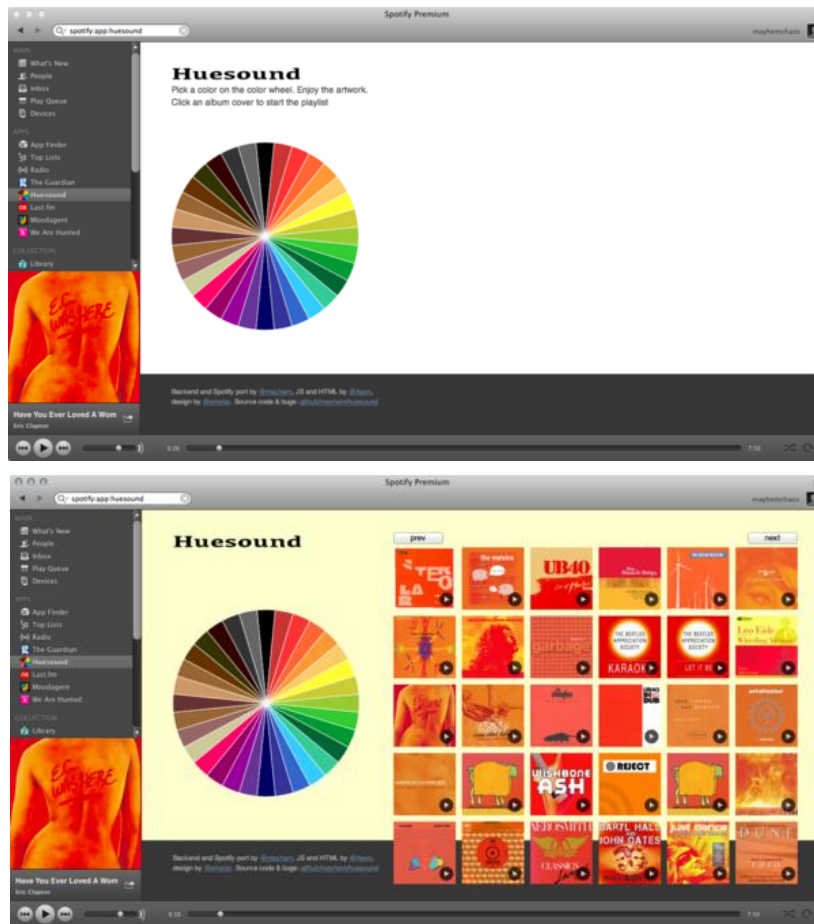


### 3.6.1.2 Huesound

Description: Huesound is an application that was originally written MHD San Francisco, 2011. This year, I've ported this application to Spotify since Spotify is my favorite music application. Initially the app opens as shown in the first image. Discover music via colors and cover art on Spotify!

You can click on the albums to view the album, or click the play button on the cover to start playing the album. You can also use the prev and next buttons to page through multiple pages of results for a selected color. Choose a color from the color wheel and cover art in that color will be shown.

Creator(s): Robert Kaye



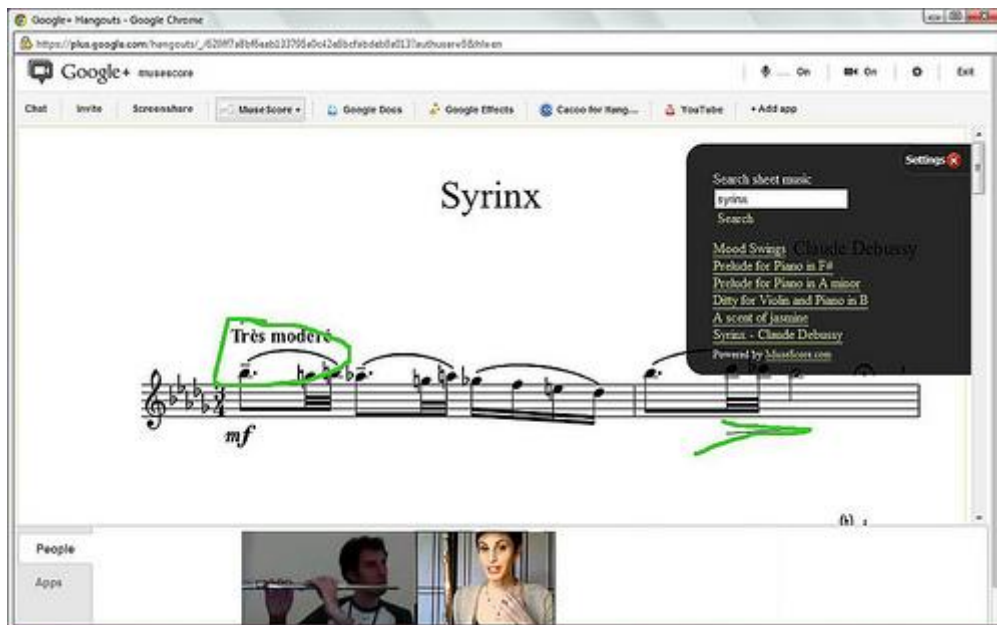
### 3.6.1.3 Teach me Nina

Description: So you are an aspiring flute player and you're dying to get a lesson from [Nina Perlove \(@Ninaflute\)](#), the famous YouTube flutist. The only problem, Nina lives at the other side of the ocean. Luckily [Google Hangout](#) comes to the rescue together with the [MuseScore+ app](#). While hanging out, you can both watch the same sheet music and make annotations on it which are visible to all the hangout participants. All set for that master class with [Nina](#)!

Creator(s): Nicolas Froment

Technology:

- Sheet music made with open source notation software [MuseScore](#)
- And stored on [MuseScore.com](#)
- [Google+ Hangout apps](#)
- [MuseScore.com API](#)
- Node.js, Redis, Faye, Express, Jade...



#### 3.6.1.4 MusicGene

Description: Music generation from feature-annotated samples. Demos available here:

- <http://zvooq.ru/musicgene/>
- <https://www.facebook.com/MusicGene>

Creator(s):

- Vlad Yakovlev <vlad.yakovlev@zvooq.com> — client-side
- Andrey Popp <andrey.popp@zvooq.com> — client-side
- Andrew Pantyukhin <andrew@zvooq.com> — wiki markup

Technology:

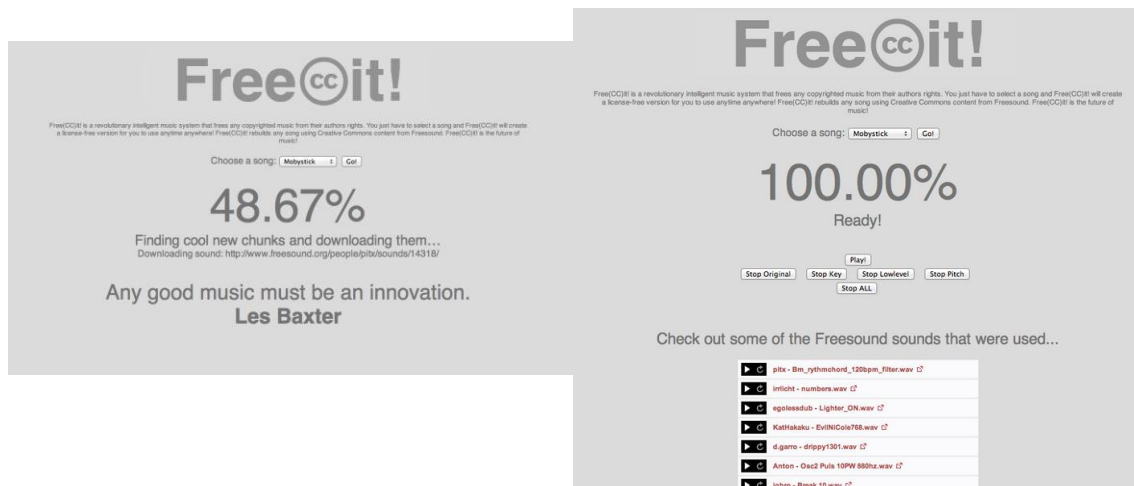
- <http://freesound.org/> — samples
- <http://mtg.upf.edu/technologies/essentia>
- Web Audio API
- jQuery

### 3.6.1.5 Free(CC)it!

**Description:** Free(CC)it! is a revolutionary intelligent music system that frees any copyrighted music from their authors rights. You just have to select a song and Free(CC)it! will create a license-free version for you to use anytime anywhere! Free(CC)it! rebuilds any song using Creative Commons content from Freesound. Free(CC)it! is the future of music! We hope to make it available online soon!

**Creator(s):** Free(CC)it! has been developed during the Music Hack Day at Sonar Festival in Barcelona (2012) by Frederic Font (frederic.font@upf.edu) and Stelios Toghias (stetogias@gmail.com) (MTG-UPF).

**Technology:** The core of Free(CC)it! is based on analysis information coming from the The Echonest API and ESSENTIA (audio feature extractor). Once a song is selected, it is chopped in small chunks using beat position information coming from Echonest. All these chunks are analysed with ESSENTIA and then some content based searches are performed with Freesound API to obtain similar samples to the different chunks. For each chunk we obtain several samples resembling low-level similarity, pitch similarity and tonal similarity. Then, all the sounds are assembled to create an amazing new and free of licenses piece of music!



The screenshot shows the Free(CC)it! web interface. At the top, the logo 'Free(CC)it!' is displayed. Below it, a small paragraph describes the system. A dropdown menu shows 'Choose a song: Mobydick' with a 'Go!' button. The progress bar shows '48.67%' and the text 'Finding cool new chunks and downloading them...'. Below this, it says 'Downloading sound: http://www.freesound.org/people/pitb/sounds/14318/'. A quote from Les Baxter is shown: 'Any good music must be an innovation. Les Baxter'. On the right side, the progress bar shows '100.00%' and 'Ready!'. Below this, there are buttons for 'Play!', 'Stop Original', 'Stop Key', 'Stop Lowlevel', 'Stop Pitch', and 'Stop ALL'. At the bottom, there is a section titled 'Check out some of the Freesound sounds that were used...' with a list of sound samples:

- ▶ pitx - Bm\_rythmchord\_120bpm\_filter.wav [?]
- ▶ inlicht - members.wav [?]
- ▶ egoleesdub - Lighter\_DN.wav [?]
- ▶ Kattakaku - EviNiCole768.wav [?]
- ▶ d.gamo - drippy1301.wav [?]
- ▶ Anton - Osc2 Puls 10PW 880hz.wav [?]
- ▶ jobro - Break 10.wav [?]

### 3.6.1.6 Scores4u

Description: With Scores4u you can search your favourite song and we will give you the streaming, lyrics and the score!

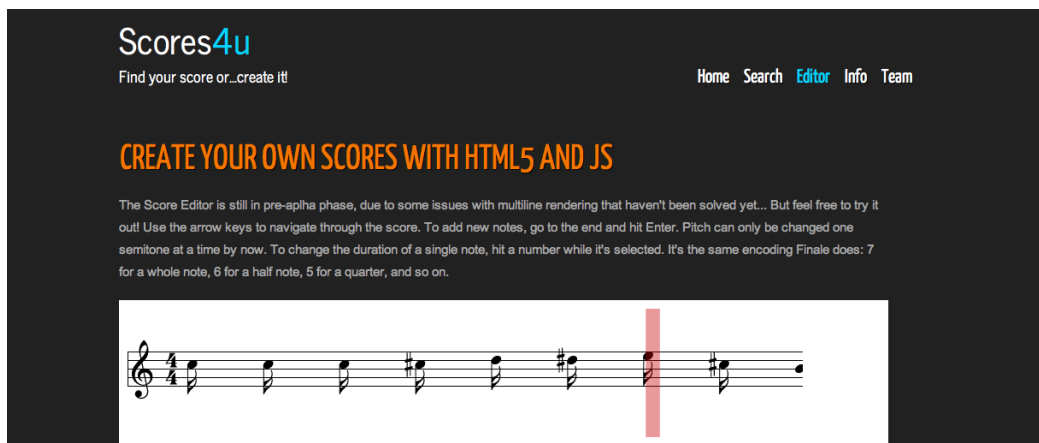
**Search Engine + Visualizer:** With our Meta-Search Engine, you can look up a song in different platforms at the same time and choose the player that you prefer :). Only one lyrics and score engine are supported by now, sorry! It's really simple and straight-forward to use: just query an input text (song title, artist, tag...) and the Streamer Boxes will be full of cool options to listen to. Whether you pick the song from one engine or the other, the main Player window will appear, with a minimal playback control widget, a panel with the retrieved lyrics and the Score of the track. If no score has been found, you'll be prompted to create your own! Please don't use the link that appears there (we know, it's kind of cruel to who you this nice button...), just click on the tab on the top.

**Score Editor:** The Score Editor is still in pre-alpha phase, due to some issues with multiline rendering that haven't been solved yet... But feel free to try it out! Use the arrow keys to navigate through the score. To add new notes, go to the end and hit Enter. Pitch can only be changed one semitone at a time by now. To change the duration of a single note, hit a number while it's selected. It's the same encoding Finale does: 7 for a whole note, 6 for a half note, 5 for a quarter, and so on. It's not possible to save the scores right now, but maybe in future we'll implement a MusicXML exporter that can post them directly to MuseScore so you can view them when you play the same song again!

Creator(s): Quim Llimona and Sara Gozalo

Technology:

- Deezer API/SDK: A HTTP Request is used to get the id of the tracks related with the user's search. After that, the SDK is used to play the song selected by the user.
- Spotify API/ Play Button: A HTTP Request is used to get the id of the tracks related with the user's search. After that, the Play Button Widget is used to play the song selected by the user.
- Musescore API The visualization of the scores are possible thanks to this API, we get the scores and render them via HTML5 and JS
- Musixmatch API: we use musixmatch API to show the lyrics of the song playing on the different players and the score showed on the web page
- Echonest API: We have used echonest like a bridge between the Spotify/Deezer APIs and musixmatch giving us more information about the relation between the tracks and lyrics.




Scores4u  
Find your score or...create it!

Home Search Editor Info Team

## CREATE YOUR OWN SCORES WITH HTML5 AND JS

The Score Editor is still in pre-alpha phase, due to some issues with multiline rendering that haven't been solved yet... But feel free to try it out! Use the arrow keys to navigate through the score. To add new notes, go to the end and hit Enter. Pitch can only be changed one semitone at a time by now. To change the duration of a single note, hit a number while it's selected. It's the same encoding Finale does: 7 for a whole note, 6 for a half note, 5 for a quarter, and so on.



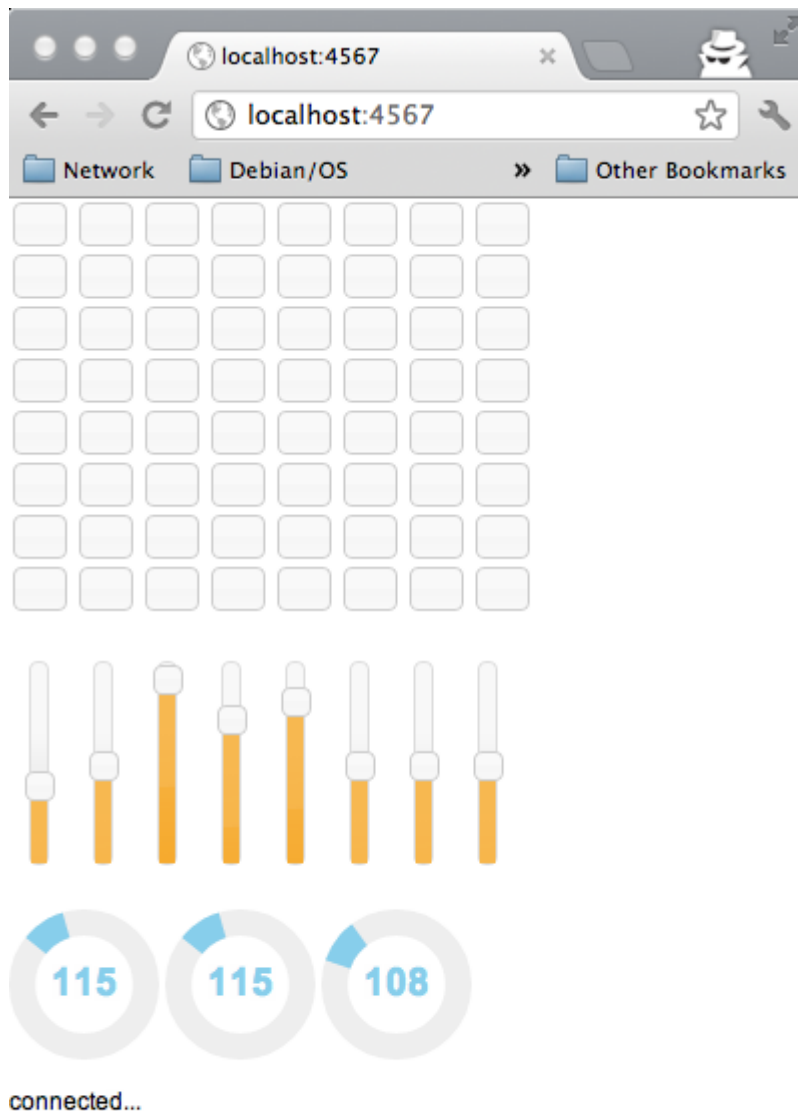
### 3.6.1.7 SOScial

Description: It builds an interface with which you can control OSCulator, which sends MIDI notes to whatever device you want to talk to. The deal is, as it's using websockets and every client subscribes to all fader/knob/button states, you have every browser in sync, meaning that you can control the same application with multiple people/devices/browsers. As the connection is stateful and you transfer a lot of small packets, you can even do it via a distant remote e.g. the internet.

Creator(s): Frederic Jaeckel

Technology:

- OSCulator
- Ableton Suite/Live 8
- JavaScript/Websockets/ruby/osc-ruby



### 3.6.1.8 Tunemap

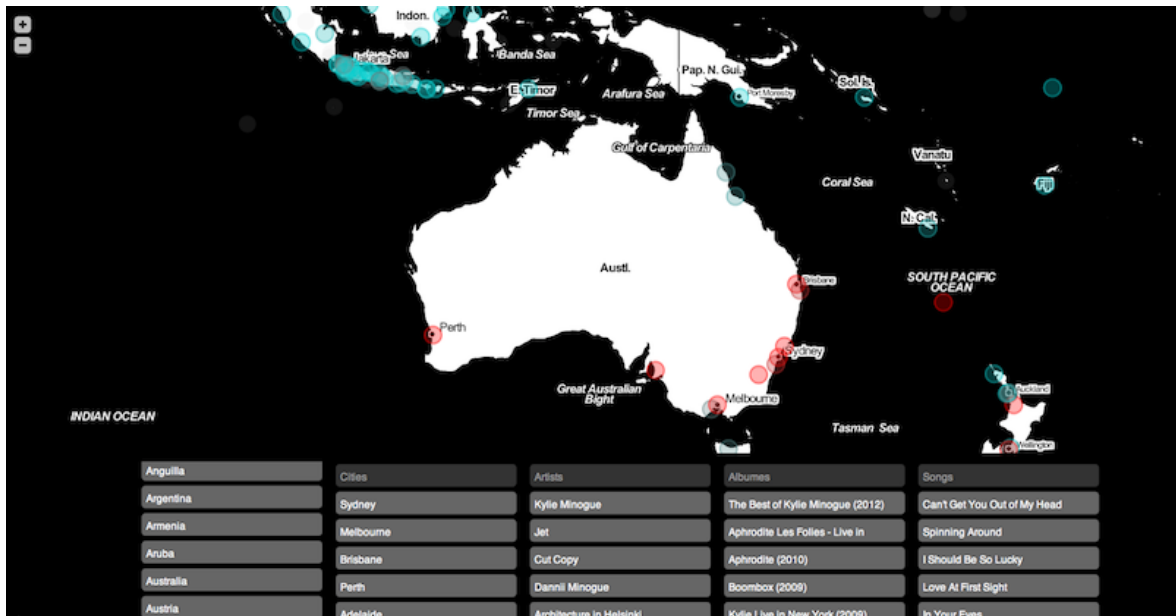
Description: Tunemap is a tool for browsing through the large music catalogs of Echonest and Deezer, using geographic location as the main input.

Creator(s):

- Guillermo Malón
- Alberto González
- JP Carrascal

Technology:

- Echonest
- Deezer
- OpenStreetMaps
- Quadrigam
- Stamen Maps
- Leaflet





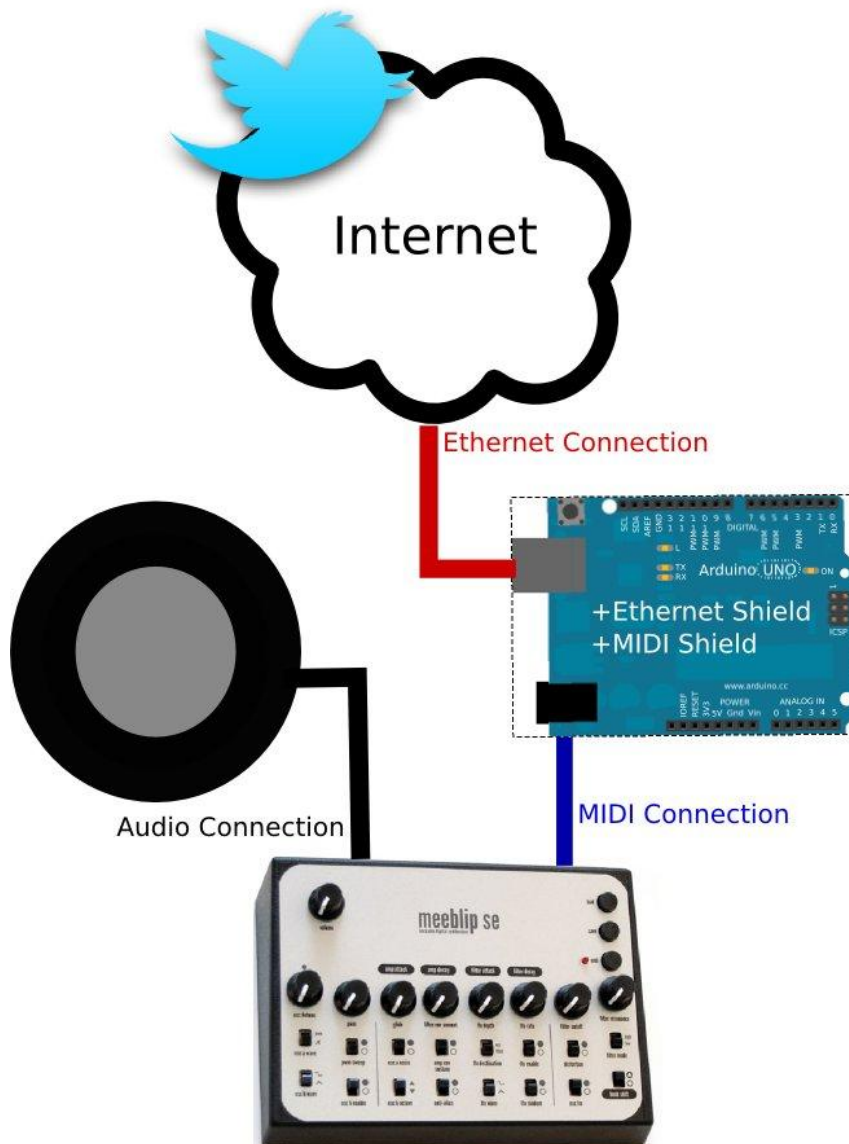
### 3.6.1.9 TuitSynth

Description: The idea is transform the tweets containing HT #sonar2012 into sounds (or noise) in real time. It's a 100% Open Source Hardware ( <http://freedomdefined.org/OSHW> ) project: an Arduino (with Ethernet Shield) gets the tweets from Twitter, converts them into MIDI Notes and MIDI Control Messages and sends them (via MIDI Shield) to MeeBlip synthesizer. So no computer is needed.

Creator(s): Jordi Sala

#### Technology:

- 1 MeeBlip (<http://meeblip.com/>)
- 1 Arduino UNO (<http://arduino.cc/en/Main/ArduinoBoardUno>)
- 1 Ethernet Shield (<http://arduino.cc/en/Main/ArduinoEthernetShield>)
- 1 MIDI Shield
- 1 I2C LCD 16x2 Screen
- 1 MIDI Cable
- 1 Battery (9v)



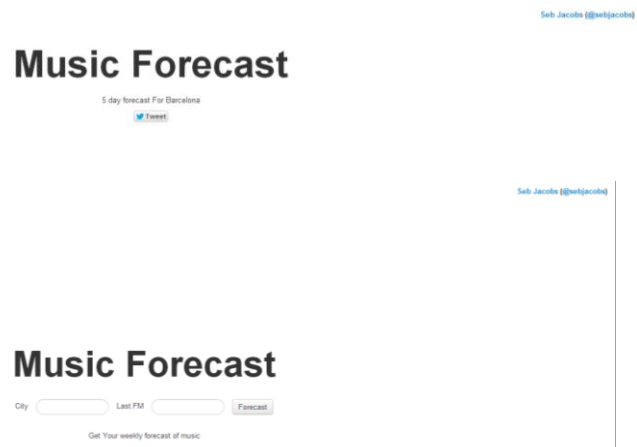
### 3.6.1.10 Music Forecast

Description: A simple web application which generates Spotify playlists using the weather forecast for a given city and your LastFm listening tastes.

Creator(s): Seb Jacobs

Technology:

- EchoNest
- LastFm
- Google's Weather API
- Spotify Play Button
- Ruby On Rails



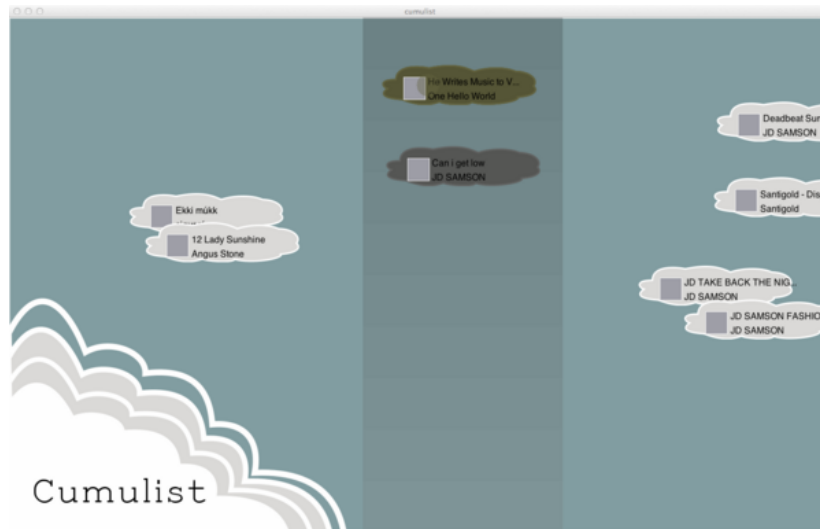
### 3.6.1.11 Cumulist

Description: Collaboratively create a playlist from SoundCloud tracks using an iOS device. Point the device at the interface to guide tracks into the playlist. Multiple users can interact at the same time and even upload their own user photos on the fly.

Creator(s): Becky Stewart and Amélie Anglade

Technology:

- Oblong's Substrate library for Processing
- SoundCloud API
- Jtool



### 3.6.1.12 Kinectstrument

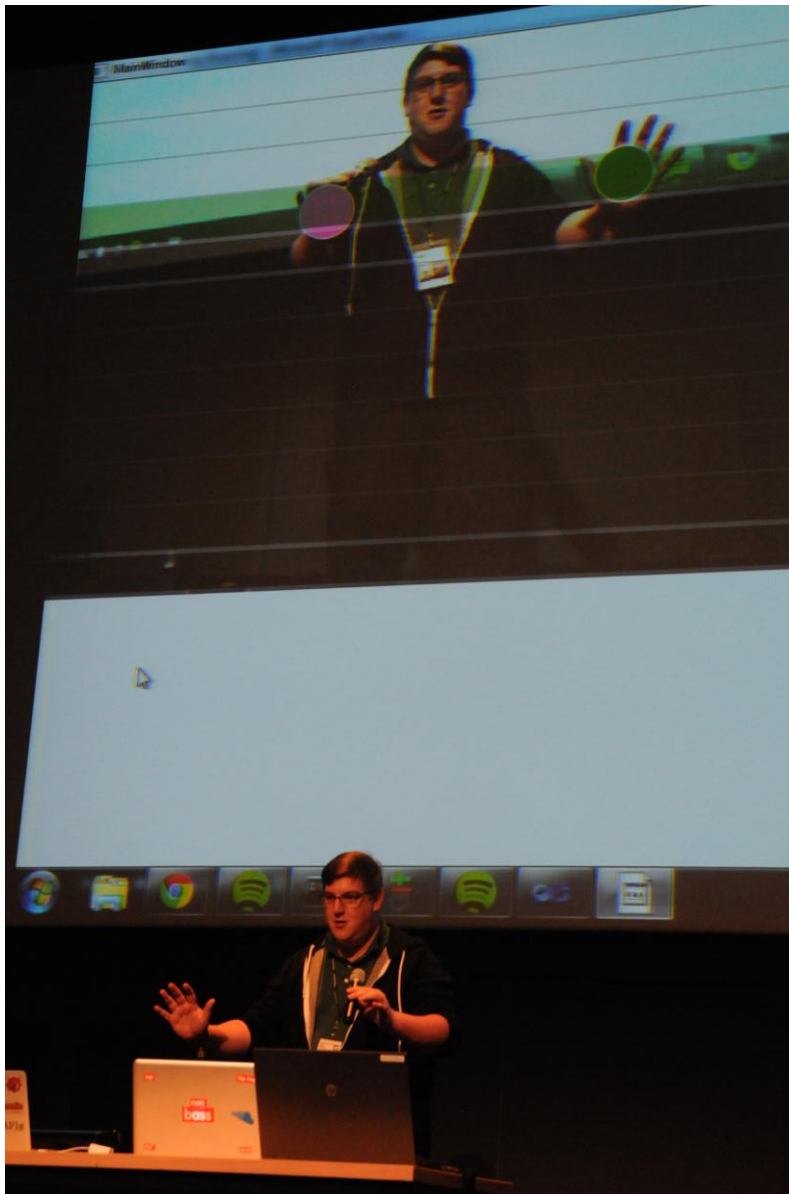
Description: Solo to your favourite song on Spotify with the Kinect!

A WCF/XAML application using the Kinect to interpret and output MIDI. Connects via a web socket to a node server that sends scale information. Spotify app that sends from the current playing track using Echonest..

Creator(s): Matthew Larsen

Technology:

- Microsoft Kinect SDK
- midi-dot-net
- EchoNest
- [1] Node.js
- socket.io for .net
- Spotify Apps API



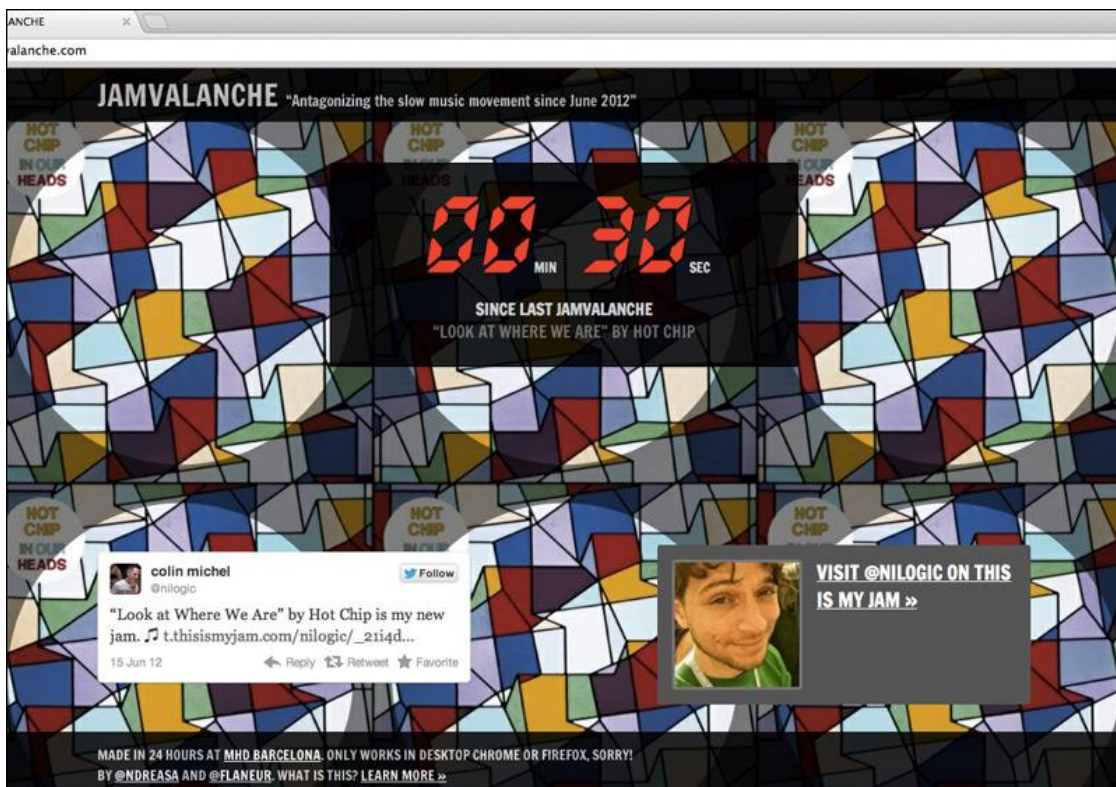
### 3.6.1.13 Jamvalanche

Description: We're part of the team that made This Is My Jam. We created TIMJ because we'd grown tired of the incessant, oppressive barrage of tweets and status updates; great music was getting lost in the deluge. So we built a new home for your favourite song, one that encourages you to slow down, choose carefully, and listen to songs from friends fully and repeatedly. Jamvalanche, on the other hand, won't have any of that touchy-feely bullshit. It watches Twitter for mentions and links to jams in real-time and turns them into an oppressive, incessant barrage of auto playing musical updates from people you don't even know. BOOM!

Creator(s): Andreas Jansson and Matthew Ogle

Technology:

- This Is My Jam beta API (with Marmalade)
- Twitter API
- Freesound (for the gong!)
- Tornado
- Some other hastily pulled together bits (Soundmanager2, HTML5 Boilerplate, Youtube, etc etc)



### 3.6.1.14 Legalize It!

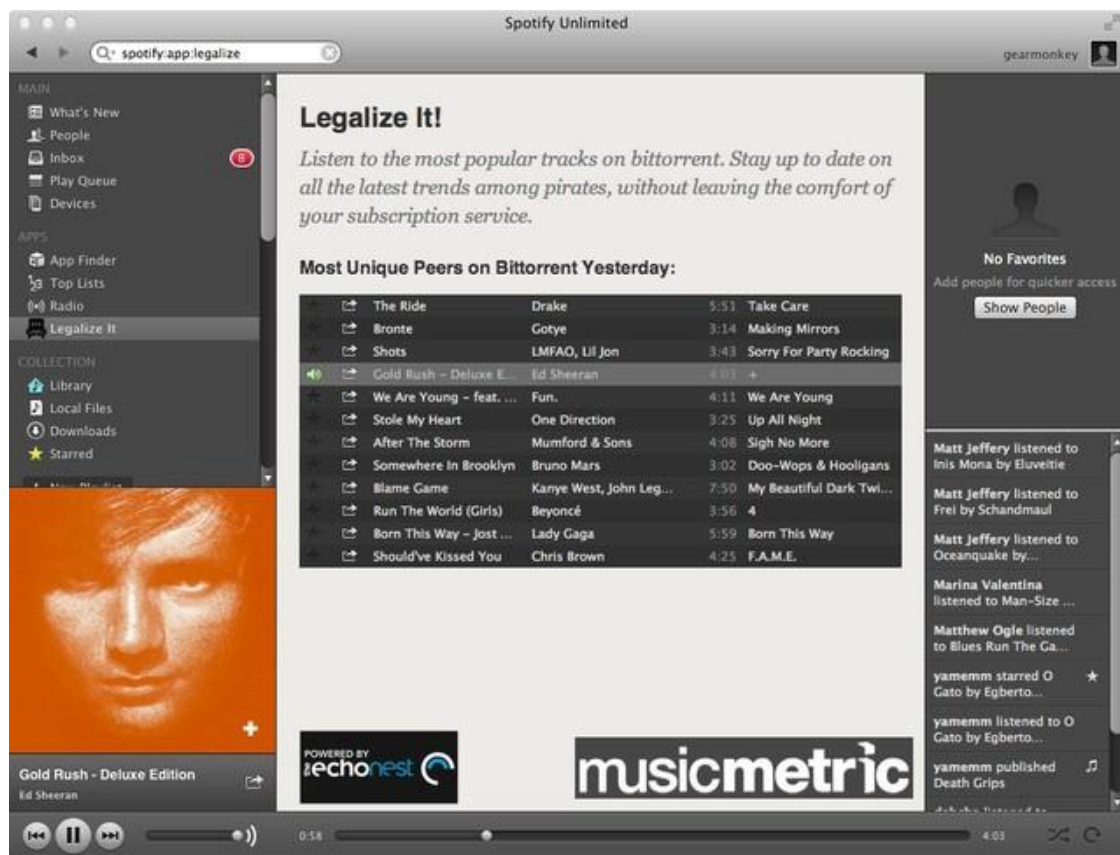
Description: Listen to the most popular tracks on bittorrent. Stay up to date on all the latest trends among pirates, without leaving the comfort of your subscription service.

Maps the most popular albums across Bittorrent (from Musicmetric API) to Spotify albums (of those that are available in our locale of course, don't want to get our ears dirty). Then determine an optimal playlist through the list of albums by means of a greedy path optimization, one track per album, via audio summary features from the echonest

Creator(s): Ben Fields

Technology:

- Spotify metadata REST API, via spotimeta python wrapper
- Spotify desktop app platform
- The Echo Nest, via pyechonest python wrapper, for high-level audio features
- Musicmetric API via mmpy python wrapper, for daily bittorrent releasegroup charts
- Pyramid is the webstack





### 3.6.1.15 AriHits

Description: The app has a drum machine that is controlled by tilting the device. The user can insert bass and guitar samples. The app also streams a random spoken word track from SoundCloud to complement your beat.

Creator(s): Ariel Elkin

Technology:

- SoundCloud Web API
- ObjectAL for iPhone, an OpenAL wrapper





### 3.6.1.16 SongWaver

Description: This hack is a proof-of-concept for a gestural-based music recommender. It makes use of the Musipedia database, that can handle melodic contour queries (for example... something like "up-down-down-down-up"), and generates queries by analysing the movement of the phone. In this way, the user can shape naturally contours and discover songs that follow them.

Creator(s): Quim Llimona

Technology:

- It's a simple webpage, plain HTML + JS. I wanted to use Musipedia API and integrate more services, but I couldn't get it to work.



### 3.6.1.17 Sing your melody

Description: In this hack, MuseScore is extending with pitch recognition. One can sing or whistle a note and MuseScore writes it into the score.

Creator(s): Kaspar

Technology:

- MuseScore
- Aubio

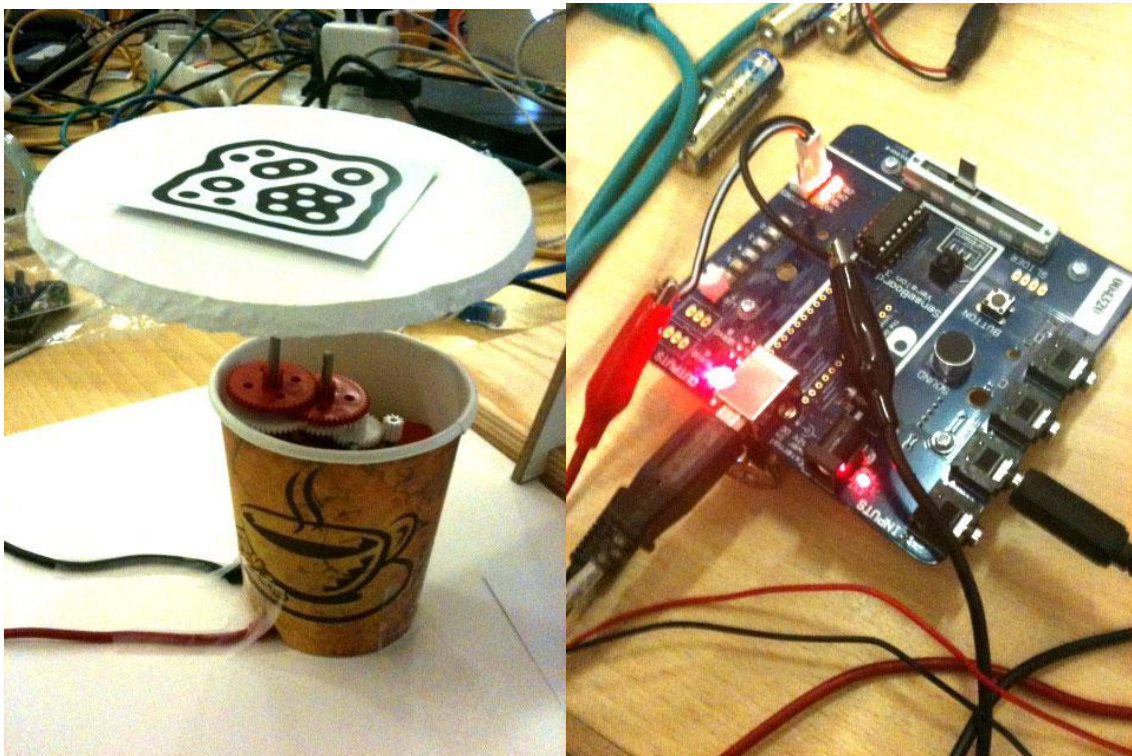
### 3.6.1.18 Soundscape Turntablism

Description: This music hack is a follow up of SoundscapeDJ, presented at the Hack Camp (Music Tech Fest, London 2012). In this occasion we built a tiny homemade turntable using a DC motor. The motor is controlled via Sense board, which allows mapping any sensors to the rotation speed. You can use Reactivation fiducials as "records", in this case, sounds from Freesound.org. The rotation rates of the fiducials affects the audio rate of the recordings.

Creator(s): Gerard Roma and Anna Xambó

Technology:

- [Freesound.org]: Freesound 2 API
- [SuperCollider]: Freesound2 Quark, SETO Quark
- [ReactIVision]
- [Sense board]



### 3.6.1.19 Talkrecordin

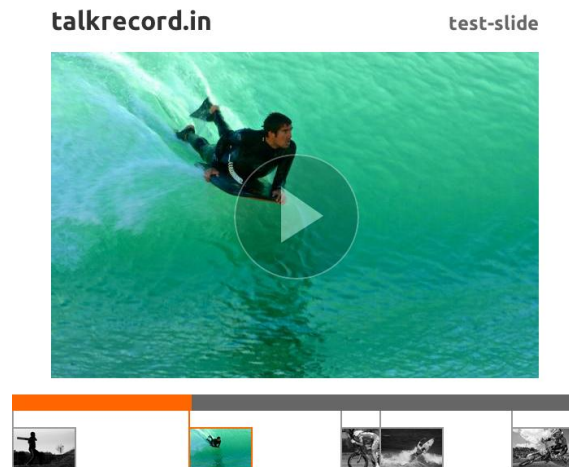
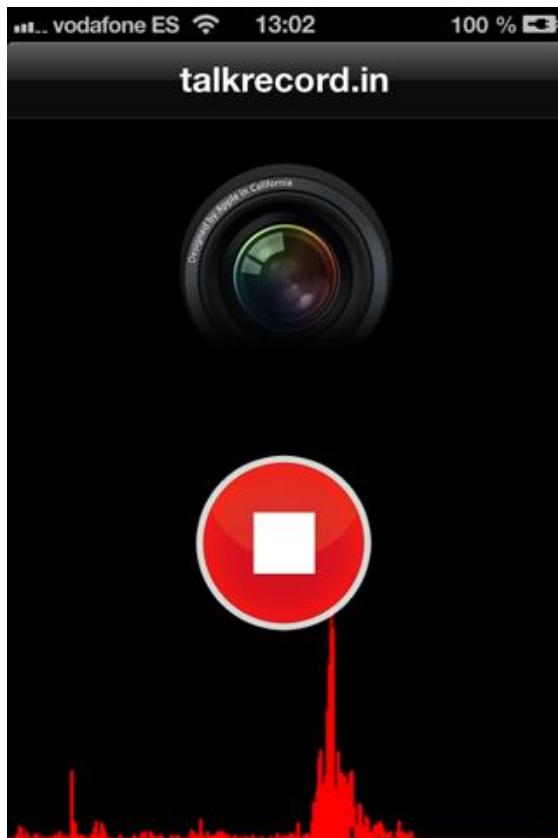
Description: With a smartphone it is easy to record the audio of talks at conferences. But how to get the slides into that?

With the talkrecordin iPhone app you can record a talk and at the same time make photos of the slides. Once you're done, everything will be uploaded. To listen to and see the presentation just go to <http://talkrecord.in/<username>/<trackname>> and enjoy..

Creator(s): Daniel Kesselborn, Alexander Simmerl and Peter Minarik

Technology:

- SoundCloud API for Track Upload and Comments



### 3.6.1.20 FreestyleSound

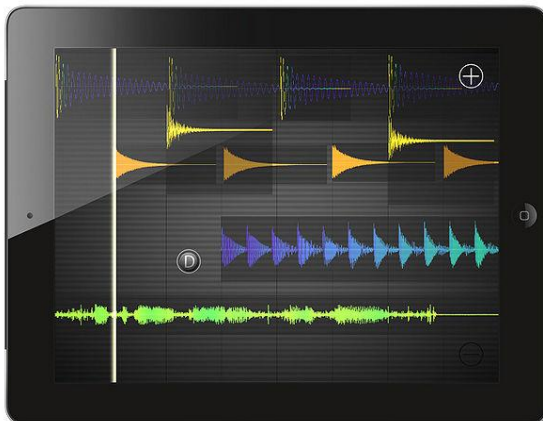
Description: It's an iPad app that connects to the Freesound database and allows the user to manipulate the samples using multitouch gestures. We put special effort in the user interaction and the visual quality.

It allows changing the tempo with the horizontal axis and the amplitude with the vertical axis of every sample, It has a global delay and it's easy to search by tags on the Freesound database. You can change the global tempo of the app

Creator(s): Marcos Alonso & Javi Agenjo

Technology:

- openFrameworks for the visual part
- Freesound JSON API for the queries



### 3.6.1.21 HackRap

Description: A live performance of a rapper, a flutist and a bunch of geeky hackers. We are employing different technologies and techniques to enhance the live performance of the rapper and the flutist.

The performance consists of:

- A lyrics hack is getting one random sentence of a paragraph from a list of different rap artists using the MusixMatch API. The singer will freestyle based on cues that she will receive from the lyrics hack.
- A flutist will perform in parallel with the singer
- One hack is getting the pitch analysis of the flute and the singer and harmonizing it to a base line
- We are utilizing samples from Freesound API with the similarity function
- We are alternating those samples with the audio input, upload it to EchoNest and we are getting the onset detection from that audio and use it to make real time rhythm section of our performance
- A Kinect user by dancing is controlling parameters of the audio signal produced in real time
- A real time data visualization of the skeleton produced by the Kinect. The public using the Oblong App can control the visualization and affect the live performance

Creator(s): Carlos Vaquero, Sylvain Le Groux, Marte Roel, Vreni Michelini Castillo, Joan Mora, Vicky Vouloutsi, Marco Marchini, Giovanni Maffei, Nuria Mone

Technology:

- MusixMatch API
- Oblong App
- Freesound
- EchoNest
- Pure Data, Processing, MaxMSP, Ableton Live, Python

### 3.6.1.22 Site Performance

Description: I wanted to expose the newer API's of the Chrome debugger that allow you to subscribe to Debugger events in other open tabs and then turn those events into music so that you could be doing something else while listening to how your page performs. Notes are slow page load, render, or script evaluation events. Higher is faster, lower is slower.

Creator(s): Darrell Stephenson

Technology:

- Chrome API

### 3.6.1.23 This is my Panda

Description: Which artists garner the most kudos amongst your followers?

When are your followers the most active, offering the most "likes"?

This hack attempts to answer these questions in the context of 'This is my Jam' in a dynamic personal dashboard.

"I should post a David Bowie jam at 18:00 GMT on a Thursday."

Idea partially inspired by @alsothings when we realised we had the same question about daily and weekly cycles on the site. I've since been told the @neomoha wrote a paper on a similar topic, as well.

Creator(s): Adam Lindsay

Technology:

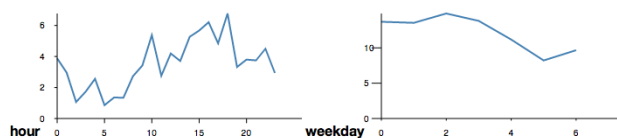
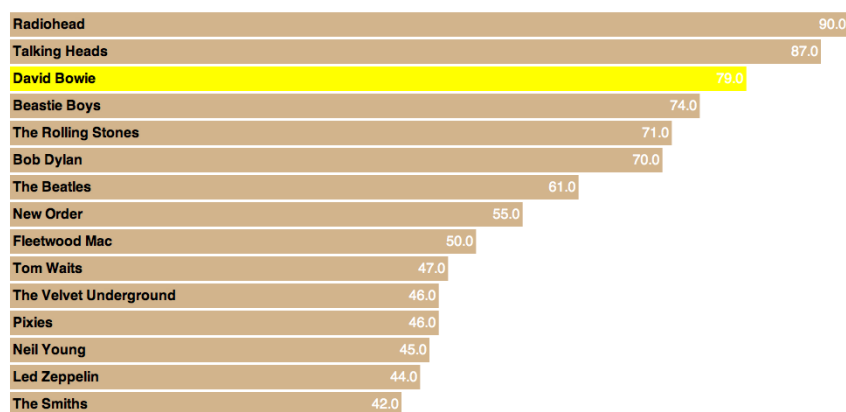
- This is my Jam API (via a forked Marmalade)
- d3.js
- Python

Discographies



## This is my Panda

15 June 2012



Popular artists among  's followers by:



### 3.6.1.24 Jamming Invasion

Description: Classic Space Shooting Game that uses a sound live source to generate the enemy line according with Frequency Analysis. It's possible to play "against" a record track or a friend recording via internet connection or a simple microphone or line-in instrument. The richer performance the harder to survive!! You can play it in your phone or in your computer.

Creator(s): Javi Aránega, Alfonso Pardo & Aimar González

Technology:

- Flash Player 10 Spectrum analyzer & Sound API
- Soundcloud Upload Service
- Sample game 'Waste Invaders' from <http://gaming.adobe.com/getstarted/>





### 3.6.1.25 Moodorama

Description: You're traveling around Spain, and you're listening to music, and have a special moment you'd like to remember forever. Moodorama is a way to save and share those memories, both visually and musically. The hack consists of a mobile app and a web site. The mobile app captures your location, and identifies the song you're listening to as well as its mood, then "tags" it for you on twitter along with a URL. The web site then takes the parameters in the URL, and renders a wraparound panorama of the spot you tagged, while the song that you were listening to plays along. The motion and color of the panorama imbue a sense of the mood of the song you tagged.

Creator(s): Ching-Wei Chen & Jaume Sanchez

#### Technology:

- Gracenote Mobile Client SDK for identifying the song and the mood
- Twitter REST API
- Google Street View API for images
- Canvas to stitch the images into a panorama
- WebGL to render the scene and apply the motion and color filters
- Spotify to play the music



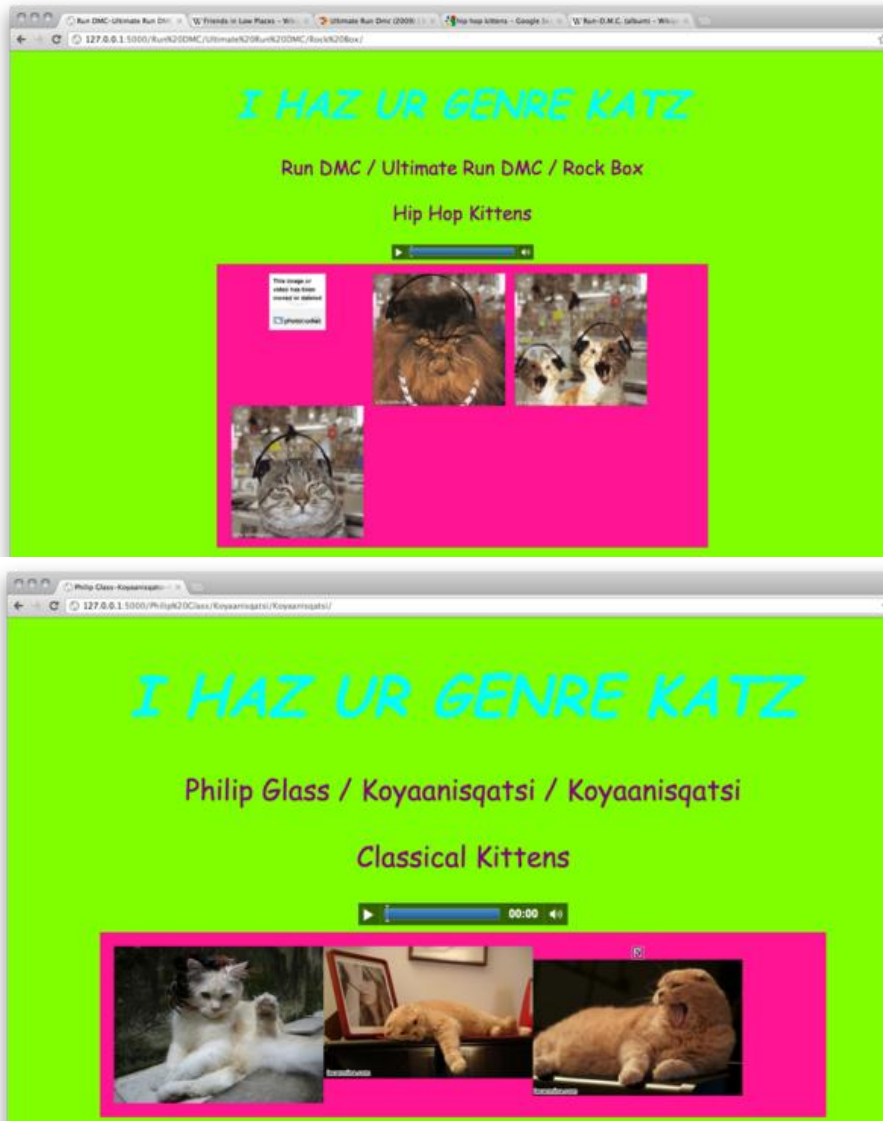
### 3.6.1.26 Genre Cats

Description: Kittens and music are combined to make listening to music more interesting.

Creator(s): Phillip Popp

Technology:

- flask (python) scipy numpy Gracenote 7digital



### 3.6.1.27 Ilikemysound

Description: ilikemysound.org allows you to upload the sounds you like and order a T-Shirt with a QR code to share it with the whole wide world.

Creator(s): Wernfried Lackner + Stefan Kersten

Technology:

- Spreadshirt API

### 3.6.1.28 Comments Sync

Description: It's a web-based video clip, using data from SoundCloud. I check the comments for a given track, check if the user posting has its location in their profile, fetch the street view panorama for that location. That creates the slides used as backdrop. I then play the song with soundcloud's streaming API, and listen to the comments. Every time there's a comment, I shake the camera a bit. You start noticing that in some tracks, comments are clustered on the best parts, which make for a good "sync" without accessing the audio data.

Creator(s): Jaume Sanchez

Technology:

- SoundCloud API
- HTML, CSS, JavaScript,HTML5 Canvas, WebGL
- three.js and GSVPano.js



### 3.6.1.29 Moodmash

Description: Display the moods from your top tracks on Last.fm.

Creator(s): David Yerrington

Technology:

- jQuery
- RaphaelJS
- PEAR Modules - HTTP\_Request, Cache\_Lite, XML\_Serializer
- Gracernote Web API



## Moodmash

Display the moods from your top tracks on Last.fm ~~and Radio~~.

- jQuery
- RaphaelJS
- PEAR Modules - HTTP\_Request, Cache\_Lite, XML\_Serializer
- Gracernote Web API

### Last.fm



*My Prototype service is a bit slow and unstable! Please be patient while the results load.*



### About Me



**David Yerrington**  
Gracernote



### 3.6.1.30 Mash TV

Description: The hack uses a song seed (artist name & song name) to find similar tracks (Same Key, Mode(Major/Minor) and BPM) by similar artists. This is done with the Echonest API. Then we use the Echonest remix API to detect the sections of the selected songs and create a loong video mashup file, which should be then streamed online to the user (not implemented yet). We have successfully generated mashups with more than 5 different songs in one video.

Creator(s): Hector Parra, Jordi Hidalgo & Oscar Casanovas

Technology:

- Echonest API
- Youtube videos.

### 3.6.1.31 VirtualMuseum

Description: The idea is to create a virtual museum with the cronological history of any artist or group, but that was just the idea. The application should work on any Android device, IOS device, Flash enabled device ,web with unityplayer, pc and mac.

Creator(s): Oriol Fernandez

Technology:

- Echonest API
- Unity to create the 3D world

### 3.6.1.32 Doodle Radio

Description: Music is changing so fast and the way we listen to it even more... Doodle Radio wants to bring you back to how you would enjoy music some years ago... but with 'the latest lyrics shared nowadays on Twitter'.

Creator(s): Nick Dima & Pierpaolo Di Panfilo

Technology:

- Twitter API
- Musixmatch API
- Spotify Apps API
- Deezer API



Organised by:



Partners attending:



### 3.7 MIRÉS Panel 'Make, Play, Share: the Future of Music Tech' at Sonar Festival

EVENT INFORMATION	
<b>Event title</b>	Sonar Festival, within SonarPRO (Professional area of the music festival)
<b>Dates</b>	June 14th 2012
<b>Location</b>	Barcelona, Spain
<b>Tags</b>	Folk music analysis, computational ethnomusicology, interdisciplinary
<b>Proceedings URL</b>	<a href="http://www.mires.cc/MIRÉSForum%40SonarPro">http://www.mires.cc/MIRÉSForum%40SonarPro</a> <a href="http://sonar.es/en/2012/pg/ideas-debate_48">http://sonar.es/en/2012/pg/ideas-debate_48</a>

The Sonar Panel is a discussion amongst Relevant Music Industry players which intended to look into the future of the Music Industry from three perspectives: Search & Discovery, Creativity and Rights Management and gather first-hand feedback from relevant industry players. Music Cataloguing, Music Search and Recommendation, Interfaces, Playlist Generation, Music format, Mobile applications, charts, tagging, Music Databases, Music services interoperability. The discussion spanned 1h20 so a big number of topics were brought up. Please, see below some of the contributions which are taken into account in the Roadmap:

- Is it Music Recommendation as good as a Human Recommendation? For some speakers, Music recommendation is as good as it gets. For some others, there is still a long road ahead for every user to have their own John Peel. Also, Music recommendation still lacks to take the time factor; the sociocultural evolution of what a given song/artist represent. This is a big topic which should be addressed.
- Music charts: Most of the speakers agreed that they are still relevant. Music is emotion and connecting with people. Listening to the same songs as your peers is a way for creating bonds with them. The charts are now more granular per tag/micro styles/community of friends....
- Geographically tagging: is very relevant for music personalization.
- Music services Interoperability: it is very necessary in order to create new user experiences. Musicbrainz is trying to reach that by building a unified music metadata database. New tools have appeared in the last years to resolve content regardless across music repositories, streaming services and geographic territories (<http://www.tomahawk-player.org/>).
- Playlist generation (Music Listening experience): it was agreed that, being music basically emotion, new music experience tools must focus on emotional coherent experiences.
- User experience: "why music services still look like music spread sheets?" More research is required in tangible and visual interfaces... Songs are no longer 3 minute long mp3 files but can be hours long and divided into tracks available through the artist mobile app.
- Unified Music Database: having a Unified universal metadata database for musical assets is key for building the music rights tracking systems of the future.

Organised by:



### 3.8 MIRÉS Panel 'The Future of Music Information Research' in the frame of CMMR 2012

EVENT INFORMATION	
<b>Event title</b>	The Future of Music Information ReSearch, a panel discussion within the scopes of CMMR 2012 conference.
<b>Dates</b>	June 21st, 2012
<b>Location</b>	London, UK
<b>Tags</b>	music and emotions, emotion and mood recognition, historical and computational musicology, MIR social and cultural impact
<b>Proceedings URL</b>	<a href="http://cmmr2012.eecs.qmul.ac.uk/sites/cmmr2012.eecs.qmul.ac.uk/files/pdf/CMMR2012ProceedingsFinal.pdf">http://cmmr2012.eecs.qmul.ac.uk/sites/cmmr2012.eecs.qmul.ac.uk/files/pdf/CMMR2012ProceedingsFinal.pdf</a>

On 19th-22<sup>nd</sup> of June 2012, Queen Mary University of London organized the 9th International Symposium on Computer Music Modeling and Retrieval (CMMR 2012) at the QMUL Mile End Campus, London, UK. The main conference topic was "Music and Emotions". In the third day of the symposium, a panel discussion was organized on the "Future of Music Information reSearch", moderated by Prof. Geraint Wiggins (QMUL), with invited speakers being Prof. Joydeep Bhattacharya (Goldsmiths, University of London), Prof. Tim Crawford (Goldsmiths, University of London), Dr. Alan Marsden (LICA, Lancaster University), and Prof. John Sloboda (Royal Holloway University, Guildhall School of Music & Drama). Panelists were asked to prepare a 10-minute introduction, followed by cross-questioning and audience participation. The panel discussion lasted about 90 minutes, was attended by about 50 people, and can be viewed online at <http://www.mires.cc/videos/CMMR2012>.

The themes and challenges that arose from the discussion can be grouped into the following categories:

1. Musical emotion
  - Music-induced mood and emotion: are they the same or different?
  - Are musical emotions "real"?
  - Perceived and felt emotion - are they the same or different?
  - Are musical emotions similar to other emotions?
  - What are the best models of musical emotion?
  - Is musical emotion equivalent to aesthetic experience?
  - What is the role of expertise, gender, culture and social context?
  - Most studies are relying on self-reports of emotions; are they trustful?
2. MIR tools/systems for historical musicology
  - Are current industry-oriented applications suitable for musicologists?
  - What is our main source for text/label information retrieval?
3. Provocations about musical value and culture
  - Are we confusing between being emotional about music and recognizing emotions in music?
  - If we care about music so much, why do we not treat it like a precious item?
  - Do we have an effect on music that we research by doing our own research?
  - What is MIR research doing to musical culture, what are the consequences?
4. Expanding the musical object
  - What is the definition of a musical object?
  - Can we expand that definition to include information on the performance in context?
  - Can context and liveliness be retrieved by MIR?



- Is MIR “finding the music you want”?
  - If so, can MIR extend its remit from past recorded performances to future live ones?
5. Addressing human benefit
- How does a researcher decide what research to do?
  - How does a research community decide what research to support/promote?
  - Are there any policies and procedures for MIR?

On MIR tools for musicologists, Tim Crawford suggested that audio is increasingly used as a source of information compared to scores, and that optical music recognition should be also considered to be part of MIR. In addition, a need for user-friendly interfaces instead of command-line tools for systematic musicology was emphasized, mentioning that the vast majority of MIR research does not take into consideration the end-users.

Regarding the consequences that MIR research can have to musical culture, two specific applications were suggested by Alan Marsden, which would treat music as if with cotton gloves: a search engine for pleasant surprises (e.g. a competition to generate playlists for an internet radio station accessible during an ISMIR conference; the winner would be the one who had attracted most listeners) and a sound-file player which respects the structure of music and goes back to the beginning of the phrase when resuming after a pause.

For the discussion on the concept of a musical object, it was proposed that it would not only include a score and/or sound file, but the complete performance in context (place, time, participants, social function, and psychological state of the participants).

Regarding the social benefit of MIR research, Alan Marsden mentioned a false logic that prevails in MIR: since music is of social benefit, and our research is on music, that would mean that our research has automatically social benefit, which is obviously not true. John Sloboda suggested selecting a percentage of papers at the next CMMR conference which will have scored highly in a social benefit assessment. A sub-committee will discuss, consult on, and agree upon criteria which would enable MIR research to have potential benefit outside the discipline.

Organised by:



Partners attending:



### 3.9 Second CompMusic Workshop

EVENT INFORMATION	
<b>Event title</b>	Second CompMusic Workshop: Computational Models for Music Information Research
<b>Dates</b>	July 12 <sup>th</sup> -13 <sup>th</sup> 2012
<b>Location</b>	Bahçeşehir Üniversitesi, Istanbul, Turkey
<b>Tags</b>	Multiculturalism
<b>Proceedings URL</b>	<a href="http://mtg.upf.edu/node/2639">http://mtg.upf.edu/node/2639</a>
<b>Other remarks</b>	Complete program available here <a href="http://compmusic.upf.edu/node/130">http://compmusic.upf.edu/node/130</a>

On July 12th and 13th 2012 we organized the 2nd CompMusic Workshop in Istanbul, at Bahçeşehir Üniversitesi. Right before the workshop we also had three days of meetings with all the project team. This was the first time that all the members of CompMusic were together. The location was idyllic, right on the Bosphorus, with a great view of the strait and of the city. Both the pre-workshop meetings and the actual workshop were very successful, academically and socially.

This second workshop coincided with the starting of the second year of the project, an ideal time for planning the remaining four years while being able to present some initial results to prove the feasibility of the project goals. We are now four research teams and we are working on three (Hindustani, Carnatic and Turkish-makam) of the five chosen non-western music cultures.

The topics and research approaches than can be covered in CompMusic are too many and we can only focus on a few. The presentations by the project members showed this focus and it was good to have presentations by external researchers that covered other relevant topics. In the project we are mainly focusing on: intonation characterization, melody and rhythm description, community characterization, and music browsing and discovering methods.

On the pre-workshop meetings we had overview talks by project members, giving space for informal discussions and exchanges of methodological approaches among the project members. The agenda of these meetings was:

- Tools (July 9th): CompMusic Browser and computational infrastructure at UPF (M. Sordo); MusicBrainz (A. Porter); Freesound (F. Font); Machine learning methods for music analysis (H. Murthy).
- Pitch and rhythm analysis (July 10th): Intro to pitch analysis (P. Rao); Comparison of pitch analysis algorithms (S. Gulati); Pitch analysis algorithms details (P. Rao, B. Bozkurt, S. Gulati); Rhythm issues (A. Holzapel, A. Srinivasamurthy); Turkish rhythm analysis [slides, video] (A. Holzapel, Fahrettin Yarkın); Indian rhythm analysis (A. Srinivasamurthy).
- Music discussions (July 11th): Open discussion on Turkish music with Okan Murat Ozturk; Open discussion on Carnatic and Hindustani music with T M Krishna and Suvarnalata Rao.

The actual workshop included 28 talks, most of them on research carried out within CompMusic but we also had presentations by external researchers working on topics of relevance to the project. For the opening of the workshop Xavier Serra gave a talk on "Opportunities for a Cultural Specific Approach in Computational Description of Music" in which he motivated and summarized the main research areas that we are working on. This was followed by three talks

covering the musical traditions being studied. Suvarnalata Rao talked on "Culture Specific Music Information Processing: A Perspective from Hindustani Music", T M Krishna on "Carnatic Music: Svara, Gamaka, Motif and Raga Identity" and Okan Murat Ozturk on "A Semiotic Approach to the Analysis of Makam Melodies: The Beginning Sections of Melodies as "Makam Indexes". The three musicians have become collaborators of CompMusic and their presentations showed how successful this collaboration is. The remaining workshop presentations dealt with specific technical topics that I list here.

### **Tonic detection and Intonation characterization in Indian music:**

- Bellur, V. Ishwar and H. Murthy. "A Knowledge Based Signal Processing Approach to Tonic Identification in Indian Classical Music".
- S. Gulati, J. Salamon and X. Serra. "Tonic Identification System for Hindustani and Carnatic Music".
- G. K. Koduri, J. Serrà and X. Serra. "Computational Analysis of Intonation in Indian Art Music".

In Indian music the tonic functions as the reference pitch from which all the harmonic and melodic relationships are established during a performance. Its automatic detection is a necessary step for analysing many musical aspects and thus it was the first problem that we wanted to solve. The tonic detection results obtained and reported in these articles are sufficient for the purposes of the project. A natural next step is the characterization of the intonation used in a performance. This is a not solved problem but the initial results reported at the workshop are quite promising. The proposed representation of intonation in raga music can be a valuable element used to describe various musical aspects.

### **Melody issues:**

- B. Bozkurt. "Features for Analysis of Makam Music".
- J. Ch. Ross and P. Rao. "Melodic Phrase Segmentation from Audio in Hindustani Classical Music".
- Vidwans, K. K. Ganguli and P. Rao. "Detecting Indian Classical Vocal Styles from Melodic Contours".
- V. Ishwar, A. Bellur and H. Murthy. "Motivic Analysis and its Relevance to rAga Identification in Carnatic Music".
- E. Ünal, B. Bozkurt and M. K. Karaosmanoğlu. "Incorporating Features of Distribution and Progression for Automatic Makam Classification".
- E. Özek. "The Concept of çeşni in Turkish Music and the Analysis of Performance-Theory Differences".
- T. H. Özaslan, X. Serra and J. Ll. Arcos. "Signal Analysis of Ney Performances".
- S. Şentürk, A. Holzapfel and X. Serra. "An Approach for Linking Score and Audio Recordings in Makam Music in Turkey".
- M. Subramanian. "Generating Computer Music from Skeletal Notation for Carnatic Music Compositions".

- S. K. Subramanian, L. Wyse and K. McGee. "A Two-Component Representation for Modeling Gamakas of Carnatic Music".

There were many talks related to the characterization of melodies, both in Indian and Turkish music traditions. An advantage of Turkish music is the existence of scores, making it very valuable for the study of some melodic aspects. For using the audio signals an important first step is the extraction of the pitch contour of the lead instrument, which requires multipitch methodologies. Both makam and raga music have particular ways in which melodies are constructed and thus they require specific approximations in order to characterize them. Most of the presentations reported preliminary work and there is a long way to go before we have proper parameterizations with which to identify musically meaningful melodic elements. Two of the papers by external researcher focused on the synthesis of melodies, which is an interesting aspect not covered in the project.

### **Rhythm issues:**

- Srinivasamurthy, S. Subramanian, G. Tronel, P. Chordia. "A Beat Tracking Approach to Complete Description of Rhythm in Indian Classical Music".
- Holzapfel and B. Bozkurt. "Metrical Strength and Contradiction in Turkish Makam Music".
- P. G. Singh. "Auditory Scene Analysis and the Performance and Perception of Tabla Rhythms in Hindustani Music".

Both Turkish and Indian rhythms are very particular. The rhythm in Turkish music revolves around the concept of *usul* and the one in Indian music is based on the concept of *tala*. These concepts have been quite well formalized by musicologists but there is practically no computational work on them. Two of the articles presented very preliminary computational work, but there is a lot to be done before the existing musicological formalization can be turned into algorithmic approaches to describe the rhythm of both Turkish and Indian music traditions. One article presented some work on perceptual aspects of rhythm, which we are not covering within the project.

### **Community characterization:**

- F. Font and X. Serra. "Analysis of the Freesound Folksonomy".
- M. Sordo, J. Serrà, G. K. Koduri and X. Serra. "Extracting Semantic Information from on-line Art Music Discussion Forums".

A basic premise in CompMusic is the need to study and characterize the communities that support the music that is being studied. We want to analyse on-line communities and develop methodologies to extract musically relevant knowledge from them. We have used Freesound (on-line community of people that share and talk about sounds) to start developing methodological approaches of relevance to the project. The first musically relevant on-line community that we have studied has been Rasikas.org, using it to extract musically relevant information for the case of Carnatic music.

### Tools for browsing and discovering music:

- M. Sordo, G. K. Koduri, S. Şentürk, S. Gulati and X. Serra. "A Musically Aware System for Browsing and Interacting with Audio Music Collections".
- O. Babacan, C. Frisson and T. Dutoit. "MakamCycle: An Interactive Tool for Browsing Makam Music".
- O. Lartillot and M. Ayari. "An Integrated Framework for Transcription, Modal and Modal and Motivic Analysis of Makam Improvisation".
- Srinivasamurthy and P. Chordia. "A Unified System for Analysis and Representation of Indian Classical Music using Humdrum Syntax".

In CompMusic we are very interested in developing tools and methodologies to be used in practical music applications, especially applications for browsing audio music collections. A relevant functionality is to be able to discover patterns and musical relationships from which a listener can learn to appreciate better the music of a given culture. We presented a paper on the initial application prototype that is developed and other researchers presented systems that are being used in tasks of relevance to CompMusic.

There were two other talks that are outside the proposed organization, one by P. Sarala et al. on "Applause Identification and its Relevance in the Archival of Carnatic Music Audio Recordings" and one by M. Demoucron et al. on "Sculpting the Sound. Timbre-Shapers in Classical Hindustani Chordophones".

A part from the formal talks, the local team put together two very interesting concerts. One was by Bengi Bağlama Üçlüsü, a turkish group dedicated to folk makam music that is lead by Okan Murat Ozturk. The second concert was dedicated to Ottoman music with a group of performers directed by Bekir Reha Sağbaş. Both concerts included a pedagogical element and the musicians made a special effort to present the pieces and discuss various aspects of their use of makams.

In all academic conferences the informal discussions among the participants during the breaks and social gatherings are as important as the actual formal presentations. This was particularly true in this workshop. Given the focus of the workshop and the shared interests among all the participants, all the breaks and meals were very lively and many interesting discussions emerged. All participants expressed their interest in keeping the communication going after the workshop and in trying to collaborate with other researchers.

Organised by:



### ***3.10 Music Tech Fest: Music Tech Talks (Cultural Olympiad)***

EVENT INFORMATION	
<b>Event title</b>	Music Tech Fest: Cultural Olympiad - Music Tech Talks
<b>Dates</b>	26 July 2012
<b>Location</b>	Ravensbourne, London
<b>Tags</b>	music, information, creative, sound, colour, artists, designers, animators, film makers, music makers, music industry
<b>Proceedings URL</b>	<a href="http://www.youtube.com/musictechfest/">http://www.youtube.com/musictechfest/</a>
<b>Other remarks</b>	<p>Music Tech Fest TED-style channel on YouTube :</p> <p>An important platform has been gained with the Music Tech Fest channel on YouTube, which contains professionally filmed and edited videos of each Music Tech Talk, and which is serving as a repository of documented events and public information, as well as attracting proposals for further contributions.</p> <p>Stromatolite plans to continue to incentivise the Music Tech community thus created throughout the duration of the MIReS project, and encourage continued use of this framework beyond the duration of the project.</p> <p>The Music Tech Fest YouTube film release programme has enabled the brand to continue to build a global following and to reach new territories, like Brazil, that had not originally tuned in to the live broadcast during the festival.</p>

Andrew Shoben, founder of Greyworld discussed the potential of small sonic interventions embedded into the urban fabric of a public space, to allow some form of self-expression in areas of the city that people see every day but normally exclude and ignore. He presented a series of examples of work, both physical and aural, that attempt to establish special intimate zones, to 'short circuit' both the environmental and social expectations supplied by the surrounding urban realm.

Matthew Hawn of Last.fm delivered a talk about the new applications that Last.fm are building at to enhance the music playlist user experience, and about the collaborations with students and academic researchers in Aarhus, Denmark, to create novel forms of physical interaction using the Last.fm API.

Awards to the Hackers who contributed to the Music Tech Fest were announced by special guest Tim Exile.

Organised by:



### ***3.11 ISMIR 2012 – special session "MIRrors: Looking back to the past of ISMIR to face the future of MIR"***

EVENT INFORMATION	
Event title	ISMIR 2012
Dates	9-12/10/2012
Location	Porto, Portugal
Tags	ISMIR
Proceedings URL	<a href="http://ismir2012.ismir.net/event/978-972-752-144-9.pdf">http://ismir2012.ismir.net/event/978-972-752-144-9.pdf</a>

A special session was organized in ISMIR-2012 to reflect on past practices and existing knowledge that could have been over-ridden or that could help to guide the consolidation of our discipline. A special call for papers and a review track was held separately than that of the regular papers resulting in 6 out of 8 submissions being selected for the session. The papers were downloadable since weeks before the conference in order to facilitate having them read in advance by interested researchers. During the session, authors were given 8 minutes to summarize their positions and then the audience could interact with them, asking for clarifications, debating or commenting on their issues. Interaction between authors touching overlapping topics was also promoted. A special Google vote web was open to help researchers to contribute to the discussion after the session, where 25 questions were addressed to the authors (<http://www.google.com/moderator/#16/e=1fc7d1>).

The presented papers were:

- *Automatic Music Transcription: Breaking the Glass Ceiling* by Emmanouil Benetos, Simon Dixon, Dimitrios Giannoulis, Holger Kirchhoff, Anssi Klapuri (Queen Mary University of London)
- *Putting the User in the Center of Music Information Retrieval* by Markus Schedl and Arthur Flexer (Johannes Kepler University, Austrian Research Institute for Artificial Intelligence)
- *The Impact (or Non-impact) of User Studies in Music Information Retrieval* by Jin Ha Lee and Sally Jo Cunningham (Information School, University of Washington; Department of Computer Science, University of Waikato)
- *Mel Cepstrum & Ann Ova: The Difficult Dialog Between MIR and Music Cognition* by Jean-Julien Aucouturier and Emmanuel Bigand (LEAD Lab, University of Burgundy, Dijon)
- *Moving Beyond Feature Design: Deep Architectures and Automatic Feature Learning in Music Informatics* by Eric J. Humphrey, Juan P. Bello, Yann LeCun (NYU)
- *Reuse, Remix, Repeat: the Workflows of MIR* by Kevin Page, Ben Fields, David De Roure, Tim Crawford, J. Stephen Downie (University of Oxford; Musicmetric (Semetric Ltd.); Goldsmiths University of London; University of Illinois)

The presentations and discussions were extremely relevant for the MIREs roadmap. They remarked many key problems and areas and showed how we have proceeded in the past and, in some cases, shed light on how should we work or where the focus should be put on, in future research. The key topics addressed by the submissions cover feature development and selection, transcription, score following, emotion, the role of the user/listener, and how (or if) other disciplines such as music cognition could be helpful for MIR goals.

Some of the ideas gathered in the session are summarized here:

- There is the glass ceiling which is unlikely to be broken by algorithms (in their conventional meaning).
- The inherent issue of all research that is really useful to humans is that you can't do better without human-in-the-loop approach.
- Computer-only algorithms are fighting for the 0.01% of performance improvement, and no framework to let human help the algorithms exist. Informed Transcription



should be promoted, where human may interact either prior or after the algorithms. Somewhat similar thing is that the algorithms are being developed and improved, but they leave almost no trace in the domain.

- It would be nice if there was some platform, which constantly applies plugged algorithms for music, stores and gives an access to the results, refine them as soon as better algorithms appear, allows for human-in-the-loop, etc.
- Despite of all advances in collaborative-filtering methods, the content-based MIR still should be used due to the cold-start program. But the content analysis should be done right, with perceptually or informationally motivated features as features are way more important and crucial than classifiers; Deep Learning is a promising path on the latter.
- There is an important (semantic?) gap between MIR researchers and those of other disciplines like music cognition. How can we bridge it?
- Music Perception is useful to characterize User Properties and User Context, factors that have been usually neglected in most of MIR.
- Proper methodology is a delicate issue when we try to understand user-related factors and build user models.
- A *systems-oriented* bias has been present in existing MIR tradition because of the availability of data for research and experiments. It will be difficult to get the proper balance with *user-oriented* studies.
- Frameworks facilitating the re-usage or repurposing of existing libraries, code, binaries, are needed. We are wasting many already existing resources, we are wasting time re-inventing wheels many times...

This initiative has been continued under the shape of a special issue of the Journal of Intelligent Information Systems to be published in the 4th trimester of 2013. We are currently starting the reviewing process of 11 submissions, some of which are expanded versions of the papers presented in this special session of ISMIR-2012.

Organised by:



Partners attending:



### **3.12 ISMIR 2012 – Panel Session on Evaluation Initiatives in MIR**

EVENT INFORMATION	
<b>Event title</b>	13th International Society for Music Information Retrieval Conference
<b>Dates</b>	Oct 12th, 2012
<b>Location</b>	Porto
<b>Tags</b>	Evaluation initiatives, methodologies, MIREX, Million-Song-Dataset, MusicClef, MediaEval
<b>Proceedings URL</b>	<a href="http://ismir2012.ismir.net/event/satellite-events">http://ismir2012.ismir.net/event/satellite-events</a>

The panel session was held in the morning. Considering the numerous questions raised by the audience during the panel session it was decided to pursue the discussions with the audience during a session of the "late-breaking news" dedicated to "evaluation".

The planning of the morning session was the following:

- 11h00            General Introduction (Geoffroy Peeters)
  
- 11h05            Short overview of diverse MIR evaluation initiatives:
  - MIREX and MIREX-Next-Generation (Stephen Downie)
  - MillionSong (Brian McFee)
  - MusiClef / MediaEval (Nicola Orio)
- 11h10            Keynote by Gareth Jones "Searching for a Music REtrieval Conference (MREC)"
  
- 11h40am        "Round table on current methodologies in MIR evaluations"  
 Participants: Stephen Downie, Brian McFee, Nicolas Orio, Julian Urbano, Gareth Jones
  
- 12h35            MIR technologies performances in 2012 - Results/Winners
  
- 12h40        MIR technologies performances in 2012 - Details - Poster Session

The following is a summary of the discussions held during the afternoon session.

#### **Methodology**

There was a general consensus on the need to question the evaluation methodologies we currently follow with MIR tasks. As mentioned during the morning panel, some of the tasks evaluated did not start from a clear user need, and there were no community discussions on the development of the most appropriate test-sets, annotation and annotation procedures, evaluation measures, etc. In fact, tasks are often initiated thanks to graduate students who build a test-set and make it available to the rest of the community or for evaluation initiatives. We find this very problematic because there is a lack of documentation regarding these methodologies, making it very difficult to assess the reliability of the very evaluations and processes followed, so much that in some cases it is even impossible to carry out similar experiments in other labs. This is particularly problematic for newcomers, who are often faced with one of the MIR tasks but can get overwhelmed very easily due to the lack of clear and centralized documentation.

#### **Data**

The MIR community has gotten used to the fact that test-sets cannot be made publicly available. This has been justified by the fact that music audio data are in many cases under copyright and by the fact that distributing the ground-truth once an evaluation performed would involve being able to create a new test-sets for the next evaluation which remain very costly for our community. For this last reason, the same test-sets are often used over the successive experiments, and therefore their inaccessibility is supposed to refrain researchers from cheating or over fitting. However, in our view, this inaccessibility slows down improvement

of systems. With only performance figures over the years, there is no way we can know why our systems failed or succeeded, which is the key for improvement. An example of this was given during the morning panel for the Beat Tracking task for which all systems seem to perform very badly for a specific song, but there is no way of knowing what this song is. As pointed out during the morning panel, the issue of the copyright related to the music could be solved by using copyright free music (such as Jamendo).

### **Model**

The data issue begs the question of the evaluation model. Due to the privacy of datasets, the MIR community has also gotten used to an "algorithm-to-data" model in which participants submit their algorithm to an entity that runs and evaluates all systems for all tasks. In MIREX, this role is currently played by the IMIRSEL for the most part, although this year some tasks were decentralized and ran elsewhere. In our view, decentralization needs to go one step further, and try to follow a "data-to- algorithm" model as much as possible, where participants can run their systems on a publicly available data set, and then submit their raw output to a third party that scores the systems. This point is especially important because the current model places a very heavy burden on IMIRSEL in terms of workload and infrastructure.

### **Participation**

MIREX is currently attracting fewer people than in the past (crisis effect?). One example is the Audio Cover Song Identification task, which had been very successful in the past but had no participants this year. However, there were some posters from MSD Challenge participants that actually tackled cover detection. This indicates that, despite the lack of participation in MIREX, there is still some interest in the task, so the question that followed is: why not let participants lead, organize and run the task by themselves? The next two points follow from this question.

### **Task leaders**

During the session, a potential solution (proved to work efficiently in evaluation initiatives outside the MIR community) to the above-mentioned issues related to Methodology, Data, Model and Participation was discussed: decentralization of the evaluations through the creation of task-communities and task-leaders.

A task leader is a person who creates and animates a group of people interested in evaluating a task, defines the methodology for evaluation (finding or creating a suitable annotated MIR corpus, query set and relevance data as appropriate for the task, and selects or defines the performance evaluation metrics, animates discussions on the results obtained for a specific task). The task leader or coordinator essentially takes ownership of the running of the task, ensuring for example that instructions and data is made available according to an arranged schedule, answers questions from participants, and analyses and collates submitted results. There should not be an evaluation task for which nobody leads the task, since definition of a task often requires considerable work and it is important that someone leads to establish consensus of the right way to structure and evaluate the task. Running a task that is poorly defined is dangerous considering the consequence of deriving conclusions from an ill-defined evaluation. Even if the task is suitably defined, if there is no leader it is likely that it may not keep to its schedule or activities will be overlooked or not completed properly.

Some people questioned the personal value of being a task leader. It seems that people are afraid of the amount of extra work this involves, especially if it requires to create a new dataset from scratch. In that line, it was proposed to slightly increase the ISMIR registration fee and spend some funds every year for the incremental development of new datasets. The involvement of a tasks community can often help to solve this issue too. If someone is sufficiently passionate about the research questions involved in a task, they will often commit the effort to design the task and develop the required dataset, since this helps them to develop their own research; but also to encourage others to become involved and develop a community of like-minded researchers interested in this and related topics 4 . In fact, the majority of attendees were willing to volunteer as task leaders next year.

### **Facilitating the gathering and exchange of knowledge**

Many people were also concerned with the traditional poster session held during the last ISMIR day, where participants show their approach for the various tasks and the various evaluation initiatives. The general feeling is that one poster session is not nearly enough for people to discuss results and task design, and wondered whether there should be one day solely devoted to this. For the time being, it was proposed to move this evaluation session to the very beginning of the conference, so researchers have the chance to discuss during the following days and exchange thoughts on task design.

Organised by:



Partners attending:



### **3.13 ISMIR 2012 – Demos and Late-breaking: Music Information Research Challenges**

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EVENT INFORMATION	
<b>Event title</b>	Gran Challenges of MIR research session at ISMIR 2012
<b>Dates</b>	Oct 12th, 2012
<b>Location</b>	Porto, Portugal
<b>Tags</b>	Roadmap challenges, feedback
<b>Proceedings URL</b>	<a href="http://ismir2012.wikispaces.com/Program+suggestions">http://ismir2012.wikispaces.com/Program+suggestions</a>

A questionnaire has been created in order to get feedback from the ISMIR Community regarding the first version of MIR challenges identified in the roadmap. The form designed is available at <http://tiny.cc/wr0jlw>.

As a result, we got a total of 50 responses that will allow MIReS team to fine tune the first version of challenges defined. The feedback collected from the ISMIR community is as follows and the statistics are available as an annex of this document. All feedback has been processed and compiled and main highlights and insights to the roadmap can be found in the ISMIR Late breaking session paper (available as Annex).

As a result, we got a total of 50 responses that will allow MIReS team to fine tune the first version of challenges defined. The feedback collected from the ISMIR community is as follows and the statistics are available as an annex of this document. All feedback has been processed and compiled and main highlights and insights to the roadmap can be found in the ISMIR Late breaking session paper.

#### **1- Musically relevant data**

"Data is of course forms the core (and the first) pursuit of every researcher. It would be nice if Facebook, Google and the likes provide the data available to the researchers in their labs to others, at least partially or in a reduced form.

As long as the data is anonymized and no user is tracked (explicitly) there is no big ethical concern about accessing their data, after all it is only to improve the way we mine such data which in turn benefits them (and corporates!)."

I would replace "as many sources as possible" for "the relevant and quality ones"

I would add standardizing evaluation methodology and formalizing problems within MIR.

MIR can also focus on methods for automatic or semi-automatic annotation of large-scale data to be used by the research community.

Interactive music platforms where you can run own plugin functionality will help doing research which requires user involvement: A "musical turk"

There are lots of underlying aspects of music (esp. cognitive) which we cannot listen to by merely analysing audio. One clear example is music recommendation & music similarity areas, where audio data cannot really encompass the "human" opinion. For such situations text mining from blogs, forums etc. would be very relevant to acquire a wider understanding.

All these issues gravitate around the current MIR paradigm that suppose that machine learning algorithms can bridge the gap between musical sounds and musical meaning. I believe MIR needs a paradigm shift towards music representations that better represent music experience.

I think these are ALL critical. Researchers want to share data without fear of copyright infringement. Evaluation is also hugely important. Do our metrics really mean anything at all?

The MIR community is very limited by the music and audio data that can be used, since it is regarded as having commercial and artistic value. If we want to carry out large-scale science on such data researchers need to have the ability to use such data in their research in a way that other researchers can reproduce and build on those results, and validate that the research is correct. It would be helpful if EU legislation allowed for legal research use of data so that this were possible.

## 2- Music representations

"Knowing the data and knowing the features is important, and now a days unfortunately, more emphasis is made on machine learning (which is not wrong) rather than meaningful features. If the features are meaningful, it should be relatively less difficult to come up with an appropriate data representation for a specific application.

On the other hand, in order for the community to benefit from each other's work, it would be really nice to have some community standards on data formats, ontologies etc. that everyone can benefit from."

More than standardization, I would put effort in the quality and live criticism of the representations. Current standardization and non-controlled dissemination (publishing) of ill-defined terms is actually a big problem.

"I think, even though desirable at first sight, unifying standards and data formats is not realistic in general and may also bear the risk that ""quasi-standards"" influence research in some undesirable way."

A unified ontology of all music is neither possible nor desirable.

See last box of comments.

Unifying standards is very important. It is a pity that there exists two important XML-formats (Music-XML and MEI) that are being developed in two different directions.

Ontologies might not be adopted by the community or might not necessarily reflect true relationships between concepts. More effort should be put in standardization and the creation of higher-level features.

Unifying data management might be very relevant for "similar" musical data. However considering the vast differences in different music genres, cultures and how music or musical elements are perceived by different cultures, unification might actually be too bulky, generic and may not capture genre/culture specific necessities. I believe standardization (in terms of engineering) should boost reproducibility of research and reusability developed technologies, as long as the standardization is not aimed at representing and treating musically relevant data as a "melting-pot". (i.e. Western notation, guitar tablature, gamelan symbols, Bhatkande notation may be all symbolic data but has different usages, levels of musical prescriptiveness and performance implications)

I am a little perplexed as to the possibility of establishing a standard format for ALL types of music information.

I think it is a great idea though and my reserves are mostly linked to what I have seen with the SDIF format: for reasons that are not too clear for me, 3 different flavours have developed from the original specification, and now there is no real standard anymore.

But maybe now is a good time to review the specifications of that format and try to combine the different flavours.

I think ontology work is useful, but it needs to be made very easy for researchers to adopt. There's a danger I think that people could feel restricted by imposed rules / structure.

Description of data and research outputs so that it can be repurposed and reused (mashed up) could allow new ways to carry out research in this field.

## 3- Data processing methodologies

"Video, document and image processing domains have much to offer our field. As they have been around for a longer time, it is possible that some of the challenges which we are currently facing already have solutions in those domains. And vice versa!

Further, as our field is one truly multidisciplinary arena, we often need to deal with data from multiple sources. As services like Spotify and Pandora become more global and popular, they offer us with immense multi-modal data that we have to deal with (like lyrics, audio, community data, listening histories etc.)."

Not just identify methods, but to provide sound understanding of them in specific applications. It's too common to (mis)use the latest "fancy" method to music without even questioning the mathematical or interpretative implications of doing so. Peer-reviewing needs to push a lot here. A good (a very good, not the usual stuff) comprehensive course in data processing should be a must in graduate programs. It's a pity that, let's say, archaeology departments are much better prepared in that sense than many information technology departments.

More emphasis should be put on score following

This is perhaps one of the greatest challenges in MIR, since there is a lack of adopting techniques from other disciplines. In order for that to happen, a discipline-centered conference like ISMIR might have limited use, apart from a dedicated session/tutorial in adopting technologies from other disciplines.

Music signals are unique in many ways. Speech processing algorithms, among others, can be a good start, but MIR needs to adapt the techniques to music. MIR will be stuck if we continue to ignore the nature of music experience and treat the problems as mere signal processing.

Yes, there's always things to learn from other disciplines, but music is quite a special case. Just applying some new machine learning technique without understanding it's applicability to a music problem (for example) does seem like

great science.

"Some MIR research can seem a bit naive to other communities, so that e.g. the IR community don't perceive the results as reliable (no statistical significance presented).

There is potential for audio-visual and audio-haptic processing that seems underexplored in the field at present. Audio and video researchers often do not talk to each other when they should!"

#### **4- Knowledge-driven methodologies**

"It is not very rare that studies from psychology are plagued with subjectivity. I personally am not aware of its recent advances, but I would wait more time before taking a look. But a similar kind of analysis, with less influence of subjectivity can be derived from neuroscience, and studying the social functions of music in various societies. Musicology and the theory are also important, especially if they are keeping up with the current practice.

""Evaluation"" of MIR applications using HCI methodologies can mean evaluation of many things. For instance, as someone pointed out in ISMIR 2011, if you generate a perfect playlist which has songs very similar to the seed song, the listener might not actually like it. When HCI component gets into such evaluation, it is also important to consider the influence of 'interaction' on evaluation. For instance, in a system where it is incredibly easy to navigate with some sort of similarity between songs, I might not mind seeing a number of irrelevant results (think of scrolling on iPad and a pc)."

"More than ""use others' methodologies"", I would say ""adapt others' methodologies"" to our needs, with their active collaboration.

Distinguish between learning from other disciplines and ""believe"" in their methods and results for music. Special care should be taken in this respect, unless the researcher becomes expert in two or more fields. Peer-reviewing should be aware in multidisciplinary studies, and include true representatives from all the involved fields. I feel an urgent need for a shift in peer-reviewing processes, which should take an active role in research rather than act as mere (and today, poor) ""filters""."

User centered evaluations are the key challenge for MIR and its wider relevance.

Although the field of music perception is rapidly growing, I am not convinced that all MIR tasks should necessarily be viewed from a cognitive aspect, forsaking acoustic and/or musicological aspects. Currently in MIR there are only few works which address computational musicology tasks, and that should be rectified by bringing back the musicologists who abandoned the community in its early years

Same as above

I think it's hard to get around the problem that psychological studies are very controlled and neuroscience ones very expensive. While it would be great to know about "truths" from these disciplines, I'm not sure what the scope is for these to be widely picked up within the MIR community. I think there's certainly scope still for just making an engineering type approach. If it works you would be able to transfer the knowledge to the general public via an application all the better. Validation from any of these disciplines is not a prerequisite for this.

User involvement in current MIR research is somewhat limited, with analysis often done on easy-to-perform tests rather than extensive user studies.

#### **5- From audio to symbolic data**

Joint estimation requires methodologies, but also careful and critical evaluations.

I believe that joint estimation is the key for actually improving on select MIR tasks, although this might have an impact on computational efficiency. Analysing music signals and extracting information such as melody and harmony can help bridge the gap which exists in computational musicology, which mostly depends on score-based information.

Musical meaning depends heavily on musical context. Joint estimation is one way of taking that into consideration. Like Al Bregman states in the introduction of his CASA book, source separation algorithms might be trying to perform a task that even the human brain doesn't solve. I believe we need more research on how humans perform the task before spending a lot of effort trying to algorithmically attack the problem.

Yes, access to the sound scene seems really important. But, it's a hard nut to crack. I'm very interested to see if imperfect separation (perceptually noisy or whatever) is still sufficient for improving MIR analysis tasks.

On the second point, I'm all for holistic approaches to analysis. Treating harmony and rhythm totally separately (for example) would appear at odds with how we listen and process music.

Combining techniques such as source separation as part of a holistic separation and recognition approach would seem a promising direction.

#### **6- From symbolic data to semantic information**



See last box of comments

Using symbolic information for extracting semantic concepts is not a big part of the MIR community, and is perhaps more represented in conferences/journals in systematic or computational musicology. However, audio data is a welcome addition for extracting semantic information and current research has only begun to scratch the surface.

Most listeners don't have access to this kind of information. I believe it's a misleading approach, even though it might help improve the results for now.

Symbolic information can be mined independent of audio data - I think "plus audio data" sounds like an unnecessary restriction.

Not all music has a score, so I think the potential here is limited in scope - at least for modern music.

The term "semantic" is often used and sounds good, but is poorly defined and is in danger of becoming a meaningless buzzword. I think more work is needed to explore what is lurking under the surface in this area.

## **7- Interface and interaction aspects**

Real-time MIR (and psychology, neuroscience, ...) can say a lot in terms of modeling relevant musical experience over time. The actual definition (and evaluation methodologies) of some usual MIR terms are still to undergo strong (maybe dramatic) revisions in that respect.

Considering MIR systems more holistically is a bit of a generalization, which would be hard to disagree on. There is however a difference between real-time approaches, which might very well fall into the realm of MIR, and the development of interfaces, which is clearly a NIME concept. Although the adoption of real-time approaches should be encouraged, I would find that the only gap that could be bridged would focus on the adoption of MIR techniques from the NIME community.

Real-time control of musically meaningful parameters could potentially lead to another technological revolution in music and performing arts.

Combining algorithm output and user input for e.g. interactive annotation, where the system learns from the user.

Well, it depends on what the aesthetic musical output is.  
Some music using technology is "difficult" to listen to.  
Where is the widespread appeal of this type of research?

This is already happening in some quarters. Perhaps ISMIR and NIME could have a joint workshop, or exchange special sessions in each other's conferences to promote cross-fertilization of ideas?

## **8- Evaluation of research results**

Evaluation initiatives should be sustained, but critically updated and revised. MIREX is such an example of promoting some ill-defined (in few cases, almost meaningless) tasks. The stress should not be put into the score, but into the insights.

Accept no paper without a proper statistical analysis.

The thing that might be lacking in current MIREX-like approaches is exactly that they lack in insights on how to improve the systems. A NEMA-like work could rectify that, although that would require a considerable amount of resources. However, public evaluation initiatives should continue to take place and greater care should be made in the creation of test data for such tasks.

Evaluation is always a good way to push the performance. However, MIR needs better evaluation strategies. MIREX competition epitomizes the current stagnant paradigm in MIR. The MIR community needs to come up with ways to challenge the research approach to improve the results rather than simply compare performance of systems.

On the last question: Even qualitative insights would be helpful. But I think this is a practical rather than a research question. People need access to the data in order to learn from their mistakes (not the case in MIREX). Having said that, even when people have access to data, they tend not to look closely at what their algorithms are doing, and just focus on summary statistics.

Again evaluation is critical. While MIREX is a great initiative, I think it could use a re-boot, including more on meta-evaluation. We want to know what we can learn from the MIREX runs, not just how we did.

Echoing comments in this year's ISMIR, evaluation like MIREX is nice for PhD students who can say they got the best so-and-so, but does not necessarily help researchers to improve what they are doing. Perhaps we should take a step

back to analyse how best to promote the "rate of progress" in the field (see also about publishing models in <http://yann.lecun.com/ex/pamphlets/publishing-models.html>).

## 9- Social aspects

OK, but not forgetting that music is, inherently, an individual experience. Again, to include sociologists in the research loop would be a must.

Music experience is heavily influenced by social context and human behavior.

This is outside my area of expertise.

## 10- Culture specificity

"This is important since studying different music cultures can be beneficial to not only that specific culture being studied, but also others, as it allows us to see various music concepts in a different context.

Comparative studies between music cultures can help to better describe the unique aspects of each of them, and this can be very crucial for building ontologies."

MIR systems should definitely take into account cultural diversity, and to some extent this is reflected by recent ISMIR submissions, where the element of ethnomusicology is more distinct. That does not necessarily mean that one would need to analyse the interaction in social networks, but that MIR applications should be culture-adaptive or culture-specific.

compose gigantic data sets of non-western music and try to join them with common large-sized data sets like MSD.

Current MIR research is mostly aimed at Western commercial music. While being aware there is a great (industrial) demand, I believe we have to XX about other musical cultures of the world, if we are to claim we work on 'music' in every aspect. This way we can also uncover some aspects which are currently hidden from our vision in the MIR field. We can also apply these findings and developed methodologies to further understand other musical cultures and even possibly other data related problems.

Cross cultural and comparative studies definitely help MIR extract and isolate musically relevant information. However, the task seems to be too ambitious for now. Maybe we should focus on what we know better (western music tradition) and use the cross cultural studies to support our findings.

The last challenge used to be called "comparative musicology", which has now developed into "ethnomusicology". We have the data to do this type of research, but I'm not sure how much the topic belongs to MIR.

Yes, outside of the Comp Music project, MIR research feels a little constrained. These other musical cultures offer great potential for expanding research techniques and ideas.

## 11- User behavior

Regarding "user needs", how are the potential users chosen?

MIR should not target blindly multi-user applications with a collaborative aspect, however there is a significant gap between MIR and music creation.

The listener plays a major role in musical experience and should definitely take a central role in MIR.

As suggested at the late-breaking session, the first challenge is identifying users and then identifying their needs - obviously a prerequisite to taking the needs into account.

In terms of actual usage, I think this will become more important in the future. There are greater demands for research projects to generate impact, and not just through scientific publications, so making usable pieces of technology would seem like a good thing.

## 12- Music industry applications

"Music similarity measures cannot be too generic when it comes to, say recommendation of songs from a repertoire of diverse music cultures.

As the modality of data keeps growing, there is a need to identify similarity measures which are cross-modal and also specific to application at hand."

Why approach scalability for a basic problem that has yet to be solved???

I consider it a given that scalable systems should be a priority in MIR research. And the community does not contribute

as much it could in the consensus-based world of industrial standards.

Commercial applications can help foster research by bringing more resources. However, the balance between applicability and relevance of research results should always be carefully considered.

Challenge: engage the music industry in collaborative research, where they e.g. provide data to our community in return for algorithms / technology developed using the data. Gareth mentioned that TREC etc. have license agreements with content providers - we don't have anything like this. We buy content and hope that no one minds when we copy it onto servers e.g. to use it in MIREX.

Yes, I think collaboration with big industry is important. We have the opportunity to inform and drive what happens here.

I wonder if scalability questions are somewhat outside the scope of the standard MIR researcher. But maybe with the MSD this is changing.

The music industry has completely changed over the last 5 years. If the MIR field does not adapt and work more closely with industry it may become increasingly irrelevant.

### 13- Artistic applications

See last box of comments

There is a difference between music analysis and music production, and although the gap is closing in certain aspects, there are other dedicated communities for the creation e.g. of new musical instruments, or the development of new interfaces etc. I feel that the energy of MIR researchers should not be spent towards that goal.

MIR could provide tools for the music of tomorrow.

Again this is outside my main interest, but I wonder if giving artists tools with specific functionalities is worthwhile

These are interesting areas, this topic is linked to the MIR/NIME section above.

### 14- Research and educational applications

"I feel that

By its nature, MIR is a multi-disciplinary field, and so it is no surprise that MIR outputs have been put to use in research settings outside of music informatics. The most notable impact has been in musicology, where MIR tools have become standard "tools of the trade" for a new generation of empirical musicologists. MIR also shows a lot of promise for educational applications, including music appreciation, instrument learning, theory and ear training, although most existing applications are still at an experimental stage. In this section we examine the relevance of MIR outputs to research and education. We also discuss the benefits and barriers to creating sustainable research outputs - papers, software and data that can be reused to verify or extend published work.

Challenges

Much work in MIR is technology-driven, and might not be applicable particularly to expert users with very specific needs, so the challenge is to step into the shoes of researchers in fields such as musicology and understand their world-view, in order to produce useful applications.

Related to this is the challenge of overcoming barriers to uptake of technology in traditional fields such as music pedagogy

Current music education tools have shallow models of music making (e.g. focusing only on playing the correct notes), and fail to give meaningful feedback to learners. The challenge here is to be able to provide diagnosis, analysis and assessment of performance at any level of expertise.

Generic tutoring applications do not engage the user, because they ignore the essential fact that users have widely varying musical tastes and interests, and that the drawing power of music is related to this personal experience. User modelling or personalisation of MIR systems is an open challenge not just for tutoring but for all MIR applications.

Many listeners find that new (to them) styles of music are inaccessible. One way to alleviate this situation and facilitate the enjoyment of a broader range of music might be via "enhanced listening", but it will be challenging to provide meaningful visualisations which elucidate structure, expression, harmony, etc.

Data curation is costly and time-consuming; the challenge is to be able to aggregate data and metadata with the quality of a curated collection, and to preserve provenance.

Please, leave your comment here...

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Please, leave your comment here...some of the core purposes of MIR research can be summarized in the above."

Music is extremely relevant socially and in people's personal lives. MIR has great potential to revolutionize the way people produce, consume, understand, and listen to music.

Music education is important, and enhanced listening. These are ways to get to people outside our community.

There is the potential to link music industry with enhanced listening, educating the public as they listen to now-vast collections available, and engage people with classical music.

### 15- Creative industries applications

I do not find the above applicable in MIR or a priority for future research or trends in research.

Same as above.

Automatic mixing is very narrow. Automating or assisting the whole production process would be a more relevant challenge, although traditionally outside the MIR field and belonging to AES.

I am not sure on the direct relevance here. Is this really a top priority compared to other potential collaborations with industry?

Some of these may be best done in a local environment. Also artists work on very short timescales so some case studies of successful collaborations can help research teams see how they can be open to this type of collaboration.

### 16- Add any topics that we might have missed or make any general comment

"What I miss is a musically-meaningful goal, at the level of corpora, single works or parts thereof, larger forms and higher concepts (than local ones such as harmony and melody: go for form, orchestration, interpretation etc.) esp. wrt to art music. Most of MIR seems geared to so-called popular music - I don't say this disparagingly -, as this is where the big bucks are and that's probably why most of the research occurs, and besides, MIR being technology, many - not all, Elaine Chew and Eric Isaacson are but two such instances - of the people active there are more competent in technology than in art music).

Unless this becomes a reality, MIR tools won't be of much use to composers and musicologists. Maybe the latter should be more actively involved in such projects."

Some "grand challenges" would also be relevant: computers that "understand" music, i.e. interact in musically "intelligent" ways. This would apply across a whole range of musical behaviours (e.g. interactive performance, composition, editing/production, recommendation)

As Masataka Goto suggested in last ISMIR, if it makes any different, I'm a MIR researcher.

This survey was a good idea, but a bit too long.

Organised by:



Partners attending:



### 3.14 Music Tech Talks (II)

EVENT INFORMATION	
<b>Event title</b>	Music Tech Fest: QMUL- Music Tech Talks
<b>Dates</b>	15 Nov 2012
<b>Location</b>	Queen Mary University London - School of Law
<b>Tags</b>	music, information, creative, sound, colour, artists, designers, animators, film makers, music makers, music industry, higher education
<b>Proceedings URL</b>	<a href="http://www.musictechfest.org">http://www.musictechfest.org</a>
<b>Other remarks</b>	<p>Music Tech Fest TED-style channel on YouTube:</p> <p>With Music Tech Talk 2, Stromatolite continues to incentivise the Music Tech community created throughout the duration of the MIREs project, and encourage continued use of this framework beyond the duration of the project.</p> <p>The Music Tech Talks series along with our dedicated Music Tech Fest YouTube film release programme continues to enable the Brand to build a Global following and to reach new communities and territories.</p>

**Robert Kaye** presented his work on MusicBrainz. Robert is founder and lead developer of MusicBrainz, and President and Executive Director of the [MetaBrainz Foundation](#). MusicBrainz is the leading open source project for music metadata on the internet. It utilizes an approach similar to Wikipedia to curate high quality metadata and to assign unique identifiers for metadata entities. These identifiers allow for unambiguous communication about music through its global metadata delivery network that includes customers like Google, BBC, Last.fm, Grooveshark, Amazon and AOL.

**Professor Mark Plumbley** introduced the work of the Centre for Digital Music (C4DM), Queen Mary, University of London. The Centre is a world-leading multidisciplinary research group in the field of Music & Audio Technology, investigating topics such as music information retrieval, music scene analysis, semantic audio processing, object-based audio coding, human machine interaction and digital performance. With its broad range of skills and a strong focus on making innovation usable, the Centre for Digital Music is ideally placed to work with industry leaders in forging new business models for the music industry.

**Dr George Fazekas** delivered a talk about technologies developed at the Centre for Digital Music, including knowledge transfer initiatives, such as their content-based Recommendation technology currently trialled by the BBC and iLikeMusic, the BBC Desktop Jukebox and research tools such as the Sonic Visualiser, which is widely used within the music information retrieval community

Organised by:



Partners attending:



## 4 CONCLUSION

During these first thirteen months of the MIREs project it was fundamental to interact with as many research communities as possible and with people from diverse communities that could give some input of relevance to the MIREs Roadmap. The activities reported in this deliverable have been instrumental in accomplishing that. We have basically organized 14 events in very diverse contexts from which we have been able to gather inputs from the three major communities of interest: research, industry, artistic.

The information gathered in these events has shaped the current draft version of the MIREs Roadmap, both in terms of its organization and of its specific content. In all the events we made a special effort to get feedback from people on our initial ideas for the Roadmap and that has been very successful. Given the boundaries that we set ourselves on the topics to cover in the project, there has been very interesting comments, proposals, and suggestions on topics beyond MIREs that we cannot reflect in the actual MIREs Roadmap. Thus, this document is also interesting for what it reflects in terms of the breath of the whole Music Technology field and it might be useful for other purposes beyond the MIREs Roadmap.

The next efforts in the project will focus on putting the draft version of the MIREs Roadmap publicly available in order to get further feedback from the communities we have already involved in the elaboration of the current draft. Especially important is to get feedback on the research challenges that we have identified.

## **5 ANNEX: ISMIR 2013 LATE BREAKING SESSION**



# MIRES ROADMAP: CHALLENGES FOR DISCUSSION

MIReS consortium

<http://www.mires.cc>

## 1. INTRODUCTION

In this document we present a number of challenges relevant to MIR research that were discussed during the IS-MIR 2012 late-break session. They are part of a Roadmap for MIR being elaborated in the context of the MIReS European project<sup>1</sup>. These challenges were presented to the MIR community with the goal to get some feedback while the Roadmap is elaborated. A more detailed -and in-the-works until mid-2013- version of the challenges is available online on a wiki<sup>2</sup>, where we invite the community to provide input.

For the purpose of the Roadmap we consider that Music Information Research (MIR) covers all the research topics involved in the understanding and modeling of music and that use information processing methodologies. We consider this research to be very much within the field of Information Technologies, thus with the major aim of developing methods and technologies with which to process musically relevant data and to develop products and services with which to create, distribute and interact with music information.

## 2. CHALLENGES

### 2.1 Musically relevant data

We define “musically relevant data” as any type of machine-readable data that can be analyzed by algorithms and that can give us relevant information for the development of musical applications. The grand challenge is to gather musically relevant data of sufficient quantity and quality to enable music information research that respects the broad multi-modality of music. More specifically: identify and use as many data sources as possible to describe music (audio, scores, text, video, blogs, ); clarify the legal and ethical concerns regarding data availability and usage; or develop and make available to the research community more-better data and more-better annotated corpus.

<sup>1</sup><http://www.mires.cc>

<sup>2</sup>[http://mires.eecs.qmul.ac.uk/wiki/index.php/MIR\\_Challenges](http://mires.eecs.qmul.ac.uk/wiki/index.php/MIR_Challenges)

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### 2.2 Music representations

Data representation decisions impact the effectiveness of MIR systems in two ways: algorithms are limited by the type(s) of input data they receive, and the user experience depends on the way that MIR systems present music data to the user. A major challenge is to provide abstractions which enable researchers to develop algorithms that meet user needs and to present music information in a form that accords with users understanding of music. More specifically: develop more musically meaningful features and representations; determine and develop the most appropriate data representation for each application; or unify standards, data formats, representations, developing ontologies to describe all types of music information.

### 2.3 Data processing methodologies

Since its origins, the MIR community has used and adapted data processing methodologies coming from related research fields like e.g. text information retrieval, machine learning or speech processing. The challenge is to more systematically identify potentially relevant methodologies from other disciplines and stay up-to-date with their latest developments. More specifically: systematically identify relevant data processing methodologies from other disciplines; or develop methodologies for cross-modality processing.

### 2.4 Knowledge-driven methodologies

The MIR community has for a long time been focusing on a range of bottom-up approaches: starting with the kinds of data we use to the types of algorithms we apply to it. The challenge is to transcend this focus and explore other methodologies and fields of science that approach music in a more integral way. More specifically: learn from music psychology and use its methodologies; emphasize the social function of music; learn from neuroscience and use their results concerning music; make a more systematic use of concepts from musicology and music theory, or use HCI methodologies in the design and the evaluation of MIR applications.

### 2.5 Musical concept extraction

The challenge here is to automatically derive musical concepts from audio signals or commonly available symbolic data, such as MIDI or scores. More specifically: develop better source separation algorithms; develop methodologies for joint estimation of music content parameters; or use symbolic information plus audio data to extract higher level semantic concepts.

## 2.6 Evaluation methodologies

It is paramount to MIR that independent researchers can build upon previous research. An overarching challenge in MIR is to define and implement sustainable research evaluation methodologies that effectively contribute to creation of knowledge and general improvements in the field. More specifically: sustain MIR evaluation initiatives like MIR; evaluate whole MIR systems; or use evaluation strategies that can provide quantitative insights on how to improve the systems.

## 2.7 Social aspects

Music is a social phenomenon, thus its understanding and modeling requires the inclusion of this dimension. In MIR, the description of a piece of music is normally approached as the study of a data object with no context. This is a partial view of what music is. With the availability of digital data that reflects the social dimension of music, especially from digital social networks, we can approach this topic from an information processing perspective. Some specific challenges would be: adopt and adapt complex networks and dynamic systems methodologies; or study social context by analyzing interaction and activity in social networks.

## 2.8 Multiculturalism

Most music makes very little sense unless we experience it in its proper cultural context, thus the processing of music information has to take into account this cultural context. Most research and development on MIR has focused on the commercial Western music of the past few decades and thus most research results and MIR technologies have a cultural bias towards that particular cultural context. The challenge is to open up our view on music, to develop Information Technologies that take into account the existing musical diversity and thus the diverse musical cultural contexts. More specifically: identify music cultures that can be approached from an MIR perspective (mainly nonwestern); identify specific music characteristics for each culture and methodologies to analyze them; or carry out comparative studies between music cultures.

## 2.9 User perspective

The challenge concerning the user perspective is how to design MIR systems that put the user at the center of the system. This applies to the whole interaction loop, including visualization, input devices, manipulation metaphors, and also system adaptation to user behavior. More specific challenges are: take into account user needs; or target collaborative, sharing and multi-user applications.

## 2.10 Music distribution applications

One of the major applications of MIR is the development of technologies for music distribution. The music industry is developing new distribution services and the challenge is to develop technologies that are relevant to these services.

Mores specifically: demonstrate exploitation possibilities of the MIR technologies; develop music similarity methods for particular applications; develop scalable systems to millions of songs; develop systems beyond recommendation, towards discovery; or contribute to industry standards for music data and representations.

## 2.11 Creative tools

Creative practitioners tend to reuse existing sound materials, or transform materials produced in a variety of contexts, including live performance, soundscaping etc. They require analysis tools for automatically extracting relevant information from these materials for various purposes: content-based manipulation, generativity, synchronization with other media, real-time processing. Some specific challenges would be: involve creative and artistic thinking in technology development; develop flexible tools for composers; develop tools for performers, thinking in realtime; or develop tools for art installations.

## 2.12 Research, educational and health applications

A challenge exists in utilizing MIR tools for producing useful applications in other research fields and to exploit that technology in traditional fields such as music pedagogy. More specifically: develop tools for musicologists; develop tools for music education; or develop tools for enhanced listening.

## 3. CONCLUSION

This work is funded by the ICT-7th Framework Program from the European Commission (Grant Agreement nr 287711). With the involvement of the MIR community hope to produce a document that is both useful for the research community and for the policy makers that have to take decisions on what research topics are important to be supported and funded.

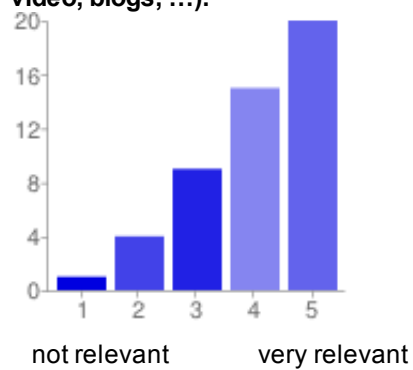
# 50 [responses](#)

## Summary [See complete responses](#)

### 1- Musically relevant data

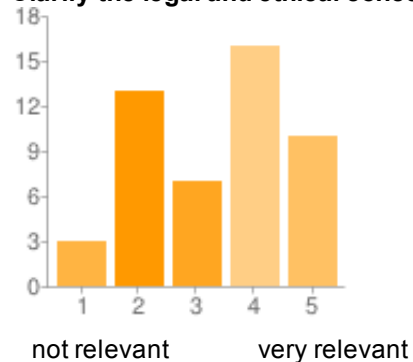
Any type of machine-readable data that can give us relevant information to be processed for the development of musical applications.

**Identify and use as many data sources as possible to describe music (audio, scores, text, video, blogs, ...).**



1 -not relevant	<b>1</b>	2%
2	<b>4</b>	8%
3	<b>9</b>	18%
4	<b>15</b>	30%
5 -very relevant	<b>20</b>	40%

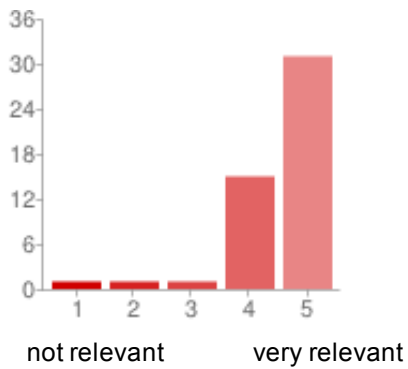
**Clarify the legal and ethical concerns regarding data availability and usage**



1 -not relevant	<b>3</b>	6%
2	<b>13</b>	26%
3	<b>7</b>	14%
4	<b>16</b>	32%
5 -very relevant	<b>10</b>	20%

**Develop and make available to the research community more-better data and more-better annotated corpus**

1 -not relevant	<b>1</b>	2%
2	<b>1</b>	2%
3	<b>1</b>	2%
4	<b>15</b>	30%
5 -very relevant	<b>31</b>	62%



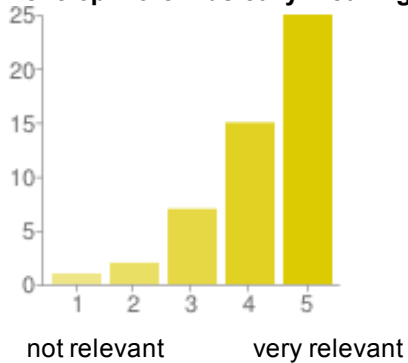
**1- Comment on your answers and propose other challenges**

Data is of course forms the core (and the first) pursuit of every researcher. It would be nice if facebook, google and the likes provide the data available to the researchers in their labs to others, at lease partially or in a reduced form. As long as the data is anonymized and no user is tracked (explicitly) there is no big ethical concern about accessing their data, after all it is only to improve the way we mine such data which in turn benefits them (and corporates!). I would replace "as many sources as possible" for "the relevant and quality ones". I would add standardizing evaluation met ...

**2- Music representations**

The way in which data is structured, both at the conceptual level (data representation) and the implementation level (data file formats).

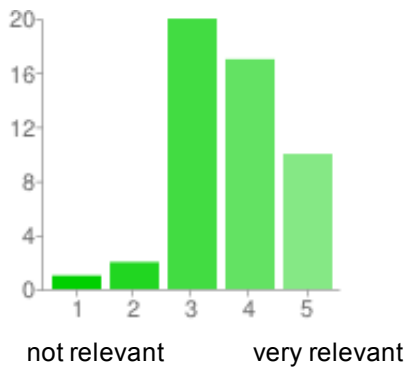
**Develop more musically meaningful features and representations**



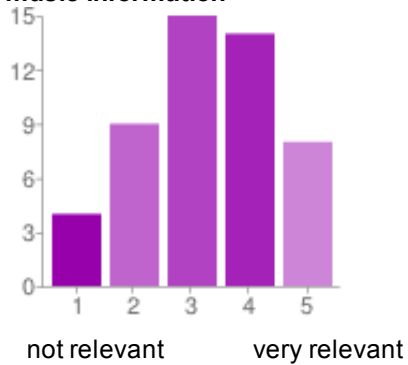
1 -not relevant	<b>1</b>	2%
2	<b>2</b>	4%
3	<b>7</b>	14%
4	<b>15</b>	30%
5 -very relevant	<b>25</b>	50%

**Determine and develop the most appropriate data representation for each application**

1 -not relevant	<b>1</b>	2%
2	<b>2</b>	4%
3	<b>20</b>	40%
4	<b>17</b>	34%
5 -very relevant	<b>10</b>	20%



**Unify standards, data formats, representations, developing ontologies to describe all types of music information**



1 -not relevant	<b>4</b>	8%
2	<b>9</b>	18%
3	<b>15</b>	30%
4	<b>14</b>	28%
5 -very relevant	<b>8</b>	16%

**2- Comment on your answers and propose other challenges**

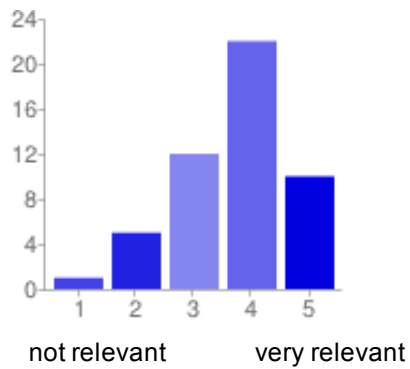
Knowing the data and knowing the features is important, and now a days unfortunately, more emphasis is made on machine learning (which is not wrong) rather than meaningful features. If the features are meaningful, it should be relatively less difficult to come up with an appropriate data representation for a specific application. On the other hand, in order for the community to benefit from each others' work, it would be really nice to have some community standards on data formats, ontologies etc that everyone can benefit from. More than standardization, I would put effort in the quality and ...

**3- Data processing methodologies**

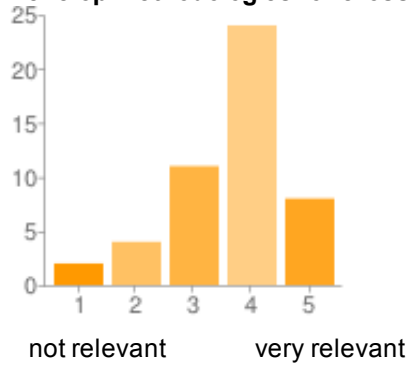
Bottom-up approaches for processing musically relevant data.

**Systematically identify relevant data processing methodologies from other disciplines**

1 -not relevant	<b>1</b>	2%
2	<b>5</b>	10%
3	<b>12</b>	24%
4	<b>22</b>	44%
5 -very relevant	<b>10</b>	20%



#### Develop methodologies for cross-modality processing



1 -not relevant	<b>2</b>	4%
2	<b>4</b>	8%
3	<b>11</b>	22%
4	<b>24</b>	48%
5 -very relevant	<b>8</b>	16%

### 3- Comment on your answers and propose other challenges

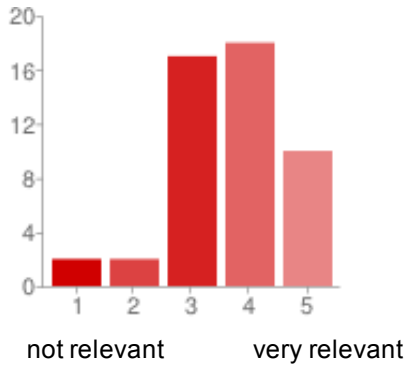
Video, document and image processing domains have much to offer our field. As they have been around for a longer time, it is possible that some of the challenges which we are currently facing already have solutions in those domains. And viceversa! Further, as our field is one truly multidisciplinary arena, we often need to deal with data from multiple sources. As services like spotify and pandora become more global and popular, they offer us with immense multi-modal data that we have to deal with (like lyrics, audio, community data, listening histories etc). Not just identify methods, but to ...

### 4- Knowledge-driven methodologies

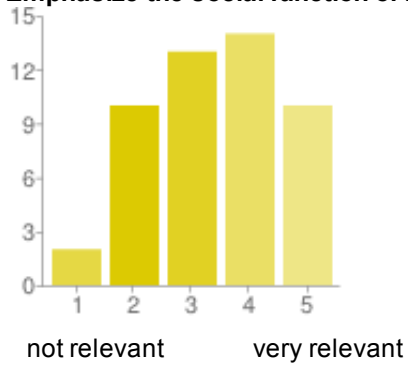
Methodologies which approach music in an integral way, from disciplines such as musicology, psychology, sociology, neuroscience or human computer interaction.

#### Learn from music psychology and use its methodologies

1 -not relevant	<b>2</b>	4%
2	<b>2</b>	4%
3	<b>17</b>	34%
4	<b>18</b>	36%
5 -very relevant	<b>10</b>	20%

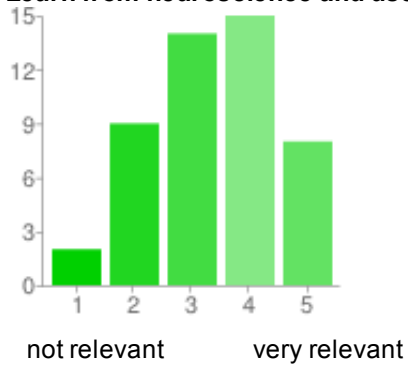


**Emphasize the social function of music**



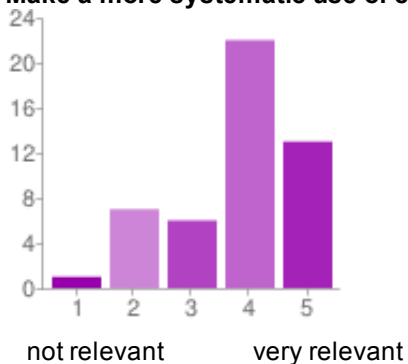
1 -not relevant	<b>2</b>	4%
2	<b>10</b>	20%
3	<b>13</b>	26%
4	<b>14</b>	28%
5 -very relevant	<b>10</b>	20%

**Learn from neuroscience and use their results concerning music**



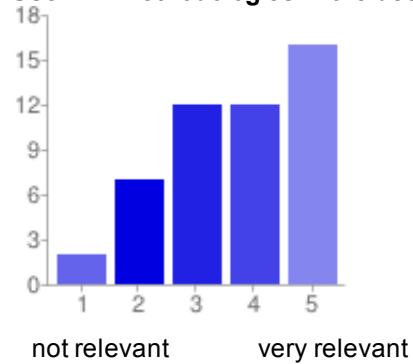
1 -not relevant	<b>2</b>	4%
2	<b>9</b>	18%
3	<b>14</b>	28%
4	<b>15</b>	30%
5 -very relevant	<b>8</b>	16%

**Make a more systematic use of concepts from musicology and music theory**



1 -not relevant	<b>1</b>	2%
2	<b>7</b>	14%
3	<b>6</b>	12%
4	<b>22</b>	44%
5 -very relevant	<b>13</b>	26%



**Use HCI methodologies in the design and the evaluation of MIR applications**

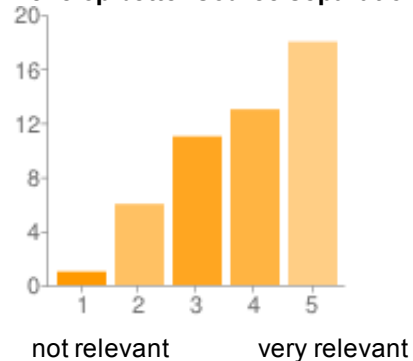
1 -not relevant	<b>2</b>	4%
2	<b>7</b>	14%
3	<b>12</b>	24%
4	<b>12</b>	24%
5 -very relevant	<b>16</b>	32%

**4- Comment on your answers and propose other challenges**

It is not very rare that studies from psychology are plagued with subjectivity. I personally am not aware of its recent advances, but I would wait more time before taking a look. But a similar kind of analysis, with less influence of subjectivity can be derived from neuroscience, and studying the social functions of music in various societies. Musicology and the theory are also important, especially if they are keeping up with the current practice. "Evaluation" of MIR applications using HCI methodologies can mean evaluation of many things. For instance, as someone pointed out in ISMIR 2011, ...

**5- From audio to symbolic data**

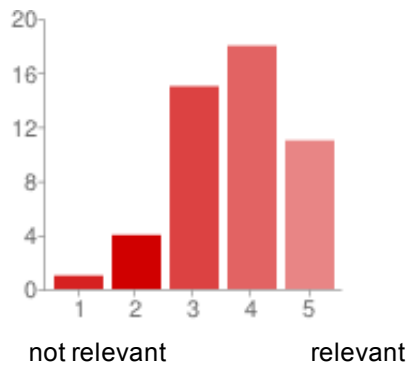
Extraction of music content from audio signals to estimate the symbolic data, content related to melody, harmony, rhythm, instruments, ....

**Develop better source separation algorithms**

1 -not relevant	<b>1</b>	2%
2	<b>6</b>	12%
3	<b>11</b>	22%
4	<b>13</b>	26%
5 -very relevant	<b>18</b>	36%

**Develop methodologies for joint estimation of music content parameters**

1 -not relevant	<b>1</b>	2%
2	<b>4</b>	8%
3	<b>15</b>	30%
4	<b>18</b>	36%
5 -relevant	<b>11</b>	22%



**5- Comment on your answers and propose other challenges**

Joint estimation requires methodologies, but also careful and critical evaluations.

I believe that joint estimation is

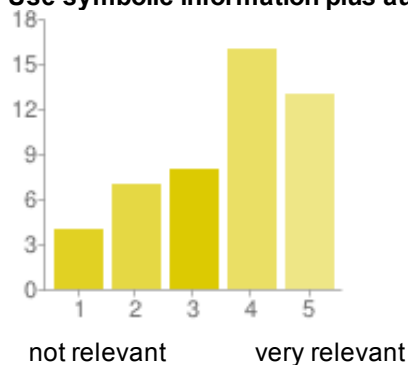
the key for actually improving on select MIR tasks, although this might have an impact on computational efficiency. Analyzing music signals and extracting information such as melody and harmony can help bridge the gap which exists in computational musicology, which mostly depends on score-based information.

Musical meaning depends heavily on musical context. Joint estimation is one way of taking that into consideration. Like Al Bregman states in the introduction of his CASA bo ...

**6- From symbolic data to semantic information**

Processing machine-readable scores to describe higher level music concepts, related to melody, rhythm, structure, tonality, ...

**Use symbolic information plus audio data to extract higher level semantic concepts**



1 -not relevant	<b>4</b>	8%
2	<b>7</b>	14%
3	<b>8</b>	16%
4	<b>16</b>	32%
5 -very relevant	<b>13</b>	26%

**6- Comment on your answers and propose other challenges**

See last box of comments

Using

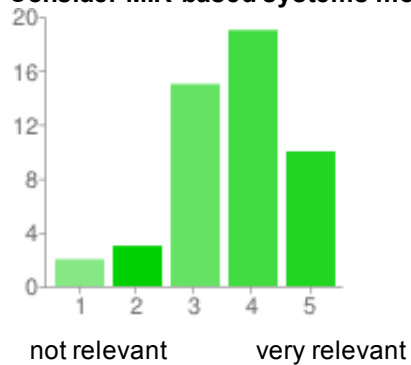
symbolic information for extracting semantic concepts is not a big part of the MIR community, and is perhaps more represented in conferences/journals in systematic or computational musicology. However, audio data is a welcome addition for extracting semantic information and current research has only begun to scratch the surface. addition Most listeners don't have access to this kind of information. I

believe it's a misleading approach, even though it might help improve the results for now. Symbolic information can be mined independent of audio data - I think "plus a ...

## 7- Interface and interaction aspects

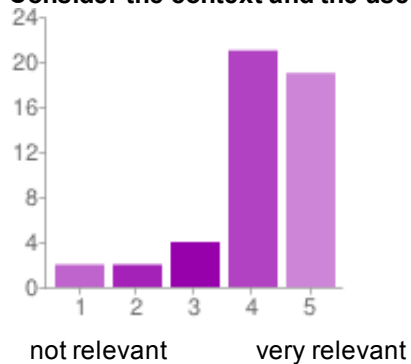
Research related to real-time musical performance and interaction.

### Consider MIR-based systems more holistically



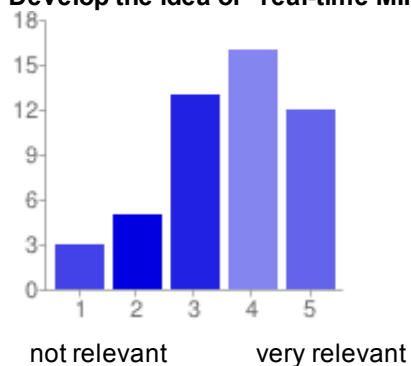
1 -not relevant	<b>2</b>	4%
2	<b>3</b>	6%
3	<b>15</b>	30%
4	<b>19</b>	38%
5 -very relevant	<b>10</b>	20%

### Consider the context and the users of a given MIR method and application



1 -not relevant	<b>2</b>	4%
2	<b>2</b>	4%
3	<b>4</b>	8%
4	<b>21</b>	42%
5 -very relevant	<b>19</b>	38%

### Develop the idea of "real-time MIR", bridging the gap between MIR and NIME



1 -not relevant	<b>3</b>	6%
2	<b>5</b>	10%
3	<b>13</b>	26%
4	<b>16</b>	32%
5 -very relevant	<b>12</b>	24%

## 7- Comment on your answers and propose other challenges

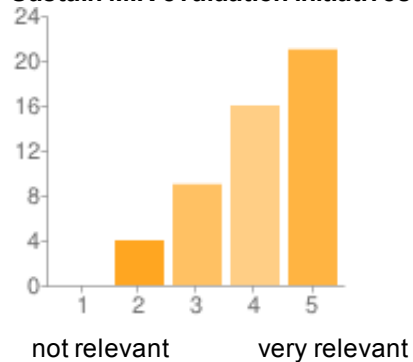
Real-time MIR (and psychology, neuroscience, ...) can say a lot in terms of modeling relevant musical experience over time. The actual definition (and evaluation methodologies) of some usual MIR terms are still to undergo strong (maybe dramatic) revisions in that respect.

Considering MIR systems more holistically is a bit of a generalization, which would be hard to disagree on. There is however a difference between real-time approaches, which might very well fall into the realm of MIR, and the development of interfaces, which is clearly a NIME concept. Although the adoption of real-time app ...

## 8- Evaluation of research results

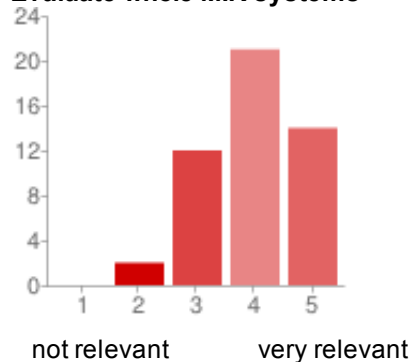
Topics related to evaluation of research results.

### Sustain MIR evaluation initiatives like MIREX



1 -not relevant	<b>0</b>	0%
2	<b>4</b>	8%
3	<b>9</b>	18%
4	<b>16</b>	32%
5 -very relevant	<b>21</b>	42%

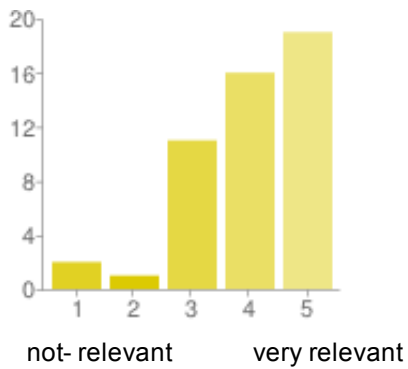
### Evaluate whole MIR systems



1 -not relevant	<b>0</b>	0%
2	<b>2</b>	4%
3	<b>12</b>	24%
4	<b>21</b>	42%
5 -very relevant	<b>14</b>	28%

### Use evaluation strategies that can provide quantitative insights on how to improve the systems

1 -not- relevant	<b>2</b>	4%
2	<b>1</b>	2%
3	<b>11</b>	22%
4	<b>16</b>	32%
5 -very relevant	<b>19</b>	38%



**8- Comment on your answers and propose other challenges**

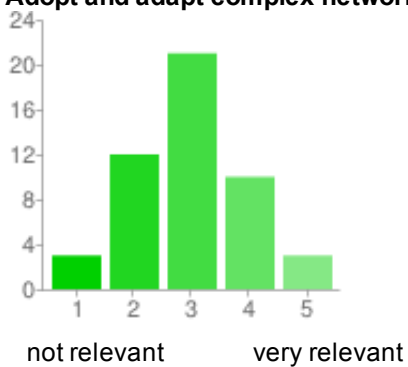
Evaluation initiatives should be sustained, but critically updated and revised. MIREX is such an example of promoting some ill-defined (in few cases, almost meaningless) tasks. The stress should not be put into the score, but into the insights. Accept no paper without a proper statistical

analysis. The thing that might be lacking in current MIREX-like approaches is exactly that they lack in insights on how to improve the systems. A NEMA-like work could rectify that, although that would require a considerable amount of resources. However, public evaluation initiatives should continue to take pl ...

**9- Social aspects**

Research related to social psychology and sociology of music, including human dynamics and social computing.

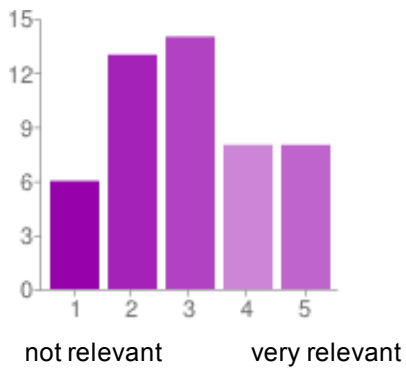
**Adopt and adapt complex networks and dynamic systems methodologies**



1 -not relevant	<b>3</b>	6%
2	<b>12</b>	24%
3	<b>21</b>	42%
4	<b>10</b>	20%
5 -very relevant	<b>3</b>	6%

**Study social context by analyzing interaction and activity in social networks**

1 -not relevant	<b>6</b>	12%
2	<b>13</b>	26%
3	<b>14</b>	28%
4	<b>8</b>	16%
5 -very relevant	<b>8</b>	16%



**9- Comment on your answers and propose other challenges**

OK, but not forgetting that music is, inherently, an individual experience. Again, to include sociologists in the research loop would be a must.

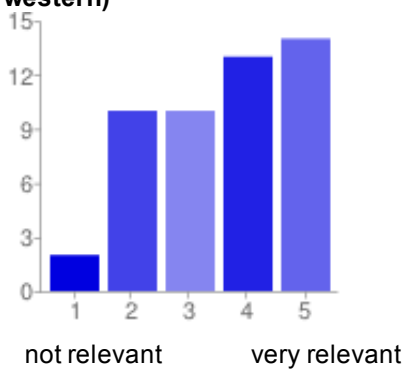
experience is heavily influenced by social context and human behavior. Music

of expertise. This is outside my area

**10- Culture specificity**

Research issues related to the cultural specificity of the music, emphasising different cultures, beyond the western commercial context.

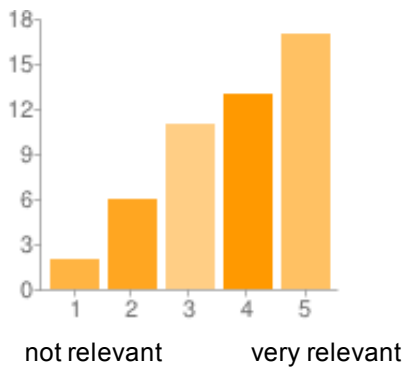
**Identify music cultures that can be approached from an MIR perspective (mainly non-western)**



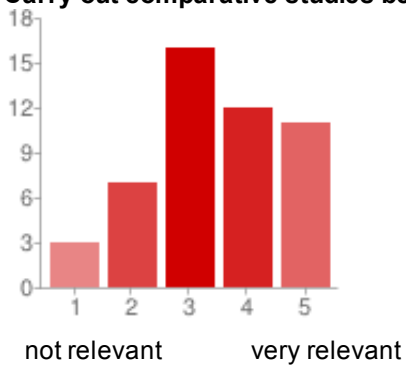
1 -not relevant	<b>2</b>	4%
2	<b>10</b>	20%
3	<b>10</b>	20%
4	<b>13</b>	26%
5 -very relevant	<b>14</b>	28%

**Identify specific music characteristics for each culture and methodologies to analyze them**

1 -not relevant	<b>2</b>	4%
2	<b>6</b>	12%
3	<b>11</b>	22%
4	<b>13</b>	26%
5 -very relevant	<b>17</b>	34%



**Carry out comparative studies between music cultures**



1 -not relevant	<b>3</b>	6%
2	<b>7</b>	14%
3	<b>16</b>	32%
4	<b>12</b>	24%
5 -very relevant	<b>11</b>	22%

**10- Comment on your answers and propose other challenges**

This is important since studying different music cultures can be beneficial to not only that specific culture being studied, but also others, as it allows us to see various music concepts in a different context. Comparative studies between music cultures can help to better describe the unique aspects of each of them, and this can be very crucial for building ontologies.

MIR

systems should definitely take into account cultural diversity, and to some extent this is reflected by recent ISMIR submissions, where the element of ethnomusicology is more distinct. That does not necessarily mean that ...

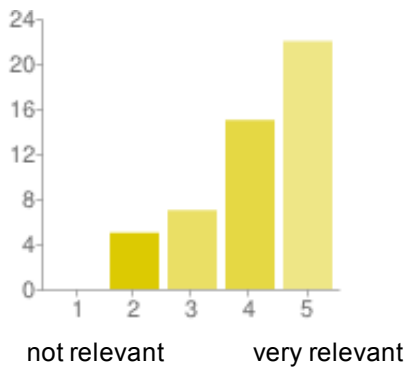
**11- User behavior**

Aspects related to the user (performer or listener) perspective.

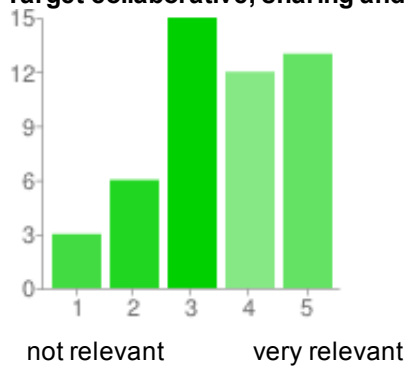
**Take into account user needs**

1 -not relevant	<b>0</b>	0%
2	<b>5</b>	10%
3	<b>7</b>	14%
4	<b>15</b>	30%
5 -very relevant	<b>22</b>	44%





**Target collaborative, sharing and multi-user applications**



1 -not relevant	<b>3</b>	6%
2	<b>6</b>	12%
3	<b>15</b>	30%
4	<b>12</b>	24%
5 -very relevant	<b>13</b>	26%

**11- Comment on your answers and propose other challenges**

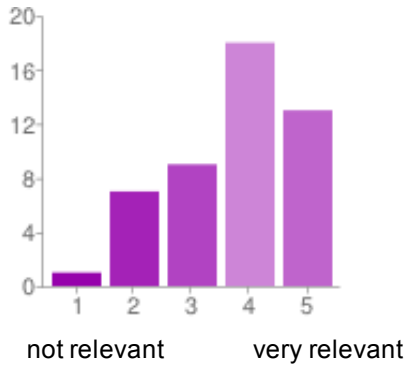
Regarding "user needs", how are the potential users chosen? MIR should not target blindly multi-user applications with a collaborative aspect, however there is a significant gap between MIR and music creation. The listener plays a major role in musical experience and should definitely take a central role in MIR. As suggested at the late-breaking session, the first challenge is identifying users and then identifying their needs - obviously a prerequisite to taking the needs into account. In terms of actual usage, I think this will become more important in the future. There are greater demands for ...

**12- Music industry applications**

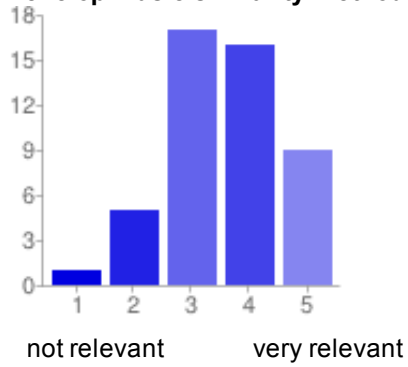
Industrial applications related to electronic music distribution, thus involving aspects of search and discovery, Interfaces, music rights...

**Demonstrate exploitation possibilities of the MIR technologies**

1 -not relevant	<b>1</b>	2%
2	<b>7</b>	14%
3	<b>9</b>	18%
4	<b>18</b>	36%
5 -very relevant	<b>13</b>	26%

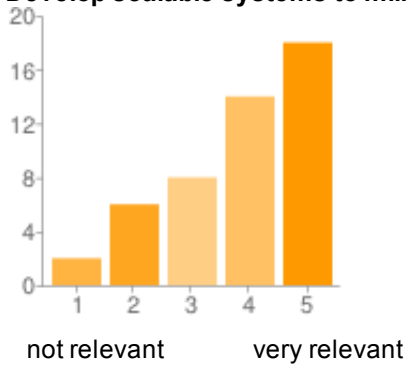


**Develop music similarity methods for particular applications**



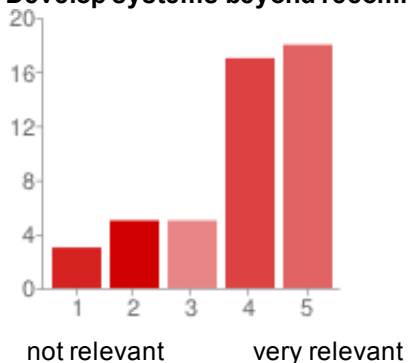
1 -not relevant	<b>1</b>	2%
2	<b>5</b>	10%
3	<b>17</b>	34%
4	<b>16</b>	32%
5 -very relevant	<b>9</b>	18%

**Develop scalable systems to millions of songs**



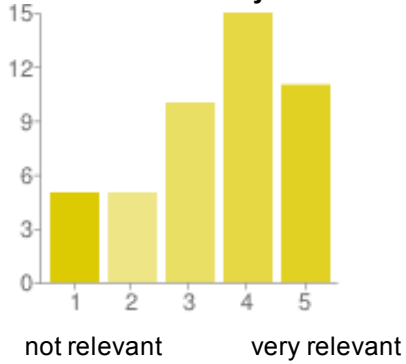
1 -not relevant	<b>2</b>	4%
2	<b>6</b>	12%
3	<b>8</b>	16%
4	<b>14</b>	28%
5 -very relevant	<b>18</b>	36%

**Develop systems beyond recommendation, towards discovery**



1 -not relevant	<b>3</b>	6%
2	<b>5</b>	10%
3	<b>5</b>	10%
4	<b>17</b>	34%
5 -very relevant	<b>18</b>	36%

**Contribute to industry standards for music data and representations**



1 -not relevant	<b>5</b>	10%
2	<b>5</b>	10%
3	<b>10</b>	20%
4	<b>15</b>	30%
5 -very relevant	<b>11</b>	22%

**12- Comment on your answers and propose other challenges**

Music similarity measures can not be too generic when it comes to, say recommendation of songs from a repertoire of diverse music cultures. As the modality of data keeps growing, there is a need to identify similarity measures which are cross-modal and also specific to application at hand. Why approach scalability for a basic problem that has yet to be solved???

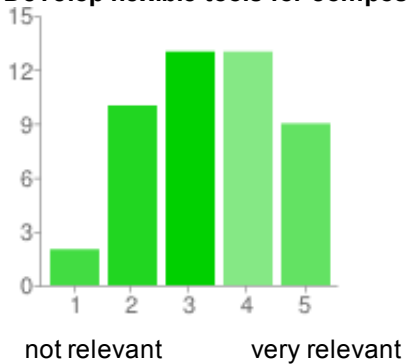
I consider it a given that scalable systems should be a priority in MIR research. And the community does not contribute as much it could in the consensus-based world of industrial standards.

Commercial applications can help foster re ...

**13- Artistic applications**

Artistic applications, both musical ones and others in which sound and music is used.

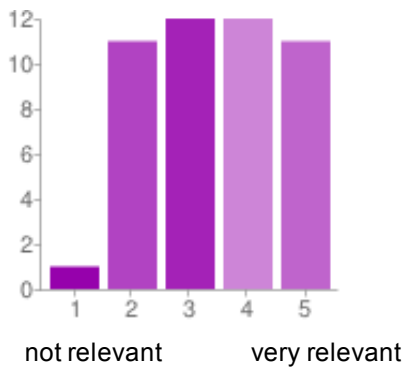
**Develop flexible tools for composers**



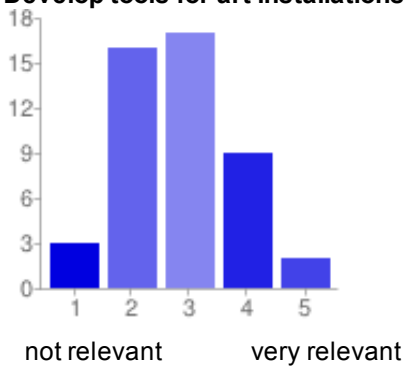
1 -not relevant	<b>2</b>	4%
2	<b>10</b>	20%
3	<b>13</b>	26%
4	<b>13</b>	26%
5 -very relevant	<b>9</b>	18%

**Develop tools for performers, thinking in real-time**

1 -not relevant	<b>1</b>	2%
2	<b>11</b>	22%
3	<b>12</b>	24%
4	<b>12</b>	24%
5 -very relevant	<b>11</b>	22%



**Develop tools for art installations**



1 -not relevant	<b>3</b>	6%
2	<b>16</b>	32%
3	<b>17</b>	34%
4	<b>9</b>	18%
5 -very relevant	<b>2</b>	4%

**13- Comment on your answers and propose other challenges**

See last box of comments

There is a

difference between music analysis and music production, and although the gap is closing in certain aspects, there are other dedicated communities for the creation e.g. of new musical instruments, or the development of new interfaces etc. I feel that the energy of MIR researchers should not be spent towards that goal.

MIR could provide tools for the music of tomorrow.

Again

this is outside my main interest, but I wonder if giving artists tools with specific functionalities is worthwhile

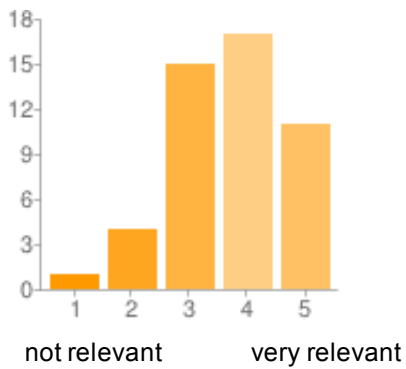
These are interesting areas, this topic is linked to the MIR/NIME section ...

**14- Research and educational applications**

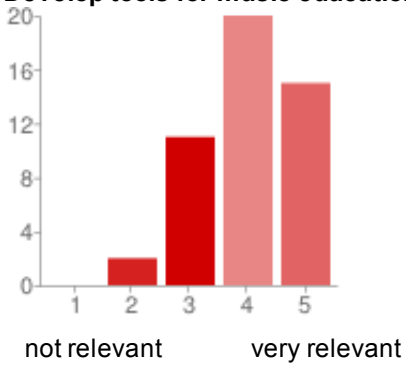
Topics related to the use of MIR results in other fields of research and to music education.

**Develop tools for musicologists**

1 -not relevant	<b>1</b>	2%
2	<b>4</b>	8%
3	<b>15</b>	30%
4	<b>17</b>	34%
5 -very relevant	<b>11</b>	22%

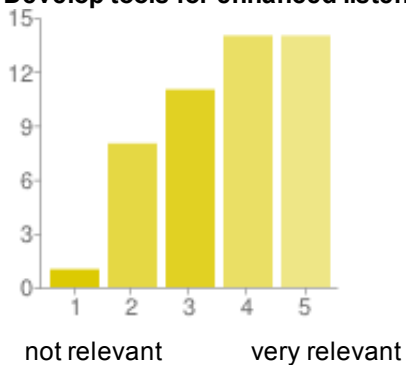


**Develop tools for music education**



1 -not relevant	<b>0</b>	0%
2	<b>2</b>	4%
3	<b>11</b>	22%
4	<b>20</b>	40%
5 -very relevant	<b>15</b>	30%

**Develop tools for enhanced listening**



1 -not relevant	<b>1</b>	2%
2	<b>8</b>	16%
3	<b>11</b>	22%
4	<b>14</b>	28%
5 -very relevant	<b>14</b>	28%

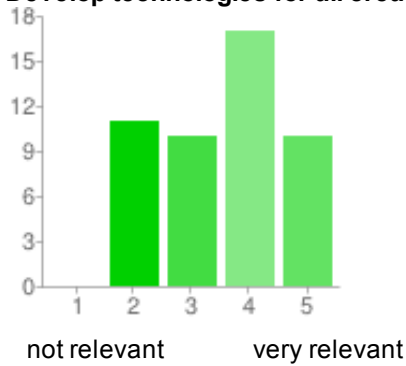
**14- Comment on your answers and propose other challenges**

I feel that By its nature, MIR is a multi-disciplinary field, and so it is no surprise that MIR outputs have been put to use in research settings outside of music informatics. The most notable impact has been in musicology, where MIR tools have become standard “tools of the trade” for a new generation of empirical musicologists. MIR also shows a lot of promise for educational applications, including music appreciation, instrument learning, theory and ear training, although most existing applications are still at an experimental stage. In this section we examine the relevance of MIR outputs ...

## 15- Creative industries applications

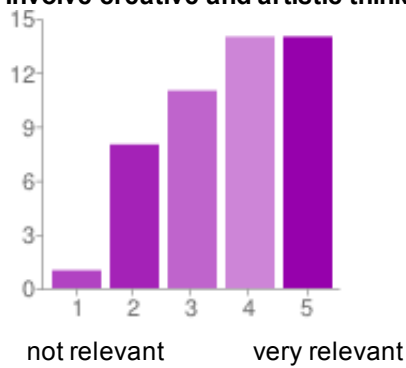
Industrial applications beyond the music distribution ones, such as videogames, publicity, sound branding, cinema, ...

### Develop technologies for all creative industries, go beyond music distribution



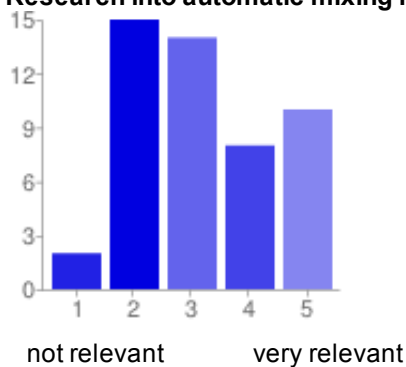
1 -not relevant	<b>0</b>	0%
2	<b>11</b>	22%
3	<b>10</b>	20%
4	<b>17</b>	34%
5 -very relevant	<b>10</b>	20%

### Involve creative and artistic thinking in technology development



1 -not relevant	<b>1</b>	2%
2	<b>8</b>	16%
3	<b>11</b>	22%
4	<b>14</b>	28%
5 -very relevant	<b>14</b>	28%

### Research into automatic mixing for commercial environments



1 -not relevant	<b>2</b>	4%
2	<b>15</b>	30%
3	<b>14</b>	28%
4	<b>8</b>	16%
5 -very relevant	<b>10</b>	20%

### 15- Comment on your answers and propose other challenges

or a priority for future research or trends.reserachreserach

I do not find the above applicable in MIR

Same as

above. Automatic mixing is very narrow. Automating or assisting the whole production process would be a more relevant challenge, although traditionally outside the MIR field and belonging to AES. I am not sure on the direct relevance here. Is this really a top priority compared to other potential collaborations with industry? Some of these may be best done in a local environment. Also artists work on very short timescales so some case studies of successful collaborations can help rese ...

## 16- Additional topics and general comments

### 16- Add any topics that we might have missed or make any general comment

What I miss is a musically-meaningful goal, at the level of corpora, single works or parts thereof, larger forms and higher concepts (than local ones such as harmony and melody: go for form, orchestration, interpretation etc.) esp. wrt to art music. Most of MIR seems geared to so-called popular music - I don't say this disparagingly -, as this is where the big bucks are and that's probably why most of the research occurs, and besides, MIR being technology, many - not all, Elaine Chew and Eric Isaacson are but two such instances - of the people active there are more competent in technology tha ...

Number of daily responses

