

Final Report

UNIKOM-Radios

Music collections & Music Metadata

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1 Why – About us

Since 7 years, Digris AG has been caring about music metadata, archive technologies and digital audio broadcasting (DAB+¹).

During this time Digris has done researches to develop new solutions to support collecting societies and to improve the fair distribution of royalties. The goal is to bring more benefits to the authors and music labels - all in all for the independent music scene.

Since 2014 Digris has been building a DAB+ network and is developing new DAB+ data services including new related business models.

2 Introduction

Presented in this document are the final reports for the “Music questionnaire” and a targeted test performed on the digital music collection of Radio Kaiseregg.

On the basis of the overall results, in the final part of the document some recommendations to approach the resolution of common thematic are included.

¹ Digris webpage: <http://digris.ch/>

3 Report of the Music questionnaire

3.1 Introduction

In the following report the results collected via the Music questionnaire are summarized, a form covering general topics related to Radio stations and their workflows - from the storage infrastructures / techniques to specific methods of work, including a general overview of the audio contents present in the digital and physical archives.

As opposed to the Memoriav questionnaire, the music questionnaire considered only audio contents (music) produced and distributed by third parties and protected by copyright.

In collaboration with Memoriav and UNIKOM association, the form was sent via email to all participants in the survey with 100% of response (18 radio stations).

The form was returned by email or completed on site during the visit, together with the person in charge (Musical editor and / or Technician).

14 of 18 radio stations have been visited between February and March 2014.

3.2 Results

The results and their comments follow approximately the structure of the questions and include additional topics discussed during the visit.

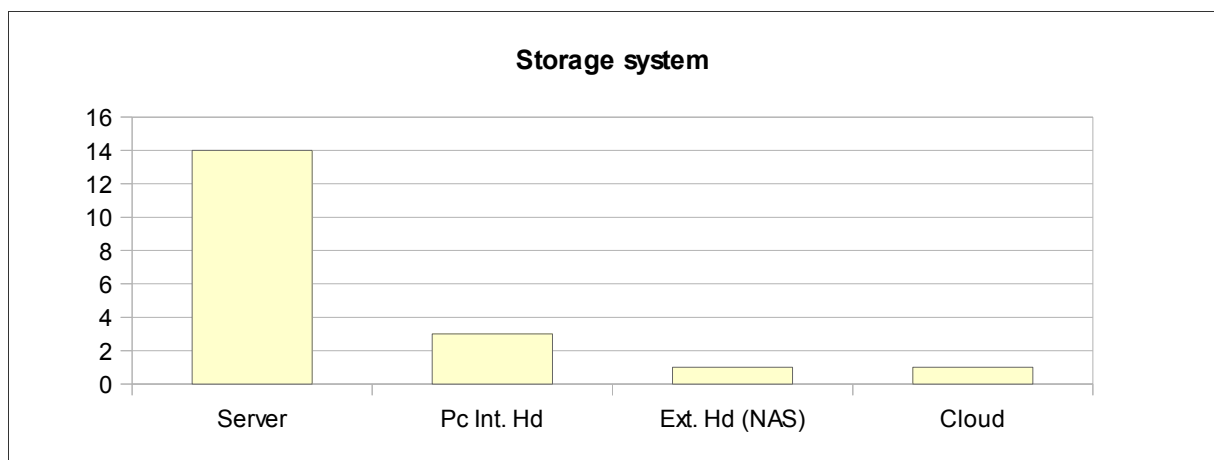
3.2.1 Storage Infrastructures

The majority of the radio use servers² as primary system to store audio contents.

The server location are either normal office rooms (small-size systems) or specialized server rooms.

The uploading and backup tasks are restricted to the music editor and / or the technical manager.

The music content can be searched by using a specific software, installed on one or more desktop computers, or directly through the radio studio software. The same method is used for PCs and External Hard disk Systems.



The backup copies are usually scheduled weekly or monthly and performed principally in two ways:

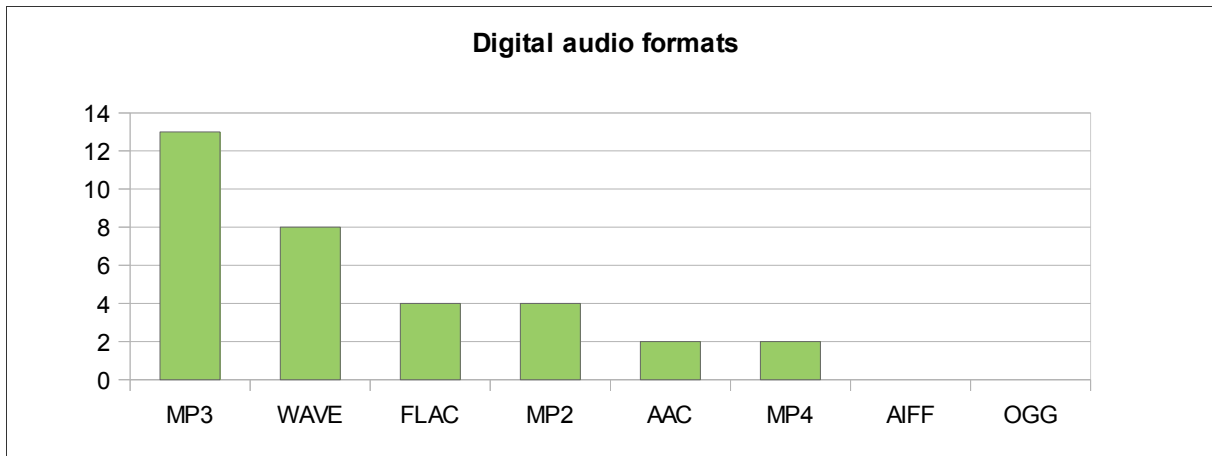
- **Automatically:** The server is mirrored 1:1 with a second unit and the backup procedure is automatized / scheduled by a dedicated software.
- **Manually:** The technical manager perform specific procedures, as plugging the backup unit (hardware) or starting the backup process (software).

A critical aspect is that the backup units are often located in the same room / building as the primary system. This handling makes all efforts useless in case of incident (fire, etc).

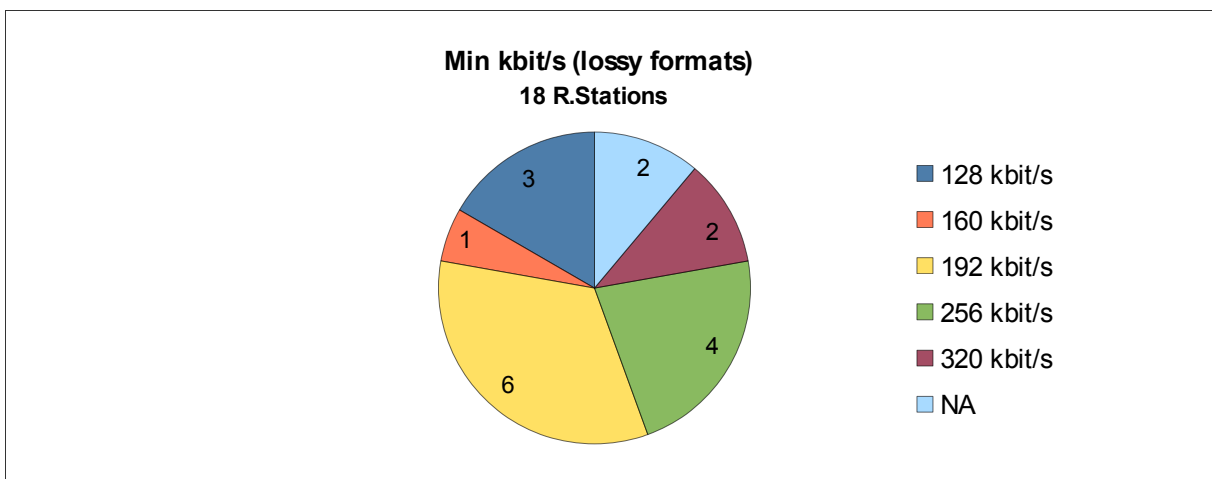
² Server system description: http://en.wikipedia.org/wiki/Server_%28computing%29

3.3 Digital audio formats

Four radios standardized the audio files exclusively to Mpeg1 layer-II format, while most digital libraries do contain more than one audio file format³ (mixed types).



The audio quality for Mpeg⁴ formats varies from 128 to 320 kbit/s while the uncompressed (Wave) formats are standardized to 16 bit 44.100 Hz (or 48.100 Hz).



The high use of Mpeg formats (mostly MP3's) is mainly referable to:

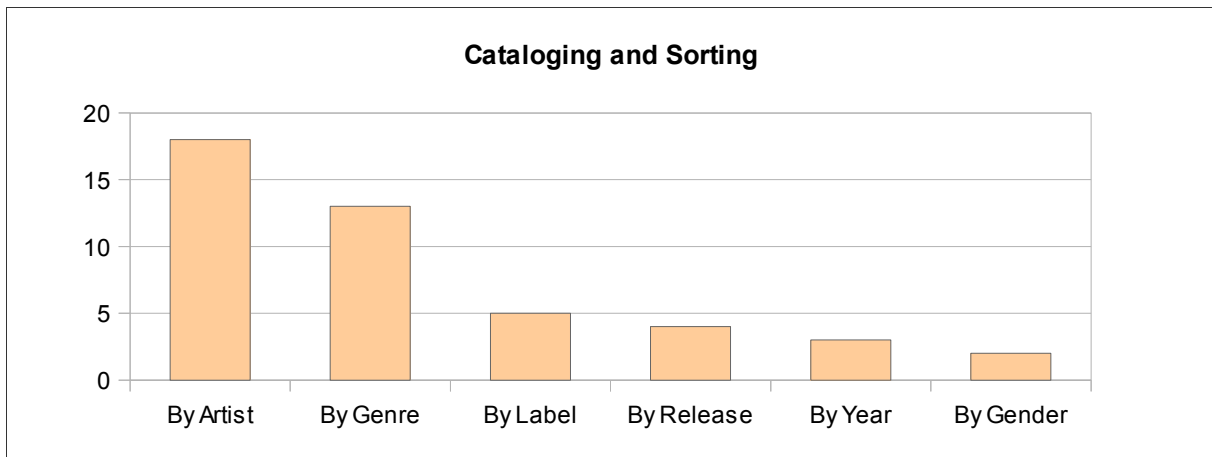
- **Popularity:** Mp3 is a format known by most of people and provided by music producers and distributors.
- **Storage costs:** The small size of the file reduced the costs for storage infrastructures (hard disk capacity).

³ Types of audio format: http://en.wikipedia.org/wiki/Audio_file_format

⁴ Mpeg description: http://en.wikipedia.org/wiki/Moving_Picture_Experts_Group

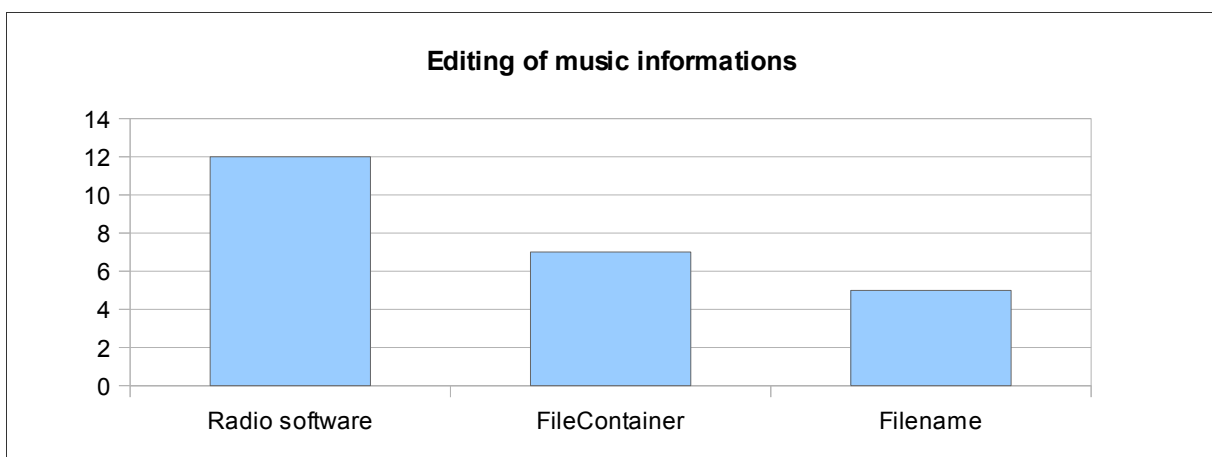
3.4 Cataloging & Tagging (Digital)

Artist name and song titles are the most used information in order to browse the music libraries. The genre information is used to create playlists with a certain style of music.



The information showed in the image can be found inside:

- **The File name:** For systems similar to a desktop browser (organized in folders), the file name is often renamed and includes the song title and the artist name (eg. *Song1 - Artist 1.mp3*).
- **The File container⁵ (embedded metadata):** The information is stored inside the container of the file and is visible by using media players (Itunes or Winamp), for example, or while using tag editors which allow the user to edit advanced informations fields (Composer, Publisher, Release Year, etc).
- **The Radio / Database software (Relational database):** The information is stored inside the database software and can be edited directly in there. The set of metadata is then related to the audio file (in this system the file name is replaced by an ID code). [See 6.3.1](#)



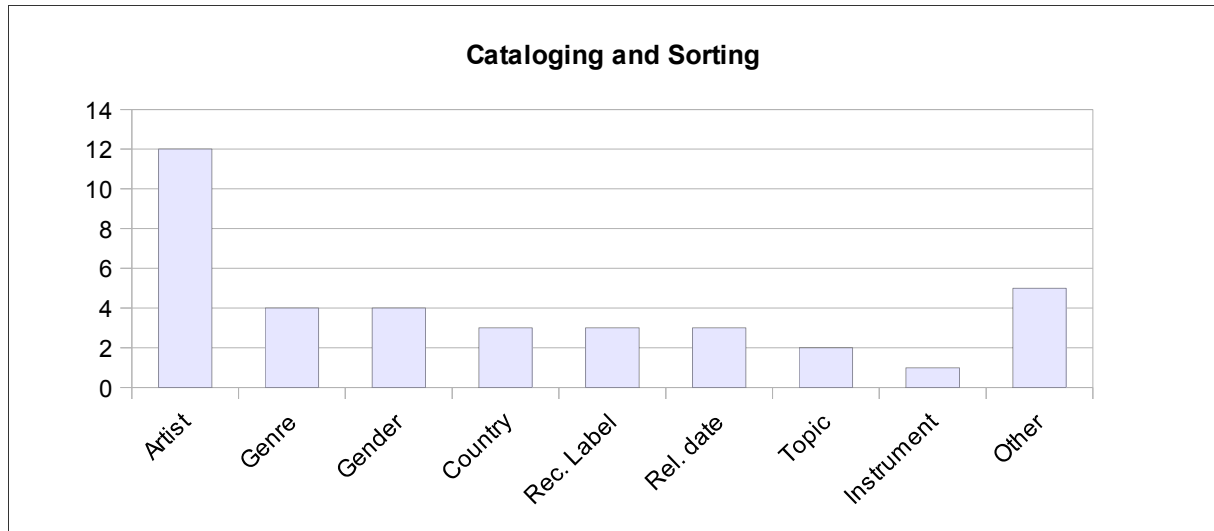
Most seen database software can automatically import the part of the information out of the file container.

⁵ Digital container description: http://en.wikipedia.org/wiki/Digital_container_format

3.5 Cataloging system (Compact Disc)

The Compact discs (Cd) are mainly sorted by:

- Name of the Artist (alphabetical order)
- Code number recorded in a data list (eg. Excel)
- Code colors to categorize the music (eg. “genre”, “gender”)
- Year of publication



The total amount of CDs from all Unikom's radios is around 61'733.

3.6 Vinyl

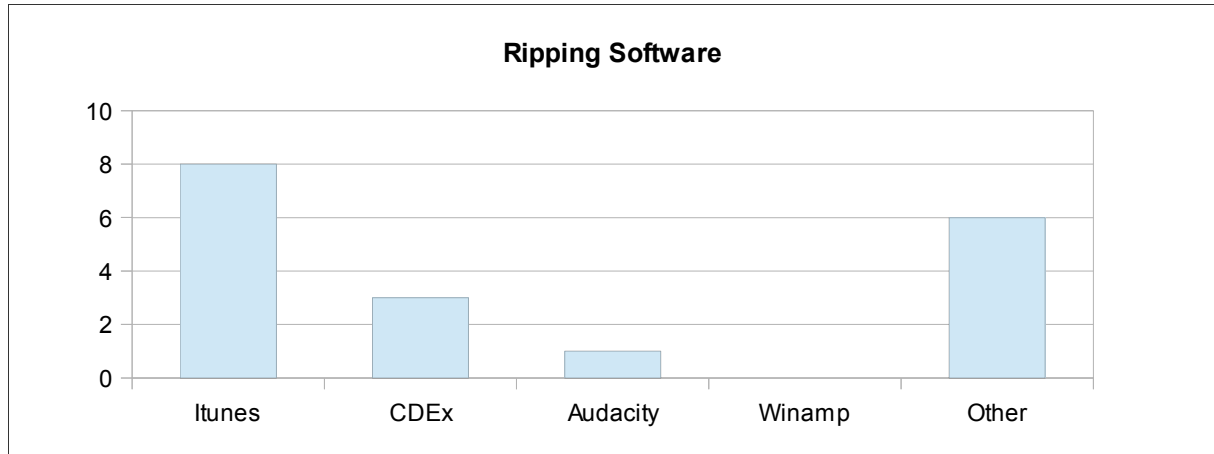
Vinyl is a seldom found format in radio archives. Nevertheless most radio studios are equipped with vinyl players for occasional use.

Approximately 10'780 vinyl are in Unikom's radios archives.

3.7 Ripping software

Compact discs are digitalized via the ripping⁶ features of certain music players (eg. Itunes) and / or database software (eg. Digimedia).

All software reviewed (including the stand-alone programs, eg. Cdex), provide the user an editing module in order to key in information about the audio content.



3.8 Radio software

The following chart shows the number of radios using a specific type of radio software.

Radio Software	Radios	Database Plug-in
Digimedia	5	Yes (see 3.4 / 3)
mAirList	3	Yes
Nautilus	1	Yes
MegaSeg	1	No
Mar4Suite	1	No
Studio Plus	1	Yes
DRS	1	Yes
Station Playlist	1	No
Dabis	1	Yes
Eigene software	3	---

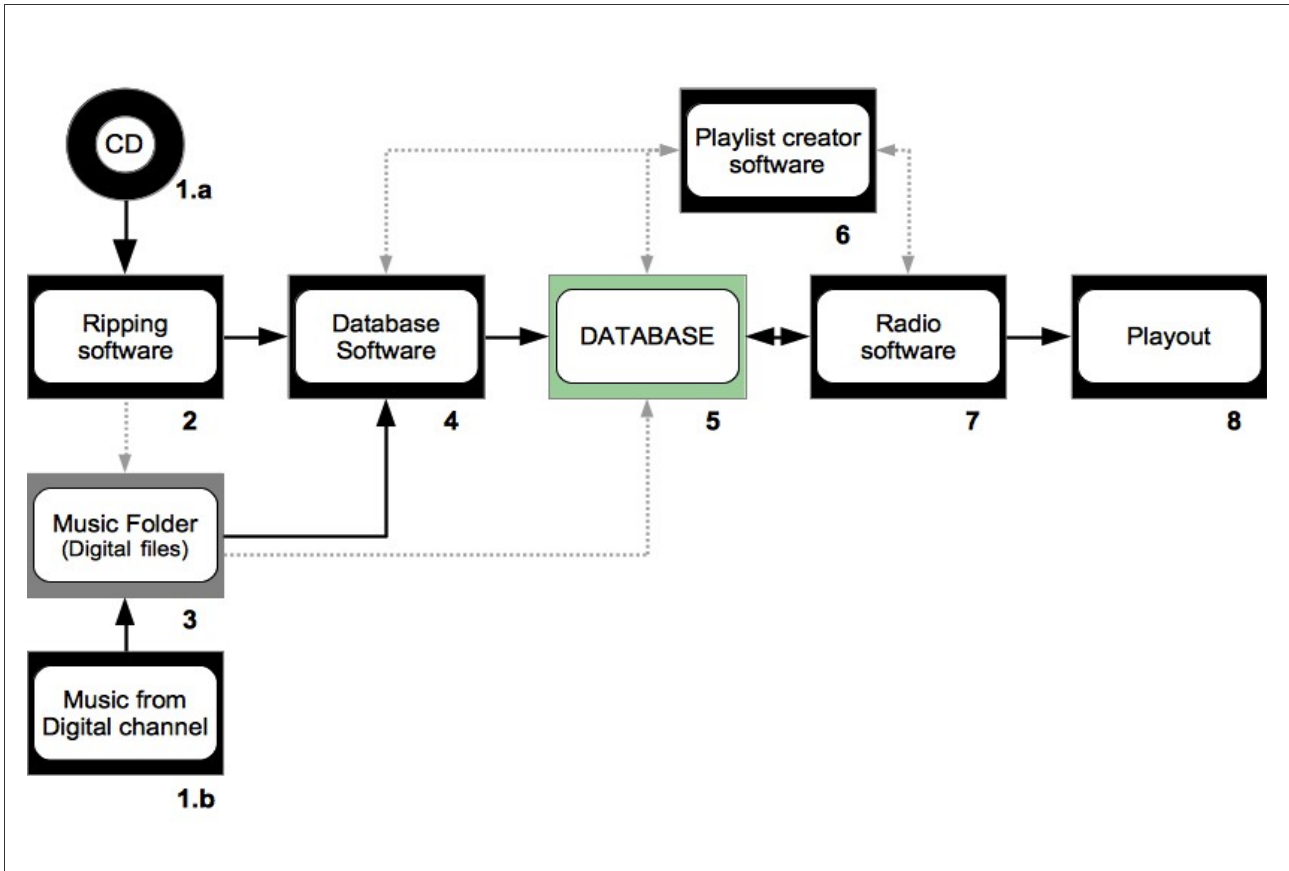
Certain radios use Music Master⁷ as an additional software to create and manage music playlists.

⁶ Ripping description: <http://en.wikipedia.org/wiki/Ripping>

⁷ Music Master website: www.musicmaster.com

3.9 Outcome of visits / Generic workflow

As a result of the visits the following scheme of a generic technical workflow can be drawn. The gray lines represent an alternative workflow due to the lack of software(s).



Nr.	Description	General issues
1	Cataloging CDs or Digital Music	1.a. Cataloging procedure abandoned, CDs are thrown away 1.b. Digital music with unknown amount of information (file container).
2	Ripping CDs	- Partial digitalization of the CDs - Digitalization in Mpeg audio quality (low kbp/s) - Partial editing of information - Entering repetitive information / misspelling (not standardized)
3	Music folder	- Digital music with unknown amount of information (file container). - Partial editing of information (min. required to "work") - Entering repetitive information / misspelling (not standardized)
4	Database software	- Limited software functionality - Partial editing of information
5	Database	- Different systems / Database architectures (not standardized)
6	Playlist creator software	- Partial editing of information - Not standardized music information handling
7	Radio software (log file)	- Inconsistent information for the music reports
8	Playout	- Data streaming limitations (See 7.2.1)

3.10 Conclusions

The visits on site were really helpful to deepen answers and issues and showed that the choices for storage infrastructures and software are related to the financial capabilities and technical compatibilities.

The way how music data are used is on the one hand defined by internal work rules. On the other hand it's limited by the features of the database software.

Because of these reasons it was not possible to recognize a standardized handling with music information, even if many similarities did show up – where lies a high potential for a centralized archive.

Although the radio stations still receive promotional Cd's (5 to 15 per month) the distribution is more and more replaced through digital channels. However, the value of the CD collections should not be underestimated. It includes especially Swiss music, often undiscoverable on the digital market anymore.

A digitalization in high quality using all the information available on the media cover is a big opportunity to store and preserve the music.

A bigger effort requires the vinyl digitalization, due to audio quality issues (crackle, noise) and the longer recording / editing procedures (cutting, signal processing). Regarding this, a certain prioritization on the vinyl digitalization has to be done in order that (Swiss) rarities can be archived and finally used / broadcasted again – before they will be beyond recovery or even lost.

4 Report of the test on Radio Kaiseregg digital music collection

4.1 Introduction

The following test is an attempt to increase and standardize the quantity and quality of music information related to audio files by using the open source tag editor from MusicBrainz⁸.

The choice for MusicBrainz is based on their reliability on collecting and relating music information following the recording industry schema.

4.2 Operating Resources

- **Hard disk:** A common external hard disk unit (1 Tb).
- **Mp3Tag Editor**⁹: A tag editor which is able to display advanced fields contained in the data structure of the audio file (Id3 / Vorbis container).
- **MusicBrainz Picard**¹⁰: The official MusicBrainz tagger application, capable of using audio fingerprints¹¹.

4.3 Amount of data

The contents have been primarily divided according to the type of audio format.

Audio Format	Initial amount
Flac	4925
Mp3	55949

Total	60874
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4.4 Duration of the test (approximate)

Steps	Description	Duration
1	Copy of the music Archive (375gb)	1 day
2	Analyse of the data (pre-Picard)	1 day
3	Scanning procedure (60768 audio files)	3 days
4	Analyse / adjustment of the results	4 days

Total duration 9 days

8 MusicBrainz official site: <http://musicbrainz.org/>

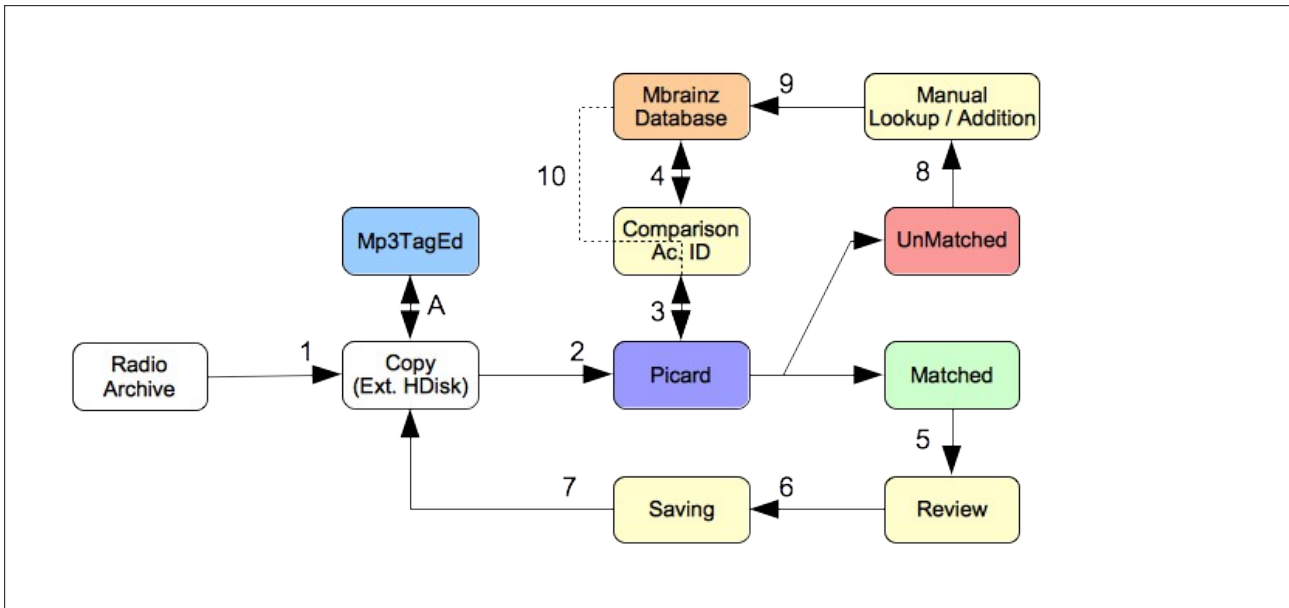
9 Mp3Tag Editor website: <http://www.mp3tag.de/en/>

10 Picard Tagger website: http://musicbrainz.org/doc/MusicBrainz_Picard

11 Acoustid website: <http://acoustid.org/>

4.5 Process overview

Below are mentioned the main steps of the tests.



A: A statistic about the improvement of music data was part of the test period ([see 4.7.1](#)).

1. The audio files are copied to an external storage unit.
2. The audio files are loaded to the tag editor (Picard).
3. The audio files are analyzed (Acoustic ID¹² comparison).
4. The acoustic ID's are compared (Audio file – Database) and used to retrieve additional music data for the tag editor ([see 4.6.1](#)).
5. The additional music data are sent to the tag editor (Picard).
6. The accuracy of the matching results are reviewed by the editor.
7. The audio files are saved, new music data are sent to the files on the external storage unit.
8. Unmatched files can be searched manually on MusicBrainz. **(Not performed)**
9. Not yet available music information on MusicBrainz can be added. **(Not performed)**
10. New information are immediately available for unmatched files. **(Not performed)**

¹² How Acoustic ID work: <https://oxygene.sk/2011/01/how-does-chromaprint-work/>

4.6 Results

Audio Format	Initial amount	Complete Set	Loaded	Matched	Not Matched	Matching %
Flac	4925	805	4120	2992	1128	72.62%
Mp3	55949	1035	54914	23719	31195	43.19%
Total	60874	1840	59034	26711	32323	45.25%

- Initial amount: The initial amount of files.
- Complete Set: The amount of files already containing detailed music information ([see 4.6.1 – Green / Blue frames](#)).
- Loaded: The amount of files loaded to the tag editor (Picard).
- Matched: The amount of files successfully recognized.
- Not matched: The amount of files not recognized.
- Matching %: The successful matching in percent.

4.6.1 Preview of the result (single file)

The following screenshot offers a preview of the gained music data showed on one example.

- Green: New values
- Yellow: Corrected values
- Black: Original values
- Green / Blue frames: [See 4.6 - Complete Set](#)

Tag	Original Value	
Title	PLACEBO	Special K
Artist	Various Artists	Placebo
Album	-	Once More With Feeling: Singles 1996-2004
Track Number	00	11
Length	3:50	3:50
Date		2004-10-25
AcoustID		fbf707dc-e00f-4026-86f7-e7ccf4d00c87
Album Artist		Placebo
Album Artist Sort Order		Placebo
Artist Sort Order		Placebo
ASIN		B0002VJT40
Barcode		0724386688620
Catalog Number		CDFLOOR23
Comment []	Jazler 2.0.x InfoTag (www.jazler.com) Various Artists PLACEBO Mainst...	Jazler 2.0.x InfoTag (www.jazler.com) Various Ar
Compilation		1
Composer	-	-
Disc Number		1
Genre	Mainstream	Mainstream
ISRC		GBAAA0400506
Record Label		Elevator Music
Media		CD
MusicBrainz Release Artist Id		847e8284-8582-4b0e-9c26-b042a4f49e57
MusicBrainz Release Id		63a847f7-e24a-46db-b9a9-767b905aad2
MusicBrainz Artist Id		847e8284-8582-4b0e-9c26-b042a4f49e57
MusicBrainz Release Group Id		8999013f-68e7-33bb-be0b-cdb8e39cb6c9
MusicBrainz Recording Id		74a0f4fe-ea74-41c7-9993-48ded8cc8455
Original Release Date		2004-10-22
Release Country		GB
Release Status		official
Release Type		album; compilation
Script		Latn
Total Discs		1
Total Tracks		19

K:\Various Artists - PLACEBO - Special K.mp3 (17%)

The new information are structured following the various tagging formats¹³.

¹³ Picard mapping: http://musicbrainz.org/doc/MusicBrainz_Picard/Tags/Mapping

4.6.2 Entities & Identifiers

The music industry scheme offers additional opportunities to correctly track music contents, where the correlation between “entities to entities” or/and “identifier codes to entities” helps to trace and identify recordings.

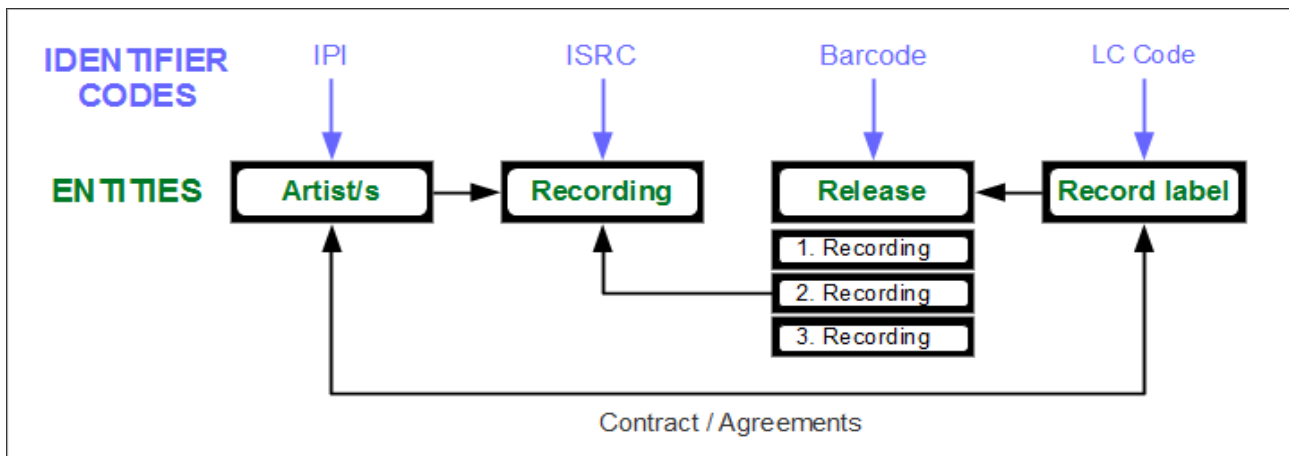
4.6.2.1 Entities

- **Artist/s:** An artist is generally a musician, group of musicians, a collaboration of multiple musicians (composer, interpret etc.) contributing to works and recordings.
- **Record label**¹⁴: A label is typically an imprint (brand/trademark) associated with the marketing of sound recordings or a company that manages imprints, and coordinates the production / promotion / relations with artist and distribution of sound recordings.
- **Release:** The unique release of a product on a specific date with specific information such as the country, label, barcode, packaging, etc.
- **Recording (Track):** A recording is represented on a particular release as a track (track list).

4.6.2.2 Identifiers code

- **IPI:** An IPI (interested party information) code is an identifying number assigned to an Artist by the CISAC database for musical rights management.
- **Label Code (LC):** It identify the different record labels for rights purposes.
- **Barcode**¹⁵: Barcodes are an industry standard for identifying products and are generally unique to a specific release.
- **ISRC**¹⁶: The International Standard Recording Code is an identification system for audio recordings standardized by the [IFPI](#).

4.6.2.3 Entities / Identifiers relationship schema



As showed on the preview of the result ([see 4.6.1 – Blue frames](#)), part of this information, when available, are copied inside the audio file.

¹⁴ Label description: <http://musicbrainz.org/doc/Label>

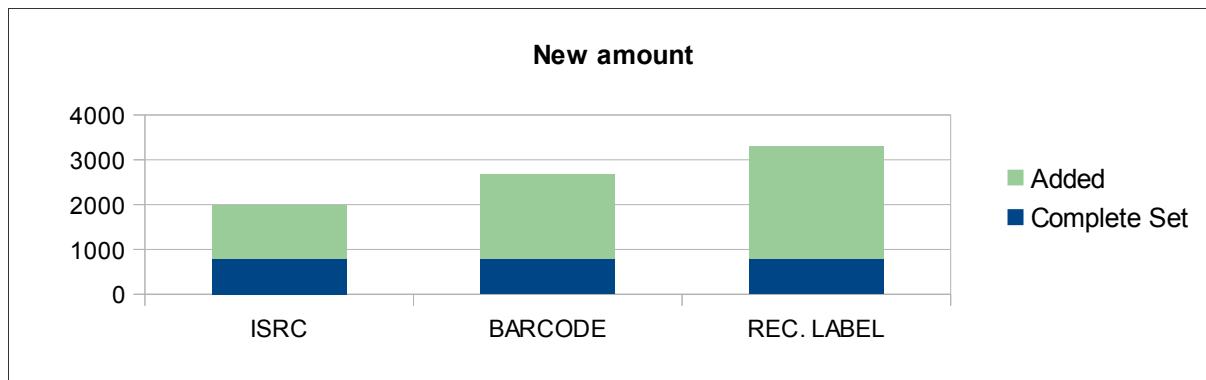
¹⁵ Barcode description: <http://musicbrainz.org/doc/Barcode>

¹⁶ ISRC description: <http://musicbrainz.org/doc/ISRC>

Below are charted the new amount of ISRC, barcode and record label information retrieved automatically from MusicBrainz.

4.6.2.4 Identifiers / Entities amount (Flac)

Description	Complete Set	Added	New amount	New amount %
ISRC	805	1187	1992	24.10%
BARCODE	799	1889	2688	38.36%
REC. LABEL	799	2505	3304	50.86%



4.6.2.5 Identifiers / Entities amount (Mp3)

Description	Complete Set	Added	New amount	New amount %
ISRC	1035	4983	6018	8.91%
BARCODE	1032	13887	14919	24.82%
REC. LABEL	1032	16978	18010	30.35%



- Complete Set: The amount of files already containing detailed music information ([see 4.6.1 - Blue frame](#)).
- Added: The amount of information added.
- New amount: The new amount of information (Complete Set + Added).
- New amount %: The new amount in percent.

4.7 Conclusions

Even if the matching is not 100%, which is mainly due to a lack of accessible music information especially from the independent music scene as well as the Swiss music repertoire, the procedure shows that it's possible to improve the editing process and therefore brings following benefits:

- The music information are corrected (misspelling) and standardized (metadata structure).
- The amount of music information are increased without any manual editing.
- A unique Identifier code (MB Id) is added to the data structure of the audio file and can be used to retrieve further information available on the MusicBrainz.

5 Final recommendations

The music information play a key role in the radio context. The official information, determinate by artists, record labels and distributors, can be used to archive the music properly and to generate efficient music reports. The knowledge of an appropriate use on these information improve and support the music editorial process. That is why specific workshops are recommended.

5.1 Workshop - Introduction to Music information & Metadata (General)

Workshop topics:

- Introduction to music information / metadata
- Introduction to MusicBrainz & Picard (tag editor)
- How to improve the music digitalization (Audio formats & Music information)
- How to improve the digital archiving (Music information)
- How to generate efficient music reports (Suisa report)

Benefits: [See Actual Benefits](#)

Possible participants: music editors and technical managers from Radios and employees of collecting societies.

5.2 Workshop - Introduction to Open Broadcast Platform (Specific)

Workshop topics:

- Introduction to Open Broadcast Platform
- Up- and download functions
- Editing music information
- Archiving as result of the editing process
- Advanced ways to an optimized music search

Benefits: [See Actual Benefits](#)

Possible participants: music editors, music distributors, music content producers and Record label managers.

5.3 Workshop - Introduction to DAB+ Data Services (Specific)

Workshop topics:

- Presentation of DLS (Radio text), SlideShows (Images, Webcam) and Journaline (Interactive features).
- How to integrate metadata in the Playout system.
- Overview of the investment costs to integrate DAB+ data services (radio studio).

Benefits: [See DAB+ Benefits](#)

Possible participants: technical managers from radios.

6 Actual Benefits

6.1 Standardized music information

The use of centralized databases as primary source settles the fundament for a progressive standardization of the music libraries. In the same time it reduces drastically the protracted efforts in the editing process (entering of repetitive information / misspelling).

6.2 Fair distribution of the Royalties

The quantitative and qualitative improvement of information raises the effectiveness of music reports and simplifies the work of the copyright societies ([see 4.6.2](#)).

6.3 Open Broadcast Platform (OBP)

By the end of 2014, Open Broadcast¹⁷ will re-launch a new platform with the aim to support the independent music and radio scene. It offers an alternative on-line music platform to archive and distribute music contents (back catalogue and promos).

Developed on different “access levels”, artists, record labels and distributors (Music Pro) can upload music contents. In the meanwhile radio editors (Radio Pro) can up- and download music for radio purposes.

The strength of the Open Broadcast Platform is the offer of audio files with embedded standardized music information – a well done symbiosis.

6.3.1 Related metadata / advanced search system

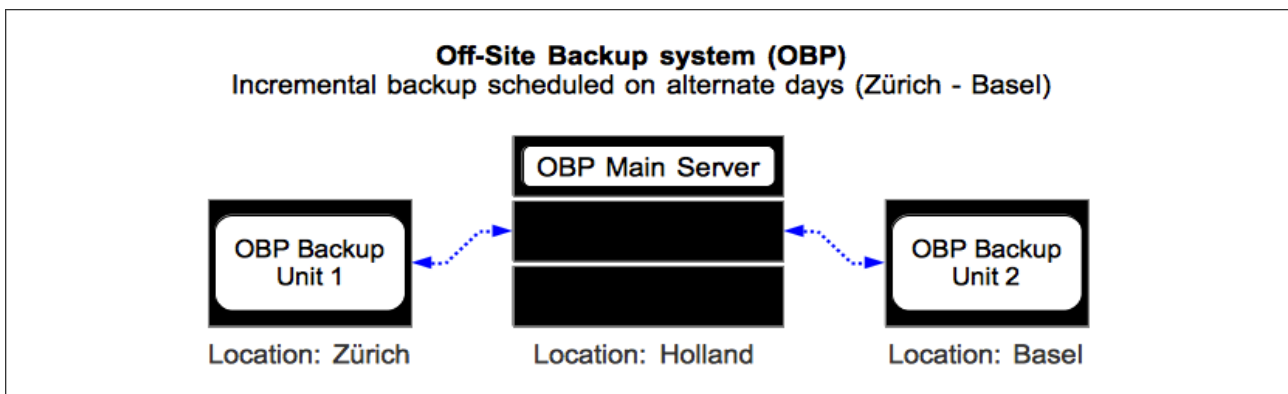
Relating music information allows advanced ways of filtering and browsing contents.

- **Example 1 (by release):** Compilations containing Downtempo music and released in the United States between 2000 – 2009. -->[Result](#)
- **Example 2 (by artist):** Rock music Band from Switzerland. -->[Result](#)
- **Example 3 (by label):** German Indie label releasing Hip Hop music. -->[Result](#)

Please use Firefox, Safari or Chrome web browsers.

6.3.2 Backup for Radios

A centralized archive allow the radios to save their entire music library on an external all time accessible platform. This solution also ensure an economical benefit, reducing the costs for storage systems and editorial work.



¹⁷ About Open Broadcast Platform: <https://www.openbroadcast.ch/de>

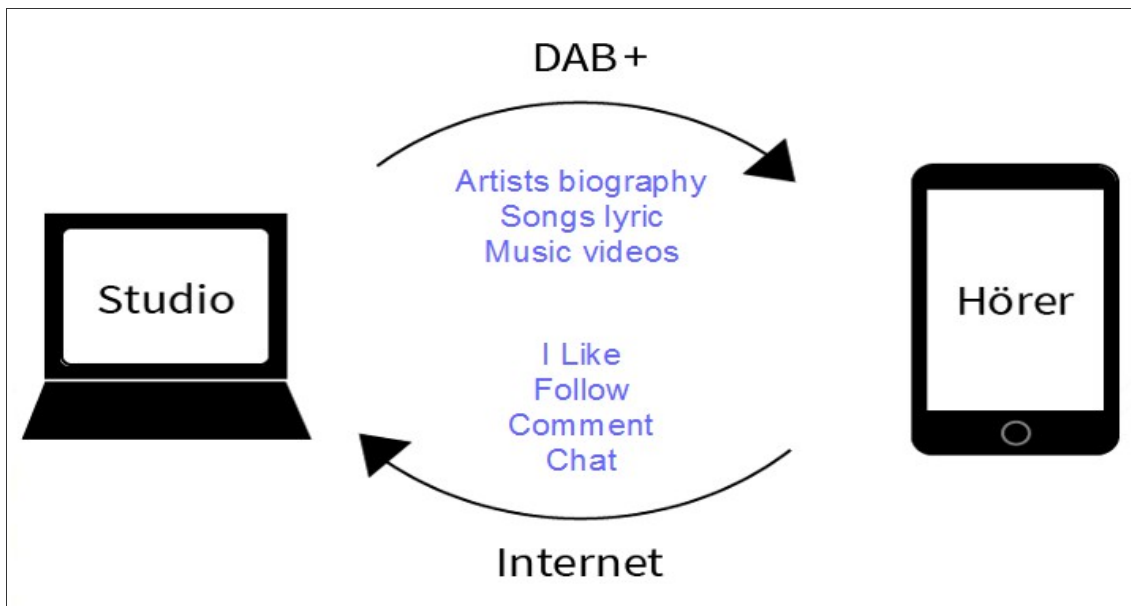
7 DAB+ Benefits

DAB technology offers solutions to send further descriptive information (data-streaming).

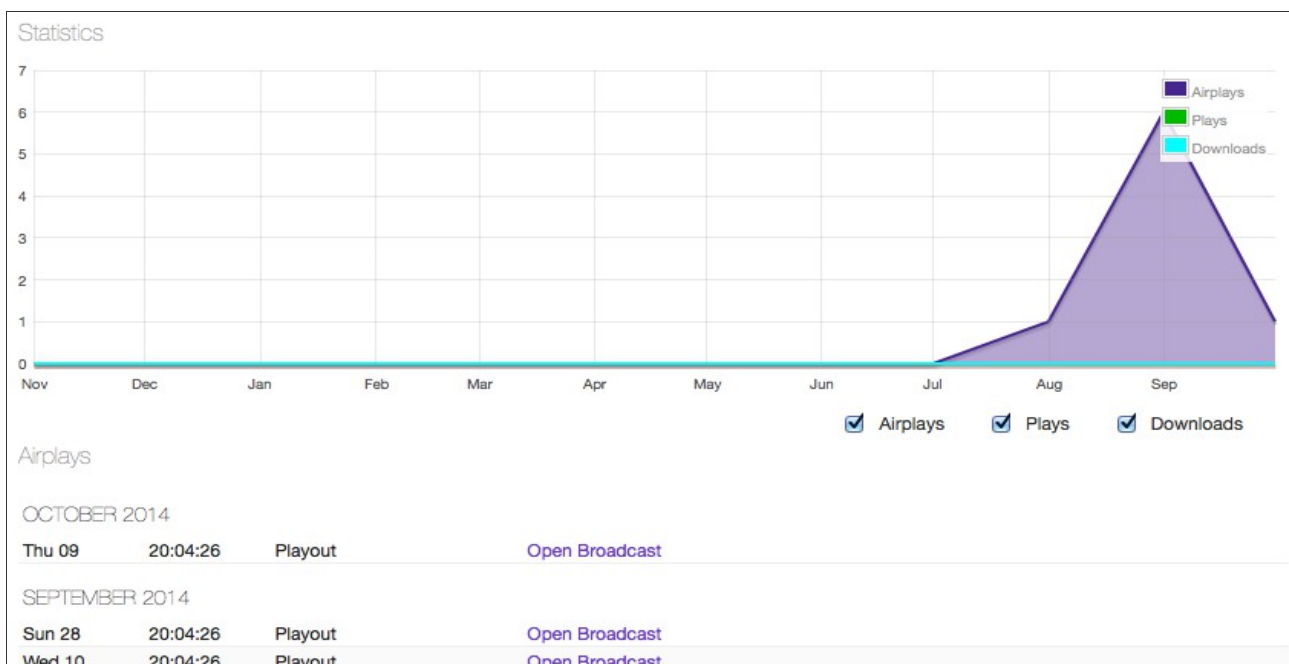
A structured and reliable set of metadata allows various exploitations of functionality, such as radio text¹⁸, slide show¹⁹ and Journaline²⁰ plugin. Hereby it is possible to send information about the radio program and the running playlist.

7.1.1 New Listeners services

A standardized distributing system allows the radios to develop new ways to entertain their listeners for e.g. with Lyrics, Biographies, Music Videos and more.



An additional gain is the option to generate statistics for internal intents ([example from OBP](#)).



18 Radio text: <http://digris.ch/#areas/radiotext>

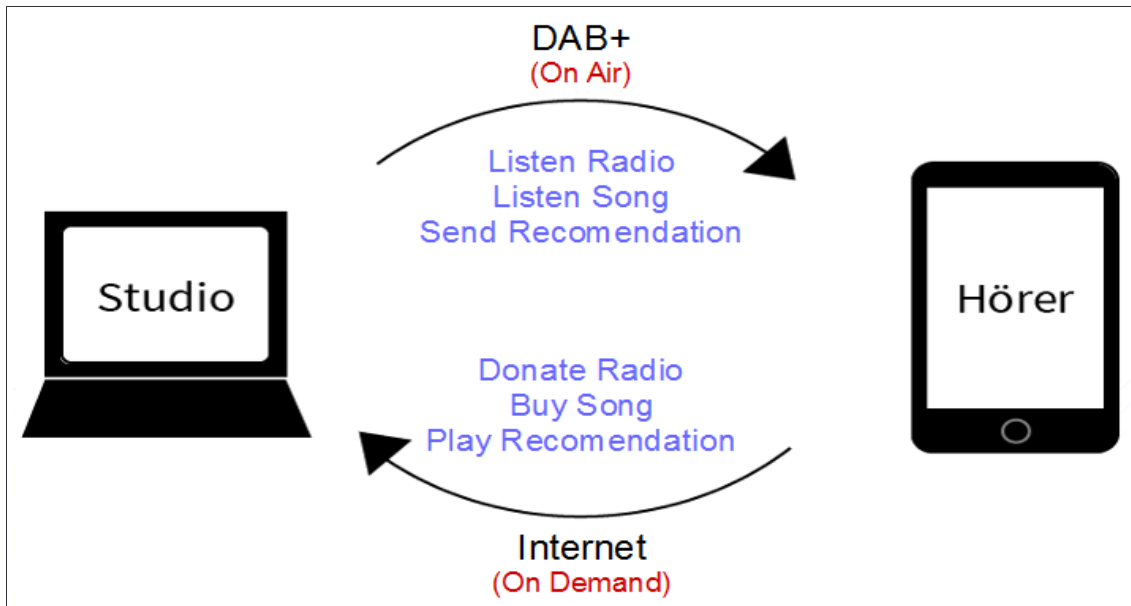
19 Slideshow: <http://digris.ch/#areas/mot-slideshow>

20 Journaline: <http://digris.ch/#areas/journaline>

7.2 New Business cases

7.2.1 On-demand / Music shop

The development of a portable application connected to a centralized music database and audio files (eg. MusicBrainz, OBP) could bring possibilities to create new business cases such as on-demand music services or/and music shops. The music and radio scene could profit.



7.2.2 Radio / Database software

Developing new interactive applications implies re- setups of the (radio) studio hard- and software (e.g. the database software and the Playout hardware to synchronize the audio-data streaming).

7.3 Development stage

Open Digital Radio²¹ and Digris are already testing some data-streaming applications (DLS, SlideShows²²). By now the European Broadcast Union (EBU) is collaborating with the radio industry to integrate the DAB reception²³ in all devices (Smartphone, Tablets, Car radio).

21 OpenDigitalRadio website: http://opendigitalradio.org/Main_Page

22 Data-streaming Genève: <https://www.facebook.com/photo.php?fbid=10205302904796159&set=pcb.10205302912796359&type=1&theater>

23 Euro-chip video introduction: <https://www.youtube.com/watch?v=LnsIHs-i6IU>