



Artist to  
Business to Business  
to Consumer  
Audio Branding System

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## D6.6 Project Final Evaluation Report

Final evaluation report on the ABC\_DJ project's developments, including in-situ demonstrator phase.

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**ABC\_DJ - Artist-to-Business-to-Business-to-Consumer Audio Branding System**

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**Project Information**

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## History

Version	Name	Date	Remark
Vo.1	Schiesser	2018-12-03	Definition of report structure
Vo.2	Borgstedt	2018-12-04	Input of preliminary material
Vo.3	Edwards	2018-12-21	Input of off-site system test results
Vo.4	Edwards	2018-12-27	Input of critical success factor and expected impact evaluation
Vo.5	Borgstedt	2018-12-29	Proofreading
Vo.6	Edwards	2018-12-30	Executive summary and conclusion
Vo.7	Edwards	2018-12-31	Final QA and revisions
V1.0	Wages	2018-12-31	Document formatting and submission to EC

# Glossary

Acronym/Abbreviation	Full Name/Description
ABC_DJ	Artist-to-Business-to-Business-to-Consumer audio branding system
ABT	Audio Branding Tool
BPM	Beats per Minute
COU	Cockpit Unit (Tool)
Eval	Evaluation
GMBI	General Music Brand Inventory
GUI	Graphical User Interface
HW	Hardware
ISP	In-Store Player
KPI	Key Performance Indicator
Lit	Literature
MLM	Music Library Manager
MSD	Music Structure Discovery
MSE	Mean squared error
Mock-up	A design prototype to test the interface or parts of the functionality of a software or hardware system.
PLG	Playlist Generator (Tool)
PoS	Point of Sale
R&I	Research & Innovation
RTB	Reason-to-Belief
SW	Software
TBA	To be announced
TUB	Technische Universität Berlin

## Executive Summary

The ABC\_DJ Description of Action identifies the means of final evaluation as “an audio branding demonstrator production,” i.e. an on-site use-test of the tools by a creative agency (HDIS) in the context of creating and implementing an audio brand for a client (PIACENZA) (Part B, pg. 9). Over the lifespan of the project, numerous intermediate tests of particular methods, software and hardware components, and tools were also conducted. This deliverable presents the final on-site test results together with consolidated results of intermediate tests, to the end of providing guidance in evaluating the extent to which the project fulfilled its expected impacts.

- Both expected impacts and comprehensive system performance were evaluated.
- The evaluation methodology comprised a combination of off- and on-site tests.
- Delays in the technical development made some alterations in the planned testing schedule and methodology necessary.
- Usability tests confirmed strong expert interest in the project concept and provided guidance for ongoing improvement of the tools.
- Off-site tests yielded a median overall rating of “good” across all tools, while also providing insight as to remaining weaknesses.
- Comparing usability and off-site test results shows a steady increase in the functionality and usability of the tools.
- On-site baseline and system tests on the provider side indicate moderate overall usability, moderate overall technical stability, and high overall willingness to use the system in the future. Qualitative reviews reveal that:
  - On the one hand, development work must still be done to match the “plug-and-play” functionality of existing basic tools.
  - On the other hand, the system’s advanced capacities make it significantly more inspiring than current tools.
- Final reviews of test results and laboratory performance metrics show that the project fulfilled nearly all its expected impacts
  - The sole exception is the visualisation-oriented Audio Branding Tool, which needs a considerable period of refinement to finalise.
  - In the consortium’s view, this does not detract from the overall impact of the project – particularly as the GMBI-enabled prediction module and the statistics that it generates have proven to be more effective communications tools than visualisations.

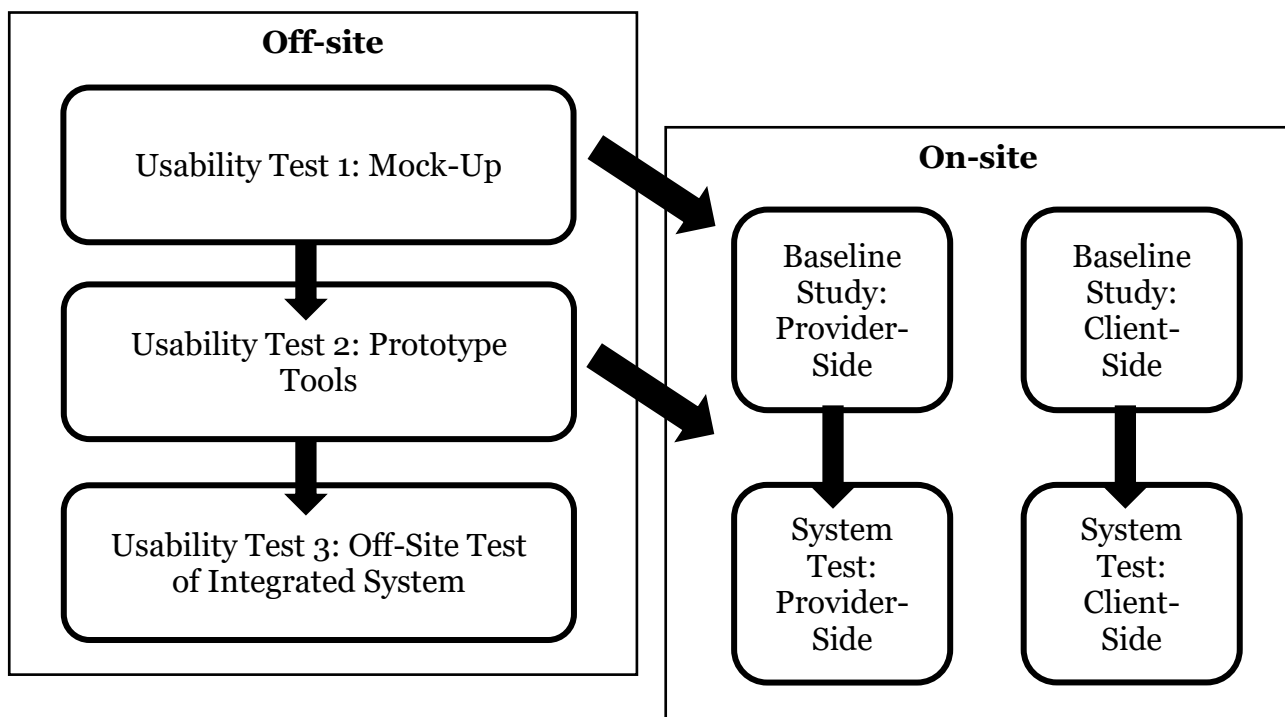
The consortium partners have committed to ongoing collaboration in order to realise the project’s promise of next-generation audio branding practices and products.

# 1. Introduction and Overall Approach

The evaluation as a whole had two main objectives:

1. Evaluation of the system's constituent tools by experts, to the end of ongoing iterative optimization
2. Validation of the system on a conceptual and practical level by end-users
  - a. Off-site, e.g. as the final stage of usability testing
  - b. On-site, e.g. as ecologically valid proof-of-concept of the system as a whole

Achieving these objects required a multi-stage research flow, which was conceived as follows (D6.2, pg. 16):



Testing was mixed-method, utilising instruments designed by INTEGRAL with input from all other consortium members. At all stages, respondents offered insight grounded in their personal experiences and needs, covering areas such as tool features and functionality, concept relevance, system usability, system reliability, quality of musical outcomes (archives and playlists), and areas for improvement.

By the end of the evaluation period, the consortium had assembled comprehensive insights as to the system's conceptual and technical functionality and impact. These insights also determined what improvements and communication strategies were necessary to take the system from laboratory to market. Taken together, these evaluations allowed us to refine our understanding of the project's success factors, as well as identifying each component's future unique selling propositions (USPs).



## 2. Evaluation Framework

The following chapter will outline the structure of the evaluation phases. For a more detailed walkthrough of the evaluation framework development process, please see D6.2.

### 2.1 Criteria for Evaluation

#### 2.1.1 Project goals and means of evaluation

The ABC\_DJ Description of Action identifies the project's aim as "to provide European creative agencies in the field of audio branding with sophisticated ICT supporting tools" (Part A, pg. 3). Specifically, the project set out to provide the following tools and feature modules (cf. Part B, pg. 9) :

- Audio branding tool (**ABT**): Desktop application for the visualisation of and communication of music. Various possibilities to visualise a song's properties with respect to: other songs, brand context, musical features etc. via underlying filter functions. Representations will include charts, 'colour fans' etc., as well as a pre-listening function.
- Playlist generator tool (**PLG**): Desktop application for the production, visualisation and export of sophisticated playlists. An underlying set of rules supports dramaturgies, time schedules, prevention of monotony as well as direct combination of non-matching changes in loudness or rhythm etc.
- Cockpit unit (**COU**): Two-piece software application (agency and instore) for content deployment, remote real-time monitoring and maintenance of an existing instore music implementation. Full set of functions in the interface on the agency-side, reduced set of functions on the store-side, connected to the in-store player (HW & SW).
- Four feature modules:
  - Extraction and indexing module: Automated indexing of music archive with measurable musical features.
  - Brand filter and prediction module: Automated prediction of end consumer's interpretation of a song, including target group indication based on socio-demographic data and milieu affiliation.
  - DJ cue point module: Provides for professional DJ software features like beat match, auto-transmission for a smooth mix and respective cue points, i.e. enter points (after beginning of a song) and exit points (before ending of a song).
  - Pre-listening module: Automated generation of audio summary files for quicker archive search
- Over the course of the project, it became clear that by incorporating these feature modules into a single music management and player tool, the consortium could produce a professional alternative to the off-the-shelf, consumer-oriented tools currently used by audio branding professionals (e.g. Foobar2000). The resulting tool was designated the Music Library Manager (**MLM**).
- In-store player module (**ISP**): Software audio player for sound design, running on instore HW, creating DJ like smooth payout from content, playlists and cue points.

### 2.1.2 Expected impacts, critical success factors, and performance indicators

The ICT-19-2015 call text specifies an expected impact of “*Validated novel ICT technologies and tools supporting the creation process and delivering measurable benefits for the creative industries as regards time and resource investment, and quality of output*” (cf. Description of Action Part B, pg. 26).

In response to the call text, the Description of Action Part B specifies six general expected impacts and 23 specific expected impacts (pg. 26-27; see Annex II: Expected Impacts).

Deliverable 6.2, “Plan for Evaluation Instruments, Samples, Test Stimuli/Settings and Timelines,” consolidates these preliminary impacts and KPIs into a more systematic framework inspired by industry best practices (Parmenter 2015). It identifies four **critical success factors**, or dimensions of performance critical to the project’s ability to achieve its expected impacts (cf. D6.2, pg. 10):

1. Improved audio branding processes
2. Improved audio branding outcomes
3. Cultural-economic impact
4. Scientific impact

The consortium’s research into audio branding processes identified gains in time, resources (i.e. margins), and quality as potential criteria to judge the project’s success (cf. D2.7, pg. 12). Taking the “time = money” maxim to heart, we have merged the first two criteria and added the criterion awareness/satisfaction, yielding three overarching **success criteria**:

1. Time/margin gain
2. Quality gain
3. Awareness gain

Applying these criteria toward all four critical success factors, the consortium derived 15 KPIs and 81 specific and measurable performance indicators (PIs) (see Annex III, Critical success factors and performance indicators). This list assimilates all expected impacts identified in the Description of Action. Details on the measurement/estimation of KPIs follow in the below summaries of the usability tests, off-site tests, and on-site tests.

## 2.2 Methodology: Off-Site Tests

The following reference groups for evaluation and sample design were defined for this stage of research (for definitions, see D2.1: Common Definitions in Audio Branding Processes):

- Music Providers
- Creative Agencies
- Brand Management
- Instore Music Providers

According to the description of action for tasks T6.1 & T6.2, qualitative research was carried out. The most suitable qualitative survey methodology was the face-to-face interview.

The surveys themselves were based on semi-structured questionnaires consisting mainly of open-ended questions, which gave the participants the opportunity to enrich the results by going into as much detail as desired or raising unforeseen related issues in accordance

with their professional intuition. The tests were conducted via in-person and remote interviews based on paper & pencil questionnaires, which were used as a loose guideline to give the experts maximum flexibility regarding their input, thoughts, and feedback (for the survey questionnaires, please see D6.1 Annex II).

The interviews were audio-recorded, and the main statements/ findings were transferred into a research matrix (in Excel format) for further analysis.

The interviews were conducted by INTEGRAL Vienna, Stuttgart, and Berlin in German, the native language of our interview partners. Participants were recruited from the address pools of INTEG and HDIS.

### 2.2.1. Usability tests

Usability testing took place in two loops. The first evaluation loop (May 2017) focused on the tools' concept and promises, whereas the second evaluation loop (March 2018) focused more on usability issues of the prototype tools and soliciting recommendations for their improvement. An additional objective was to validate hypotheses formed after the first testing loop regarding target group needs, use drivers, and barriers to use.

Based on industry knowledge, research results, and the mock-up reports (D 5.1-5.3), the draft interview guide was developed according to the main research questions and test stimuli.

The test stimuli in the first loop were the following:

1. Descriptions of the overall system concept
2. Descriptions of three ABC\_DJ tools (PLG, ABT, COU)
3. Mock-up graphical user interfaces (with limited clickable features)
4. Descriptions of use cases for each tool

At the time the second usability test were conducted, three of the four ABC\_DJ tools had been developed to functional prototype stage. The test stimuli during the second loop were the following:

1. Descriptions of the overall system concept,
2. Prototype versions of three ABC\_DJ tools (PLG, ABT, COU).

During the test, respondents were asked to use the tools to complete tasks representative of the first stages of the audio branding process (identified in D2.5 and D2.7):

1. Creating and naming a project
2. Specifying a pool of songs to use
3. Setting rules and rulesets (playlist parameters on criteria like BPM, energy level, and allowable genres)
4. Scheduling these rulesets
5. Generating a playlist
6. Creating data visualisations of the playlist contents
7. Linking the playlist to an in-store player.

In order to gain new perspectives while also enabling longitudinal comparison of the ABC\_DJ tools at difference stages of development, INTEG recruited a mix of respondents who participated only in one and who participated in both usability tests (for more detailed information about our research sample, please see D6.3, Annex VI).

### 2.2.2 Off-site system test

The purpose of the off-site test was to validate the usability of the integrated system and establish a benchmark with which to compare the findings of the on-site tests. The test ran from May 4th to May 15th, with a total of 22 consortium representatives participating. All consortium partner organisations were represented.

The off-site test was online and accompanied by an online survey (self-interview). The questionnaire was designed by INTEGRAL based on two tasks per tool (PLG, ABT, COU) (see D 6.4 Annex 1). These were similar in style to those assigned during the usability tests, insofar as they mirrored the basic tasks that real users would use the tools to accomplish on an everyday basis. Respondents were asked to complete each task and rate its ease of completion on a scale of 1 (very easy) to 5 (very difficult). Respondents were furthermore asked to rate each tool both overall and on the different attributes such as innovative, easy to navigate, or self-explanatory, also using a scale of 1 (very good) to 5 (very bad). In addition to numerical ratings, participants were asked to give qualitative feedback.

## 2.3 Methodology: On-Site Tests

The final evaluation of the ABC\_DJ system's impact took place through testing within its expected everyday use environments. This test stage was crucial to the assessment of the success of the project as a whole.

Two stakeholders were identified for this stage of research (cf. D6.2, 3.3.1)

- The **creative agency** or provider-side use environment as the primary **site of audio branding processes**
- The **brand point of sale** or client-side use environment as the primary **site of audio branding outcomes**

In order to evaluate the ABC\_DJ system's potential impact on both processes and outcomes, it was necessary to test it within both the provider-side use environment and the client-side use environments. The consortium determined the following sites, KPIs to be measured, and evaluation actions.

Site	KPIs to be measured	Evaluation actions	Action objectives
HearDis! Stuttgart and Berlin offices	1-5, 7, 10	Baseline study	Evaluate pre-ABC_DJ audio branding practices
		On-site system test	Evaluate impact of ABC_DJ system
PIACENZA Pollone point-of-sale	4-5, 8, 11, 12	Baseline study	Evaluate pre-ABC_DJ in-store music condition
		On-site system test	Evaluate impact of ABC_DJ system

During both baseline and system tests, INTEGRAL used standardized test instruments derived from the KPIs to achieve a before-and-after comparison of audio branding processes and outcomes.

### 2.3.1 Provider side

**Baseline study:** The following instruments were employed:

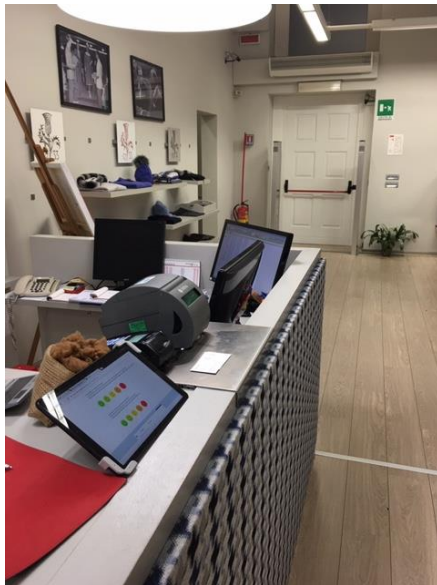
- Relevant staff were given short self-interviews (see Appendix 2), including both closed and open questions, covering the following topics:
  - Time spent on audio branding tasks (KPI1, KPI3)
  - Tools and resources used during audio branding tasks (KPI4)
  - Subjective rating of specified aspects of the overall process (KPI4)
    - Classifying songs
    - Editing songs
    - Searching and discovering songs
    - Creating playlists
    - Updating playlists
    - Meeting with clients
    - Uploading playlists
  - Subjective rating of playlists or other audio branding products created during the period using existing methods (KPI5)
- A face-to-face interview was conducted with HEARDIS management (see Appendix 2), covering all of the above topics but with special focus on:
  - Time and resource inefficiencies of current practices (KPI1, KPI3)
  - Cost and profit margin where relevant (PI61)
- HearDis! was furthermore asked to provide data on the structure and contents of their music archive (KPI2) and relevant playlists (KPI5).

**On-site system test:** The on-site system test was conducted after the installation of the ABC\_DJ system at the HDIS office. In order to maximize comparability, the study design matched that of the baseline study to the best extent possible.

### 2.3.2 Client side

**Baseline study:** The following instruments were employed:

- Telephone interviews were conducted with PIACENZA staff and management at the Pollone point of sale covering the following topics (see D6.4, Appendix 2):
  - Current in-store music selection practices (KPI4)
  - Perception of brand, playlist brand fit, and playlist quality (KPI4, 5)
  - Attitudes toward the idea of audio branding (KPI8, 11)
- A written debrief was exchanged with PIACENZA management concerning expectations toward the ABC\_DJ system (KPI8, 11)
- Customers were surveyed using computer-assisted and pencil-and-paper self-interviews on perceptions of the brand and in-store music (KPI12) (see D6.4, Appendix 2). The computer-assisted self-questionnaire was implemented on a tablet mounted next to the cash register at the counter, for easy customer access. PIACENZA staff were familiarised with the operation of the tablet.



- PIACENZA kept a log of the music played in-store, starting in January 2018 and running until the beginning of the on-site system test (KPI5).
- An advanced person-counter system was installed and used to measure customer data (footfall, time-in-store, etc.) (KPI11, 12). In order to collect the data necessary to support ABC\_DJ pilot Piacenza has installed a real time detection system in the main entrance, which is able to acquire the data by image analysis. The system is based on a state of the art image analysis process, run by 4 high definition cameras installed in the antitheft gate at the entrance of the shop. The architecture of the system is fully GDPR compliant, since the data are stored in an anonymous way, without any reference to the identity of consumers. It was installed at the end of November 2017, December was dedicated to the tuning of the system (i.e. positioning of cameras, cross check of acquired data, exclusion of Piacenza operators, tuning of face image analysis) while from January 2018 the data have a good level of reliability. In March 2018 an additional camera will be added to increase facial expression interpretation. The data collected are:
  - Entrances and exits count – precision > 99%
  - Time of permanence – precision > 99%
  - Gender (M/F) – precision > 90%
  - Age range (children, 20-35, 35-60, over 60) – precision > 75%
  - Emotional expression: neutral, positive (cheerful, happy, astonished), negative (sad, angry, disgusted, afraid) – precision > 90%

**On-site system test:** The on-site system test was conducted after the implementation of the ABC\_DJ system at the PIACENZA Pollone point-of-sale. As with the on-site evaluation at HDIS, the study design of the on-site evaluation at PIACENZA matched the design of the baseline study.

## 2.4 Alterations in On-Site Test Planning

### 2.4.1 Alterations in timing

In D6.2 (31 August 2017), the following on-site system test schedule was proposed (p. 28):

Schedule as of 31.08.2017	
Transfer workshop	WK 26/ 2018
Briefing by FINCONS, check of player	WK 27
Revision of method & questionnaire(s)	Till end of WK 39
Finalisation of method & questionnaire(s)	WK 41
Fieldwork	WK 42-43
First debrief for FINCONS	WK 43
Report (D6.6) for quality check	WK 48
Upload of the final report	WK 50

In D6.4 (28 June 2018), in light of low customer traffic at the point of sale, it was decided that the evaluation period should be extended from one to six weeks (p.25).

Schedule as of 28.06.2017	
Transfer workshop	WK 26/ 2018
Briefing by FINCONS, check of player	WK 27
Revision of method & questionnaire(s)	Till end of WK 39
Finalisation of method & questionnaire(s)	WK 41
Fieldwork	WK 42-49
First debrief for FINCONS	WK 45
Report (D6.6) for quality check	WK 49
Upload of the final report	WK 50

In August 2018, FINCONS indicated that D5.12, “Fully Integrated System,” would be delivered in WK35 (rather than in WK27 as planned). Accordingly, INTEGRAL proposed the following final schedule, which was adhered to:

Schedule as of 20.08.2018	
Briefing by FINCONS, check of player	WK 36 Till end of WK 39
Revision of method & questionnaire(s)	39
Finalisation of method & questionnaire(s)	WK 41
Fieldwork	WK 42-49
First debrief for FINCONS	WK 45
Report for quality check	WK 52
Upload of the final report	WK 52

### 2.4.2 Alterations in methodology

Changing partner capacities and needs also necessitated the following alterations in the on-site system testing methodology:

- Provider side: Due to delays in the technical development, it became clear in November 2018 that it would not be possible to fully implement the ABC\_DJ system at HDIS. As of late December 2018, the system remains in beta testing. As a result:
  - It was not possible for HDIS co-workers to evaluate the system in all of the areas specified in the self-questionnaire
  - It was not possible for HDIS co-workers to fill in a daily work log using the

system.

- As a substitute mode of evaluation, HDIS and INTEGRAL have provided a step-by-step **walkthrough of the audio branding process** using ABC\_DJ in its current state of readiness.
- Client side:
  - The original plan for the on-site system test was to install the ABC\_DJ In-Store Player along with a custom hardware solution in the PIACENZA store in Pollone in Autumn 2018. In agreement with Fratelli Piacenza, the consortium decided instead to rely upon the existing (commercially available) IT and audio infrastructure. The reasoning behind this decision was as follows:
    - Over the past several years, the best practice in the in-store music industry has shifted from the provision of custom hardware to the provision of software and streaming solutions that are tailored to serve multiple existing hardware configurations (cf. D8.8).
    - Accordingly, the current version of the ABC\_DJ ISP was designed to be hardware agnostic. HW comparable to the designated standard player (i.e. Asus Thinkerboard; cf. D2.9) was used throughout the development, and is still operative in the FINCONS lab for continuous testing.
    - The HW available at PIACENZA in Pollone has similar specifications to the reference high-end ISP player, and thus the results in terms of performance and stability can be still considered relevant.
  - It was furthermore originally planned to gather financial data as well as interview data, however, PIACENZA strongly suggested that doing so would not add value to the evaluation: due to the number of factors that influence fashion purchase behaviour (ranging from product range to weather conditions), it would be impossible to isolate any impact of the change in background music at a single point-of-sale.
  - To compensate, PIACENZA and INTEGRAL have provided a step-by-step **walkthrough of the technical preparation process**.



## 3. Results: Off-Site Tests

### 3.1 Results: First Usability Test (cf. D6.1)

**Positive:** Respondents expressed positive attitudes toward the project. They suggested that the system's most innovative point was not any single tool, but the integrated system itself. They furthermore stated that audio branding could benefit from the empirical correlation of audio features and semantic dimensions. Their spontaneously-elicited impacts mirrored those planned by the consortium: time/quality gains due to the streamlining of workflows and support during communication with clients.

**Negative:** Respondents questioned the technical and aesthetic feasibility of automating audio branding (e.g. how does it work, how can I check it, how good will the resulting playlists really be?). They furthermore expressed some anxiety regarding the impact of automation on the industry (e.g. will the software increase the number of competitors?).

**Suggestions for improvement:** Respondents expressed a strong desire for reassurance. They liked the idea of algorithmic software capable of streamlining their workflows, but wanted it to be transparent and capable of integrating their own expertise and intuition. Accordingly, they suggested designing basic and professional versions of the system with fully automated, semi-automated, and manual modes.

### 3.2 Results: Second Usability Test (cf. D6.3)

**Positive:** All respondents expressed top-level interest in the ABC\_DJ concept and identified at least some tools/functions as useful, and some respondents indicated that they would be ready to incorporate the tools into their own professional practice as-is.

**Negative:** Many respondents were quite critical of the tools at their current stage of development. Some experienced backend and frontend errors, while others challenged the project to more clearly indicate how it fit into the audio branding ecosystem and improved audio branding workflows.

**Suggestions for improvement:** Respondents offered numerous specific insights as to how to improve usability and functionality. As in the first usability test, many also expressed a desire for enhanced musicality (e.g. an audio preview function) and enhanced manual functionality.

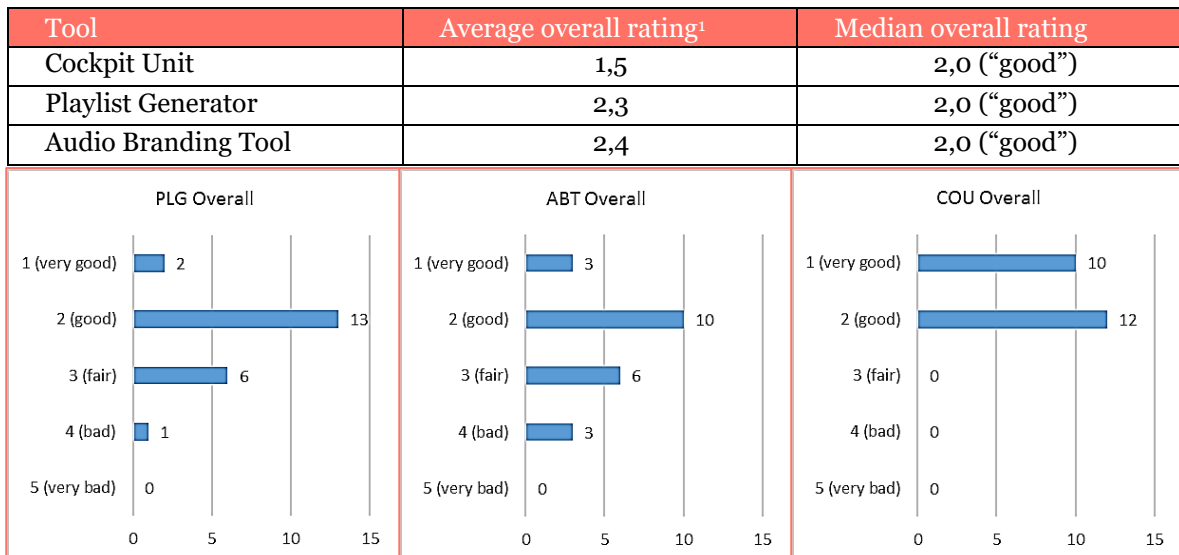
### 3.3 Results: Off-Site System Test (cf. D6.4)

#### **Benchmarks achieved during prediction module testing:**

- **Speed:** Over the course of three iterations of the integrated system, the time required to process and tag a song decreased from 9:20 to 4:09 (cf. D5.12, pg. 21).
- **Accuracy:** The current release of the prediction module and automated music annotation software achieve the following prediction accuracy (MSE) when running the baseline prediction model (accuracy for the target-group-specific models is comparable; cf. D3.6, pg. 15-16).:
  - D1\_Arousal: 0.118
  - D2\_Valence: 0.090
  - D3\_Authenticity: 0.099

- D4\_Timeliness: 0.094
- D5\_Knowing: 0.434
- D6\_Liking: 0.158

**Positive:** In all, 22 participants completed the off-site system test. The results were generally positive, with a median overall rating of “Good” across all tools. The Cockpit Unit was the best-rated tool, followed by the Playlist Generator and the Audio Branding Tool.

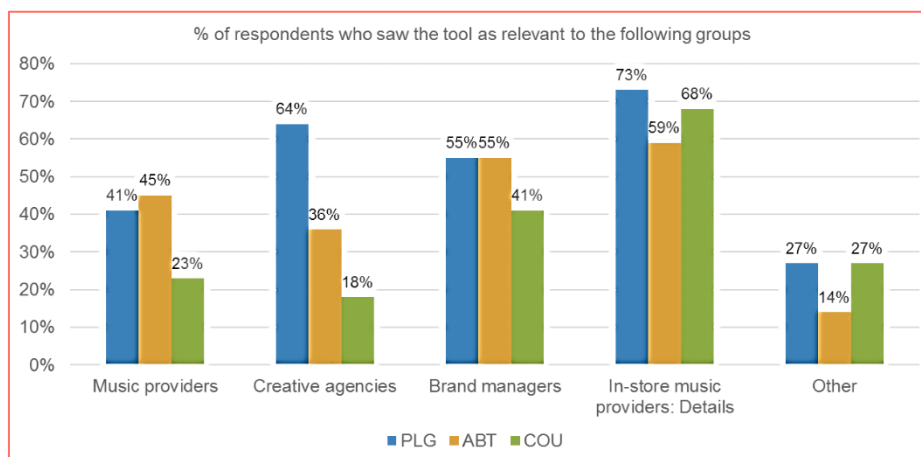


The **Playlist Generator** was rated highest on the attributes “good font size, easily readable”, “likeable/pleasant”, and “well-structured”, and lowest on the attributes “self-explanatory, intuitive to use,” and “visually appealing”.

The **Audio Branding Tool** was rated highest on the attributes “good font size, easily readable”, “innovative”, and “well-structured”, and lowest on the attributes “visually appealing (design)” and “self-explanatory, easy to use”.

The **Cockpit Unit** was rated highest on the attributes “good font size, easily readable”, “well-structured”, and “easy to navigate”, and lowest on the attributes “visually appealing (design)” and “versatile”.

Respondents saw all three tools as highly relevant to in-store music providers. The ABT was furthermore identified as relevant to creative agencies and brand managers, and the PLG as highly relevant to creative agencies but less so to the other target groups.



<sup>1</sup>Averages are not generally used when assessing ordinal data, however in a very rough analysis they can help give a sense of the distribution of responses.

**Negative:** The system's weakest attributes were "self-explanatory/intuitive to use" and "visually appealing" – though most users still rated the tools as "good" or "very good" in these areas. Regarding all tools and attributes, users who encountered technical errors were more likely to give negative ratings.

**Suggestions for improvement:** The tests indicated that some of the system's shortcomings had been addressed, but that some key steps remained to be taken: most crucially, the integration and testing of the Music Library Manager and audio player. Respondents furthermore provided extensive feedback on specific usability issues of all three tools, which will assist in the continual improvement of the system during its lifespan in the market.

## 4. Results: On-Site Tests

### 4.1 Results: On-Site Tests, Provider Side

#### 4.1.1 Baseline study, provider side

The baseline study results are based upon the following:

- Self-questionnaires completed by n=3 HDIS staff
- Daily work logs completed by n=3 HDIS staff for a period of one week
- One face-to-face interview conducted with n=2 HDIS managers

The questionnaires included both closed questions incorporating a rating scale and open questions.

**HDIS staff:** Staff unfortunately used the rating scales irregularly, sometimes preferring the open question format. Ratings below are thus qualitative rather than based exclusively on numerical central tendencies.

Relevant task	Average minutes spent	Rating dimension	Prior system rating	Details/comments
Classifying songs	472	Efficient	Mid	N/A
		Inspiring	Mid-low	
		Uncomplicated	Mid	
Editing songs	78	Efficient	Mid-low	Automatic cue points (fade in, fade out, etc.) would greatly improve efficiency. Manual editing of songs is a time-killer.
		Inspiring	Low	
		Uncomplicated	Mid-low	
Searching and discovering songs	963	Efficient	Mid	Tags that are dependent on the person should be standardised in order to improve the database. A better search function would be appreciated: Currently, a single mistake in the artist or track name derails the search.
		Inspiring	Mid-low	
		Uncomplicated	Mid	
Creating playlists	40	Efficient	High	Currently no pre-check function, e.g. to ensure that playlist transitions are all smooth, etc.
		Inspiring	High	
		Uncomplicated	High	
Updating playlists	0	Efficient	High	N/A
		Inspiring	Mid	
		Uncomplicated	Mid	
Meeting with clients	15	Efficient	Mid-high	Consultation process should be standardised and documented. Better communication with project managers on the client side could be helpful. More and better musical examples from clients would be very helpful.
		Inspiring	Mid-high	
		Uncomplicated	Mid-high	
Uploading playlists	0	Efficient	Mid	Current process is error-prone due to human error. Ideally, new songs and playlists should be sent directly to the player after being added to the client profile. Instead, the task is outsourced. As a result, currently, getting a new song to a customer can take 3-8 weeks.
		Inspiring	Mid-low	
		Uncomplicated	Mid-low	

**HDIS management:** The management interview was semi-structured; however, numerical ratings as well as extensive qualitative explanations were requested. Because numerical ratings were consistently given, the ratings below are based thereon.

Relevant task	Rating dimension	Prior system rating	Details/comments
Classifying songs	Efficient process	Mid-high	The classification process at HDIS is already more systematic than at many agencies. <i>"We're better than what's existing, better than average, but we're not very good. We're not perfect."</i>
	Quality outcomes	N/A	
Editing songs	Efficient process	Low	Different co-workers use different programs to edit and prepare tracks. Moreover, editing can destroy metadata. <i>"Just imagine you manually tag a file, and the metadata is saved in the file, and when you cut it in a different software, all the metadata gets lost."</i>
	Quality outcomes	N/A	
Searching and discovering songs	Efficient process	Mid-high	The ever-increasing volume of musical output makes searching and discovering songs extremely time-consuming. <i>"I used to be a DJ as well back in the days, and I was searching through records manually, but this was during a time when you had, I would say, several hundred releases per week, and on Spotify you have 20,000 a week. And this is why you have to have systems, you can't browse manually through such a huge amount of new releases."</i>
	Quality outcomes	N/A	
Creating playlists	Efficient process	High	Both managers identified playlist creation as HDIS' strongest point. <i>"I think it's already pretty good"; "Also we're testing our competitors, like Spotify's Soundtrack Your Brand, I mean we're testing those systems, and without trying to be mean or anything – it's not really good. It doesn't have the quality we will deliver [...] but still, we have to rely on the input we receive from clients [...] when we can use real-time data and make the playlists in real time, it will be a massive improvement, and will make it perfect."</i>
	Quality outcomes	Mid-high	
Updating playlists	Efficient process	Low	Currently, a third party is subcontracted to provide necessary playback hardware/software and update and manage playlists. This reduces HEARDIS' control, specifically their ability to respond to technical issues.
	Quality outcomes	Low	
Meeting with clients	Efficient process	Mid	Clients without musical expertise often very quickly hit a barrier when trying to describe their needs or give constructive criticism on playlists: <i>"They'll say it's too fast but they'll mean it's too loud. Everything. It's very weird sometimes."</i>
	Quality outcomes	High	
Uploading playlists	Efficient process	Mid-low	As with updating playlists. <i>"At the moment we're not allowed to do it ourselves, because we have a partner here [...] we rely on those people, and if they make a mistake, you know, we can't control them, we have no idea what's going on."</i>
	Quality outcomes	Mid-low	
Overall effort per client-service request		Mid-low	Currently, too much time and effort is spent on low-level tasks, which is a misallocation of human capital as HDIS staff are capable of very high-level work. <i>"At the moment we spend too much time in those manual tagging and controlling administration. People who are very good in music and have deep understanding of music are losing time in copying files and doing technical things, you know?"</i>
Cost vs. profit margin: Audio brand consulting and creation		Very high	Creation of audio brand identities is HDIS' specialisation. Initial costs are mostly internal and relatively low. <i>"For audio branding in general, as soon as we make a musical profile for a brand, and not thinking about playing back music in a store, I would say it's very high because we're quite good at it..."</i>
Cost vs. profit margin: In-store music provision		Low-very low	Translating the initial audio brand identity into long playlists is extremely time-intensive – in part because the initial action sets extremely high standards of craftsmanship and quality, which then must be maintained throughout the playlist creation process. Running costs are higher than initial costs and include external as well as internal costs (see above re: subcontracting). <i>"...But as we are hand-picking stuff for in-store music, it's very low because we spend so much time to create a musical profile for the brand that it's very inefficient."</i>

The management furthermore gave insight as to their hopes and expectations regarding this iteration of the ABC\_DJ system (cf. D6.4, pg. 23-24 for details):

- The system will bring playback software and hardware provision in-house, reducing or eliminating dependence on third parties. This will lead to fewer technical errors and allow faster responses to customer service request.

- The system's improved search, discovery, and tagging tools will free up staff members' specialised human capital for more communicative tasks such as client acquisition. This is significant, as search and discovery is currently the single most time-consuming task for staff.
- The system will provide an empirical foundation for communication both between staff members and between the provider and clients. This will help ensure that the achieved translation from brand values to musical attributes meets the expectations of all stakeholders.

#### 4.1.2 Walkthrough of the audio branding process using ABC\_DJ

**Workflow:** The development of the In-Store Music programme for the Piacenza test-store in Pollone was basically carried out according to the general workflow as designed in D2.5 Audio Branding Processes (pg. 4):

- **Refinement** of client's briefing by identification of central music related terms  
→ Translation of client terminology into GMBI
- **Circular exchange** of feedback and mood tracks between agency and client
- **Transfer** of the refined briefing with music examples
- **Creation** of the requested music product or service
- **Presentation** of the final music product or service to the client
- **Monitoring** of the implementation and control of the results

However, due to time constraints, and as some tools are still in a prototype status which does not mirror the full potential of ABC\_DJ (namely MLM and ABT), some of these steps were abbreviated.

**Refinement of client's briefing:** To start things off, at the end of June 2018 HDIS supplied four central questions to Piacenza to get a main idea of the expected music. The following are the questions from HDIS (abbreviated) and answers from PIAC (in full length):

Area of insight	Piacenza briefing
What are the brand values of Piacenza?	<i>"The aim of Piacenza is to analyse our customers' desires in order to create a range of products both respecting our traditions and also paying attention to innovation. In fact in our stores it is possible to find our traditional products along with some innovative articles, which share one important characteristic: quality.  Piacenza's primary attributes are quality, tradition &amp; innovation; its secondary qualities are humanness and environment/nature."</i>
What target groups does the brand want to reach?	<i>"Our habitual customers are mostly over 50 years old, but we would like to address also to a younger target."</i>
Does Piacenza already have certain general ideas about music?	<i>"The music we usually play in our stores is both in English and Italian. It can be soft or rhythmical, but it has to be melodic in order to respect the elegant atmosphere in our stores."</i>
Which times of day are important at the point of sale?	<i>"The opening hours are from 10 to 13 in the morning and from 14 to 19 in the afternoon. Usually mornings are more quiet, while afternoons are more busy."</i>

**Translation of client terminology into GMBI:** This short briefing was further condensed and a translation from the Piacenza terminology to GMBI was carried out:

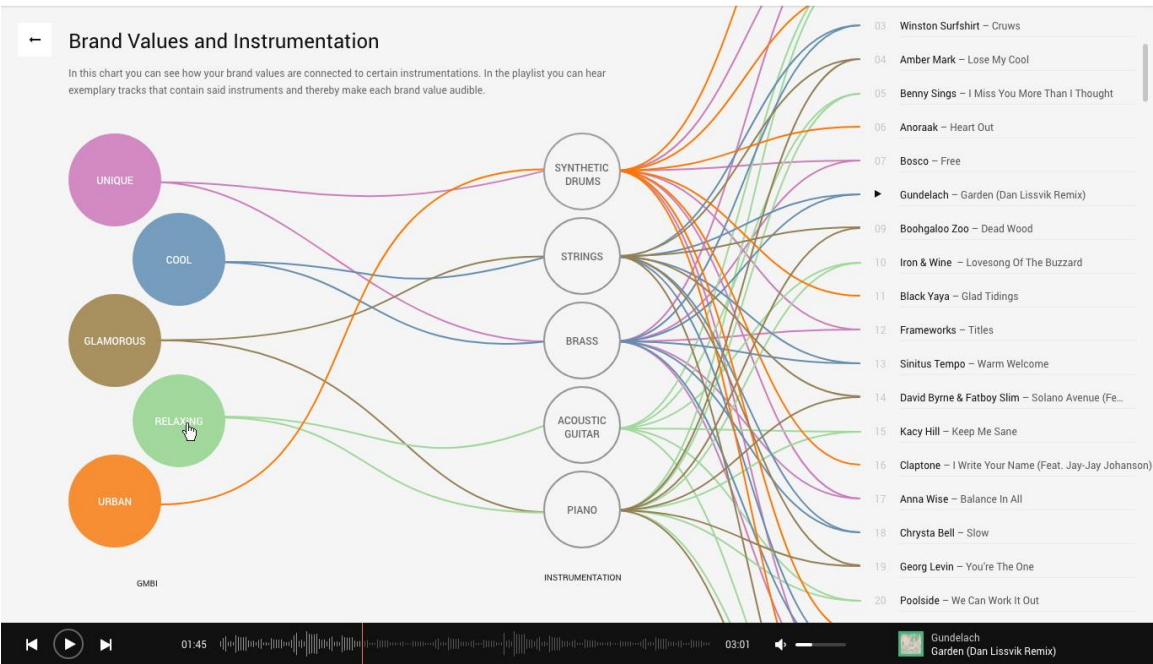
	PIAC	GMBI
Primary Values	Innovation	Innovative

Secondary Values	Tradition	Classic, timeless
	Quality	Detailed, unique
	Human	Honest, trustworthy
	Environmental	Honest, trustworthy

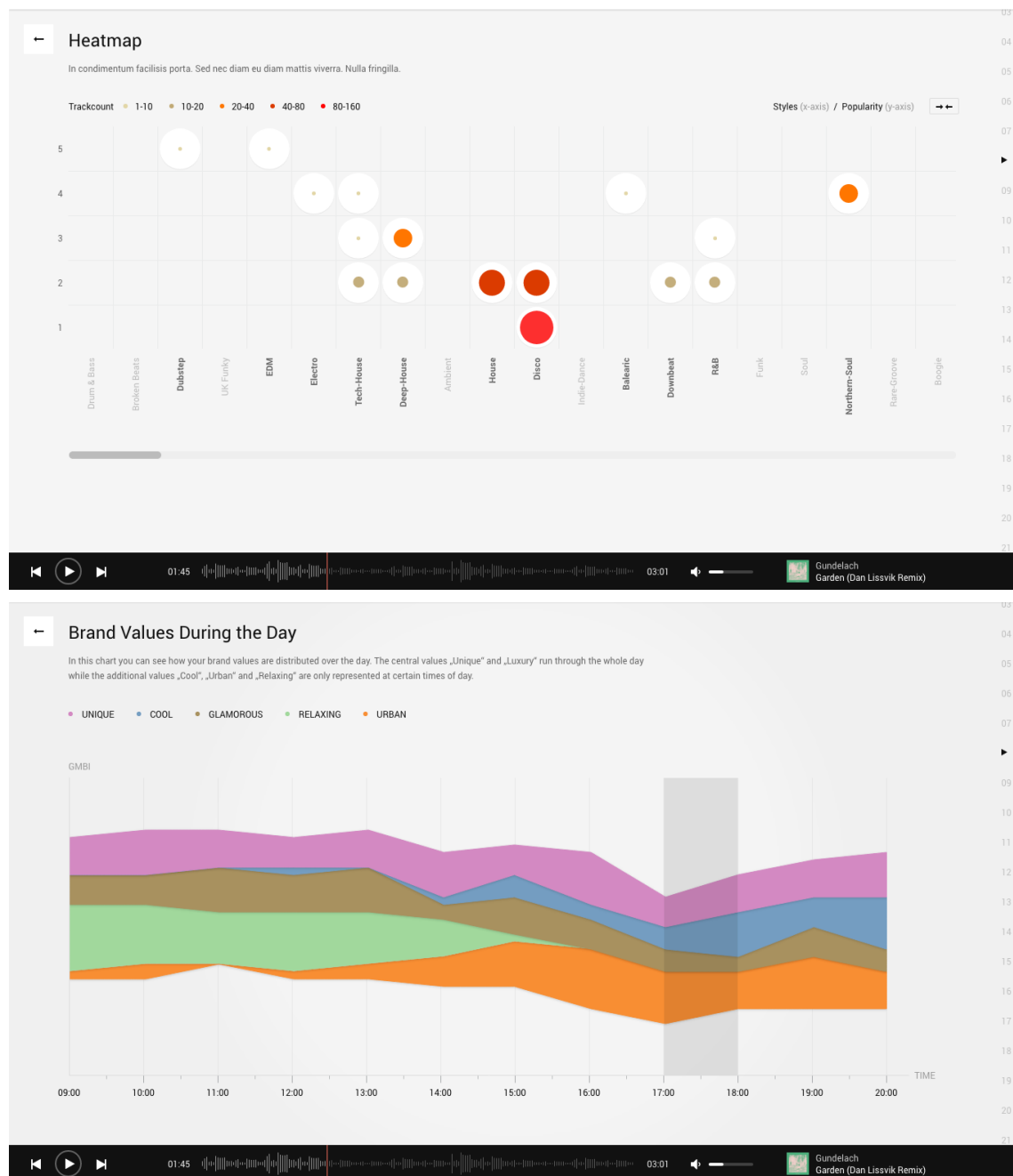
**Circular exchange of feedback and mood tracks:** Exchange of feedback was carried out once. HDIS shared their condensed and translated briefing once with PIAC to receive their confirmation that everything was understood correctly. In the future, the Audio Branding Tool (ABT) will be used at this stage to provide communications support; however, as it was necessary to concentrate development resources on other priorities, mock-ups were used instead. These proved useful in explaining aspects such as the GMBI value of particular songs:



The translation between GMBI value and instrumentation:



And the genre and GMBI composition of playlists as a whole:



In addition, HDIS also created a small music selection of 13 tracks to show and make audible their understanding of fitting music. This selection was carried out manually and shared through the tool PlayerMaker, developed in 2015/16 within the CreatiFI Grant Programme. These 13 tracks are divided in two groups. The first 6 are more suitable for the first half of the day, while the second 7 are designed to fit the opening hours in the afternoon: <https://listen.heardis.com/compilationPlayer/4b013ea8-9539-4489-adab-4fdfob976000>

PIAC approved of the preliminary music selection.

**Transfer of the refined briefing with music examples:** Transferring the briefing to a complete music selection was not carried out using the MLM. This was decided upon for two reasons

- Initially, the start of the in-situ test was planned for the beginning of September.



However, only in the middle of September, shortly before the ISMIR workshop on September 20th in Paris, the predicted values for the GMBI were transferred to a meaningful format. For that, the predicted output values for any given sound recording are standardized to the z-domain by subtracting the detected mean value of the GMBI item in the ground truth from its predicted value, then divided by the ground truth standard deviation of the respective term (e.g. “urban”, “friendly”):  $\frac{GMBI \text{ Predicted Value} - GMBI \text{ Mean in GT}}{GMBI \text{ Standard Deviation in GT}}$ . The individual z-values thus achieved, allow for the employment of the distribution function of the standard normal distribution. Hence a percentage value for all predicted individual GMBI items of a song is calculated, representing the amount of sound recordings within the population, forecast by the algorithm to be perceived as being of less gradual quality on the respective GMBI item within a target group (e.g. song A: urban=87 %, the algorithm predicts that 87 % of all other sound recordings are perceived as being less urban than song A). This feature was only integrated into the MLM at the end of September.

- Furthermore, due to the in progress status of the software development and the time needed for the extraction/indexing of each song, HDIS did not upload all of their 93,591 (2.39 TB) Flac files (as of 04.12.18, the time of writing) to the MLM database, but rather only those 1,053 files, converted to MP3 (8.83 GB), that seemed suitable for the Piacenza store in Pollone.

Because of these restrictions, fitting music was not selected by the MLM but rather manually, based on the briefing and feedback from PIAC. The collected qualities of the selected songs are these:

BPM	40 - 200
Intensity	2 - 4
Conventionality	2 - 5
Styles (both Main and Sub-Styles)	Nu-Soul, Indie-Dance, Dream-Pop, Electro-Pop, Balearic, Contemporary-Folk, Boogie, Downbeat, R&B, Nu-Jazz, Indie-Pop, Disco, Mainstream, Funk, Soul, Easy-Listening, Smooth-Jazz
Timbre	Soft, Warm, Dark, Bright

The MLM then was used randomly to validate the selection, e.g.: Elli Ingram “Rocket”: Innovative (83.63%), Detailed (79.31%), Trustworthy (77.77%). Furthermore, the pool was filtered using the now integrated filter functionality in the MLM at the beginning of December. The filter was set to the exact same qualities as mentioned above and returned 878 tracks (cf. <https://mlm.abcdj.eu/#/pools/05bf98c5-7a68-42de-add0-dd3aa8834f69>). This indicates that – as could be predicted – several tracks were tagged slightly differently by the automated ABC\_DJ system than in the old, manual system (foobar2000).

**Creation of the requested music product or service:** For the playlist, the following basic-rules were defined (i.e. rules that apply for the whole playlist in general):

Intensity Difference	$abs(b) \leq 1 \rightarrow$ Maximum difference in intensity allowed between two consecutive tracks is 1 or lower
Artist Repetition	1h $\rightarrow$ Minimum number of hours between two tracks of same artist are played is 1 hour
Combination Rule	Style OR timbre $\rightarrow$ One of the styles (be it main-style or sub-style) must match between subsequent tracks OR timbre must match
Title Repetition	26h $\rightarrow$ Minimum number of hours between payout of same track is 26 hours
Mornings Rule	Every song from the pool is allowed
Daytimes Rule	Only those tracks from the pool are allowed, that have an intensity value equal or above 3

Since there was no difference suggested between the various days of the week, every day

was assigned the same rules, with the “Morning” ruleset applied from 9:00 to 13:00 and the “Day” ruleset applied from 13:00 to 20:00.

The resulting playlists, however, do not only contain music for the opening hours. They are always 24 hours long for each day, with the time slots outside of the opening hours filled randomly with music from the associated music-pool. Each playlist is one month long.

The first playlists were generated using a local development version of the PLG rather than the online version. This is because not all features were yet implemented into the online version. The playlist generation for Piacenza was regarded as a good test case for the newest features (UI changes & new rules, like “Combination Rule”). After creating the Piacenza playlists, the relevant partners successfully implemented these features in the online version (cf. <https://plg-staging.abcdj.eu/admin/schedule/291/playlist/135>).

**Presentation of the final music product or service:** The final playlist was presented to Piacenza at the Pollone point of implementation rather than in a separate meeting. Implementation of the ISP and hence replay of the playlists faced some difficulties which took longer to overcome than planned.

**Monitoring of the implementation and control:** Control of the playout was carried out via the online COU (cf. <https://cou.abcdj.eu/#/players/156/details>). Two main aspects were monitored, namely:

- Is the planned song playing at the moment? This was done randomly, from time to time.
- Was the next playlist transferred to the player and is it ready for the playout? This was done on the last day of the current playlist.

The email feedback-channel, integrated into the COU, is designed primarily for urgent requests from the store, e.g. for technical problems. Feedback about the music quality itself was collected by INTEGRAL using staff and customer interviews.

#### 4.1.3 On-site system test, provider side

The on-site system test was conducted at the HDIS office during Week 49. The results are based upon the following:

- Self-questionnaires completed by n=3 HDIS staff
- Email and telephone interviews with n=2 HDIS managers

The questionnaires included both closed questions incorporating a rating scale and open questions.

**HDIS staff:** HDIS staff were given a two-part questionnaire: The first part focused on overall usability and technical stability, while the second part replicated the baseline study questionnaire. Findings regarding overall usability and technical stability were tempered by staff recognition that aspects of the system are still in development.

Relevant task	Rating dimension	ABC_DJ rating	Details/comments
Overall	User-friendliness	Mid	It is a completely new system and requires getting used to.
	Technical stability	Mid	Staff recognise that the system is still in beta, and that debugging complex systems takes time. <i>“It will definitely still be improved, and then will be good – or even excellent, when one is shown how to use it from the ground up. You can only use a machine once you know how it works!”</i>
	Desire to use the system in the future	Very high	When one tries to skip between functions, everything takes forever; likewise when one tries to use simple functions like re-sorting tracks by artist or genre; some MIR tasks like BPM recognition, genre recognition, vocal gender recognition, and key recognition do not appear to have noticeably improved vis-a-vis prior systems (e.g. Foobar).

When rating specific tasks, as in the baseline study, HDIS staff did not always use the rating scale. The below ratings are thus qualitative rather than based on numerical central tendency. Due to technical difficulties implementing the ABC\_DJ system, daily work logs could not be used during the on-site system test.

The below comparative matrix is colour-coded: **orange** indicates a lower rating than the baseline, white indicates not applicable (N/A) or no change, and **green** indicates a higher rating.

Relevant task	Rating dimension	Prior system rating	ABC_DJ rating	Details/comments
Classifying songs	Efficient	Mid	Low	New workflow, completely different than in previous system (Foobar). The Edit Mode and Player are currently separate. When searching for potential tags within a certain ontology category (e.g. sub-styles), lots of scrolling is required – there should be an overview mode. This applies generally: All relevant information in a certain function window should be accessible in overview. Auto-tagging still produces some mistakes re: BPM, genre.
	Inspiring	Mid-low	High	
	Uncomplicated	Mid	Low	
Editing songs	Efficient	Mid-low	Low	Everything still must be integrated onto the single platform. This particular tool doesn't function consistently yet: Search within track is not yet possible, fade-in has some technical errors that must be resolved, etc. <i>"Let's talk about it again when the tool is finished."</i>
	Inspiring	Low	High	
	Uncomplicated	Mid-low	Low	
Searching and discovering songs	Efficient	Mid	Very low	Completely new workflow that requires getting used to. The search function within the MLM does not work consistently yet. Sorting by BPM or sub-style is not yet possible. In general, the UI is not very intuitive. Suggestion: Take UI inspiration from some of the well-liked features of Foobar.
	Inspiring	Mid-low	High	
	Uncomplicated	Mid	Very low	
Creating playlists	Efficient	High	Mid	The tool is exciting in concept. It will augment human creativity and inspiration, thereby adding a lot of value to the playlist creation process – as soon as the above technical errors are resolved.
	Inspiring	High	Very high	
	Uncomplicated	High	Very low	
Updating playlists	Efficient	High	N/A	N/A
	Inspiring	Mid	N/A	
	Uncomplicated	Mid	N/A	
Meeting with clients	Efficient	Mid-high	N/A	N/A
	Inspiring	Mid-high	N/A	
	Uncomplicated	Mid-high	N/A	
Uploading playlists	Efficient	Mid	High	The workflow has become more compact and efficient. However, when uploading new songs, it currently still takes a long time before they become active.
	Inspiring	Mid-low	High	
	Uncomplicated	Mid-low	High	

It is worth noting that **ABC\_DJ received consistently higher ratings than the previous system on the dimension “inspiring.”** This is furthermore the dimension on which the previous system was consistently rated lowest. Creating efficient and uncomplicated software solutions is a science and a matter of consistent hard work in the technical-development trenches, whereas creating *inspiring* software solutions is an art.

The former can incrementally improve workflows, whereas the latter have the potential to be “game changers” – as exemplified by the Apple business case. The ABC\_DJ system’s potential to bring new inspiration to the audio branding workflow could be interpreted as an early indication of its “paradigm shift” potential. In order to realise this potential, further rounds of technical improvement are needed – and will be carried out.

**HDIS management:** The original plan was to use an interview guideline based on the baseline study guideline; however, due to the beta status of many system components and the fact that they have not been fully integrated into the HDIS daily workflow, it was decided to change the guideline to focus specifically on **expectations, realities, and needed improvements**. As in the baseline study, two dimensions for evaluation were addressed: **efficiency of processes** and **quality of outcomes**.

Efficiency of processes			
Relevant task	What was the expected impact on efficiency?	What has been the actual impact on efficiency so far?	How can the system be improved?
Classifying songs	It was expected that every track is classified as correct as possible.	There are many errors in the automated extraction, nearly half of the styles are off.	Extraction module has to be re-trained.
Editing songs	Songs do not have to be edited because cue-points abbreviate them at the right position.	Cue-Point Module works in a test environment but was not yet implemented into MLM.	Cue-Point Module has to be fully integrated into the MLM.
Searching and discovering songs	Song discovery should be aided by sophisticated filters.	Filter is implemented, but not all functionalities are available. Hence discovery did not improve much yet.	Advanced filter functionalities have to be implemented.
Creating playlists	Playlist creation should be aided by algorithm based on DJ-like rules.)	Many rules are integrated into the algorithm but not available on the frontend UI. Playlist creation however already works well.	Further improve the frontend to make all rules available.
Updating playlists	After a schedule is created the idea was to change the time and generate a new playlist - two clicks to update a playlist!	Currently duplicating schedules is not possible.	PLG has to be improved to make duplicating playlists possible. Furthermore it should be easier to create a schedule (e.g. copy & paste of daytimes).
Meetings with clients	With various visualisations at hand meetings with clients should be vastly improved.	Only a fraction of the envisioned visualisations could be implemented in the course of the project. Meetings did not improve.	It is essential to further enhance the number and also look of visualisations. This is not as simple as planned.
Uploading playlists	Playlists should be easily published from PLG via COU to ISP. With ca. two clicks.	Publishing of playlists currently still has to be done by the developers, through the backend.	Workflow from generated playlist to upload to ISP has to be fully implemented.
Overall qualitative assessment	Time can be freed from tagging to enable more search and inspiration. Quality should stay the same or even increase due to more time for quality checks.	Currently same amount of time (or even more?) has to be invested to keep the same quality.	When all above points are realised we should reach the expected status.
Impact on cost vs. profit margin	Reduce the differential between audio branding margins (cost-efficient) and in-store music margins (cost-inefficient). Bring HW/SW provision and playlist uploading in-house, thus turning external into internal costs.	Tangible impact on business performance is currently not achieved as no market-ready products/services are available but the outlook in 2019 and beyond looks very promising.	Fincons will self-invest to bring MLM to a market-ready status. In order to realise the next-generation, real-time playlist generation, additional funding is needed. Therefore, HDIS will apply for the national ZIM programme along with

			DILAX, a leading retail tracking technology provider.
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Quality of outcomes			
Relevant task	What was the expected impact on quality of outcomes?	What has been the actual impact on quality of outcomes so far?	How can the system be improved?
Creating playlists	It was expected that the quality of playlists would increase, since playlist for a long time-span can be created according to rules DJs follow.	Currently playlists are not as good as expected, since not all rules are implemented and several tracks have faulty metadata.	More rules have to be implemented into PLG UI, Extraction Module needs re-training.
Updating and managing playlists	Quality improvement due to higher integration between systems.	There are still some technical problems when it comes to transferring the final playlist to the ISP.	PLG has to communicate better with COU.
Communication with clients	Quality should increase, because the music selected for a client can be explained in more detail with more visualisations.	Quality did not increase because still too little visualisations are available.	Number of available visualisations has to be increased.
Overall effort required per client service request	With the same time spent the overall quality was expected to increase.	With the same time spent quality is currently lower.	Better UX in MLM, more rules in PLG and more visualisation in ABT would be the most important steps.
Impact on costs vs. margins	Tangible impact on business performance is currently not achieved as no market-ready products/services are available but the outlook in 2019 and beyond looks very promising.	Some applications such as the MLM need considerable time for refinement before they are usable in day-to-day business activities.	Fincons will self-invest to bring MLM to a market-ready status. Regarding realising the next-generation aim of live-generating playlists based on in-store data, additional fundings are needed. Therefore HDIS will apply for the national ZIM programme along with DILAX, a leading retail tracking technology provider.

#### 4.1.4. Analysis by Key Performance Indicators

In brief, the HDIS staff and manager ratings reflect the ABC\_DJ's beta status. Many features have yet to be fully debugged or adapted to the needs of everyday use in a business context. However, the tool is seen as having very high potential.

## 4.2 Results: On-Site Test, Client Side

### 4.2.1 Baseline study, client side

The baseline study results are based upon the following:

- Telephone interviews completed by n=3 PIACENZA staff and n=1 PIACENZA manager
- Passive data on n=1733 PIACENZA customers

The staff interview guidelines included both closed questions incorporating a rating scale and open questions.

**PIACENZA staff:** Staff used the rating scales irregularly, sometimes preferring the open question format. Ratings below are thus qualitative rather than based exclusively on numerical central tendencies.

Aspect of in-store music	Prior system rating	Details/comments
Music selection process	Mid-high	In-store music was not in the focus of the PIACENZA brand management. The shop staff was in charge of the in-store music selection. At each of the brand's two physical points of sale, it was decided by mutual consent what music to play, guided by shared perceptions of appropriateness and management veto power which has never been used. At the Pollone outlet store, one staff member, who was particularly interested in music, had the strongest impact on the playlists ( <i>"é il mastermind"</i> ). There are no disputes regarding music.
Technical dimensions of in-store music	Mid-high	A desktop PC was used as a hardware player. The main music source was unlicensed streaming via the internet (esp. YouTube). Advertisements thus occasionally interrupt the playlist and must be skipped manually. Interruptions of the Internet connection were perceived as extremely rare (ca. once every 2-3 months). In such cases, the IT department was in charge of solving the problem. During interruptions, radio music played in the store.
In-store music fit to store atmosphere	High	Staff describe the music as a mix of different genres and styles: blues, jazz, lounge music, Italian pop, some chart music, and sometimes classical music or film scores. American/English music dominated the playlists with an estimated share of 70%.
In-store music fit to brand	Mid-high	The music is seen as sharing certain attributes with the brand, namely "elegance." Sometimes, Italian music is played – this fits the products being made in Italy.
In-store music fit to customers	Mid-high	Customers were classified as being mid-aged (40-60 years), with high education, high-culture affinity, and rather low interest in in-store music. The style of music was reflexively judged to be suitable to the customers. Occasionally, customers have asked the staff in a positive sense for the name of the artist currently playing (e.g. Italian artists). However, at least once, a customer requested that the in-store music be changed to classical. Customers also occasionally ask for the volume to be adjusted. All such requests are naturally honoured. Occasionally, the staff change the music to fit the perceived possible taste of particular customers who enter the store.
Other dimensions of in-store music fit and impact	Mid	In the morning, focus was given on lively pop music, while in the afternoon, more relaxing and soft music was chosen. Clients had some influence on the music selection. In-store music was not seen as having much impact on customer shopping behaviour.
Overall evaluation and suggestions for improvement	Mid-high	The primary criticism in terms of the music management was regarding the interruption of playlists by advertisements, which required skipping to the next track manually.

**PIACENZA management:** PIACENZA management expressed the following expectations toward the system:

<b>Business context</b>	In the vision of Piacenza the shop experience is becoming critical to enhance the performance of traditional retail, especially in an historical moment when e-commerce is becoming a real alternative. Traditional retail has to exploit its advantages towards virtual shopping, which are based on the physical interaction with consumer senses. Vision, touch, smell and sound are the 4 senses involved in a traditional clothing retail customer experience (taste is limited to food and beverage sector). PIACENZA has already considered the visual aspect of the goods in terms of colour offer, their touch (which is crucial aspect in cashmere market, where the pleasure of touch is a primarily expectation by consumers), and even the perfume of the products which has been specifically developed and is appreciated by its customers.
<b>Expectations toward ABC_DJ: Customer experience</b>	The expectation of PIACENZA from ABC DJ at its beginning was to enhance the in-store consumer experience on the side of sound pleasure, which actually is not properly managed and is a significant part of the traditional retail shop experience. More in particular it was expected that the music released creates a positive impact on wellness sensation, coherent with the brand, the products and the customers of PIACENZA, able to create a pleasant and unique environment for customers.
<b>Expectations toward ABC_DJ: Usability</b>	The company was expecting a stable and user friendly tool, easy to run by the shops assistants who alternates in the shop.

**PIACENZA customers – passive data collection:** Unfortunately, the number of customer self-questionnaires collected during the baseline study period of July to October 2018 was too low to be meaningfully interpreted. Passive data, however, was collected. A total of 1.733 customers were counted by the sensors in the point of sale during the baseline study period. The average rate of customers was 104 per week and 21

per day. Females and the age group of 41-60 years were overrepresented in the sample. The average duration of stay was 16 minutes. Facial tracking measured that the majority of visitors (76%) were in a neutral mood. A comparison of the results with the in-situ measurement is given in the following sections.

#### 4.2.2 Walkthrough of the technical preparation process

The ABC\_DJ in-store player was expected to be installed and start working by the end of September 2018. In practice, the month of October was dedicated to fixing technical problems and bugs; accordingly, the system's constant and stable use was started on 1 November 2018. October has been a very warm month in Italy and sales have been slow, therefore this delay did not cause a significant loss of data.

As mentioned in Section 2.4.2, it was agreed upon to use the existing PIACENZA audio system rather than installing the ABC\_DJ hardware. Accordingly, ABC\_DJ was installed on a PC at the cashier's desk.



The scenario where the ISP software is configured on existing HW infrastructure is quite common both in terms of previous experiences by the partners and looking to the competitors offering. Moreover, testing the SW solution on a third environment allowed to experiment on field the configuration of the solution in an uncontrolled environment. This provided additional ideas to optimize the ISP in terms of compatibility and easiness of configuration. The outcomes of this activity will benefit also the upcoming commercial usage of the toolset.

When it comes to the issues encountered during the pilot execution, they were of two main types:

- Software bugs, that were partly expected due to the WIP and R&D nature of the solution and were addressed by two additional releases of the ISP SW (one configured by Fincons on premise, the other one remotely).
- Network restrictions, again partly expected and considered to be the most critical issue due to the limited capability to control the security policies of the store network. These issues were addressed by Fincons thanks to the support of F.Ili Piacenza IT team, by moving all the involved tools (MLM, COU and single sign on) to secure protocols (from http to https).



### 4.2.3 On-site system test, client side

The on-site system study results are based upon the following:

- Telephone interviews with n=2 PIACENZA staff and managers
- Self-questionnaires completed by n=51 PIACENZA customers
- Passive data on n=1502 PIACENZA customers

The staff interview guidelines included both closed questions incorporating a rating scale and open questions. The customer self-questionnaires consisted of closed questions.

**PIACENZA staff:** As in the baseline study, staff did not always give a clear numerical rating, sometimes preferring the open question format. Ratings below are thus qualitative rather than based exclusively on numerical central tendencies.

The below matrix is colour-coded: **orange** indicates a lower rating than the baseline, white indicates not applicable (N/A) or no change, and **green** indicates a higher rating.

Aspect of in-store music	Prior system rating	ABC_DJ system rating	Details/comments
Music selection process	Mid-high	Very high	From the staff perspective, the effort and stress of music management have been reduced since no active selection of music or skipping of advertisements is required anymore. The "player" just has to be turned on in the morning and switched off in the evening. The ABC_DJ playlists furthermore match the expectations the staff had when told about the system and how it worked.
Technical dimensions of in-store music	Mid-high	Very high	Usability is seen as having improved compared to the earlier system. There are no further interruptions due to advertisements, nor occasional technical failures.
In-store music fit to store atmosphere	High	High	The music is elegant and not too loud, which fits both the shop and the PIACENZA brand.
In-store music fit to brand	Mid-high	High	As above
In-store music fit to customers	Mid-high	Very high	<i>"It depends upon the customer, but in any case the music fits better than the previous playlists"; "They feel good and comfortable."</i>
Other dimensions of in-store music fit and impact	Mid	High	<i>"The system is practical and is just fine the way it is. The one thing is that it would have been great to hear a couple of Christmas songs in the mix during the holidays [...] not the whole playlist, just here and there."</i>
Overall evaluation and suggestions for improvement	Mid-high	High	If given the choice, staff would prefer to keep using the system rather than switching back to the old way of doing things. One staff member suggested making multiple playlists available ("one with more soul, one with more classical, one more pop/rhythmical"), which staff could switch between based on their own mood or their sense of the customers in the store at any given time.

Despite having rated the previous system as adequate, the PIACENZA staff saw the ABC\_DJ system as a clear improvement in several regards. This is relevant to the ABC\_DJ business case development: Many small businesses in particular might feel satisfied with their current (ad hoc) in-store music systems – but not because these systems are actually effective, rather because they do not know that better solutions are available.

**PIACENZA management:** The system fully met all PIACENZA management expectations:

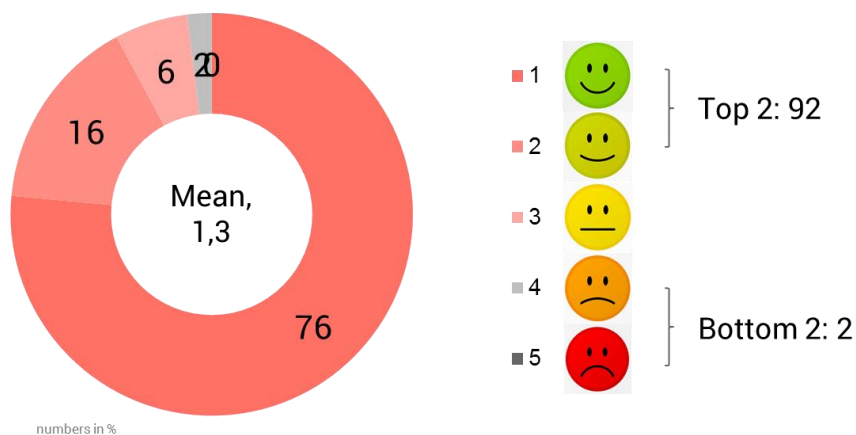
<b>Expectations toward ABC_DJ: Music brand fit and likeability</b>	The playlist have been considered in line with the brand positioning expressed by Piacenza is the dedicated questionnaires, with the plus of the inclusion of Italian songs and new and unknown artists in the playlists. A detailed feedback has been provided by the shop operators. Especially one of them is also a singer and music passionate, therefore she paid a particular attention to ABC_DJ playlist mix of songs, artists and genres.
<b>Expectations toward ABC_DJ: Customer experience</b>	Customers have provided pleased evaluations about music and considered it pleasant, as expected. A detailed analysis of the feedbacks is provided in qualitative KPI analysis.



<b>Expectations toward ABC_DJ: Usability</b>	After the normal debugging due to its novelty the system has been judged stable and easy to run by the various shop assistants using it. Its only limit has been a slow starting in some rare occasions. Therefore it can be said that it met PIACENZA expectations on the side of usability.
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**PIACENZA customers – exit self-questionnaire:** The exit interviews prove a very high satisfaction with the overall shopping experience and the shopping atmosphere: The customers feel very comfortable in the outlet store.

## Exit survey: Overall shopping experience



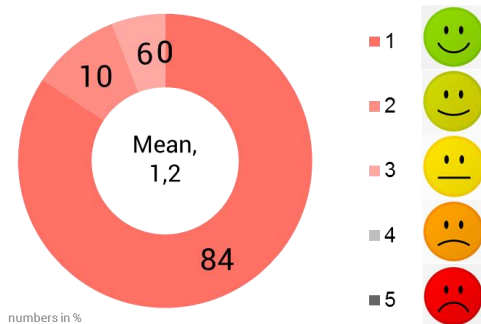
Q1: All in all, how would you rate today's visit to the PIACENZA Outlet Store?

Basis: PIAC exit interviews, Nov/Dec. 2018, n=51

*Aspects of shopping experience:* The music selection was rated as good - though it did not always match the customers' personal taste. The music selection was evaluated as suitable for the store and brand. The small number of negative ratings is no cause for concern.

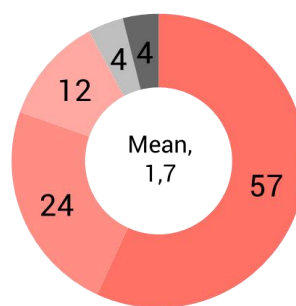
## Exit survey: Aspects of shopping experience

### Shopping atmosphere



Top 2: 94  
Bottom 2: 0

### In-store music



Top 2: 80  
Bottom 2: 8

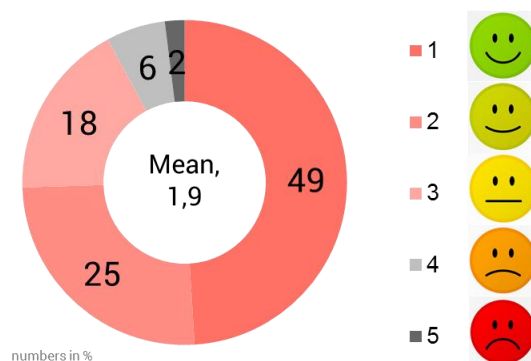
Q2: How would you rate the following aspects of the PIACENZA Outlet Store?

Basis: PIAC exit interviews, Nov/Dec. 2018, n=51

*Music fit to store and brand and perception of music:* The in-store music was classified as “**elegant**” and “**simple**”, but ambivalent with regard to “modernity” vs. “tradition” and “innovation” vs. “conservatism”. This matches both the PIACENZA brand values and the GMBI validation perfectly.

## Exit survey: Music fit to store and brand

### Fit to outlet store



Top 2: 75  
Bottom 2: 8

### Fit to brand

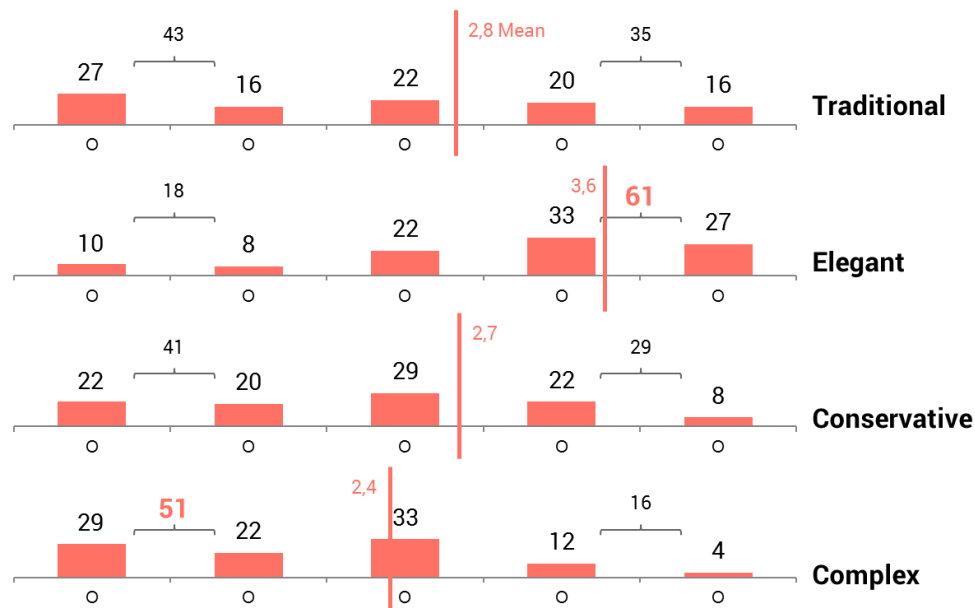
Mean, 2,0

Top 2: 71  
Bottom 2: 8

Q3a: In your opinion, how well does the in-store music fit the atmosphere of the Outlet Store?  
Q3b: How well does the music seem to fit the brand PIACENZA?

Basis: PIAC exit interviews, Nov/Dec. 2018, n=51

## Exit survey: Perception of in-store music



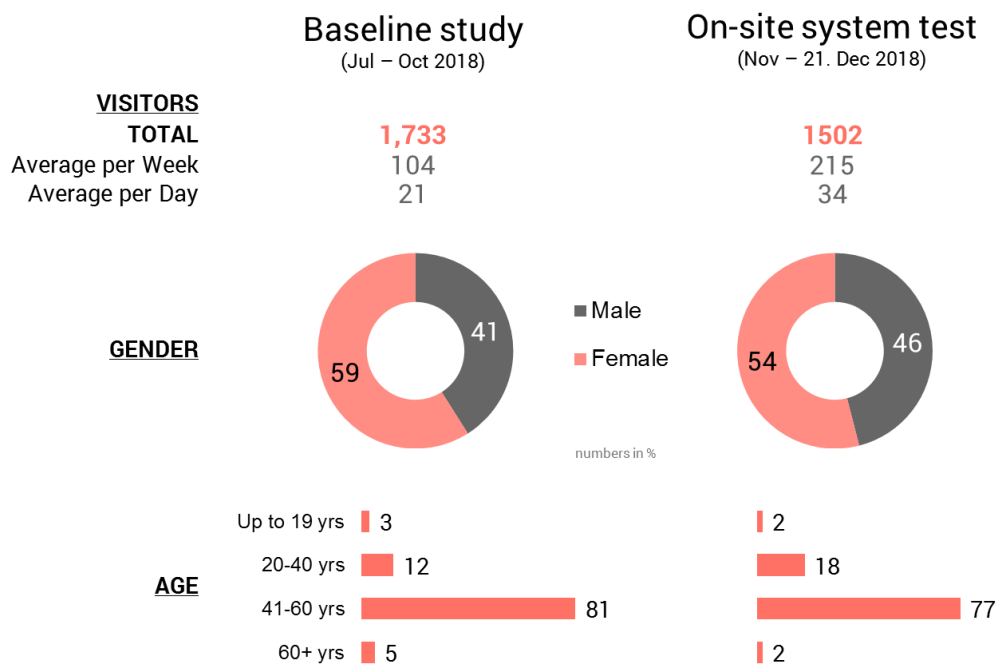
Q4: How would you classify the music played in the outlet store?

numbers in %

Basis: PIAC exit interviews, Nov/Dec. 2018, n=51

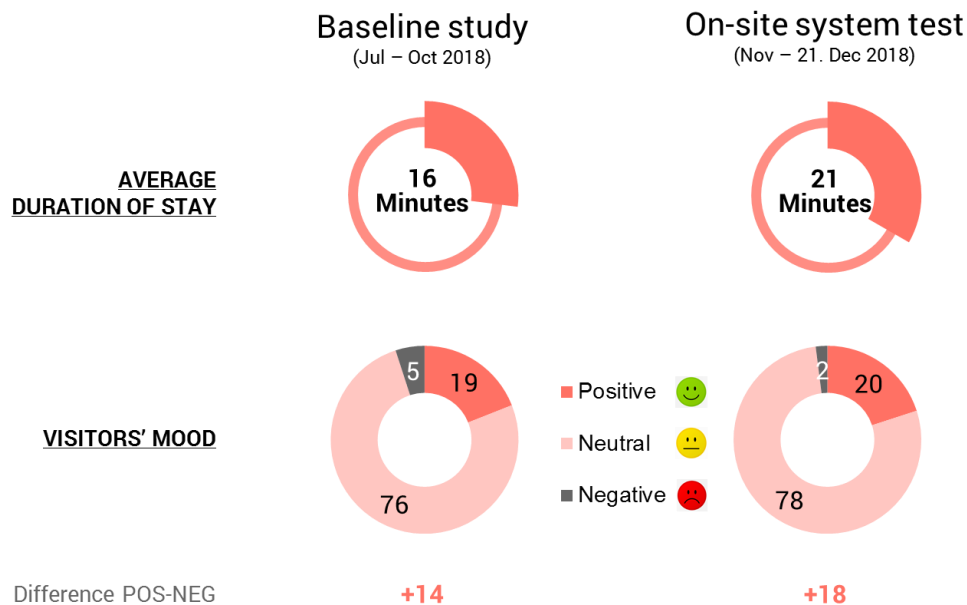
**PIACENZA customers – passive data collection:** Footfall was slightly lower during the test period vs. the baseline study period. Customer demographics were comparable:

## PIACENZA counting system: Demographics



*Stay and mood:* Slight increases in both time spent in store (+4 min) and customer mood (-3pp negative, +1pp positive, +2pp neutral), while by no means scientifically conclusive, can be co-interpreted alongside the strongly favourable staff and customer feedback as signalling a positive effect of the ABC\_DJ musical outcomes

## PIACENZA counting system: Stay and mood



## 5. Overall Evaluation of the ABC\_DJ Project

The overall evaluation is split into two sections. The first section focuses on the **performance indicators**, which as indicated in D6.2 were designed to comprehensively capture all significant dimensions of the performance of the ABC\_DJ tools and business model as *continually evolving systems* (not necessarily in the context of a Research & Innovation project of limited duration). The second section focuses on the **expected impacts specified in the funding call and the Description of Action**.

### 5.1 Fulfilment of Critical Success Factors and Performance Indicators

While all performance indicators are relevant to the evaluation of the ABC\_DJ system's full potential, not all are relevant to the evaluation of the present Research & Innovation project. For instance, some performance indicators are market-oriented and intended to help guide the system's commercialisation. The below matrices are colour-coded: **green** indicates a high degree of fulfilment, white indicates not measured, not applicable (N/A), or neutral, and **orange** indicates a need for improvement.

#### 5.1.1 Critical success factor 1: Improved audio branding processes

KPI	Performance indicator	Project phase	Fulfilment
1. Time gain: Music discovery & archiving	1. Time to tag songs	On-site	Over the course of three iterations of the integrated system, the time required to process and tag a song decreased from 9:20 to 4:09 -- which is considerably faster than an experienced manual tagger could achieve (cf. D5.12, pg. 21).
	2. Time to generate audio summaries	On-site	The Music Structure Discovery (MSD) tool IrcamSummary has been laboratory tested for functionality and evaluated positively by HDIS. It has been integrated into the automated music description module imdABCDJ and is thus interoperable with the audio player. During the first week of January 2019, the pre-listening function will be re-tested for time within the context of the audio player.
	3. Time to search and discover songs	On-site	On-site system testing made it clear that in a day-to-day business use context, the system does not yet achieve time saving vs. previous practices at HDIS. This is in part because of remaining bugs and in part because the HDIS staff have not yet had a chance to train on, or get used to, the system. However, HDIS staff report confidence that once the system is further matured and they have had more time to familiarise, it will prove very effective.
2. Quality gain: Music discovery & archiving	4. Accuracy of tags in archive	On-site	The current release of the prediction module and automated music annotation software achieve the following prediction accuracy (MSE) when running the baseline prediction model (cf. D3.6, pg. 15-16): D1_Arousal: 0.118 D2_Valence: 0.090 D3_Authenticity: 0.099 D4_Timeliness: 0.094 D5_Knowing: 0.434 D6_Liking: 0.158 Accuracy for the target-group-specific models is comparable. Qualitative validation of the tagging function by HDIS staff during the on-site test furthermore demonstrated no redundancies, no unclear tags, and only
	5. Number of redundant or unclear tags in archive	On-site	

			moderate deviation from manually-assigned tags.
	6. Fidelity/usability of audio summaries	On-site	Audio summaries are generated by the audio player using MSD data harvested by im-dABCDJ. During the first week of January, the audio summary function will be tested qualitatively for fidelity/usability.
	7. Number of songs/artists/genres in archive	On-site	Several more months of continuous use are needed before the archive can be evaluated with regard to these parameters.
	8. Diversity of songs/artists/genres in archive	On-site	
	9. Percentage of European music providers in archive	On-site	
	10. Percentage of major-label music providers in archive	On-site	
	11. Percentage of independent music providers in archive	On-site	
3. Time gain: Playlist creation & management	12. Time to create playlist	On-site	During the first week of January, the PLG will be tested for time-to-generate playlists of representative lengths.
	13. Time to update playlist (monthly, quarterly, yearly)	On-site	The on-site test at PIACENZA did not require any playlist updates. However, the ISP software utilising JSON format, and thus compatible with automated playlist updates, was successfully installed at PIACENZA and ran without error. HDIS management estimates that bringing playlist updating in-house will significantly reduce both time required for client service requests and attendant external costs.
	14. Time and number of meetings between creator and brand per client service request	On-site	In preparation for the on-site test, HDIS and PIACENZA engaged in a representative audio branding consultation, during which the GMBI, mock-ups of ABT visualisations, and a demo playlist were utilised to bridge the communication barrier between music experts and non-experts. Because PIACENZA has been involved with the project since its inception, this communication barrier was not as severe as it can be in the “real world.” Nevertheless, the GMBI and ABT mock-ups, and demo playlist were perceived by the client as effective means of expressing the value that the ABC_DJ product would bring to their brand, and the only one round of feedback was required in order to design a satisfactory final playlist.
	15. Time between playlist finalization and implementation	On-site	The playlist was transmitted to the ISP player smoothly and without error. If this error-free performance can be maintained it will constitute a major improvement on the current third-party service (see Section 4.1 above).
4. Quality gain: Playlist creation & management	16. Rating scale: playlist creation	On-site	HDIS staff and management anticipate that the system, once further matured, will constitute a qualitative improvement over their current practice.
	17. Rating scale: playlist update/management	On-site	
	18. Rating scale: communication between playlist creator and brand	On-site	
	19. Rating scale: overall effort per client service request	On-site	

### 5.1.2 Fulfilment of critical success factor 2: Improved audio branding outcomes

KPI	Performance indicator	Project phase	Fulfilment
5. Quality gain: Playlist contents	20. Number of breaks in playback (technical errors, advertisements, etc.)	On-site	Zero breaks recorded during on-site system test at PIACENZA
	21. Consistency of playlists between points of sale (single brand)	On-site	High degree of consistency reported by PIACENZA staff during on-site system test at PIACENZA

	22. Percentage of smooth song transitions (bpm, key, genre, etc.)	On-site	Playlist adherence to transition rules was validated by the MLM, as indicated in D6.6, Section 4.1 above
	23. Appropriateness of playlist to conditions in shop (volume, mood, etc.)	On-site	High degree of appropriateness reported by PIACENZA staff during on-site system test at PIACENZA
	24. Consistency of playlist contents over time	On-site	Playlist consistency was validated by the MLM, as indicated in D6.6, Section 4.1 above
	25. Diversity of songs/artists/genres on playlists	On-site	During the first week of January, the reference playlist generated for PIACENZA will be evaluated on these parameters.
	26. Percentage of European music providers on playlists	On-site	
	27. Percentage of major-label music providers in archive	On-site	
	28. Percentage of independent music providers on playlists	On-site	
	29. Rating scale: playlist contents	On-site	Very high overall playlist quality reported by PIACENZA staff during on-site system test at PIACENZA
	30. Number of song likes/saves	On-site	App-based song likes/saves by staff were not supported at this stage

### 5.1.3 Fulfilment of critical success factor 3: Cultural-economic impact

KPI	Performance indicator	Project phase	Fulfilment
6. Awareness/satisfaction gain: Music providers	31. Rating scale: ABC_DJ concept	Usability; off-site	High qualitative rating in both second usability test and off-site test (cf. D6.4)
	32. Rating scale: ABC_DJ usability	Usability; off-site	Moderate qualitative rating in both second usability test and off-site test (cf. D6.4)
	33. Rating scale: Audio Branding Tool (ABT)	Usability; off-site	Improvement in rating between second usability test and off-site test (cf. D6.4)
	34. Rating scale: Playlist Generator (PLG)	Usability; off-site	Improvement in rating between second usability test and off-site test (cf. D6.4)
	35. Rating scale: Cockpit Unit (COU)	Usability; off-site	High qualitative rating in both second usability test and off-site test (cf. D6.4)
	36. Rating scale: audio branding as a revenue source	Usability; off-site	Moderate qualitative rating at close of project (cf. D7.5 and 7.6)
	37. Rating scale: professional network	Post-R&I	Not intended for measurement during R&I phase
	38. Number of citations in professional media	Ongoing	The project has generated continual positive press coverage, including in music- and media-oriented professional media such as Die Tonkunst (Germany), IDW (Germany), Medienrot (Germany), Psychologia Muzyki (Poland), and Backspin (Germany). Please see D8.9 for a full list of publications resulting from the project.
	39. Number of music providers on ABC_DJ roster	Post-R&I	Not intended for measurement during R&I phase
	40. Percentage of major-label music providers on ABC_DJ roster	Post-R&I	Not intended for measurement during R&I phase
7. Awareness/satisfaction gain: Creative agents	41. Percentage of small/independent music providers on ABC_DJ roster	Post-R&I	Not intended for measurement during R&I phase
	42. Rating scale: ABC_DJ concept	Usability; on-site	High qualitative rating in both second usability test and off-site test (cf. D6.4)
	43. Rating scale: ABC_DJ usability	Usability; on-site	Improvement in rating between second usability test and off-site test (cf. D6.4)
	44. Rating scale: Audio Branding Tool (ABT)	Usability; on-site	Improvement in rating between second usability test and off-site test (cf. D6.4)
	45. Rating scale: Playlist Generator (PLG)	Usability; on-site	Improvement in rating between second usability test and off-site test (cf. D6.4)
	46. Rating scale: Cockpit Unit (COU)	Usability; on-site	High qualitative rating in both second usability test and off-site test (cf. D6.4)
	47. Rating scale: audio branding as a revenue source	Usability; on-site	High qualitative rating at close of project (cf. D8.8)
	48. Rating scale: professional network	Post-R&I	Not intended for measurement during R&I phase
	49. Number of citations in professional media	Ongoing	The project has generated continual positive press coverage, including in marketing and business media such as Adzine (Germany),

			IP Mark (Spain), L.E.A.D. Digital (Germany), Marketing & Kommunikation (Switzerland), Marketingboerse (Germany), Horizont (Germany), Business Punk (Germany), and Absatzwirtschaft (Germany). Please see D8.9 for a full list of publications resulting from the project.
	50. Number of creative agents on ABC_DJ roster	Post-R&I	Not intended for measurement during R&I phase
8. Awareness/satisfaction gain: Brand managers & store owners	51. Rating scale: ABC_DJ concept	Usability; on-site	High qualitative rating in both second usability test and off-site test (cf. D6.4)
	52. Rating scale: ABC_DJ usability	Usability; on-site	Improvement in rating between second usability test and off-site test (cf. D6.4)
	53. Rating scale: Audio Branding Tool (ABT)	Usability; on-site	Slight decrease in rating between second usability test and off-site test (cf. D6.4).
	54. Rating scale: Playlist Generator (PLG)	Usability; on-site	Improvement in rating between second usability test and off-site test (cf. D6.4)
	55. Rating scale: Cockpit Unit (COU)	Usability; on-site	High qualitative rating in both second usability test and off-site test (cf. D6.4)
	56. Rating scale: audio branding as marketing	Usability; on-site	High qualitative rating at close of project (cf. D6.6, Section 4.2)
	57. Number of citations in professional media	Ongoing	The project has generated continual positive press coverage, including in retail media such as AIT (Germany), FAMAB (Europe-wide), and Revista Info Retail (Spain). Please see D8.9 for a full list of publications resulting from the project.
	58. Number of clients on ABC_DJ roster	Post-R&I	Not intended for measurement during R&I phase
9. Margin gain: Music providers	59. Barriers to entry	Post-R&I	Not intended for measurement during R&I phase
	60. Audio branding revenue	Post-R&I	Not intended for measurement during R&I phase
10. Margin gain: Creative agents	61. Audio branding project costs	Post-R&I	Not intended for measurement during R&I phase
	62. Audio branding revenue	Post-R&I	Not intended for measurement during R&I phase
11. Margin gain: Brand managers & store owners	63. Audio branding project costs	Post-R&I	Not intended for measurement during R&I phase
	64. Audio branding revenue	Post-R&I	Not intended for measurement during R&I phase
12. Awareness/satisfaction gain: B2C consumers	65. Number of likes/follows/etc. for musicians on playlists	On-site	App-based music likes, saves, and inquiries by customers were not measured at this stage, however, exit self-questionnaires reveal that 57% of customers liked the ABC_DJ-selected in-store music during the on-site system test
	66. Number of app-based music inquiries in store	On-site	See above
	67. Relevant behavioural data (time in store, spending, affect measurement, etc.)	On-site	Slight increase in relevant metrics: time spent in-store and mood
	68. Rating scale: audio branding as consumer culture	On-site	Due to low response rates, the customer self-questionnaire was shortened significantly, with questions on interest in audio branding being among the sections cut. However, two recent studies by Mood Media indicate persisting consumer enthusiasm for high-quality in-store music and moderate desire to participate personally (via rating apps, etc.) in the in-store curation process (cf. D8.8, pg. 11-12).
	69. Number of citations in mass media	Ongoing	The project's most recent press release led to features on the German national programme Deutschlandfunk (daily reach of 1.6 million listeners) and the national newsweekly Focus Online (23+ million unique user and 560+ million page impressions). Project partner HDIS' 2018 presentation at SWSX was furthermore covered in Stuttgarter Zeitung (coverage of 500,000 readers). Please see D8.9 for a full list of publications resulting from the project.



13. Quality gain: Inclusion & diversity	70. Inclusivity of ABC_DJ system (gender neutrality of interface, etc.)	Project end	This rating will be based on EC evaluator feedback
	71. Inclusivity of ABC_DJ promotional materials and publications	Project end	This rating will be based on EC evaluator feedback
	72. Inclusivity of ABC_DJ team	Project end	This rating will be based on EC evaluator feedback
	73. Inclusivity of ABC_DJ artist/client roster	Project end	This rating will be based on EC evaluator feedback

### 5.1.4 Fulfilment of critical success factor 4: Scientific impact

KPI	Performance indicator	Project phase	Fulfilment
14. Awareness/satisfaction gain: Scientific community	74. Number of publications by ABC_DJ consortium	Ongoing (T8.3)	To date, consortium members have published, presented, or submitted eight papers in the field of MIR, nine papers in the field of music psychology, one paper in the field of media and communications research, and one encyclopaedia article in the field of ethnomusicology. Please see D8.9 for a full list of current and forthcoming publications resulting from the project. For citations/impact factor, please refer to the corresponding authors.
	75. Number of scientific citations (and/or impact factor)	Ongoing	
	76. Number of related projects/patents	Ongoing	
	77. Qualitative comparison to related projects, etc.	Ongoing	Please see D8.8 for a qualitative evaluation of the project's potential within the context of the audio branding industry as a whole.
15. Quality gain: State of scientific research	78. Qualitative evaluation of measurable musical features	Project end	This rating will be based on EC evaluator feedback
	79. Qualitative evaluation of GMBI	Project end	This rating will be based on EC evaluator feedback
	80. Statistically significant accuracy of algorithms	Project end	See performance indicators 4 & 5 above
	81. Follow-up project potential	Project end	Partner HDIS is currently in the process of applying for national funding to enable a follow-up project with DILAX, a leading provider of retail tracking technology.

## 5.2 Fulfilment of Expected Impacts

The following expected impacts are specified under topic ICT-19-2015: *“Validated novel ICT technologies and tools supporting the creation process and delivering measurable benefits for the creative industries as regards time and resource investment, and quality of output.”*

In response to this text, the Description of Action Part B specifies six general expected impacts and 23 specific expected impacts (pg. 26). The below matrices are colour-coded: **green** indicates a high degree of fulfilment, white indicates not measured, not applicable (N/A), or neutral, and **orange** indicates a need for improvement:

Relevant section of call text	Expected impact	Fulfilment
Validated	1. Scientific findings are translated and embedded into a brand related environment.	The project has generated the GMBI, which to our knowledge is the first and only empirically validated method for bridging the semantic gap between brand value terminologies and musical terminologies. It has furthermore operationalised the GMBI in the form of the prediction module, which predicted up to 90% of the GMBI variance of tracks used in the training dataset and up to 70% of the GMBI variance of tracks used in the final test dataset, for a weighted overall mean accuracy of 80.1% (cf. D3.5, pg. 6; pg. 21).
	2. The interaction (correlation) of music-perception is tested in defined social milieus and can be evaluated statistically.	By incorporating the SINUS-Milieu target group model in its second foundational listening experiment, the project achieved a ground truth on the musical perceptions, demographic attributes, and social milieus of n=10144 European consumers in two survey waves. This allowed the creation of 234 statistical prediction models covering 39 demographic and milieu-based target groups and six dependent

		musical variables (GMBI factors 1-4, knowing, and liking; cf. D3.6, pg. 9). The final accuracy of the target-group-specific prediction models is comparable to that of the baseline model (pg. 15-16).
Novel	3. A facilitation of the discovery of music by brand values or marketing qualities might well lead the creation of new and exploitable standards in audio branding process.	The ABC_DJ project has been presented at IEEE SMC 2018 and ISMIR (the leading international forum for academic and industry work on music information retrieval), as well as at the Audio Branding Academy, an industry group comprised of leading practitioners in the audio branding and in-store music industries. Both the scholarly and industry communities have responded favourably to ABC_DJ's music information retrieval tools, music perception research, and synthesis and operationalisation of findings in these domains through machine learning as qualitative advances toward the establishment of standards in audio branding process that are at once commercially exploitable and scientifically credible.
ICT technology and tools	4. Design of flexible, open, and smart ICT technology amplifying the manual work of music consultants, e.g. automated indexing and filtering of large music archives by music features and brand values (B2B)	The project consortium has successfully developed tools tailored to the needs of music consultants that are, to our knowledge, completely unique – the Music Library Manager, Audio Branding Tool, and Playlist Generator – as well as playback control tools, the Cockpit Unit and software/hardware In-Store Player, that are on par with the proprietary systems used by leading in-store music providers. The consortium has furthermore taken major steps toward solving the challenge of integrating these tools into a single, open audio branding software and hardware solution.
Support of creation processes	5. The creation of a common audio branding language' would mean a huge support for artists, agencies and brands	The GMBI has been validated and presented to both the scholarly and industry communities (cf. D8.9). As a result of ongoing dissemination efforts, the consortium has received expressions of interest from diverse agencies, music rights holders, and brands. Business plans have been developed to answer these expressions of interest, which will require ongoing productive collaboration between consortium partners.
	6. Visualisation of audio branding processes supporting the understanding and acceptance of all involved parties on the other hand would mean a fundamental change in B2B communication.	The consortium has developed systematic means of visualising musical attributes, and made significant progress toward automating the process via the Audio Branding Tool. For the following reasons, however, the MLM and PLG were given development and debugging priority: 1) hard statistics and the GMBI itself have proven a more effective sales tool than visualisations, 2) the business focus of the project has shifted from audio branding consultation to in-store music provision, and 3) expert usability testers reacted less enthusiastically to the ABT concept than the other core tools. As a result, the ABT requires work before it is ready for commercial use. However, ABC mock-ups used audio branding consultations with PIACENZA (as well as other HDIS clients) have been recognised as successful methods for communicating complex musical ideas and relationships to a non-expert audience (e.g. brand managers).

ABC_DJ contribution	Expected impact	Fulfilment
Extraction and indexing module enables the automatic indexing of large music archives.	1. Automated indexing/filtering systems enable a music consultant to handle more content in the same time than today	Over the course of three iterations of the integrated system, the time required to process and tag a song decreased from 9:20 to 4:09 -- which is considerably faster than an experienced manual tagger could achieve (cf. D5.12, pg. 21).
	2. Size of archives deemed to be manageable increases	The on-site system test at HDIS reveals that one barrier standing between good laboratory performance and good performance in a day-to-day business context is the need for staff to "un-learn" previous systems and learn the new system. As the system is still maturing and additional development, it would not be prudent to train the HDIS staff on it yet, nor to process the entire HDIS archive. Thus, data on speed of tagging in a day-to-day business context and data on an archive-wide level are still lacking. As previously indicated, we anticipate that achieving these business goals will take several months.
	3. Minimising bias by subjective taste of annotators	The GMBI is to our knowledge the first systematic and empirically validated ontology for the annotation of musical expressions of brand values. This alone qualifies it as a significant advance beyond existing, purely subjective annotation tools.

		During the first week of January 2019, further testing on subjective bias will be conducted. A test set of songs will be manually annotated independently by two professional music consultants. The same set of test songs will then be annotated in two independent runs by the prediction module. Inter-coder reliability will be calculated and compared. This being said, results useful in public communications will only be achievable after several more months of continuous usage.
Pre-listening module enables grasping of a track's key elements through audio summary	4. Higher accuracy for quick qualitative interpretation of a track	Audio summaries are generated based on Music Structure Discovery (MSD) data reaped by the IrcamSummary tool (ICS_Part_Sequence, ICS_Part_Sequence_Total, ICS_Part_Sequence_Unique) (cf. Kaiser and Peeters 2013). This is the same tool used to estimate DJ cue points. During the first laboratory test of cue point estimation using IrcamSummary, over 50% of estimated cue points were within 10 seconds from manual cue points chosen by HDIS music consultants, and 66% were within 20 second (D4.7, pg. 71). The second round of testing improved these figures slightly (pg. 73-74). HDIS consultants' qualitative evaluations of the results were favourable (cf. Schwarz et al. 2018). IrcamSummary has been integrated into the automated music description module im-ABCDJ, which feeds data in XML format to the audio player. During the first week of January 2019, the pre-listening module will be re-tested within the context of the audio player.
Brand filter and prediction module maps brand identities onto musical identities	5. Resulting music program is tailored to a specific repertoire of brand values as well as the intended user group, of higher quality and accuracy. After a successful first mapping maintenance of future additional repertoire can automatically be pre-selected	The GMBI was used to create a playlist tailored to the specific repertoire of PIACENZA brand values, which was received positively by PIACENZA staff and customers alike. The on-site test design did not require the selection of additional repertoire and updating of the playlist; however, during the first week of January 2019, the personnel cost per song will be calculated and used to calculate approximate cost savings on a playlist update, e.g. for PIACENZA.
Playlist generator tool generates high quality music programs	6. Higher quality of the resulting music program sequence due to smooth and dramatically coherent transitions between the songs	Zero breaks were recorded during on-site system test at PIACENZA. High degree of consistency reported by PIACENZA staff during on-site system test at PIACENZA. High degree of appropriateness reported by PIACENZA staff during on-site system test at PIACENZA.
Audio branding tool facilitates communication between creative agencies and brand clients	7. Communication process duration reduced, higher accuracy of results, more efficient working atmosphere	The GMBI was successfully integrated into audio branding provider-client communications during the on-site system test. It has furthermore been used provisionally by HDIS in communications with the client Mercedes-AMG (cf. D8.9, pg. 20) and by agency Sixième Son in a re-analysis and public presentation of work done for client Renault (pg. 21). Audio Branding Society member agencies have recommended using the GMBI/ABC_DJ as a universal validation tool or "seal of quality" for audio branding projects Europe-wide.
	8. Communication tool result can be saved and used as a 'compass' for future dialogues with same client	As mentioned above, the MLM and PLG were given development and debugging priority over the ABT communication tool. As a result, the ABT requires work before it is ready for commercial use.
DJ cue point module basis for smooth transitions between songs (DJ mix)	9. Qualitatively enhanced performance of instore music, gradually replacing classical instore music channels and radio	The cue point module has been presented to the scholarly community at the SMC 2018 conference, and has been validated by expert listeners from HDIS. The ISMIR 2017 position paper "Towards Ground Truth Extraction of DJ Mixes" and the ISMIR 2018 "Unmixdb" open dataset have additionally already served as the basis for further scholarly research and software development (cf. D4.8, pg. 39). It was suggested in D4.8 that the final performance evaluation of the sound design and audio player should be carried out by expert listener (pg. 8). HDIS staff rated the overall technical stability of the ISP as acceptable and PIACENZA rated the audible performance as very good.
Instore player module (HW/SW)	10. Qualitatively enhanced performance of instore music, gradually replacing classical instore music channels and radio	The ISP was successfully installed at PIACENZA, tested, and evaluated positively by PIACENZA staff and customers.
Cockpit unit facilitates remote monitoring and maintenance	11. More stores can be monitored with less resources. Fixes and updates can be done remotely	The COU was successfully used during on-site system testing to monitor the ISP at PIACENZA. During the first week of January, approximate external costs per store will be provided and used to analyse approximate savings achieved by bringing these tasks in-house.
Single producer-to-licenser monetising scheme brings many small labels into the instore music market	12. An easy way to find the 'pearls' in virtually unlimited resources, quality music off the beaten track, from all resources including local and independent artists	Template licensing agreements usable by local and independent artists are available in D7.5.

Tools and module set integrated, complementing each other	13. Elimination up/downloads for file handling as a major 'time killer' for agencies and clients	Implementation at PIACENZA during the on-site system test was smooth, and the system ran throughout the period without errors or interruptions. No client service requests were necessary.
Tools and modules cost effective and intuitive	14. Even small agencies can handle complex systems and support large projects/clients	As indicated in D8.9, the Audio Branding Academy, a professional organisation representing independent creative agencies and practitioners, has expressed great interest in the project tools as resources enabling enhanced competition in the in-store music space. The ABC_DJ consortium has furthermore solicited statements of interest from potential clients, which will be presented during the first week of January 2019.
	15. New project does not entail big resource investments	
	16. Big team of IT specialists not needed for a creative agency, systems handle complex tasks via easy to use interfaces	
Offering structural and monetising support to independent labels	17. Strengthening European music sources and diversity by offering an alternative concept to US charts programs	Template licensing agreements usable by local and independent artists are available in D7.5.
Overcoming the semantic gap between music content and marketing values	18. Providing access for a large group of creative industries to commercial markets such as retail settings, audio branding, soundtracks and music in advertising	As indicated above, the consortium has solicited statements of interest from potential clients, which will be presented during the first week of January 2019.
Overcoming the semantic gap provides a stimulus for adjacent areas of music-related commercial disciplines	19. Uptake/adaptation of the approach by e.g. broadcasting, radio production, interior design, experience design	The consortium has received coverage and positive receptions in professional media and at conferences in numerous fields of cultural and economic relevance, including architecture and interior design, experience design, music cataloguing, retail, etc., and consortium partners have published and presented scholarly papers in fields including MIR, music psychology, media and communications research, and ethnomusicology (D8.9). The consortium has furthermore engaged in preliminary communication with potential collaborators in adjacent sectors such as generative music design and music archiving, which will be presented during the first week of January 2019.
New perspectives in the area of music information retrieval in general, e.g. the analysis of higher-order semantic meanings of music	20. New knowledge will stimulate economic growth in other areas of music-related multimedia ICT applications	
Identification of relationships between musical qualities and human values and emotions establishes new insights into the field of music semantics. Findings here contribute to a general understanding the origin of musical expressiveness	21. Application to other fields of cultural and economic relevance, such as media effects research or therapeutic methods (e.g. psychology)	
	22. Application also conceivable in the reverse direction, i.e., use types of consumed music as assessment indicators for 'meaning' desired, beyond (obvious) parameters like lyrics. E.g. diagnosis tool for psychological analysis	
Exemplary trans-disciplinary approach	23. Provide a model for the interdisciplinary cooperation of academic disciplines with SMEs	Please see D8.9 for a full list of interdisciplinary collaborative publications resulting from the project.

## 6. Summary and Conclusions

The ABC\_DJ project set out to improve European audio branding practitioners' competitive capacity by providing three tools (ABT, PLG, COU), four feature modules, and an in-store player module (ISP) tailored to their professional needs.

Over the course of the project, a fourth tool was furthermore developed – the Music Library Manager (MLM) – which incorporates the planned feature modules while equalling and surpassing off-the-shelf, consumer-oriented music management tools (e.g. Foobar2000).

The Description of Action Part B argues that this work would offer six general expected impacts, of which the project has fulfilled five, and 22 specific expected impacts, of which the project has fulfilled 20. Key impacts include:

- The creation of the General Music Branding Inventory (GMBI), the first and only validated method for bridging the semantic gap between brand value terminologies and musical terminologies.
- The operationalisation of the GMBI in the form of a prediction module capable of evaluating the perceived brand-fit of songs to an accuracy of ca. 80%, based solely on their acoustic/musical features.
- The integration of this module into the Music Library Manager, a music information retrieval and annotation tool capable of tagging both acoustic/musical features (e.g. rhythm, melody, instrumentation, structural boundaries, etc.) and the brand values to which they correlate at higher speed than a trained human.
- The creation of near-market-ready tools (PLG and COU) for the creation, uploading, playback, and management of DJ-quality playlists, based on the automated evaluation of acoustic and GMBI features of hundreds of tracks in sequence.

The only expected impacts that the consortium must still fulfil are those related to the Audio Branding Tool. Over the course of the project, emphasis was shifted from the ABT to the newly-conceptualised and developed MLM. The purpose of the ABT is to expedite communications between creative agencies and clients by generating visual representations of musical attributes. Over the course of the project, the consortium determined that the GMBI-enabled prediction module, and the hard statistics that it provides, are more effective communications tools than visualisations.

In addition to determining which expected impacts were fulfilled, this deliverable has measured the performance of the ABC\_DJ tools and system using a comprehensive set of success factors and performance indicators.

- Usability and off-site tests show that all individual tools and modules work as planned, with the exception of the abovementioned ABT.
- On-site tests on the provider side (HDIS) show that many tools and modules add significant value to audio branding processes as-is, while certain functions and interfaces need time for refinement.
- On-site tests on the client side (PIACENZA) show that the ABC\_DJ system yields frictionless provider-client communications and excellent musical outcomes.
- Reviews of dissemination activities show both interdisciplinary scientific impact and a positive reception in professional and mainstream media.

In sum, the ABC\_DJ project has driven a qualitative improvement in audio branding methodology. It has also produced tools and capacities that European audio branding practitioners would otherwise lack, which are increasingly necessary given intensified

competition in the field (cf. D8.8). It does not yet constitute a “plug-and-play” solution. The partners, however, are committed to pursuing its further development – out of conviction that they have laid the foundation for a next-generation product with significant competitive advantages.

## 7. Annexes

### 7.1 Annex I: Evaluation Management Overview

Each step in the evaluation process has delivered specific and hands-on information for the ongoing technical development and further improvement of the ABC\_DJ system in general, as well as shaping consecutive steps of testing in particular.

First findings have been reported frequently to relevant consortium partners during and after each test period via e-mails and conference calls.

The results of the WP6 evaluation processes have been communicated to all consortium members via:

- D6.1 Usability tests (mockups) report
- D6.2 Plan for evaluation instruments, samples, test stimuli/settings and timeline
- D6.3 Updated report of usability tests after first release (M26)
- D6.4 Interim evaluation report (M30)
- D 6.5 Transfer workshop (M30), covering the results of the usability test and the test of the fully integrated off-site system; this workshop can also be seen as a kick-off session for the on-site test
- D6.6 Project final evaluation report (M36), which has summarised all of the project's major developments, including the on-site demonstrator phase.

The final deliverable, D6.7 Feedback channels for in-store music (M36), will develop an outlook model and methodology for constant data transfer from shops to the audio branding concept.

For a general overview of the evaluation processes of WP6, please refer to the table of the following page.

	Deliverables WP5	Deliverables WP6	Design & Development			Integration	
M	Month	all INTEGRAL	Audio Branding Tool Prototype (T 5.1)	Playlist Generator Tool (T 5.2)	Cockpit Unit - Instore Client Tool (T 5.3)	Instore Player Integration (T 5.4)	System Integration (T 5.5)
20	Aug.17	D6.2 Plan for evaluation instruments, samples, test stimuli/settings & timelines (MS11)**	Demoversion for EC meeting (unscheduled delivery by HDIS)				
		D5.4: First Release of the ABT Prototype (HDIS); D5.5: First Release of the PLG Software (HDIS)					
21	Sep.17		1st version released				Set-up of baseline test at POS
22	Oct.17						Fieldwork of baseline test
23	Nov.17						Draft analysis baseline test
		D 5.6 Final Release Cockpit Unit & Instore Client Tool (FINCOS); D5.7 First Release Instore Player SW & HW (FINCONS)					
24	Dec.17			Final tool prototype available	Final tool prototype available	First release available	
25	Jan.18						
26	Feb.18	D6.3 Updated report of usability tests after first release					
27	Mar.18	D5.8 Integrated System Off-Site (FINCONS)					First off-site system released
28	Apr.18						Testing by consortium partners
							Analysis of off-site test, preparation of transfer workshop for M30
29	May.18						
		D5.9 Final Release of the ABT Prototype (HDIS); D5.10 Final Release of the Playlist Generator SW (HDIS); D5.11 Final Release Instore Player SW & HW (FINCONS); D5.12: Fully Integrates System (FINCONS)					Fully working system, running also at stores' level
30	Jun.18	D6.4 Interim evaluation report; D6.5 Transfer WS with partners	MS16: ABC_DJ ready for in situ evaluation			Final integrated Player available	
31	Jul.18						
32	Aug.18						
33	Sep.18						Set-up in-situ test
34	Oct.18						Fieldwork, start of analysis
35	Nov.18						
		D6.6 Project final evaluation report; D6.7 Feedback channels for instore music					
36	Dec.18		MS17: Evaluation completed				Finalisation of reports



## 7.2 Annex II: Expected Impacts

See Description of Action Part B., pg. 27-28.

General impacts	
Validated	Scientific findings are translated and embedded into a brand related environment.
	The interaction (correlation) of music-perception is tested in defined social milieus and can be evaluated statistically.
Novel	A facilitation of the discovery of music by brand values or marketing qualities might well lead the creation of new and exploitable standards in audio branding process.
ICT technology and tools	Design of flexible, open, and smart ICT technology amplifying the manual work of music consultants, e.g. automated indexing and filtering of large music archives by music features and brand values (B2B)
Support of creation processes	The creation of a common 'audio branding language' would mean a huge support for artists, agencies and brands
	Visualisation of audio branding processes supporting the understanding and acceptance of all involved parties on the other hand would mean a fundamental change in B2B communication.

Specific impacts			
Impact type	ABC_DJ contribution	a) Impact	b) KPIs and targets (where possible)
<b>Impacts expected under topic ICT-19-2015:</b> <i>"Validated novel ICT technologies and tools supporting the creation process and delivering measurable benefits for the creative industries as regards time and resource investment, and quality of output."</i>	<b>Extraction and indexing module</b> enables the automatic indexing of large music archives.	a) automated indexing/filtering systems enable a music consultant to handle more content in the same time than today	b) today: 10min/song for manual tagging. In future: 5 min./song (for manual correction if necessary), i.e., today: 150 songs/week, future: 300. In consequence > 50% time saved
		a) size of archives deemed to be manageable increases. Selection which can be offered increases, thus also the quality (potentially)	
		a) minimising bias by subjective taste of annotators, archive more balanced	b) divergence of music samples annotated by different persons
	<b>Pre-listening module</b> enables grasping of a track's key elements through audio summary in high accuracy	a) higher accuracy for quick qualitative interpretation of a track	b) time and cost savings same as above
	<b>Brand filter and prediction module</b> maps brand identities onto musical identities	a) resulting music program is tailored to a specific repertoire of brand values as well as the intended user group, of higher quality and accuracy. After a successful first mapping maintenance of future additional repertoire can automatically be pre-selected	b) number of necessary repertoire revisions sinks to max. one. Time savings > 50%. Proof-editing phases reduced to a minimum, 10% of entire production cost can be cut through this alone

	<b>Playlist generator tool</b> generates high quality music programs	a) Higher quality of the resulting music program sequence due to smooth and dramaturgically coherent transitions between the songs	b) qualitative assessment by music consultants, brand clients and end consumers
	<b>Audio branding tool</b> facilitates communication between creative agencies and brand clients	a) communication process duration reduced, higher accuracy of results, more efficient working atmosphere (music expert to non-expert)	b) time savings of >30%, number of repertoire revisions max. one
		a) communication tool result can be saved and used as a 'compass' for future dialogues with the same client (but maybe different representative)	
	<b>DJ cue point module</b> basis for smooth transitions between songs (DJ mix) and <b>instore player module (HW/SW)</b>	a) qualitatively enhanced performance of instore music, gradually replacing classical instore music channels and radio. Growing demand can be met by SMEs and micro-businesses	b) number of brands/store implementing the new system, number of citations in stakeholder publications/blogs/fairs
	<b>Cockpit unit - instore client tool</b> facilitates remote monitoring and maintenance	a) reduction of regular phone calls, emails or even travels for maintenance, <i>more</i> stores can be monitored with <i>less</i> resources. Fixes and updates can be done remotely	b) time savings for the account manager >20% in general
	<b>Single producer-to-licenser monetising scheme</b> brings many small labels into the instore music market	a) while music search today is often reduced to known genres/styles/artists/mainstream taste, our tools offer an easy way to find the 'pearls' in virtually unlimited resources, quality music off the beaten track, from all resources including local and independent artists Diversification raises quality	b) number of labels joining the new scheme
	<b>Tools and module set</b> integrated, complementing each other	a) elimination up/downloads for file handling as a major 'time killer' for agencies and clients	b) overall additional time savings of >20%
	<b>Tools and modules</b> cost effective and intuitive	a) even small agencies can handle complex systems and support large projects/clients, opportunity for micro-businesses	
		a) new project does not entail big resource investments, smart, flexible and scalable solution	
		a) big team of IT specialists not needed for a creative agency, systems handle complex tasks via easy to use interfaces, no large and expensive HW/SW structure needed like today, since most tools are	b) measurable interest of smaller agencies

		cloud based and accessible via browser	
<b>Cultural-economic impact</b>	<b>Offering structural and monetising support</b> to independent labels / alternative sources of music	a) strengthening European music sources and diversity by offering an alternative concept to US charts programs, providing additional income to European musicians/labels. Promoting European music culture with its diverse regional traditions	b) empirical assessment of the music actually used in stores, number of labels joining the approach
	<b>Overcoming the semantic gap</b> between music content and marketing values	a) providing access for a large group of creative industries to commercial markets such as retail settings, audio branding, soundtracks and music in advertising. In particular independent, small and medium size music labels, artists and producers are, up to now, virtually cut off from these markets	b) empirical research
	Providing a stimulus for adjacent areas of music-related commercial disciplines by <b>overcoming the semantic gap</b> between music content and marketing values	a) uptake/adaptation of the approach by e.g. broadcasting, radio production, interior design, experience design. This might well play heavily into rethinking of the 'in-store experience' worldwide with huge potential additional market segments, especially those which deal with 'intangibles' like music	b) empirical research
	<b>New perspectives in the area of music information retrieval in general</b> , previously strongly focused on the analysis of low-level acoustical qualities, the interdisciplinary cooperation between the social sciences and engineering within ABC DJ will provide a model for the analysis of higher-order semantic meanings of music	a) new knowledge will stimulate economic growth in other areas of music-related multimedia ICT applications	
<b>Scientific impact</b>	<b>Identification of relationships between musical qualities and human values and emotions</b> establishes new insights into the field of music semantics, i.e. the question to what extent music is able to convey 'meaning' in terms of semantic concepts. Findings here contribute to a general understanding	a) application to other fields of cultural and economic relevance, such as media effects research or therapeutic methods (e.g. psychology	b) number of citations in those disciplines
		a) application also conceivable in the reverse direction, i.e., use types of consumed music as assessment indicators for 'meaning' desired, beyond (obvious) parameters like lyrics. E.g. diagnosis tool for psychological analysis	b) number of citations in those disciplines

	the origin of musical expressiveness		
	<b>Exemplary trans-disciplinary approach</b> , coordinating the cooperation of academic excellence in the fields of audio signal processing and empirical musicology with market leaders in the fields of creative agencies, IT system integration, creative content producers, brand clients, and market research	a) provide a model for the interdisciplinary cooperation of usually separated academic disciplines with SMEs under the premise of applied, IT-supported social research	

### 7.3 Annex III: Critical Success Factors and Performance Indicators

See D6.2, pg. 12-14.

Critical success factor (CSF)	Key performance indicator (KPI)	Performance indicator (PI)	Means of measurement	Project phase
1. Improved audio branding process	1. Time gain: Music discovery & archiving	1. Time to tag songs	Survey	On-site
		2. Time to generate audio summaries	Survey	On-site
		3. Time to search and discover songs	Survey	On-site
	2. Quality gain: Music discovery & archiving	4. Accuracy of tags in archive	Archive eval	On-site
		5. Number of redundant or unclear tags in archive	Archive eval	On-site
		6. Fidelity/usability of audio summaries	Archive eval	On-site
		7. Number of songs/artists/genres in archive	Archive eval	On-site
		8. Diversity of songs/artists/genres in archive	Archive eval	On-site
		9. Percentage of European music providers in archive	Archive eval	On-site
		10. Percentage of major-label music providers in archive	Archive eval	On-site
		11. Percentage of independent music providers in archive	Archive eval	On-site
	3. Time gain: Playlist creation & management	12. Time to create playlist	Survey	On-site
		13. Time to update playlist (monthly, quarterly, yearly)	Survey	On-site
		14. Time and number of meetings between creator and brand per client service request	Survey	On-site
		15. Time between playlist finalization and implementation	Survey	On-site
	4. Quality gain: Playlist creation & management	16. Rating scale: playlist creation	Survey	On-site
		17. Rating scale: playlist update/management	Survey	On-site
		18. Rating scale: communication between playlist creator and brand	Survey	On-site
		19. Rating scale: overall effort per client service request	Survey	On-site
2. Improved audio branding outcomes	5. Quality gain: Playlist contents	20. Number of breaks in playback (technical errors, advertisements, etc.)	Playlist eval	On-site
		21. Consistency of playlists between points of sale (single brand)	Playlist eval	On-site
		22. Percentage of smooth song transitions (bpm, key, genre, etc.)	Playlist eval; survey	On-site
		23. Appropriateness of playlist to conditions in shop (volume, mood, etc.)	Playlist eval; survey	On-site

3. Cultural-economic impact		24. Consistency of playlist contents over time	Playlist eval	On-site
		25. Diversity of songs/artists/genres on playlists	Playlist eval	On-site
		26. Percentage of European music providers on playlists	Playlist eval	On-site
		27. Percentage of major-label music providers in archive	Playlist eval	On-site
		28. Percentage of independent music providers on playlists	Playlist eval	On-site
		29. Rating scale: playlist contents	Survey	On-site
		30. Number of song likes/saves	Survey	On-site
	6. Awareness/satisfaction gain: Music providers	31. Rating scale: ABC_DJ concept	Survey	Usability; off-site
		32. Rating scale: ABC_DJ usability	Survey	Usability; off-site
		33. Rating scale: Audio Branding Tool (ABT)	Survey	Usability; off-site
		34. Rating scale: Playlist Generator (PLG)	Survey	Usability; off-site
		35. Rating scale: Cockpit Unit (COU)	Survey	Usability; off-site
		36. Rating scale: audio branding as a revenue source	Survey	Usability; off-site
		37. Rating scale: professional network	Survey	Post-R&I
		38. Number of citations in professional media	Lit review	Ongoing
		39. Number of music providers on ABC_DJ roster	Roster eval	Post-R&I
		40. Percentage of major-label music providers on ABC_DJ roster	Roster eval	Post-R&I
		41. Percentage of small/independent music providers on ABC_DJ roster	Roster eval	Post-R&I
	7. Awareness/satisfaction gain: Creative agents	42. Rating scale: ABC_DJ concept	Survey	Usability; on-site
		43. Rating scale: ABC_DJ usability	Survey	Usability; on-site
		44. Rating scale: Audio Branding Tool (ABT)	Survey	Usability; on-site
		45. Rating scale: Playlist Generator (PLG)	Survey	Usability; on-site
		46. Rating scale: Cockpit Unit (COU)	Survey	Usability; on-site
		47. Rating scale: audio branding as a revenue source	Survey	Usability; on-site
		48. Rating scale: professional network	Survey	Post-R&I
		49. Number of citations in professional media	Lit review	Ongoing
		50. Number of creative agents on ABC_DJ roster	Roster eval	Post-R&I
	8. Awareness/satisfaction gain: Brand managers & store owners	51. Rating scale: ABC_DJ concept	Survey	Usability; on-site
		52. Rating scale: ABC_DJ usability	Survey	Usability; on-site
		53. Rating scale: Audio Branding Tool (ABT)	Survey	Usability; on-site
		54. Rating scale: Playlist Generator (PLG)	Survey	Usability; on-site
		55. Rating scale: Cockpit Unit (COU)	Survey	Usability; on-site
		56. Rating scale: audio branding as marketing	Survey	Usability; on-site
		57. Number of citations in professional media	Lit review	Ongoing
		58. Number of clients on ABC_DJ roster	Roster eval	Post-R&I
	9. Margin gain: Music providers	59. Barriers to entry	Survey	Post-R&I
		60. Audio branding revenue	Survey	Post-R&I
	10. Margin gain: Creative agents	61. Audio branding project costs	Survey	On-site
		62. Audio branding revenue	Survey	On-site
		63. Audio branding project costs	Survey	On-site

	11. Margin gain: Brand managers & store owners	64. Audio branding revenue	Survey	On-site
	12. Awareness/satisfaction gain: B2C consumers	65. Number of likes/follows/etc. for musicians on playlists	Passive data; survey	On-site
		66. Number of app-based music inquiries in store	Passive data; survey	On-site
		67. Relevant behavioural data (time in store, spending, affect measurement, etc.)	Passive data; survey	On-site
		68. Rating scale: audio branding as consumer culture	Survey	On-site
		69. Number of citations in mass media	Lit review	Ongoing
	13. Quality gain: Inclusion & diversity	70. Inclusivity of ABC_DJ system (gender neutrality of interface, etc.)	Survey	Project end
		71. Inclusivity of ABC_DJ promotional materials and publications	Survey	Project end
		72. Inclusivity of ABC_DJ team	Survey	Project end
		73. Inclusivity of ABC_DJ artist/client roster	Survey	Project end
4. Scientific impact	14. Awareness/satisfaction gain: Scientific community	74. Number of publications by ABC_DJ consortium	Lit review	Ongoing (T8.3)
		75. Number of scientific citations (and/or impact factor)	Lit review	Ongoing
		76. Number of related projects/patents	Lit review	Ongoing
		77. Qualitative comparison to related projects etc.	Lit review	Ongoing
	15. Quality gain: State of scientific research	78. Qualitative evaluation of measurable musical features	Survey	Project end
		79. Qualitative evaluation of GMBI	Survey	Project end
		80. Statistically significant accuracy of algorithms	Survey	Project end
		81. Follow-up project potential	Survey	Project end

For more details please see D 6.2, chapter 2.

## 7.3 Annex IV: Research Instruments On-Site Tests

### 7.3.1 On-site baseline test instruments

Please see D6.4 Annex 5.1.

### 7.3.2 On-site system test instrument: HDis staff self-questionnaire

## WP6 – Insitumessung HDis Mitarbeiter (Selbstaussfüller)

### **Status: FINAL**

Herzlichen Dank für deine Unterstützung bei unserem internationalen EU Forschungsprojekt ABC\_DJ. Wie mit Robin und Felix vereinbart, werden zwei Bereiche durch unseren Fragebogen erhoben:

Eine **allgemeine Beurteilung von Tätigkeitsbereichen**. Die anschließenden Fragen bitte nach dem letzten Tag der Messung ausfüllen.

1. Kreuzt bitte euren Tätigkeitsbereich an:

- Music Consultant
- Music Searcher

### **DIE FOLGENDEN FRAGEN BITTE AUSFÜLLEN**

2. Welche Tasks fallen in deinen persönlichen Zuständigkeitsbereich?

- Klassifizierung von Musiktiteln (Tag songs)
- [Aufbereitung von Musiktiteln \(Preparation of music titles\)](#)

- Suchen und Entdecken von Songs (Search and discover songs)
- Erstellung von Playlists (Create playlists)
- Update von Playlists (Update playlists)
- Meetings mit Kunden (Meetings between creator and brand)
- Upload und Versand von Playlists (Playlist finalization and implementation)

3. Wie würden Sie die folgende Aspekte des ABC\_DJ-Systems bewerten?

	Sehr gut	Eher gut	Durchschnitt	Eher nicht gut	Überhaupt nicht gut
Userfreundlichkeit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technische Stabilität	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Wie stufen Sie den Prozess der **Klassifizierung von Musiktiteln** (Tagging) nach den folgenden Kriterien ein?

(Tasks, die nicht auf dich zutreffen bitte streichen)

	Sehr gut	Eher gut	Durchschnitt	Eher nicht gut	Überhaupt nicht gut
Effizient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspirierend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unkompliziert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Wie hat ABC\_DJ den Prozess der **Klassifizierung von Musiktiteln** beeinflusst?

6. Was könnte am aktuellen Prozess der **Klassifizierung von Musiktiteln** noch verändert werden, um den Zeitaufwand für diese Task zu verringern?

7. Wie stufen Sie die **Aufbereitung von Musiktiteln** nach den folgenden Kriterien ein?

(Tasks, die nicht auf dich zutreffen bitte streichen)

	Sehr gut	Eher gut	Durchschnitt	Eher nicht gut	Überhaupt nicht gut
Effizient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspirierend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unkompliziert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Wie hat ABC\_DJ den Prozess der **Erstellung von Audio Summaries** beeinflusst?

9. Was könnte am aktuellen Prozess der **Erstellung von Audio Summaries** noch verändert werden, um den Zeitaufwand für diese Task zu verringern?

10. Wie stufen Sie die **Suche und des Entdeckens von Songs** in eurem Musikarchiv nach den folgenden Kriterien ein?

(Tasks, die nicht auf dich zutreffen bitte streichen)

	Sehr gut	Eher gut	Durchschnitt	Eher nicht gut	Überhaupt nicht gut
Effizient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspirierend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unkompliziert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Wie hat ABC\_DJ den Prozess der Suche und Entdeckung von Songs beeinflusst?

12. Was könnte am aktuellen Prozess der **Suche und Entdeckung von Songs** in eurem Musikarchiv noch verändert werden, um den Zeitaufwand für diese Task zu verringern?

13. Wie stufen Sie die **Erstellung von Playlisten** nach den folgenden Kriterien ein?

(Tasks, die nicht auf dich zutreffen bitte streichen)

	Sehr gut	Eher gut	Durchschnitt	Eher nicht gut	Überhaupt nicht gut
Effizient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspirierend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unkompliziert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Wie hat ABC\_DJ den Prozess der Erstellung von Playlisten beeinflusst?

15. Was könnte am aktuellen Prozess der **Erstellung von Playlisten** noch verändert werden, um den Zeitaufwand für diese Task zu verringern?

16. Wie stufen Sie das **Update von Playlisten** nach den folgenden Kriterien ein?

(Tasks, die nicht auf dich zutreffen bitte streichen)

	Sehr gut	Eher gut	Durchschnitt	Eher nicht gut	Überhaupt nicht gut
Effizient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspirierend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unkompliziert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. Wie hat ABC\_DJ den Prozess des Updatens von Playlisten beeinflusst?

18. Was könnte am aktuellen Prozess des **Updates von Playlisten** noch verändert werden, um den Zeitaufwand für diese Task zu verringern?

19. Wie stufen Sie die **Meetings mit Kunden** nach den folgenden Kriterien ein?

(Tasks, die nicht auf dich zutreffen bitte streichen)



	Sehr gut	Eher gut	Durchschnitt	Eher nicht gut	Überhaupt nicht gut
Effizient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspirierend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unkompliziert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. Wie hat ABC\_DJ den Prozess **Meetings mit Kunden** beeinflusst?

21. Was könnte am aktuellen Prozess **Meetings mit Kunden** noch verändert werden, um den Zeitaufwand für diese Task zu verringern?

22. Wie stufen Sie den **Upload und Versand von Playlisten** nach den folgenden Kriterien ein?

(Tasks, die nicht auf dich zutreffen bitte streichen)

	Sehr gut	Eher gut	Durchschnitt	Eher nicht gut	Überhaupt nicht gut
Effizient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unkompliziert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23. Wie hat ABC\_DJ den Prozess des **Uploads und Versands von Playlisten** beeinflusst?

24. Was könnte am aktuellen Prozess des **Uploads und Versands von Playlisten** noch verändert werden, um den Zeitaufwand für diese Task zu verringern?

25. Wenn Sie die Wahl hätten: Würden Sie das ABC\_DJ-Musiksystem gerne auch künftig bei HearDis! einsetzen?

Unbedingt	Eher schon	Teils-Teils	Eher nicht	Sicher nicht
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. Falls „Teils-Teils/Eher nicht/Sicher nicht“: Was müsste konkret verbessert/ verändert werden, damit Sie sich doch für das System entscheiden würden?

### 7.3.3 On-site system test instrument: HDis management interview guideline

#### WP6 – In-Situ Measurement: HDis Management (Guide)

##### *Status: Final draft*

D 6.2: At the end of the evaluation week, INTEGRAL will conduct face-to-face interviews with HearDis! Management using semi-structured paper & pencil questionnaires, with a particular focus on quantifying the time and resource costs of current audio branding processes and pinpointing the frictions in provider/client communications.

The following areas will be addressed (*table can be deleted later*):

Critical success factor (CSF)	Key performance indicator (KPI)	Performance indicator (PI)
1. Improved audio branding process	1. Time gain: Music discovery & archiving*	1. Time to tag songs
		2. Time to prepare songs (editing, fade-out, etc.)
		3. Time to search and discover songs
	3. Time gain: Playlist creation & management*	12. Time to create playlist
		13. Time to update playlist (monthly, quarterly, yearly)
		14. Time and number of meetings between creator and brand per client service request
		15. Time between playlist finalization and implementation
	4. Quality gain: Playlist creation & management	16. Rating scale: playlist creation
		17. Rating scale: playlist update/management
		18. Rating scale: communication between playlist creator and brand
		19. Rating scale: overall effort per client service request
10. Margin gain: Creative agents	61. Audio branding project costs	
	62. Audio branding revenue	

#### KPI 1 & 3

1. First, we would like to talk about efficiency. From a management perspective, what impact has ABC\_DJ had on the **efficiency** of the following tasks? Did the system meet expectations? In what concrete ways can it be further improved?

Task	What was the expected impact on	What has been the actual impact on	How can the system
------	---------------------------------	------------------------------------	--------------------

	<b>efficiency?</b>	<b>efficiency so far?</b>	<b>be improved?</b>
Classifying songs			
Editing songs			
Searching and discovering songs			
Creating playlists			
Updating playlists			
Meetings with clients			
Playlist finalization and implementation			
Overall qualitative assessment cost/resource/time efficiency			

#### KPI 4

2. Next, we would like to talk about the quality of audio branding outcomes. From a management perspective, what impact has ABC\_DJ had on the HearDis' **quality of outcomes**? Did the system meet expectations? In what concrete ways can it be further improved?

Task	What was the expected impact on <b>quality of outcomes</b> ?	What has been the actual impact on <b>quality of outcomes</b> so far?	How can the system be improved?
Creating playlists			
Updating and managing playlists			
Communication with clients			
Overall effort required per client service request			

#### KPI 10

Finally, we would like to discuss business models and finances.

3. Has ABC\_DJ had any tangible impact so far on HearDis' business performance?
4. In what specific ways do you hope or expect ABC\_DJ to reduce internal or external costs?
5. In what specific ways do you hope or expect ABC\_DJ to augment HearDis' spectrum of services or unique selling proposition?
6. What other hopes and expectations do you have regarding the ABC\_DJ Project as it transitions from the research and innovation phase into the marketplace?

### 7.3.4 On-site system test instrument: PIACENZA staff interview guideline

#### WP6 – In-situ measurement: Piacenza staff (guide)

Interviewer: Please indicate staff member role

#1 Management

#2 Sales

#3 Shop-assistent

Thank you for helping to support our international research project! As previously mentioned, I will audio-record this interview to make sure I get your answers right in detail. The recording will not be passed on to third parties; it will only be used by INTEGRAL as a basis for later analysis.

Our interview is about the ABC\_DJ System, which is being tested at PIACENZA during this trial period. **By "ABC\_DJ System" we mean the hardware and/or software players, the musical playlists themselves, and any technical support services or other associated services.**

1. How involved are you personally in selecting in-store music at PIACENZA?  
What was your experience with the ABC\_DJ system during the trial period?  
#1 I was responsible for managing the system  
#2 I interacted with the system in a hands-on way  
#3 I never dealt with the system personally; I just listened to the music that was played  
If #1 or #2, please describe.

#### Evaluation of technical aspects

2. How satisfied were you with the technical aspects of the ABC\_DJ system?  
#1 Very satisfied  
#2 Rather satisfied  
#3 So-so  
#4 Rather unsatisfied  
#5 Very unsatisfied  
Ask follow-up questions about the respondent's thoughts on this.  
What worked well?  
What worked less well?  
If any problems occurred: How did you resolve them? Did such problems complicate your workflow and add stress to your workday?  
What do you think should be improved? why?
3. How would you rate the system according to the following aspects?
  - a User-friendliness
    - #1 Very good
    - #2 Rather good
    - #3 So-so
    - #4 Rather poor
    - #5 Very poor
  - b Reliability
    - #1 Very good
    - #2 Rather good
    - #3 So-so
    - #4 Rather bad
    - #5 Very bad

Is the ABC\_DJ System more or less user-friendly than the previous in-store music system? How and why?  
Is the ABC\_DJ System more or less reliable than the previous in-store music system? How and why?

### **Evaluation of the music selection**

4. Let's get to the music: How satisfied were you with the music selection during the test period?
- #1 Very satisfied
  - #2 Rather satisfied
  - #3 So-so
  - #4 Rather unsatisfied
  - #5 Very unsatisfied

Ask follow-up questions about the respondent's thoughts on this.

5. In your opinion, how well did the music selection fit the atmosphere of the Outlet Store?
- #1 Very well
  - #2 Rather well
  - #3 So-so
  - #4 Rather poorly
  - #5 Very poorly

#6 I haven't given it much thought (don't read aloud)

Ask follow-up questions about the respondent's thoughts on this.

6. How well did the music seem to fit the brand PIACENZA?

#1 Very well

#2 Rather well

#3 So-so

#4 Rather poorly

#5 Very poorly

#6 I haven't given it much thought (don't read aloud)

Ask follow-up questions about the respondent's thoughts on this.

7. Do you think the music fit the visitors to your shop?

#1 Fit very well

#2 Fit rather well

#3 Fit so-so

#4 Fit rather poorly

#5 Fit very poorly

#6 I don't know (don't read aloud)

Why do you think the music did fit / didn't fit the visitors?

For what kind of visitor do you think the music was appropriate? For what kind of visitor it might have been inappropriate?

Were you more or less satisfied with the ABC\_DJ system playlists than with the music previously played in the store? Why?

Do you think the ABC\_DJ playlists fit the atmosphere in the store better or worse than the music previously played in the store? Why?

Do you think the ABC\_DJ playlists fit the brand PIACENZA better or worse than the music previously played in the store? Why?

### **Preferences for future use**

If you had the choice, would you choose to continue using the ABC\_DJ System in the outlet store?

- 8.
- #1 Absolutely
  - #2 Probably
  - #3 So-so
  - #4 Probably not
  - #5 Definitely not

Ask follow-up questions about the respondent's thoughts on this.

If answer was So-so/Probably not/Definitely not:

What exactly would need to be improved or changed about the ABC\_DJ System for you to choose to continue to use it?

**Thank you for the interview!**

### 7.3.5 On-site system test instrument: PIACENZA customer exit self-questionnaire

#### **WP6 – In-situ measurement: Piacenza customer exit interview (CAWI/CAPI self-questionnaire)**

Thank you for taking part in our short survey! This questionnaire should take 1-2 minutes at most.

**All in all, how would you rate today's visit to the PIACENZA Outlet Store?**

5 Smiley Scale

**How would you rate the following aspects of the PIACENZA Outlet Store?**

B - Shopping atmosphere

E - In-store music

5 Smiley Scale

**In your opinion, how well does the in-store music fit the atmosphere of the Outlet Store?**

5 Smiley Scale

**How well does the music seem to fit the brand PIACENZA?**

5 Smiley Scale

**How would you classify the music played in the outlet store?**

A - Modern o o o o o Traditional

B - Earthy o o o o o Elegant

C - Innovative o o o o o Conservative

D - Simple o o o o o Complex

**Thank you for your time!**

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