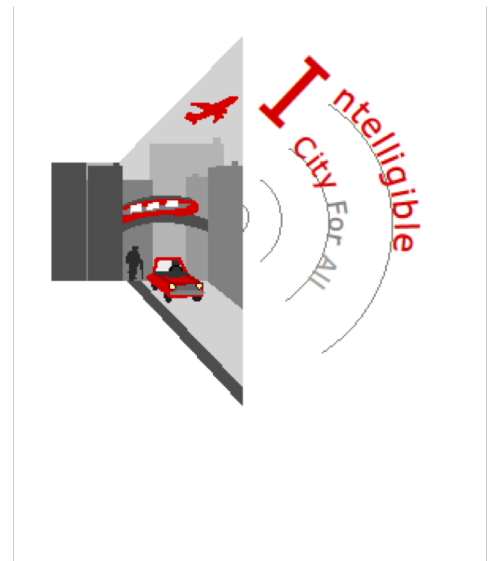




D5.6 – Dissemination report



Project acronym: I'CityForAll

Project name: Age Sensitive ICT Systems for Intelligible City For All

Strategic objective: Socio-acusis ICT solutions for a better social well-being of Ederly People

Project Duration: July, 1st 2012 – Dec, 31th 2015 (42 months)

Co-ordinator: CEA: Commissariat à l'Energie Atomique et aux Energies Alternatives

Partners: UPD: Université Paris Descartes
 ENEA: Agenzia Nazionale per le Nuove tecnologie, l'Energia e lo sviluppo economico sostenibile
 TUM: Technische Universität München
 CRF: Centro Ricerche FIAT
 CENTICH: Centre d'Expertise National des Technologies de l'Information et de la Communication pour l'autonomie Active Audio

D5.6

Version: 1.00
 Delivery Date: 31-12-2015
 Due date: 31-12-2015
 Task: 5.1
 Leader: CEA
 Dissemination status: PU

Once completed please e-mail to WP leader with a copy to

sylvie.ghalila@cea.fr

D5.6	Executive Summary
<p>This document reports the performed dissemination activities of the l'CityForAll project. The main objective being to raise awareness towards any potentially interested parties and to ensure that the final outcomes of the project are communicated in the most persuasive way. The three main dissemination activities are scientific publications, public conferences participation and in terms of results: one patent concerning the main technological achievement of the project. The dissemination report ends by a description of the updated marketing materials including the project website that are to be shared with the different partners.</p>	

Dissemination Level of this deliverable (Source: l'CityForAll Technical Annex p20 & 22)	
PU	Public
Nature of this deliverable (Source: l'CityForAll Technical Annex p20 & 22)	
R	Report and marketing materials :1 full project presentation and flyer/product and and flyer/project

Due date of deliverable	31-12-2015
Actual submission date	31-12-2015
Evidence of delivery	31-12-2015

Date	Version	Reviewer	Recommendations
	1.0	Gaël Mahé	
	1.0	Régis Cazin	

Authorisation			
No.	Action	Company/Name	Date
1	Prepared	CEA_LinkLab/Dridi	15-12-2015
2	Approved	CEA_LinkLab/Ghalila	31-12-2015
3	Released		31-12-2015

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1.Introduction

1.2 I'City for All-overview and expected impact

The project I'CityForAll (Age Sensitive ICT Systems for Intelligible City For All) aims at enhancing the sense of safety and self-confidence of presbycusic people, whose hearing degradation increases with age.

Two situations are considered: mobility in public confined spaces and mobility in urban space. For public confined spaces, the ICT solutions consist in intelligent loudspeakers for better intelligibility of vocal messages.

For urban mobility, I'CityForAll partners will develop a system embedded in vehicles for better localization of alarm sounds (e.g.ambulances, police cars, fire trucks, etc.) and studied an appropriate enhancement of car signal alarms (e.g. safety belt warning, lane change warning), as the hearing degradation alters not only perception of distance and direction of sound sources but also and diminishes gradually the sound volume and frequency perception.

These systems will be “transparent” and embedded in mass products for the large public. We target the design of embedded solutions in mass products at reasonable cost for people with pseudo-normal and presbycusic hearing without impacting normal hearing people (concept “for All”).

The 4 main steps of ICityForAll project are described below and illustrated by figure 1.

Hereafter, we start by describing the groups targeted by our dissemination strategy. Chapter 3 gives the different dissemination channels used to target these groups are specified. Chapter 4 presents the website dedicated to the project. Chapter 5 gives an overall assessment of the dissemination channels impact either by commonly used metrics (impact factor, classification...) or by quantifying the reached audience. Finally, chapter 6 presents the updated marketing materials.

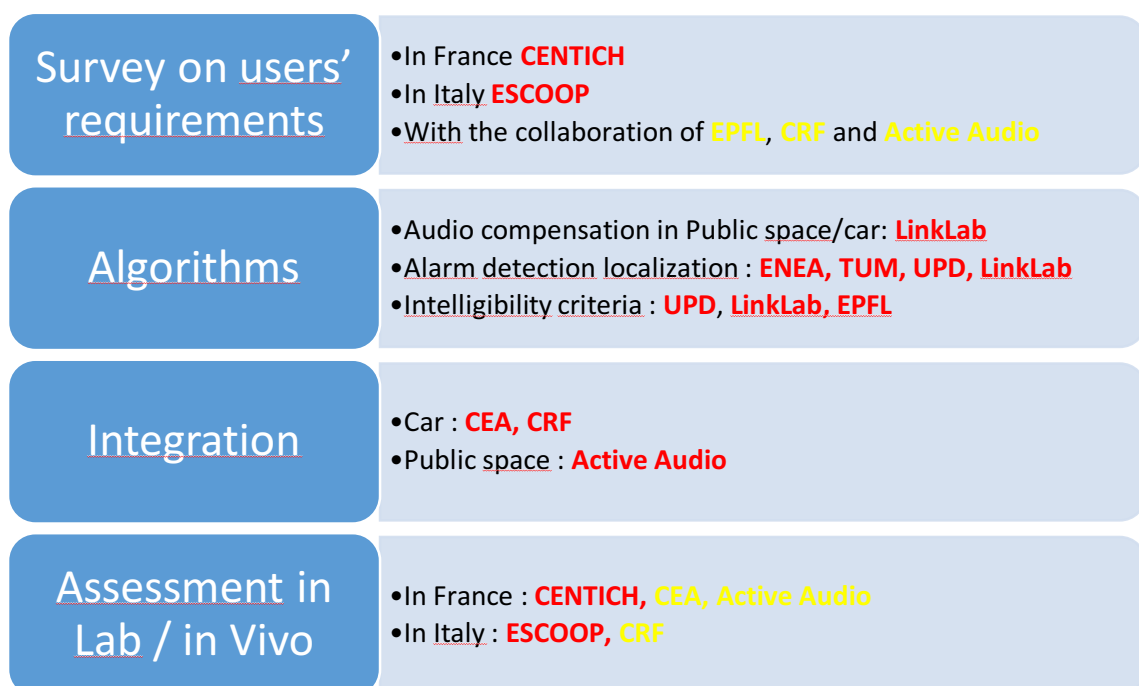


Figure 1. I'CityForAll main steps

2. Target groups

End-user groups and associations

this target group refers mainly to end users who will find in the solutions developed by the l'CityForAll - opportunities for new approaches and for new, more effective ways of performing their tasks. The dissemination activities targeting this group is being achieved by the two end-users organizations partnering with l'CityForAll project: CENTICH (France) and ESCOOP (Italy).

- Industry sector,

including large enterprises and SMEs, operating in various areas where the introduction of new solutions for hearing impaired community could represent an important differentiating element and a significant added value; The addressed players will include manufacturers and vendors of both hardware and software solutions, service providers, *etc.* The dissemination activities targeting this group are being achieved by Active AUDIO (FRANCE) and CRF (ITALY).

- The scientific community

i.e. research and academic organizations, scientific journals, committees, Internet forum and other working groups operating in fields similar or related to the technologies developed by l'CityForAll. The dissemination activities targeting this group are being achieved by EPFL (SUISSE), ENEA (ITALY), TUM (GERMANY) and CEA (France).

-

-General public / opinion makers

the dissemination activities addressed to them will have the objective of generating awareness of and interest in the new applications which will be made possible through the use of an innovative approach in interacting with the computing and telecommunication devices. The dissemination activities targeting this group are being achieved by mixed end-users organizations.

- **Other relevant Projects funded** or planned to be funded by the EU as well as other EU sponsored activities, this group is targeted through AAL meetings and forums.

- **The Consortium staff itself.**

3. Dissemination channels

3.1 Scientific papers and conferences

In the course of research dedicated to l'CityForAll, the following results were published and presented in specialized conferences.

- [CEA1], C. Megard, V. Le Guelvouit, S. Strachan, C. Mercier, C. Bolzmacher “**Directional identification of sirens and warnings in a simulated driving task: Comparison of two loudspeaker technologies**”, 7th International Conference on Applied Human Factors and Ergonomics 2016, Florida, USA, July 27-31, 2016,
- [CEA2], Y. MZAH, S. Maarfi, R. Ghozzi, M. Jaidane “**Non-monotonic impact of occupancy level on reverberation indicators: case of a public confined eating establishment**”, AES 60th International Conference, Leuven, Belgium, *February 2016*.
- [CEA3], C. Bolzmacher, V. Le Guelvouit “**Transforming car glass into microphones using piezoelectric transducers**”, Microsystem Technologies, Springer, *December 2015*.
- [CEA4], A. Ben Jemaa, N. Mechergui, G. Courtois, A. Mudry, S. Jaziri-Larbi, M. Turki, H. Lissek, M. Jaidane “**Intelligibility Enhancement of Vocal Announcements for Public Address Systems: A design For All through a Presbycusis Pre-compensation Filter**”, Interspeech, Dresden, Germany, *September 2015*.
- [CEA5], C. Bolzmacher, V. Le Guelvouit, “**Car glass microphones using piezoelectric transducers for external alarm detection and localization**”, 7th Smart Sensors, Actuators, and MEMS conference at the SPIE Microtechnologies Symposium, Barcelona, Spain, *May 2015*.
- [Enea1], M. Paoloni, A. Zanela, “**Supporting Presbycusis Drivers in Detection and Localization of Emergency Vehicles: Alarm Sound Signal Processing Algorithms**”, Proceedings of the Conference-Workshop Bio-inspired Robotics, Frascati, *May 2014*.
- [UPD1], T. Bouchara, G. Mahe “**Evaluation de la saillance d’annonces vocales par un paradigme de double-tâche**”, Congrès Français d’Acoustique, Poitiers, France, *April 2014*.
- [TUM1], C. Hage, T. Habigt, M. Kleinsteuber “**Sparse DOA Estimation of Wideband Sound Sources Using Circular Harmonics**”, Online <http://arxiv.org/abs/1403.1501v1>, *March 2014*.
- [Enea2], A. Zanela, “**Il progetto l'CityForAll: Age Sensitive ICT Systems for Intelligible City For All**”, CUP 2014, Rome Italy *March 2014*.
- [CEA-LinkLab], N. Mechergui, N. El Haouij, Y. Mzah, A. Ben Jemaa, M. Jaidane, S. Larbi, S. Ghalila, D. Malouche, K. Lecoz, Y. Belouard, M. Turki, R. Ghozi, C. Mercier, J. Hajjam, S. Erve, A. Brescia, “**AAL: Intelligible City for All Evaluation of Ecological Intelligibility Test for Normal Hearing and Hearing Impaired**”, 6th Workshop on Speech in Noise: Intelligibility and Quality (SPIN) Marseille, France, *January 2014*.
(http://www.icityforall.eu/publications/poster_spin_modif.pdf)

Hereafter, we present a table that evaluate the impact of the scientific production by giving the different key metrics that assess the dissemination channels quality.

Table 1

Dissemination channel	Impact factor/conference ranking/affiliation/number of attendees
[CEA1]	A
[CEA2]	0.875
[CEA3]	A
[CEA4]	A
[ENE1]	ENE1
[UPD1]	French Society of Acoustics
[TUM1]	Free access
[ENE2]	Nearly 250 participants
[CEA-LINKLAB]	Nearly 400 participants

3.2 AAL Events

- [CEA-LinkLab, CENTICH], K. Le Coz , “**Audio and Elderly Mobility needs in the City: survey on Speech Intelligibility and Sound Alarm Localization**”, AAL Forum, *September 2013*. (http://www.icityforall.eu/publications/poster_aal_stockholmlinklabv3.pdf).
- [CEA-LinkLab], S.Sevestre-Ghalila, M.Jaidane “**demonstration of the I'CityForAll products through the use of loudspeakers**”, AAL workshop,*Raising the awareness of AAL JP activities and AAL JP projects among European regions*, Brussels, November 2013.

Table 2

Hosting Event	Number of participants
[CEA-LinkLab, CENTICH]	Nearly 800
[CEA-LinkLab]	Nearly 250 participants

3.3 Project presentations

- [CENTICH], J.Hajjam, “« IcityForAll » - Les TIC pour une meilleure audition dans la cité pour tous », La semaine du son, *January 2015*. (Event organized by CENTICH)

- [EPFL], H. Lissek, “Age Sensitive ICT Systems for Intelligible City For All: I'CityForAll”, Swiss Society of Acoustics meeting, Lausanne, *May 2014*. (http://www.icityforall.eu/publications/140515_ssa_herbsttagung_icityforall_presentation_hliss_ek.pdf)

- [TUM], C. Hage, “Detecting, Localizing, and Tracking Alarm Signals in Traffic using a Microphone Array”, Swiss Society of Acoustics meeting, Lausanne, *May 2014*.

- [UPD], G. Mahe, “Age Sensitive ICT Systems for Intelligible City For All: I'CityForAll”, VITE'14: Vivre et se mouvoir dans la ville grâce aux nouvelles technologies, Paris, France, *5 February 2014*. (<http://www.icityforall.eu/publications/vite14-2.pdf><https://www-icityforall.cea.fr/lib/exe/fetch.php?media=vite14-2.pdf>) (event co-organized by CENTICH)

- [CRF], E. Bianco, “Age Sensitive ICT Systems for Intelligible City For All: I'CityForAll”, Meeting on interior comfort and accessibility, CRF-Torino, *December 2013*. (http://www.icityforall.eu/publications/icityforall_workshop_high_comfort_usability_20131213.pdf)

Table 3

Hosting Event	Number of participants
[CRF]	Nearly 800
[UPD]	85 participants
[EPFL]	Between 200-450
[TUM]	
[CENTICH]	300-400 participants

3.4 Brochure

IcityForAll produced its own brochure that was distributed in the following events

- AAL Kongress, Berlin, January 2013.
- AAL Info day, Brussels, February 2013.
- AAL network dinner, Munich, 2013



Company
Research group
■ **Project**

Project partners

Coordinator:
CEA LIST (France)

Parties involved:
UPD (France)
ENEA (Italy)
TUM (Germany)
CRF (Italy)
CENTICH (France)
ACTIVE AUDIO (France)
EPFL (Switzerland)

Project finance

Funding agencies:
ANR, BMBF, MUR, FDEA, CNSA

Amount of funding:
EUR 2,409,300





Targeted application scenarios:
(a) confined public spaces and (b) vehicle

Objectives

The project I'CityForAll (Age Sensitive ICT Systems for Intelligible City For All) aims at enhancing the sense of security and self-confidence of presbycousic persons, whose hearing degradation increases with age. Two situations are considered: mobility in public confined spaces and mobility in urban space. For public confined spaces, the ICT solutions consist of intelligent loudspeakers for better intelligibility of vocal messages. For urban mobility, I'CityForAll partners will develop a system embedded in vehicles for better sound alarm localization of ambulances, police cars, fire trucks, etc., as the hearing degradation alters perception of distance and direction of sound source. These systems will be "transparent" and embedded in mass products for the large public. We target the design of embedded solutions in mass products at reasonable cost for persons with pseudo-normal and presbycousic hearing without impacting normal hearing people (concept "for All").

AAL deliverables

Based on an end-user orientated evaluation carried out within I'CityForAll, the main deliverables are:

- Objective quality criteria for vocal announcements and alarms
- Loudspeakers dedicated to large spaces (i.e. railway stations), integrating the global processing chain of emission, correction and generation of vocal announcements with various ambient noises
- Vehicles equipped with automatic real-time presbycousic equalization and alarm localization systems
- Intelligibility For All recommendations

Demonstrators will be presented at the end of the I'CityForAll project, scheduled for June 2015.

Target partners

The targeted partners are companies interested in integrating the compensated loudspeaker system developed during the project, such as:

- Public transport companies
- Museums
- Supermarkets
- Associations

Contact details

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Phone: +33 (0) 1 69 08 02 35, E-mail: sylvie.ghaila@cea.fr, Website: <http://www.cityforall.eu>
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14 I'CityForAll Made in Bavaria

I'CityForAll brochure

3.5 Patent

As a direct outcome of l'City For all project, a patent titled "Procédé et système de réhaussement d'un signal audio" was submitted on august 2015 to the INPI date base under the references V/Réf: BD16536 - N/Réf: 069994 FR PHA/MGU.



15 rue des Minimes - CS 50001 - 92677 Courbevoie Cedex

Pour vous informer : INPI Direct 0820 210 211

Pour déposer par télécopie : 33 (0)1 56 65 86 00

BREVET D'INVENTION

Code de la propriété intellectuelle - Livre VI



DÉSIGNATION D'INVENTEUR(S)

Vos références pour ce dossier	69994 FR PHA
N° D'ENREGISTREMENT NATIONAL	
TITRE DE L'INVENTION	
Titre	PROCEDE ET SYSTEME DE REHAUSSEMENT D'UN SIGNAL AUDIO
LE(S) DEMANDEUR(S)	COMMISSARIAT A L'ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES
DÉSIGNE(NT) EN TANT QU'INVENTEUR(S)	

Patent

3.5 Other forms of dissemination

Cerignola Festival

The I'CityForAll project was presented during the “New economies and new jobs festival” (*Festival delle Nuove economie e dei nuovi lavori*) in Cerignola, Italy from the 18th to the 20th of December 2015. The project was presented by Mr. Paolo Tanese, ESCOOP chairman during a talk. The poster presented during this festival was used at many other occasions by the project partners such as in in-vivo field trials of the project in Italy



I'CityForAll participation to Cerignola festival

AAL forum September 2015 in Ghent, Belgium

From September 22nd to 24th, more than 600 experts, researchers and entrepreneurs from all over Europe gathered in Ghent to discuss and showcase innovative ICT solutions for a healthier, happier and more independent lifestyle for older adults. The AAL Programme, IWT and iMinds hosted this year's successful and largely-attended edition of the annual AAL Forum, whose main focus was interactivity.

The program featured interactive sessions covering the central themes of education and training, the roll-out of solutions and trialing, connecting supply and demand, meeting the needs and hopes of older people, interoperability and the future of AAL.

Demonstrations of AAL solutions were another key part of the event, with projects and industry members able to showcase and test their products before a receptive audience of older people, who were asked to evaluate and rate them.

The I'City For All project was invited to participate to the session on **“Co-creation of markets for AAL-solutions”**. Apart from a brief, 5-minute introduction, the I'City For All representative was given the opportunity to present the audience with questions, ideas, statements we were facing in the commercialization and upscaling of our AAL solution. The answers of the audience (who get to vote on our statements) were highly valuable to further the market entry of our AAL-solution.



I'city For All presentation during AAL forum

Media coverage

The l'CityForAll project was cited in the quarterly publication of the « Association de Réadaptation et Défense des Devenus-Sourds (ARDDS) which is an association working to improve the rehabilitation and protection of persons with hearing problems on its April 2015 issue.

Europe | International

Un accès à la ville pour tous : l'CityForALL

L'association Surdi 49 a collaboré avec le Centre d'Expertise National des Technologies de l'Information et de la Communication pour l'autonomie (CENTICH), pour trouver des utilisateurs-testeurs pour le projet l'CityForALL.

Le projet l'CityForAll vise à renforcer le sentiment de sécurité et de confiance en soi des personnes presbycusiques qui ont une perte progressive de l'audition liée à l'âge. Pour les personnes âgées, ce phénomène peut avoir un impact sur l'intelligibilité des annonces vocales ainsi que sur la perception de la distance et de la direction d'une alarme extérieure (sirène ambulance, police, etc.). Les solutions du système l'CityForAll sont transparentes et intégrées dans les produits de masse afin que le matériel puisse être utilisé par un large public et avec un coût raisonnable. Ce projet vise à répondre aux besoins de tous (*for all*). En effet, le système l'CityForAll souhaite répondre aux besoins des personnes ayant une audition pseudo-normale et des personnes presbycusiques sans avoir un impact sur l'intelligibilité des personnes avec une audition normale.

Première étape
Une première enquête nous a permis de relever les besoins des utilisateurs. Cette dernière s'est basée sur les réponses données par une cohorte de 49 utilisateurs de plus de 50 ans, dont des personnes presbycusiques (avec ou sans appareil auditif) et des personnes avec une audition normale. Cette première enquête s'est déroulée dans deux pays : Italie et France.

La mobilité dans les espaces confinés publics :
Voici les principaux résultats de l'enquête menée auprès des utilisateurs.

- Pour toutes les personnes presbycusiques, l'intelligibilité des annonces vocales diminue lors des heures de pointe.
- Les jingles diffusés avant les annonces vocales permettent d'attirer l'attention de toutes les personnes.
- Le sentiment de stress et l'inconfort lors de l'écoute sont plus perceptibles chez les personnes avec une audition normale.
- Les personnes presbycusiques sont les plus sensibles aux sons forts et au bruit environnant.
- Les personnes presbycusiques avec un appareil auditif sont plus conscientes de leurs problèmes que les personnes presbycusiques sans appareil auditif.

La mobilité dans les espaces ouverts publics :
Voici les principaux résultats de l'enquête menée auprès des utilisateurs.

- Toutes les personnes de l'échantillon semblent avoir des difficultés pour estimer la distance effective entre l'alarme à venir et leur position. De plus, les personnes presbycusiques avec un appareil auditif ont encore plus de difficultés.

- La confusion dans la localisation d'une alarme provenant de l'avant / arrière ou de la gauche / droite est une difficulté commune aux personnes presbycusiques.
- La confusion dans la localisation d'une alarme provenant de la gauche / droite est plus difficile pour les personnes presbycusiques avec un appareil auditif.
- Toutes les personnes rencontrent quelques difficultés pour distinguer les différentes alarmes dans la voiture (ex. : pompier ou ambulance).
- Les personnes presbycusiques ont des difficultés pour entendre les alarmes extérieures dans la voiture ou pour entendre le navigateur de bord dans un environnement bruyant, en particulier les personnes presbycusiques avec un appareil auditif.

Deuxième étape
Une deuxième enquête nous permettra de tester les solutions du système l'CityForAll: les haut-parleurs intelligents pour une meilleure intelligibilité des annonces vocales et le système embarqué dans les véhicules pour une meilleure localisation des alarmes extérieures (par exemple, ambulances, voitures de police) et une localisation appropriée des alarmes de la voiture (par exemple, alerte de ceinture de sécurité, avertissement de changement de voie). Deux cohortes de 45 personnes, de plus de 50 ans, seront composées en France et en Italie afin d'évaluer les solutions du projet. Parmi ces personnes, nous aurons 15 personnes presbycusiques avec un appareil auditif, 15 personnes presbycusiques sans appareil auditif et 15 personnes avec une audition normale. Une première phase se réalisera dans un hangar à Nantes (pour l'étude en France) afin de reproduire un environnement similaire à celui d'une gare. Les haut-parleurs intelligents seront installés dans la pièce afin de diffuser 32 annonces vocales avec ou sans la solution l'CityForAll. Une seconde phase se réalisera à bord d'une voiture afin d'évaluer les apports d'un système embarqué de localisation des alarmes internes ou externes.

Les partenaires
Le projet l'CityForAll s'articule autour de plusieurs partenaires: UPD (France), ENEA (Italie), TUM (Allemagne), CRF (Italie), CENTICH (France), AUDIO ACTIVE (France), EPFL (Suisse), LinkLab-telnet (Tunisie), ESCOOP (Italie) et CEA LIST (France).

Pour en savoir plus : www.cityforall.eu

■ Mercier Cendrine, CENTICH

28
29

Avril 2015 | 6 millions de malentendants

« 6 millions de malentendants » magazine talking about l'CityForAll

4. The project website www.icityforall.eu

Internet represents an important tool in terms of information dissemination to a wide audience in a fast and accessible manner. The website represents an immediate and easy-to-access entry point which is open to all relevant stakeholders, and thus able to create awareness and interest about the project by making the most important information publicly available in a concise but exhaustive manner. The project website was updated recently with a better design and a more user-friendly interface. The products brochures as well as the project results were included with a detailed description.



I'CityForAll website

5. Quantification of dissemination activities:

DISSEMINATION ACTIVITY	IMPACT INDICATOR
Publications and conferences	Table 1
Posters	Table 2
Presentations	Table 3
Patent	200.000 visitors of INPI website can potentially be impacted
Cerignola Festival	150 attendees
Media coverage	6 millions potential readers 😊
AAL Forum, Ghent Belgium	1000 participants

6. Updated marketing material:

So far numerous marketing materials has been updated as part of the dissemination activities of the work package WP6. As a matter of fact, four brochures has been prepared for every product of the I'CityForAll project, *namely PerceiveAll, SIMForAll, AlarmSniffer and Speechconformer*. Moreover, project website has been updated into a more aesthetic and user-friendly version. Finally, a twenty-slides presentation exposing the I'CityForAll project In all of its details was prepared as well as a two-slides presentation summing up the project in a concise way. These are planned to be sent to each of the project partners. (See appendix fir marketing materials)

Appendix

SpeechConformer Product

SPEECH CONFORMER

Easily homogenizes the timbre of voices

The Speech conformer homogenizes the timbre of different voices. The algorithm analyses the spectrum of the input signal and applies the necessary gains so that the spectrum of the output signal meets the target spectrum chosen by the user.

Two steps to homogenize voice spectra

1

Specify the target spectrum

- Standard: IEC60268-16 female
- Broadcast: with emphasis on warmth
- Max intelligibility: with emphasis on presence
- Free user: specification with cursors

2

Visualize and tweak the Gain in bands warmth, Presence and Brightness

Principle

The Speech Conformer algorithm :


- 4 band analysis (warmth : 70-200Hz ; reference 200-1500Hz ; Presence : 1.5-6kHz ; Brightness : >6kHz).
- user specifies a target spectrum (Female voice as per IEC60268-16 in I'city).
- Level is computed in the 4 bands.
- Gain in bands warmth, Presence and Brightness are computed using a dual rate scheme.

Speech Conformer Diagram

Contact: regis.cazin@activeaudio.fr

AAL 2011-4-056
www.cityforall.eu

SIM^{ForAll} Product




SIM^{ForAll}

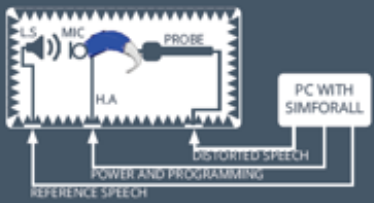
NO ONE LEFT BEHIND

Know your customer audio experience with the new generation of intelligibility assessment algorithm

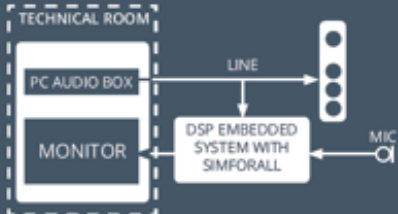
The SIMforall algorithm provides a Speech Intelligibility Measure for a variety of hearing abilities. It provides a for all score of perceived intelligibility for a specified population or for a specific sensorial hearing loss.




Hearing Aid Assesement



PA System Monitoring



SIM^{ForAll} Mobile solutions




SONOMETER and similar devices integration

Specifications

Speech Intelligibility Measure "for all" (based on ISO 60268-16)


- Inputs: reference speech, distorted speech and audiogram or age
- Can use live broadcasted vocal announce to measure intelligibility
- Provide an intelligibility score that is audiogram dependent
- Can be used as an assessment criteria for public address system or hearing aids
- Decrease the testing cost of speech processing algorithms assessment.



Speech intelligibility

0% to 100% comprehension score:

- Real time
- Time average
- In multiple rooms



EXTRA MEASURES

- Noise level
- Noise spectrum
- Reverberation



Contact: nader.mechergui@gmail.com



AAL 2011-4-056
www.cityforall.eu



AlarmSniffer Product

ALARMsniffer
SEE THE ALARM AROUND

Enhance driver's safety through automating alarm detection

AlarmSniffer is designed to help drivers to detect and localize emergency alarm sounds (like police or ambulance alarms). Using a microphone array installed on the car roof, the system analyses the audio input and provide all necessary information : alarm presence, type, direction and distance.

Detection
Ability to detect emergency alarms among a wide range
CEA-LinkLab | U2S | ENEA | UPD

Identification
Identify the alarm type
CEA-LinkLab | U2S | ENEA | UPD

Localization
Indicate the right direction and how far is the emergency vehicle in order to shorten the driver's reaction time
TUM | ENEA

Specifications

- Input : audio flow from an 8 channels microphone array
- Detect the alarm presence in 200 meters radius
- Fast alarm identification system (less than 0.02s)
- Different alarm types can be detected and identified according to a normalized alarms' database
- Accurate direction of arrival feedback (Resolution = 5°)
- Three main safety range:
Critical zone: 0-50 meters
Alert zone: 50-100 meters
Safe zone: >100 meters

System overview

```

    graph LR
      A[8 channels Micro-array] --> B[Detection & Identification]
      A --> C[Distance Estimation]
      A --> D[Direction Estimation]
      B --> E[Display System]
      C --> E
      D --> E
      subgraph Localization
        C
        D
      end
  
```

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PerceivAll Product

The graphic features a stylized illustration of a diverse group of people in a public space. A sign in the background reads 'I' CITYFORALL'. A speaker icon is also present. The main title 'PERCEIVALL' is prominently displayed with the tagline 'AUDIO FOR EVERYONE, ANYWHERE'. The background is a mix of warm and cool colors, suggesting an indoor or sheltered outdoor environment.

For better intelligibility and localization of audio signals

PerceivAll pre-adjusts audio signal to the target user of diverse spaces taking into account the acoustic environment and the variability of sound ambiances. Its parameter setting allows an application in confined spaces such as railway station and airport or vehicles.

1
"ForAll" user oriented processing

PerceivAll system includes:

- A frequency pre-compensation for age related hearing loss according to the personal user profile or a "for all" profile based on the ISO 7029 standard
- A gain limiter module for presbycusisauditory recruitment phenomenon
- dedicated AGC module based on adaptive ambient noise estimation robust to sound events

Public address systems
Automatic adjustment of the public address systems sound level with regards to the variation of ambient noise and reverberation amounts.

Car Auditory display
Adaptation of auditory display according to the driver auditory profile and urban ambient noise masking threshold

2
Acoustic environment oriented processing

System overview

The flowchart shows the signal processing pipeline. It starts with 'Vocal announce / Sound Alarm' entering a 'Pre-compensation' block. This block is influenced by 'Presbycusis parameters'. The output goes to an 'AGC' block, which is split into 'AGC^speech' and 'AGC^alarm'. Both AGC blocks feed into a 'Recruitment limitation' block. A 'Dedicated criterion' block also receives input from the AGC blocks and provides feedback to the 'Pre-compensation' block. The final output is shown as a speaker icon. The environment is represented by 'Ambient noise' and 'Reverberation'.

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I'CityForAll Overall review

I'CityForAll

Age Sensitive ICT Systems for Intelligible City For All



The project I'CityForAll aims at **enhancing the sense of safety** and **self-confidence of presbycousic persons** whose hearing degradation increases with age. For elderly persons, this is impacting on the **intelligibility of vocal messages** and their **perception** of the distance-direction of alarm sounds and of their alarming power.

The project consortium focuses on finding ICT solutions for 2 situations:

1. Mobility in public confined spaces

Smart loudspeakers for better intelligibility of vocal messages in terms of listening effort and sound quality.

2. Mobility in the urban spaces

System embedded in vehicles for better localization of alarm sounds (e.g. ambulances, police cars) and an appropriate enhancement of car signal alarms (e.g. safety belt warning, lane change warning).

I'City4All Products: SIM^{ForAll}₁ | SpeechConformer₁ | AGC^{ForAll}_{1,2} | AlarmSniffer₂

These products were designed following "for All" concept. As result, presbycousic persons will be able to perceive sounds clearly without affecting sound quality for normal hearing people.

I'CityForAll Partners

UPD (France), ENEA (Italy), TUM (Germany), CRF (Italy), CENTICH (France), ACTIVE AUDIO (France), EPFL (Switzerland)

Subcontractors

LinkLab -TELNET (Tunisia), ESCOOP (Italy) U2S-ENIT (Tunisia)

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