Closing Conference QUADMAP

19-20 February 2015

Presentation of the Guidelines for the identification, selection, analysis and management of Quiet Urban Areas

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Introduction

Quadmap Project has met the challenge of defining a **methodology to select, analyse and manage Quiet Urban Areas (QUAs)** which has been tested in **10 Pilot Areas** located in Florence (6 school yards), Bilbao (a square and a green corridor) and Rotterdam (2 public parks).

The methodology is thoroughly illustrated in the **Guidelines** which can be considered one of the Project's main final result.

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Guidelines were drawn up to:

- help policymakers, competent authorities and any other stakeholders to understand the END's requirements pertaining to QUAs
- propose a complete and tested methodology in order to fulfill the END requirements, to deliver indicators for selecting, analysing and managing QUAs and also propose specific tools offering a high degree of flexibility in their application
- help to answer some research questions posed in the Good practice guide on quiet areas, published by the EEA in 2014, in particular the need to combine users' acoustic and overall perception of a QUA.

Summary

- QUAs definition
- Methodology addressed to QUAs
  - QUAs pre-selection: description and tools
  - QUAs analysis (non-acoustic evaluations by experts, noise measurements and end-users questionnaires): description, tools and examples
  - QUAs management: description and tools
- Conclusions

QUA definition

The methodology proposed by the QUADMAP Project is based on a new definition of QUA.

END definition:

"quiet area in an agglomeration" shall mean an area, delimited by the competent authority, for instance, which is not exposed to a value of Lden or of another appropriate noise indicator greater than a certain value set by the Member State, from any noise source.

QUADMAP definition:

a QUA is an urban area whose current or future use and function require a specific acoustic environment, which contributes to the well-being of the population.

According to the QUADMAP definition, the final objective when providing QUAs is to define areas where people can **find some refuge from urban environmental stress factors and where the well-being is improved, regardless of the current acoustical and general climate of the area**.

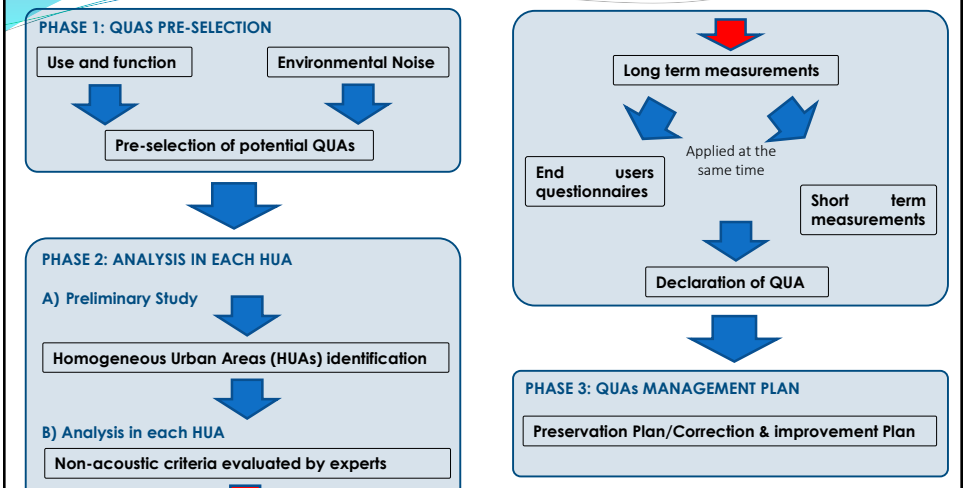
Methodology addressed to QUA

The methodology illustrated in the guidelines is essentially organised into three main phases: the **pre-selection of potential QUAs**, the **analysis used to designate them as QUAs** and their **management**.

The proposed methodology is based on crossing information from four main sources of information:

- **Environmental noise maps**;
- **Expert analysis**;
- **User perception**;
- **Sound measurements**.

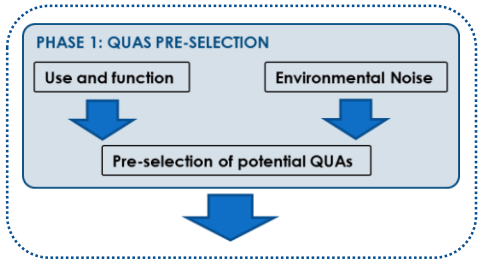
Methodology flowchart



The set of variables to be considered, the procedures to be used and practical tools are described in each section of the Guidelines.

QUAs pre-selection: description and tools

Pre-selection is an important, strategic and political stage to enable the subsequent evaluation of areas in the field and take measures if needed.



The Tool proposed for the pre-selection consists in two principal variables:

- Variable 1- Use and Function
- Variable 2- Noise levels

These variables should be analysed in sequence (variable 1 first)

Indicators for describing the two principle variables and the methods for their use are also introduced.

Variable 1-Use and Function

Criteria:

- **Category of land use in general urban planning**: residential, parks, gardens and forests, commercial areas, school areas, historic center, cultural areas, etc.;
- The **area's (current) function**: social relationships, conversation, resting, reading, playground, sport activities, leisure activities, etc.

Method of Analysis:

- Category of land use in general urban planning: **official urban planning documents**;
- Current or future function of the area: **interview with and/or observation of key experts and municipality technical staff**.

Variable 2-Noise Levels

Criteria:

- Yearly averaged **Lden values** related to noise emitted by road, rail, and air traffic, and industrial sites.

Method of Analysis:

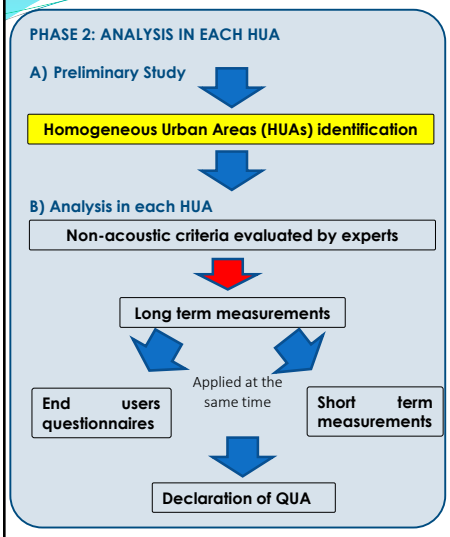
- **Comparison of Noise Maps** (provided by the END's requirements or national legislation) **with the threshold defined below**.

Threshold value:

- **Lden < 55 dB or another value defined by national legislation**, depending on the use and function of the area.

As well as the variables 1 and 2, complementary variables and approaches can also be employed to pre-selection QUAs (Fair access, public opinion, public use) according to the Guidelines.

QUAs analysis: description, tools and examples



HUAs should be delimited according to one or more of the following criteria:

Criterion 1-Landscape: uniform visual elements and landmarks.

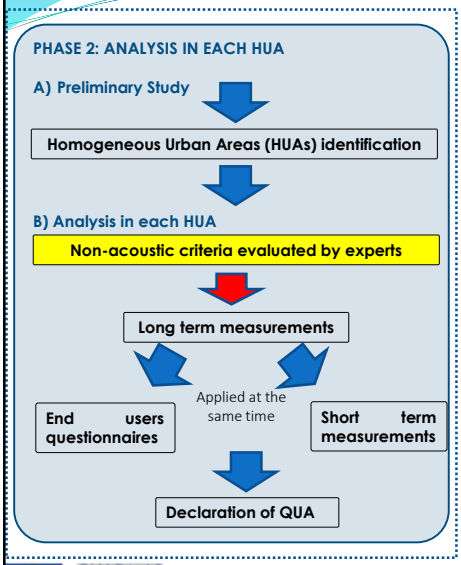
Criterion 2 - Use: one main and specific use or function. This is related to the facilities and furniture in the area.

Criterion 3 - Presence of and distance from sound sources

HUAs subdivision-example from the application of the Tool in a pilot case located in Florence

Montessori-Vamba schoolyard, plan of the area	Description of the pilot area
	The "Montessori-Vamba" school complex is located in Giardini della Bizzarria Street, Florence (ITALY). The schoolyard designated as a QUA as part of the QUADMAP Project is attended by pupils from the nursery school. It is mainly affected by road noise from Torre degli Agli Street and Giardini della Bizzarria Street. Around 460 people use this schoolyard.
	Using the tool
	•Landscape: The potential HUAs both feature similar visual elements and landmarks; •Use: The potential HUAs are both in the school grounds but the users are different. Each class is assigned part of garden for recreation time. •Presence of and distance from sound sources: HUA "A" is affected by road traffic noise from Giardini della Bizzarria Street and Torre degli Agli Street; HUA "B" is only affected by road traffic noise from Torre degli Agli Street. The presence of two sub-areas is, therefore, confirmed due to their use by different groups and the distance from sound sources.

Non-acoustic evaluations by experts



This Tool is implemented in order to collect some non-acoustic factors that might be required for an area to be considered in the assessment of the quality of QUAs.

Criteria to be evaluated by experts are:

CRITERIA
Principal non-acoustic criteria
Landscape
Natural elements
Cleanliness and maintenance
Safety
General criteria
Urban environment
Proximity to residential areas
Accessibility
Proximity to noise sources
Presence of a multi-source scenario
Measures to reduce noise
Behavioural criteria
Number of users
Distribution of users (geographical)
Activities performed

Criteria, methods of analysis and ratings

Variables for general analysis

CRITERIA	DESCRIPTION	PARAMETERS	RATING	POSSIBLE SOLUTIONS
Urban environment	Location of the area with respect to key social points in the city (e.g. library, church, etc.)	Far from key points		No immediate solution
		No key points		
		Close to key points		
Proximity to residential areas	Proximity to residential area increases the number of users of the area	More than 3 km		No immediate solution
		Between 500 m and 3 km		
		Less than 500 m		
Accessibility	Accessibility (also considering people with reduced mobility) by public transport or by cycle paths and/or footpaths	No public transport, no cycle path, no footpath		Create cycle and footpaths; develop public transport; add bus stops or lines; create reduced speed zone.
		Two of the following: public transport, cycle path, footpath		
		Public transport and cycle path and footpath		
Proximity to noise sources	Proximity to noise sources means possible high noise levels. If users can also see the source of noise, this psychologically affects their perception of the noise	Main noise source is close to the HUA and it is visible by users, potentially audible		The choice of solutions should consider measures that hide or mask the sources.
		Main noise source is close to the HUA and it is not visible by users, potentially non-audible		
		Main noise source is far from the HUA potentially audible		
Multi-source scenario	Presence of multiple noise sources of one or more kinds (road, rail, air traffic, industrial activities)	3 or more sources		Assess contribution of every kind of noise source and study solutions also evaluating combined effects for all main sources.
		2 sources		
		1 source		
Measures to reduce noise	Noise reduction measures carried out	Measures with good acoustic efficacy are needed but not possible		Propose possible integration of current measure to improve acoustic efficacy. The choice of solution should be made taking into account the results of end-user questionnaires
		Measures with average acoustic efficacy are needed and possible, but not present		
		No measures are needed		

Non acoustic analysis carried out by experts-example from the application of the Tool in a pilot case located in Florence

Dionisi schoolyard, plan of the area

Description of the pilot area

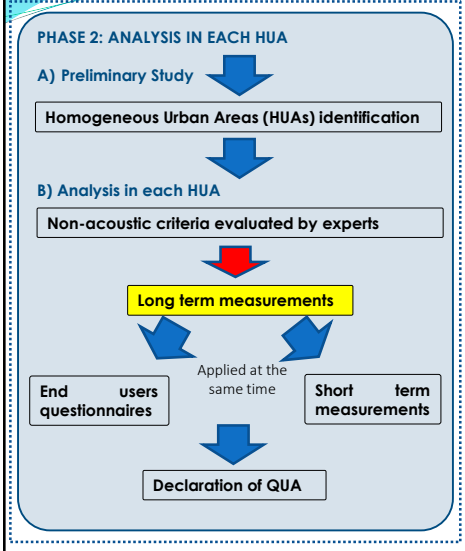
"Dionisi" nursery school is located in Aretina Street, Florence (ITALY).
It is mainly affected by road noise from Aretina Street.
Around 54 people use this schoolyard.

Using the tool

The experts nominated to evaluate non-acoustic criteria were the

CRITERIA	DESCRIPTION	PARAMETERS	RATING	4 -	POSSIBLE SOLUTIONS
Landscape	Greenery, water, or specific view (architecture, etc.) visible from the area	None			
		Only in 1 direction (N, S, E, W)			
		3/4 directions (N, S, E, W)			
Cleanliness and maintenance	Evaluation of cleanliness through observation by experts	Not maintained (uncut grass, broken benches, etc.) and unclean (rubbish on the ground and/or not in the bin, etc.)			Recommend measures to improve cleanliness.
		Regular deterioration/badly maintained			
		Regularly maintained and clean			
Safety	Evaluation of safety through observation by experts	Dangerous area (official statistics from the area show robberies, attacks and accidents in the area)			Recommend interventions to improve safety. 04: FENCE-OFF THE GARDEN
		Unguarded spaces or dark zones with poor lighting			
		Guarded and well-lit spaces			

Long term measurements



Long-term measurements should be carried out in each QUA to achieve the following aims:
1) To **detail** the **noise maps**, in the specific studied areas.
2) To **collect acoustic information about the variability of sound levels** over time in the area and to decide and justify the representativeness of the acoustic environment in the periods when the deeper analysis is made. In this sense, long-term measurements can be used to establish which are the most representative periods for carrying out "in situ" surveys (end-user questionnaires and short-term measurements).
3) To **assess the impact of the acoustical interventions**. This means, to compare results before and after the interventions.

Long term measurements-example from the application of the Tool in a pilot case located in Florence

Dionisi schoolyard, plan of the area

Description of the pilot area

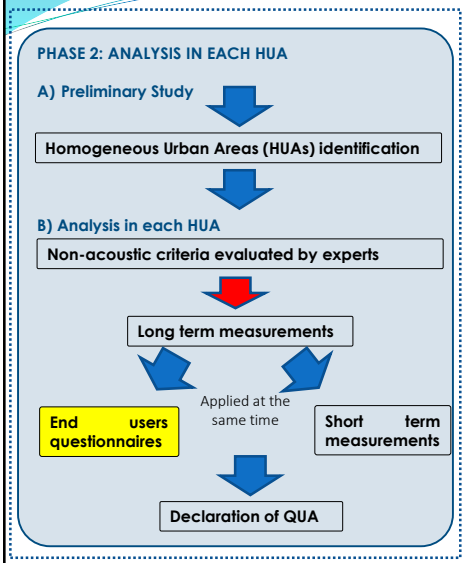
"Dionisi" nursery school is located in Aretina Street, Florence (ITALY).
It is mainly affected by road noise from Aretina Street.
Around 54 people use this schoolyard.

Using the tool

In this case, surveys were carried out between 2 p.m. and 4 p.m., although other time slots could also be considered equivalent. Compared with the noise levels in the noise map produced according to directive 2002/49/EC, the long-term measurements produced very interesting results, because in some pilot cases, such as the Dionisi school, they demonstrated the poor accuracy of noise maps due to overestimated road traffic in the streets close to this school.

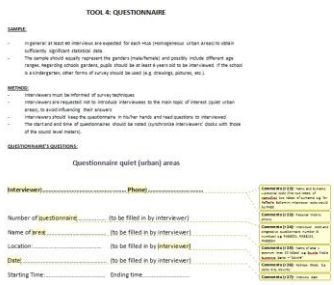
	L50	L10-L90		L50	L10-L90		L50	L10-L90
average	52,3	6,6	average	52,3	6,6	average	52,3	6,6
DAY 1			DAY 2			DAY 3		
			9:00	<=> range	<=> range	9:00	<=> range	<=> range
10:00	<=> range	<=> range	10:00	> up bound	> up bound	10:00	> up bound	> up bound
11:00	<=> range	> up bound	11:00	> up bound	> up bound	11:00	> up bound	> up bound
12:00	<=> range	<=> range	12:00	<=> range	<=> range	12:00	<=> range	<=> range
13:00	<=> range	> up bound	13:00	<=> range	<=> range	13:00	<=> range	<=> range
14:00	<=> range	<=> range	14:00	<=> range	<=> range	14:00	<=> range	<=> range
15:00	<=> range	<=> range	15:00	<=> range	<=> range	15:00	<=> range	<=> range
16:00	<=> range	<=> range	16:00	<=> range	<=> range	16:00	<=> range	<=> range
17:00	<=> range	<=> range	17:00	<=> range	<=> range	17:00	<=> range	<=> range
			18:00	<=> range	<=> range	18:00	<=> range	<=> range

End-users questionnaires



An "in situ" analysis is carried out in each area during the times of day that are most representative in terms of when people visit the area (chosen based on long-term measurement analysis). This Tool describes the questionnaire's structure and deployment strategy.

The surveys are conducted at the same time as the short-term measurements and they are grouped within 30 min. periods.


TOOL 4: QUESTIONNAIRE

SAMPLE:

METHOD:

QUESTIONNAIRE'S QUESTIONS:

Questionnaire quiet (urban) areas

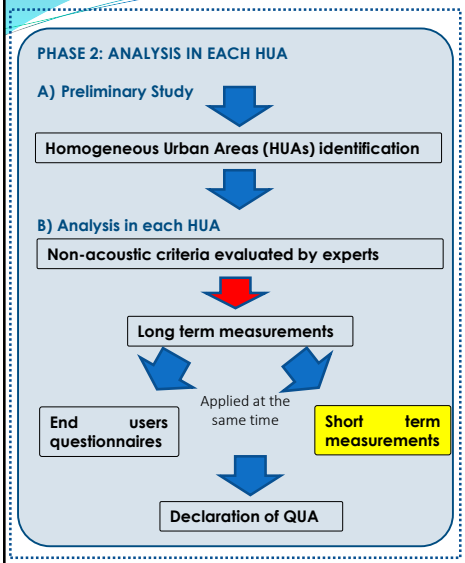
End users questionnaire-example from the application of the Tool in a pilot case located in Bilbao

General La Torre square, plan of the area	Description of the pilot area
	Mainly use for resting, social interaction, reading and relaxing (benches fully occupied) and going through. Mainly use by elder people > 50 years old. It was in the middle of a redevelopment during the Project. Consequently, this Tool was used twice – before and after interventions – to analyse the improvement in the acoustic environment in an area that underwent changes aimed at reducing noise and increasing tranquillity.
	Using the tool
	The sample was big enough to be representative: 80 people, 38 (47.75 %) in the morning and 41 (51.25 %) in the evening. There was a good gender split (43.75 % male, 56.25 % female) and the respondents were mainly from Bilbao and from the neighbourhood where the square is located (87.5 % Bilbao residents and 51 % local residents).
	-Activity of users: - -Good overall satisfaction with the place:

BEFORE INTERVENTIONS	AFTER INTERVENTIONS
22.8 %	97.5%

Waiting for someone (8.0%).	Waiting for someone (22.2%)

Short term measurements



The purpose of short-term measurements is to **collect acoustic information about the present sound levels during the in situ analysis**. They are carried out in each area at the time of day that is most representative (chosen on the basis of long-term measurement analysis) in terms of when the public visits the area and at the same time as the questionnaires.

The evaluation is made in **30 minutes**, since this is the average length of time people remain in the areas in which an interview takes place. This way, the acoustic parameters are strictly linked to the groups of interviews.

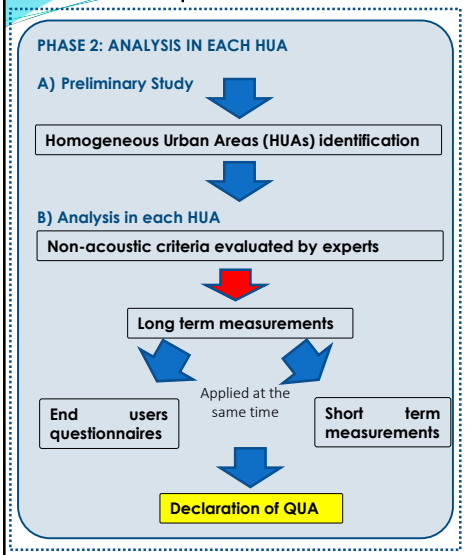
Short term measurements-example from the application of the Tool in a pilot case located in Bilbao

General La Torre square, plan of the area	Description of the pilot area
	Mainly use for resting, social interaction, reading and relaxing (benches fully occupied) and going through. Mainly use by elder people > 50 years old.
	Using the tool
	1 second short measurements were carried out in a point located in the center of the are and information on different noise indicators were collected. The data from the short measurement is linked to the results of the questionnaires to analyse the possible acoustic causes of certain answers. The information collected was summarised and processed to obtain data from a time of day that was representative of when the area was in use.

POST-INTERVENTIONS	Morning		Evening	
	11:00-11:30	11:30-12:00	18:00-18:30	18:30-19:00
LAeq	64 dBA (-3)	66 dBA (+4)	64 dBA (0)	66 dBA (+4)
Negative events	2 (-4)	2 (-4)	2 (-7)	0 (-2)
Positive events	0	0	0	4 (+4)

The information in brackets is the difference between the results after and before the interventions.

Evaluation of quietness

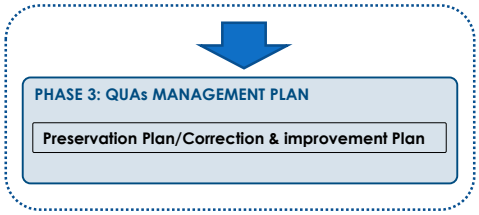


Finally, the following method is suggested for evaluating the results of the analysis phase:

- If a criterion is present in only one analysis (e.g. in the expert analysis) and has a negative rating (e.g. red colour) the area is defined as only potentially quiet;

- If a criterion is present in more than one analysis (e.g. in both the expert analysis and the end-user questionnaire) and has a negative rating (red colour) in the expert analysis, the corresponding score assigned by end-users should be checked; if the evaluation given by end-users is also negative (e.g. average score <=3) the area is defined as only potentially quiet.

QUAs management: description and tools



Different management goals can be defined depending on whether the selected areas were defined as actually quiet or only potentially quiet during the analysis phase:

- A plan to preserve the quality of the area if it is defined as already quiet.
- A plan to increase the value of the area and to promote its use.
- A plan to improve the quality of the area if it can only be defined as potentially quiet, and planning of the type of measures to be implemented.

Actions for the QUA preservation and promotion have been detailed in the guidelines (...).

In the last case, the following procedure is proposed for defining and designing interventions:

- Any intervention should aim to **solve all critical situations identified during the analysis phase**;
- **Intervention should be inspired by the suggestions obtained from the expert analysis and/or end-user questionnaire results.**

Moreover, according to the analysis carried out in the QUADMAP Project, the suggested criteria for **evaluating the effectiveness of noise abatement measures** in an quiet urban area are as follows:

- The **reduction of noise levels** (mainly concerning the LA50/LAeq indicators) **compared to a threshold level** (e.g. 55 dB);
- The **reduction of noise levels** (mainly concerning the LA50/LAeq indicators) **compared with the noise levels before the interventions**; a **reduction of unpleasant noise events and/or an increase in pleasant events**.
- An **improvement in end-users' perception** (evaluated through the end-user questionnaire) compared with the users' perception before the interventions.

Meeting at least one of the above criteria can be considered as an improvement to the area's acoustic environment.

Conclusions 1/2

EU Directive 49/2002/EC on Environmental Noise defines a Quiet Urban Area (QUA) as “an area, delimited by the competent authority, for instance which is not exposed to a value of Lden or of another appropriate noise indicator greater than a certain value set by the Member State, from any noise source”. This definition is extremely vague and does not provide usable procedures to be applied in each country.

Proposing a solution to overcome the lack of harmonised methodologies for QUAs is the main aim of the QUADMAP (QUiet Areas Definition and Management in Action Plans) Project.

In fact, the QUADMAP Project has developed a procedure for selecting, analysing and managing QUAs that has been tested in ten pilot areas and that, consequently, has proved to be valid. In addition, thanks to its flexibility, the methodology is also easily replicable in other urban environments.

Conclusions 2/2

One of the most innovative aspects of the methodology developed by QUADMAP Project is the **involvement of the public in planning and designing noise abatement intervention (Participatory approach)**. In fact, interviews should always be carried out in order to ask for users’ opinion about the typical aspects of each QUA and to obtain suggestions for the type of intervention to be implemented.

Using the proposed methodology as a starting point, comprehensive guidelines have been produced.

The first aim of the guidelines is to help stakeholders, competent authorities and interested parties to understand the END's requirements with respect to QUAs and to suggest a valid and easily applicable methodology in order to meet them. In addition, these guidelines also suggest possible answers to some research questions posed in the Good practice guide on quiet areas, published by EEA in 2014, in particular the need to combine users' acoustic perception of a QUA with their general opinion of the area.

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