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AUTOMATED ASSISTANCE TO RESPONDENTS: THE CASE OF THE AGRICULTURAL CENSUS MEASUREMENT ERROR SURVEY

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Istat | Direzione Centrale Raccolta Dati

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The context: the Agricultural Census Measurement Error Survey

Nearly **five months after** the end of the survey of the seventh General Agricultural Census, which took place between January and July 2021, Istat designed and implemented a **Measurement Error Survey**, with the aim of **estimating the extent of the measurement error** committed during data collection operations.

The **main characteristics** of the measurement survey (MES in the following) are:

○ **Repetition of a subset of questions** yet included in Census questionnaire;

○ Selection of nearly **135.000 respondents** who had declared their farm to be active at the time of the Census;

○ Only **CATI outbound** technique;

○ **Information and support to the respondents**: paper letter, toll free number to book interviews with **VoiceBOT**, email address with back office operators to obtain information on MES;

○ Period of the data collection: between **January and April 2022**.

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BOT: what is it?

The word VoiceBOT combines the two terms "**voice**" and "**robot**", although VoiceBOTs have nothing of the appearance that we commonly attribute to an advanced robot.

They are in fact **powerful software**, capable to understand **human natural language** and to respond in a relevant way to the questions that are asked for or, if necessary, to ask questions themselves to better understand clients requests.

VoiceBOTs are based on **Natural Language Processing** (NLP) platforms with the addition, compared to ChatBOTs, of **Automatic Speech Recognition** (ASR) systems, i.e. AI techniques and algorithms for the automatic processing of information in natural language.

Private industries began to use VoiceBOT several years ago and nowadays many of them we know very well, for beeing **an indestructible part of our lives**…
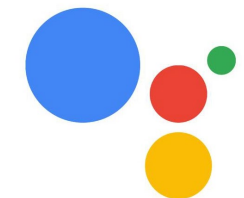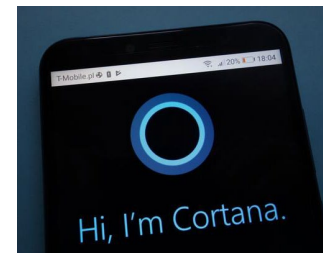
MES and the VoiceBOT: an adaptive develop

For the Measurement Error Survey, VoiceBOT was chosen to assure to the respondents **a booking service** by a toll free number, through which they could request **to be interviewed on a more suitable day/time**, eventually specifying a preferential telephone number.

Therefore, the structure of the BOT focused above all on two aspects:
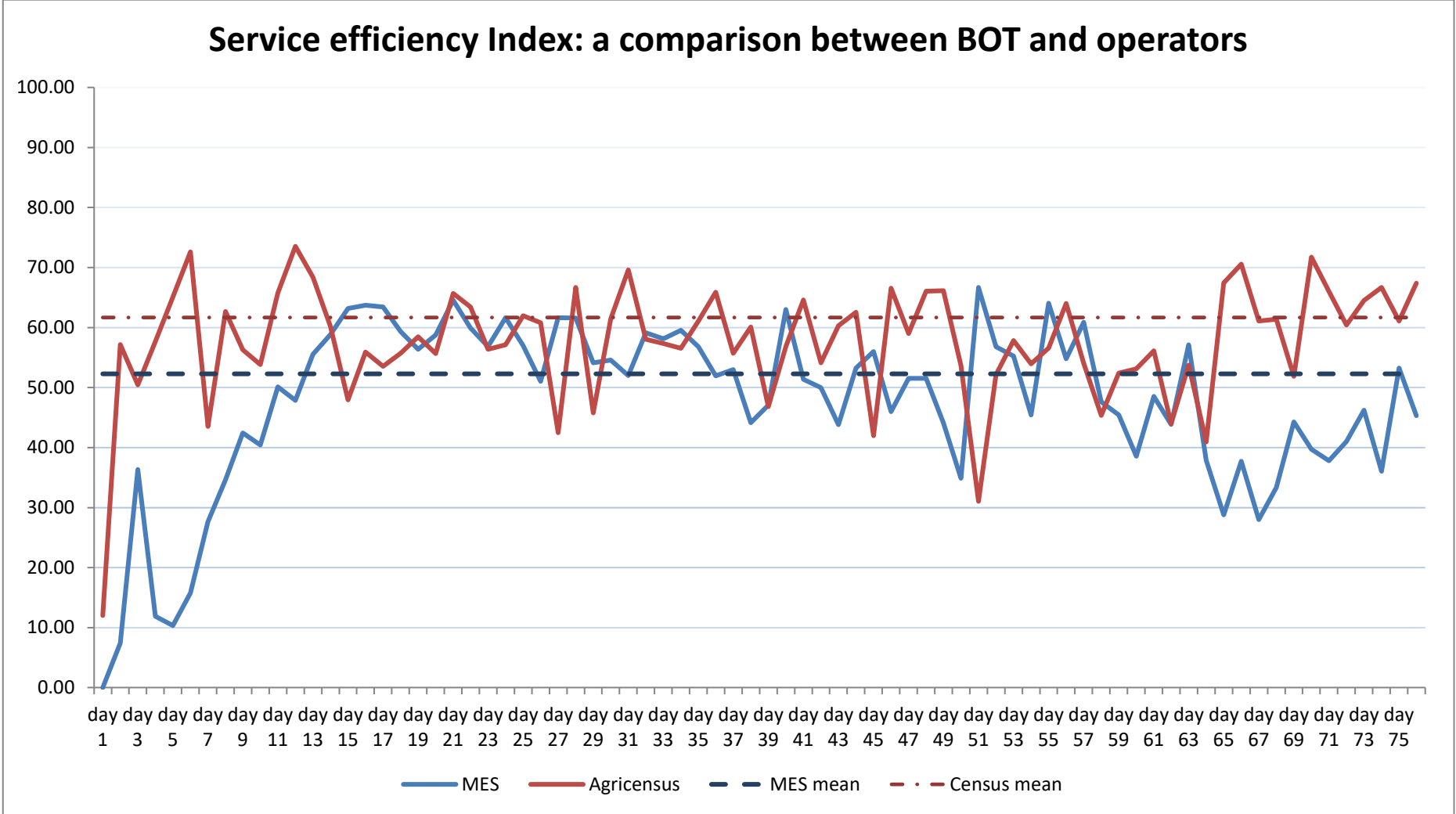
o **the ability to identify the caller**, associating him with the corresponding record within the sample of farms selected for the survey;

o **the ability to recognize and memorize dates and times proposed by the caller**, and after that, interacting with the CATI software in order to schedule a priority contact (in the case of an immediate interview request) or an ordinary appointment, for outbound interviewers.

The first one was the more complex activity, because farms were identified with a **long code**, composed by numbers and letters easily misunderstandable by phone (es. T058060U00123).

Consequently, in the first decade of service, **VoiceBOT has been modified many times**, simplified and enriched with additional capabilities such as understand spelling, in order to improve its ability to identify correctly the caller.

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MES and the VoiceBOT: an adaptive develop

Taking advantage of the availability of data from the toll-free number of the Census of Agriculture, it was possible to compute a **Service Efficiency Index**, defined as the percentage ratio between the number of calls received whose relevant request has been satisfied, and the total amount of received calls (including the abandoned ones).

Service efficiency Index: a comparison between BOT and operators

Legend: MES — Agricensus — MES mean — Census mean

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The service offered by VoiceBOT: characteristics and peculiarities

A further indicator of efficiency is given by the **First Call Resolution**. In a traditional call center, the FCR is **the percentage of requests processed directly online, i.e. without further interactions with the customer and without referrals to level II (if any)**.

The following are the results, both for MES and Agricensus:

	Requests resolved on the first call	Total resolved requests	FCR Index
MES	4,494	5,569	80.7%
AgriCensus	47,737	58,285	81.9%

The small entity of the difference, also if it's statistically significant, is in itself surprising, considering that a VoiceBOT has the ability to relaunch and dialogue with the caller limited to its own script and capacity, compared to a human operator who can interact longer with the caller to understand and concretely satisfy his request.

The service offered by VoiceBOT: characteristics and peculiarities

Another interesting comparison is between the **distribution of calls received** for VoiceBOT (to the left) and the traditional human-based service (to the right).
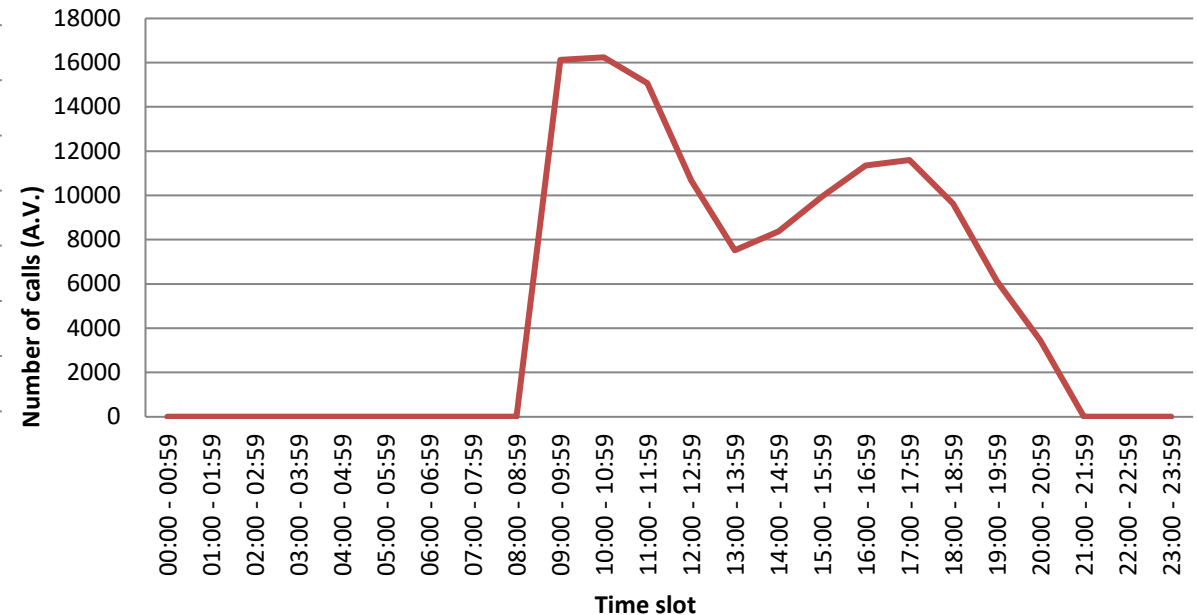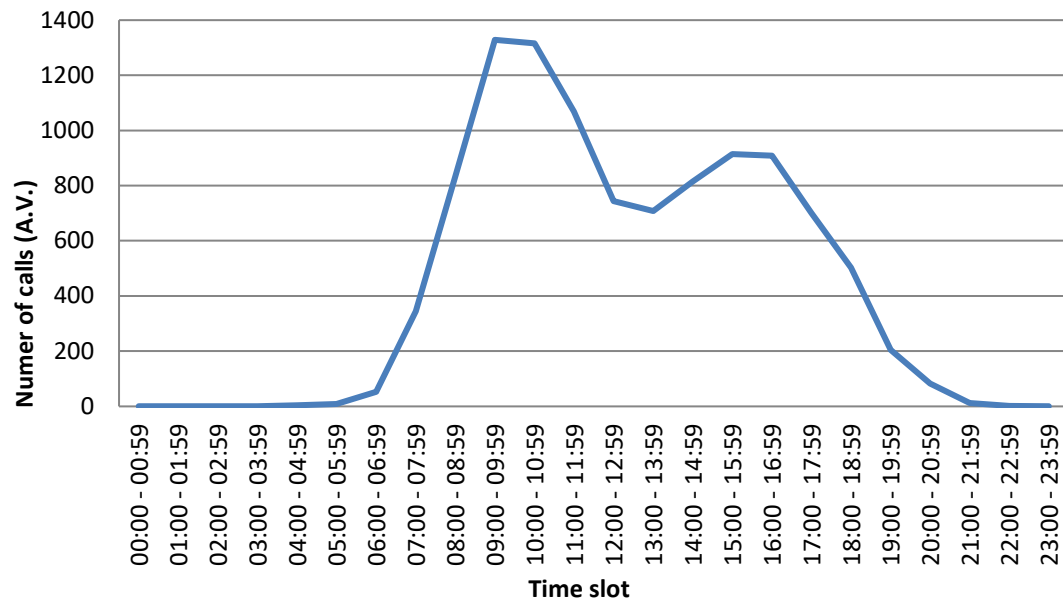

The use of the BOT allows to evaluate **the "natural" curve of an inbound service**, without forcing the designer to make assumptions about the most appropriate service time for the target audience before the service is actually provided. For Agricultural Census, the start of the service managed by operators at 9:00 a.m. was probably too late. In general, **there are no days or times in which the BOT has reasons to be out of service**, while a service managed by human operators has necessary to deal with the increasing costs needed to cover residual time slots.

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The service offered by VoiceBOT: characteristics and peculiarities

Analyzing call duration, it's possible to notice how **VoiceBOT is more efficient in answering to all respondent's requests**.

For the BOT **an interaction between 2 and 3.5 minutes** is sufficient to finalize the request: we can really say that VoiceBOT doesn't get lost in small talk!
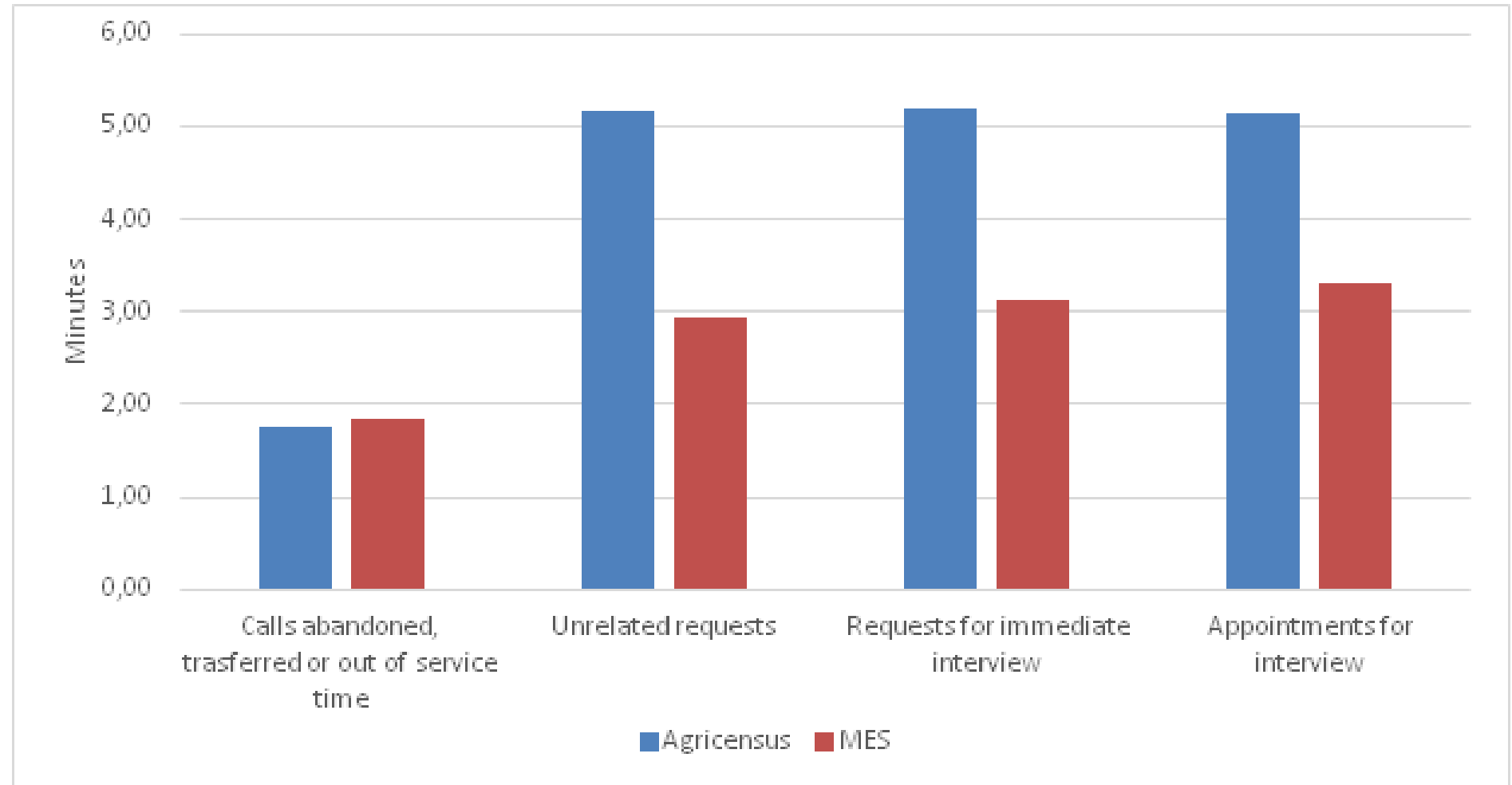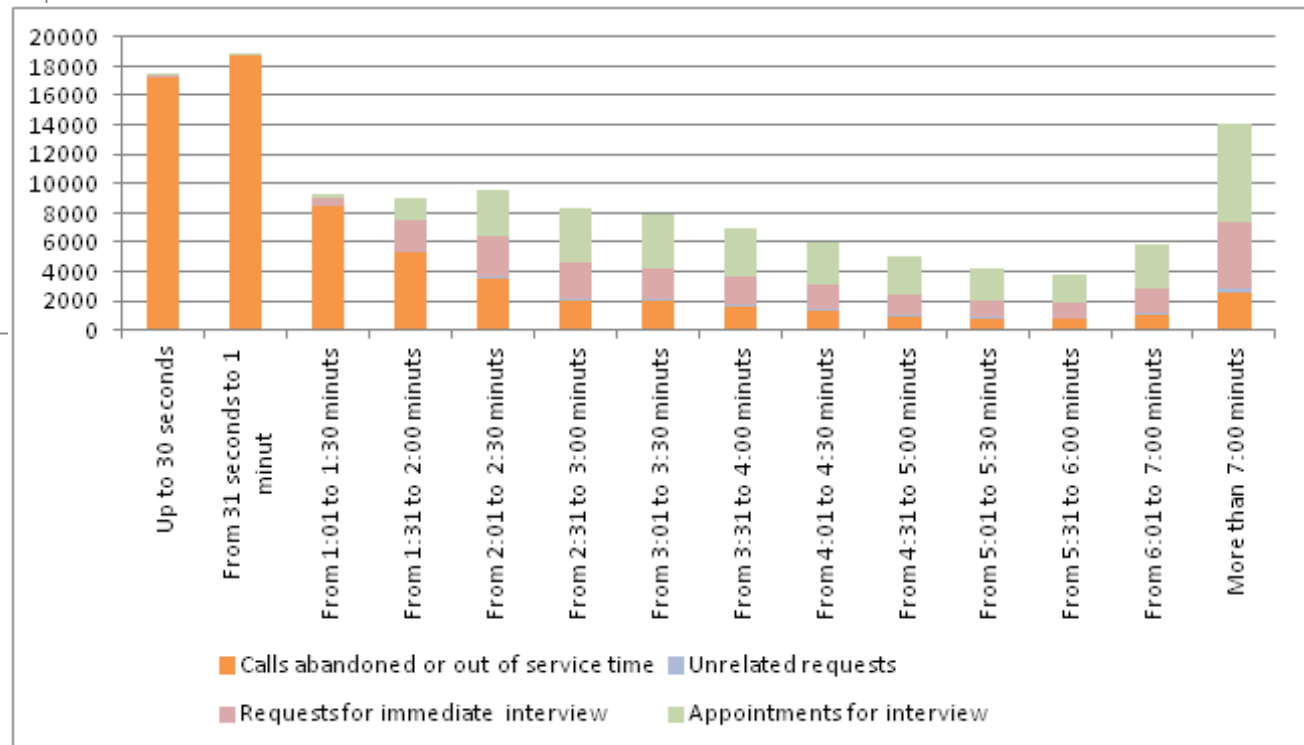
The service offered by VoiceBOT: characteristics and peculiarities
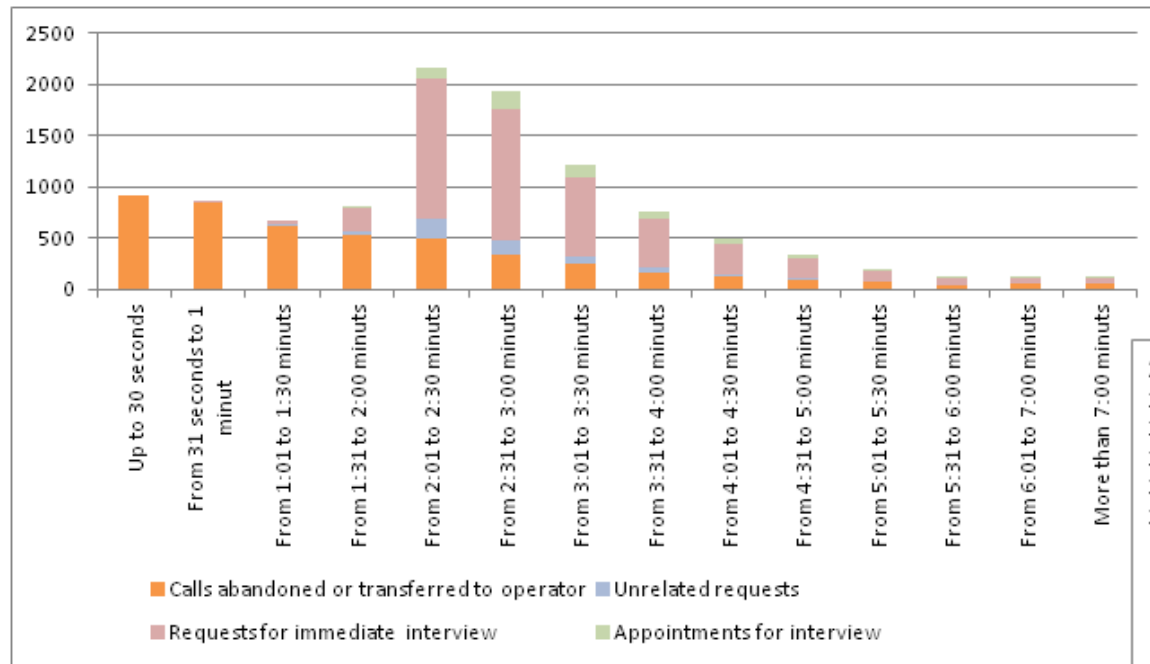
The same evidence emerges also from the distribution of **VoiceBOT calls by typology and duration** (to the left).

The same service managed by operators tends to take longer to fulfill the same typology of requests (to the right).

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Summary, conclusions and perspectives

Beyond the performance indicators presented, there are many further aspects that are waiting to be evaluated, regarding the use of a VoiceBOT:

○ **Costs savings**: a very complex work should be made, for evaluating the economic costs sustained for both services typology, in terms of human and technological resources. Unfortunately, many of these data are not available. To provide at least an approximate estimate, it is possible to consider the amount of minutes taken by VoiceBOT to answer to resolved requests. This amount is actually 17,476 minutes of the human operators work saved

○ **Customer Satisfaction**: this could be important to evaluate not only the efficiency of a BOT service, but also its quality for the users and for the survey it is intended to support

○ **Detailed data on the amount of calls that the VoiceBOT have to transfer to human operators**. This information could be useful to understand what is the percentage of callers that refuse to talk with an AI, despite how perfect it is

Looking ahead, it is therefore necessary to start designing **a set of indicators that are independent from marketing applications** and more suitable for assistance services in support of official statistical surveys. This work intends to offer an initial contribution to this purpose, with the awareness that **the use of VoiceBOT can be valuable and profitable**, providing an innovative support to the activities of official statistical research.

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Thanks!

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