

An Analysis of the Notion of Need for the Representation of Public Services

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Abstract. Many Public Administrations structure their services around the notion of users' need. However, there is a gap between private, subjectively perceived needs (self-attributed) and needs that are attributed by PA to citizens (hetero-attributed). Because of the gap, citizens' needs are often only partially satisfied by PAs services. This gap is in part due to the fact that the meaning of the word "need" is ambiguous and full of antinomic nuances. The purpose of this paper is to formulate a definition of "need" suitable for citizens' needs management with respect to PA's services offering, and to provide an accurate ontological analysis of the notion of "need" and the network of concepts that relate to it.

Keywords. need, instrumental need, self-attributed need, hetero-attributed need, mental attitude, Public Administration, goal, satisfier, service.

1. Introduction and motivation

Public administration (PA) is a constituent element of political action directed towards the satisfaction of citizens' needs. The main events of people's lives such as births, deaths, weddings, changes of address, are recorded and managed by PA. Every day, citizens contact the PA's offices in order to obtain identity cards, certificates of professional competence, services. With regard to the latter, the ongoing procedure of digitising PA's data allows for the improvement of efficiency and simplifies the citizens' access to the requested service.

However, there is a *gap* between private needs (self-attributed) and needs that are attributed by PA to citizens (hetero-attributed). Because of the gap, citizens' needs are often only partially satisfied by PA's services. This gap is in part due to the fact that the meaning of the word "need" is ambiguous and full of antinomic nuances.

A need can be defined as absolute or relative, objective or subjective, natural or artificial, endogenous or exogenous, private or social, particular or universal, and so on. Therefore, there is currently no consensus about what 'to have a need' exactly means. It is thus extremely important to engage in a rigorous conceptual analysis that would enable to distinguish between various notions of meaning and single out those that are more functionally useful in analyzing and representing services.

Given the relevance of needs for human well-being, through the centuries different disciplines, from philosophy to economics, as well as anthropology and psychology, have been promoting several theories of needs trying to explain their nature. More recently,

the area of information science also got interested in understanding needs and using such notion as a guiding conceptual device to represent and manage consumers' and citizens' necessities. To this aim, a deep analysis of the notion of need is of paramount importance.

The purpose of this paper is to take some steps forward in this direction, trying to formulate a general notion of "need" able to provide a focus around which PA's services can be structured and made accessible.

2. Ontological analysis of needs and their connections with other entities

The contemporary philosophical debate about needs revolves around two main issues: the *moral* one and the *ontological* one. In short, the former is focused on the problem of satisfying the so-called "fundamental human needs". The satisfaction of those needs should ensure respect for universal human rights and support a more equitable worldwide distribution of wealth. From this perspective, Manfred Max-Neef, Antonio Elizalde and Martin Hopenhayn [1, pp. 13-47] suggest that a good economic theory has to answer, first of all, the following question: *what are fundamental human needs?*

Actually, first we should be able to know what 'to have a need' means, so as to answer the question above. Trying to single out the *meaning* of 'having a need' is precisely the aim of the ontological issue. Although it is clear that the needs' moral issue is closely related to the ontological one, in this article we are going to discuss only the latter. Let us start to take into consideration the more relevant theoretical elements about the nature of needs.

In literature, we can find two different ontological perspectives about needs: *instrumentalism* and *absolutism*. The supporters of the instrumentalist theory believe that all needs are instrumental, that is, they are necessarily *ontologically dependent on goals* or ends or purposes (in other words, needs could not exist without goals). Philosophers who sustain absolutism, instead, reject this assumption, claiming that although it is true that some needs are instrumental, others are absolute, namely they can exist *independently from goals* or purposes. According to absolutists, there would be an evident *conceptual distinction* between instrumental and absolute needs. For example, consider these cases:

- (A) Paul needs a camera to take a picture
- (B) Maria needs food

(A) shows the typical logical structure of *means-end reasoning*, where Paul's need for a camera plays an instrumental role for Paul's goal, that is taking a picture. The general conceptual frame that represents an instrumental need is 'A needs X for P', where A stands for an agent, X stands for a resource (an object or an action) and P stands for a goal. Both absolutists and instrumentalists agree upon the fact that (A) is instrumental.

Regarding (B), an exponent of absolutism would affirm that the need under consideration doesn't ontologically depend on other goals. In fact, Maria's need for food is an *end in itself*, as well as other "vital needs", like water or shelter. McLeod [2, pp. 211-213] believes that vital needs are *universal*; for this reason, they are shared with other organisms (besides, an organism could not have existed without having them). In contrast to other needs, such as the need to smoke, vital needs are those absolute needs that we can't refuse to ascribe to ourselves because they depend on our biological constitution. Clearly, we can refuse to satisfy them. For instance, Maria can refuse to eat, but if she

doesn't eat she will be harmed. Wiggins [3, pp. 10, 14] explicitly points out that absolute needs are those the non-satisfaction of which implies *harm*.

In any case, instrumentalist philosophers can still explain (B) in terms of the means-end prospect. For example, it is possible to put forward the idea that the satisfaction of Maria's need for food is necessary for avoiding physiological harm caused by hunger. Therefore, 'avoiding harm' would represent Maria's aim in (B). This interpretation is based on the elliptical thesis, that is: "A needs X" is a short form to say 'A needs X for P'. This is one of the thesis shared by instrumentalists.

However, McLeod [4, 6] warns against the risk of confusing the absolutist theory with an instrumentalism-by-the-back-door. In fact, he states that:

When an absolutist regards an absolute need as a need that must be met for harm to be avoided, this does not result in collapse of the absolute/instrumental distinction. Some beings without ends, goals or purposes of their own, such as plants, can be harmed.

To sum up, the topic of dispute between absolutists and instrumentalists is based on the needs' ontological dependence on goals. The former deny that all needs are necessarily ontologically dependent on goals, ends or purposes. The latter state that ontological dependency on goals is a *necessary condition* for something to be a need.

Moreover, various philosophers, in particular Fletcher [5], have attempted to stress the importance of the notion of "necessity", so as to shed light on the meaning of "need". With regard to the philosophical debate on needs, Fletcher's position is neither absolutist nor instrumental. According to him, there would not be a conceptual difference between instrumental and absolute needs. Rather, Fletcher asserts that there would be different kinds of necessity in the face of a single concept of need [5, pp. 12-13]¹. Nevertheless, with the exception of Fletcher, both instrumentalists and absolutists agree upon the following three points:

- (i) There are entities called needs
- (ii) Needs are different from their satisfiers
- (iii) There are different types of needs

Regarding (i), even though philosophers don't question the existence of needs, they might disagree about the kind of ontological category that has to be used to classify them. McLeod [2, pp. 214-220] casts doubt on the so-called "phenomenological thesis", denying that 'a person can know his or her own needs by feeling them'. He suggests that we should distinguish between a need and the *experience* of it.

¹We believe that the concept of necessity referred to needs should not be intended as the modal logical state of necessity, that is to say, that something is necessary when it is not possible for it to not be the case. Rather, the notion of necessity, as Castelfranchi [6, p.57] has stressed, is related to *negative* perceptions, feelings or emotions which are linked to needs (e.g., the need for water is associated with the sensation of thirst). So, the need's necessity is due to a kind of *physical urge* which is ascribable to a need's perception, rather than to the need itself. Furthermore, usually there are different satisfiers which can satisfy a specific need *q* in order to achieve a goal *p*. This means that the choice of a specific satisfier, far from being mandatory, is optional (what really matters is that satisfiers allow goal achievement). Note that, from an instrumentalist point of view, satisfiers are resources and, like all resources, they are limited and require an effort to be acquired. If the satisfier is not reached, then the related need is not satisfied, and the agent's expectations about the goal are frustrated. We suggest that the avoidance of such frustration represents another reason that explains why needs are especially urgent.

For instance, when someone says ‘I need a drink’, he doesn’t feel the need for a drink, rather he feels thirsty. So, a need can be indirectly manifested by means of a feeling, but the need is not itself a feeling. Needs can exist regardless of feelings. For example, Paul could have an iron deficiency and not knowing it, because he can’t feel his iron deficiency. Nonetheless, his physician could inform him about it. So Paul would be conscious of his need only through a third-person knowledge, that is a physician’s knowledge. Furthermore, needs, in contrast to desires, can’t be a type of mental states. Very roughly, if needs were mental states, organisms without mental lives such as plants, would not have needs, which is unlikely. Therefore, according to McLeod, a need is not a type of experience or mental state. So, what is a need?

Unfortunately, McLeod doesn’t provide any ontological definition. However, he strongly states a relevant *epistemological issue* about the philosophy of needs, which is related to point (ii). McLeod [2, p. 218] affirms that the source of our knowledge of needs is neither perception nor introspection, but rather an *inferential process* that has as outcome a *satisfier*. Namely, we can know a need only indirectly, through an inference about what will satisfy our need (like in the above example of Paul’s need for iron, which could be detected by medical diagnosis).

It is worth noting that Paul’s need for iron is not iron itself; in other words, we must distinguish between a “need about *x*” and “*x*”, which is the need’s satisfier. A satisfier can be seen as a *resource* (object or action) that has the function of satisfying a need. Generally, there are many satisfiers which can satisfy a specific need, and vice-versa.

With respect to (iii), in literature it is widely recognized that there are many kinds of needs and ways to categorize them. The most famous hierarchy of needs is represented by Maslow’s *pyramid* [7], where needs are ordered according to the principle that, among needs, some of them would be more *fundamental* or *urgent* to be satisfied, compared to others. Maslow’s hierarchy is grounded on five categories of needs, which are: physiological, security, social, esteem, self-actualization.

Another interesting theory of fundamental needs has been proposed by Max-Neef [1, pp. 30-31], where needs are classified on the one hand through the *existential categories* of being, having, doing and interacting and, on the other hand, according to the *axiological categories* of subsistence, protection, affection, understanding, participation, idleness, creation, identity and freedom. From Max-Neef’s point of view [1, pp. 27-28], needs don’t change through time, or rather, they ‘change with the pace of evolution, that is to say, at a very slow rate. Therefore, fundamental human needs are not only universal, but are also entwined with the evolution of the species’. In contrast to needs, satisfiers change according to time, cultures, and circumstances.

Finally, in a very influential book [8], Len Doyal and Ian Gough present a distinction between *basic* and *intermediate* needs, in which the former are *universal preconditions* that enable participation in any form of life, while the latter connect basic needs to their fulfillment.

The two basic needs that they identify are *physical health* and *autonomy*², for which the “avoidance of serious harm” is implicitly considered as a final purpose. In their words:

²The inclusion of personal autonomy within basic needs is interesting, as it seems to presuppose a consideration for an “internal” or “mental” dimension that is neglected by other authors who deal with the concept of basic, fundamental or absolute need.

since physical survival and personal autonomy are the preconditions for any individual action in any culture, they constitute the most basic human needs – those which must be satisfied to some degree before actors can effectively participate in their form of life to achieve any other valued goals. [8, p. 54]

Intermediate needs are instead conceptualized as *satisfiers of basic needs*, goals that, when achieved, *contribute* positively to the satisfaction of basic needs³.

The authors also provide a list of intermediate needs, comprising: food and water, housing, a non-hazardous work environment, a non-hazardous physical environment, health care, security in childhood, significant primary relationships, economic security, physical security, education, safe birth control and child-bearing⁴. Being satisfiers of basic needs, they are *universal* satisfiers, valid for all cultures. Universal satisfiers (or intermediate needs), on their turn, are seen as *goals* with their own *specific satisfiers*, which are the means to achieve them.

Also Doyal and Gough see needs, differently from wants, as *objective*: ‘Not only is it the case that you can need something that you do not want. You may need it without even knowing of its existence!’ [8, p. 42]. This is also interesting, as it implicitly introduces a distinction between needs that are objective (or externally ascribed) and the subjective perception of needs⁵.

After this brief presentation of the state of the art concerning the main notions involved in the conceptualization of needs, we will now turn to a proposal based on some *ontological choices* that have to be taken to enable an ontological characterization that could be useful to structure a *need-driven* representation of services for the PA.

We cannot conclude our overview of needs’ theories without first having introduced a further distinction, namely the difference that elapses between needs and *desires*. Wiggins and Dermen [10, p. 62] underline that needs are often conceptually confused with desires, even if they are quite different from each other. Needs and desires don’t overlap because, for example, someone could desire something without needing it, and she could desire it in a more or less conscious state. Conversely, someone could need something without desiring it. In addition, in order to need something, it is not necessary to be conscious of it (e.g., people in a coma are not aware of specific treatments and drugs they need). In light of this, we can assume that needs and desires are different entities. But what is the relationship between them?

It might be supposed [11] that needs are a sort of universal human requirement and that they underlie desires, which depend on a personal perspective. However, as McLeod remarked [4, p. 13], there are also those who think [12, p. 29] that needs are generated by desires’ goals. A third hypothesis is that needs are complementary to desires, in the sense that needs involve desires and vice-versa. This idea has been proposed by Castelfranchi

³At p. 155, though, satisfiers are more generally defined as ‘all objects, activities and relationships which satisfy our basic needs’. It seems likely that a more thorough conceptual analysis could point to a difference between intermediate needs (or goals) and the resources that are necessary to achieve them.

⁴In their book, Doyal and Gough provide also mechanisms to measure need satisfaction and political and economical strategies to try to satisfy human needs. Although this is of course a relevant contribution of the book, we won’t touch such dimensions in the current paper, as our main aim is the ontological analysis of the primitive notions.

⁵Such distinction between needs and wants based on the “objectivity” of the former vs. the subjectivity of the latter is also present in the philosophical literature. See [9, p. 68] and [3, p. 152].

[13, pp. 863-864], who believes that when someone feels a need, at the same time, she feels a desire for something that can satisfy that need.

Actually, as stated above, not all needs are experienced. Moreover, the expression “felt need” is unclear, because we should make a distinction between a need and the associated experience. So, as McLeod [2, p. 216] affirms, ‘from the supposition that urges associated with a need are felt, it does not follow that the need itself is felt’.

In any case, Castelfranchi’s theory of needs has the merit of clarifying, from a psychological standpoint, the cognitive schema that underpins the theory of instrumental needs. According to him [6, p. 56], we must take into account the following elements so as to understand such notion of need:

- X has a goal p ;
- For this goal, q (action or situation) or y (a resource) needed, q/y is a potential sub-goal;
- X lacks it;
- So, X cannot achieve p .

3. Towards a proposal

The ongoing digitisation process of Public Administration (PA) aims to make public services more accessible and effective and to increase citizens’ satisfaction with respect to them. In this perspective, every service is designed so as to meet citizens’ needs. Therefore, two themes have become a focus of increasing attention for PA: the quality of public services and the citizen active role.

The locution “citizen active role” means that the citizen is no longer intended as the mere beneficiary of the service, but rather as an *actor* contributing to determine the aim and the ways of services providing. In fact, citizens’ direct perspective on their own needs represents a relevant source of knowledge in order to evaluate the matching between citizens needs on one hand and needs that are attributed to citizens by PA on the other. The rationale behind this distinction is in that the whole decision process on whether to activate a public service and which one is initially triggered either by a request of the interested citizen, or by a highlighting of some other citizen or institution, or by a monitoring process put in place by the PA itself. Moreover, the beliefs of citizens about their current state may differ with respect to the beliefs the PA has on that same state and also the citizens’ goals rarely if ever correspond exactly to the goals the PA has with respect to the citizen’s desirable state.

We might call a need expressed in a citizen request for herself *self-attributed need*, a need highlighted by another citizen, institution or the PA itself through its monitoring processes *hetero-attributed need*⁶.

A useful method of investigation used by PA to measure the service quality as perceived by citizens is the so-called “customer satisfaction”, which allows to understand

⁶The literature on services for the PA usually distinguishes between “perceived” – Castelfranchi [6] call them “felt” – and “actual” needs, but we believe that for the PA it is not so central whether the need is actually perceived or not, as citizens may self-attribute needs either by feeling them, or by coming to know them in some other way, for instance if an expert tells them. Also, calling needs “actual” implies the assumption of a strongly realistic perspective, while what the PA is really interested in is whether such needs may be recognised based on the information which is available to the citizen and on some parameters that define goal states.

the self-attributed citizens' needs (e.g., by means of complaints and suggestions on PA's web pages, opinion surveys, etc.). The perceived quality of service depends on citizens' needs satisfaction, which is linked to their *expectation* with regard to a specific service. If the citizens' service experience far exceeds their previous expectations, then the satisfaction will be high; conversely, if the service experience disappoints the citizens' expectations, then the satisfaction will be low. The deviation (*quality gap*) between perceptions and expectations allows to quantify the service quality and the citizens' satisfaction level.

It is reasonable to assume that the quality gap is in part due to another one, which is the discrepancy between self-attributed needs and hetero-attributed needs. This is an *epistemological gap* concerning the difference between *first-person* and *third-person* knowledge about mental states. Obviously, the citizens' needs satisfaction can be measured if and only if we are able to identify their needs and expectations. But how can we succeed in a well-founded citizen satisfaction analysis, if we don't even know what 'to have a need' exactly means?

For all these reasons, we believe that it is necessary to work toward a representation of human needs for PA's services which takes into account the gaps that we have discussed.

A first choice we will take is to focus on *instrumental needs*, rather than on absolute, basic or fundamental needs, as the latter, though probably morally binding for PA, are so general that they may constitute sort of "missions" or "inspiring values"⁷, rather than a conceptual tool that can help in the management of its decision processes. So, in what follows we will use the term "need" to talk about instrumental needs.

Given that our final aim is to model the PA's decision processes that lead to the activation of services, which are driven by citizens' needs, in our framework we will assume a *BDI* (Belief-Desire-Intention) *perspective*. We deem this choice as appropriate for a twofold reason: it is theoretically well-founded (see the seminal works by Bratman [14], Rao and Georgeff [15] and Cohen and Levesque [16]) and it has been implemented in many widely used architectures (JAM⁸, Jason⁹, SPARK¹⁰ among many others), so that tools and applications are already available for implementation.

Modelling the whole life-cycle of a service would obviously require to model also what happens "in the world", including the events that trigger the starting of a PA's decision process and how the service that the PA decides to deliver is realized by actual actions, but in this paper we will focus only on the *internal processes*, starting from when the PA becomes aware of a certain situation on which it decides to act and ending when the PA decides to activate a certain service to respond to a citizen's need that has been manifested.

In brief, in the philosophical literature, beliefs, desires and intentions may be seen as *attitudes* an agent entertains with respect to a certain *representation*. Similarly as in [17], we see mental (or propositional) attitudes – as beliefs, desires and intentions – as

⁷What we have in mind here is similar to what Doyal and Gough [8] call "preconditions", what makes it possible for human beings to have goals.

⁸http://www.marcush.net/IRS/irs_downloads.html

⁹<http://jason.sourceforge.net/wp/>

¹⁰<http://www.ai.sri.com/~spark/>

a *mental state* an agent is in and that is *about*¹¹ a certain *mental object*, whose content could be expressed by a statement that can be true or false (where “mental object” just means ‘representation of something else’).

Along these lines, beliefs are *informational states* of the agent about states of affairs, general laws, rules, norms, but also other mental attitudes, of the agent herself or of other agents. Desires are instead *motivational states*, which are about states that the agent would like to reach and they can also be about other mental states, of the agent herself or of other agents. Intentions are *deliberative states*, in a sense they are desires that the agent has *committed* to get realized.

It is worth noting that there are other two fundamental notions in classic BDI approaches, that of *goal* and that of *plan*. Goals are also *motivational states* and, similarly to desires, they are states the agent would like to see realized but, differently from desires, the agent *selects* them as states to be pursued or brought about, thus they have additional constraints, like for instance the fact that they have to be *consistent* with other goals the agents has selected and this is not necessarily the case for desires. In this sense, it is more correct to say that the commitment of intentions is directed towards goals rather than desires. Finally, plans are *deliberative states*, very similar to intentions, but more articulated; roughly, they can be seen as concatenations of intentions or, in Bratman’s words [14, p. 86]:

Plans, as I shall understand them, are mental states involving an appropriate sort of commitment to action: I have a plan to *A* only if it is true of me that I plan to *A*.
Plans, so understood, are intentions writ large.

So, the picture we have so far seems to be the following: an agent has a set of beliefs (what she believes to obtain in the world, in her mind, or in others’ minds). She also has a set of desires, states she wants to see realized and she may decide to select, among these states, those that she wants to pursue (her goals). After the selection, she can commit to bring about such states and form an intention. Intentions are then expanded and detailed in plans.

Another kind of informational states are *expectations*, which can be seen as sort of beliefs directed towards a future state and, more specifically, to a state that is a goal of the agent, possibly a goal whose achievement she delegates to some other agent.

So far so good. Now let’s see whether the notions we have analyzed in the previous section are connected with the ones just characterized and how. Let’s start with needs and focus on an instrumentalist vision of needs. According to the instrumentalist, sentences expressing needs have the form: ‘*A* needs *X* for *P*’, where *A* is an agent and *P* is a goal state.

Now, let’s assume that needs are mental attitudes, like beliefs, desires, intentions, goals and plans. Are they informational, motivational or deliberative states? What are they about? What are they ontologically dependent on?

¹¹We are referring here to the notion of aboutness illustrated in [18]. Crane defines intentional objects as those upon which intentional states are directed. He rejects the thesis that all intentional states have a propositional content [18, p.31] and holds an internalist position w.r.t. intentional objects and contents [18, p.118]. Due to space constraints, we won’t enter in this paper in the internalism/externalism dispute and postpone a detailed analysis of mental content to future work.

We agree with Castelfranchi [6] that needs can be seen as instrumental goals¹², as without what is needed, what is aimed at cannot be reached or, in other words, we must obtain what we need before (and for) obtaining what we aim at. For this reason, we believe needs are *motivational attitudes*. But let us remind that a need should be distinguished from what is needed (analogously, a desire should be distinguished from what is desired, an intention from what is intended etc.). The philosophical literature on needs distinguishes, in fact, between *needs* and *satisfiers*, being satisfiers the states that satisfy the needs. A distinction can thus also be traced between desires and needs because, while the former are *about* states that the agent would like to obtain (and goals are *about* desired states the agent selects to be pursued), needs are *about* satisfiers, states that, whenever they obtain, make a state the agent aims at (state the agent has a goal about) obtain¹³.

Another interesting aspect of needs is that they also seem to involve a *choice* (like goals); intuitively, an agent who has already selected a goal (state) and formed an intention towards it, has to decide what to do (or what should obtain) to reach it. But we can imagine that at any moment, at least for some goals, there are multiple ways to try and achieve them; in other words, there are multiple satisfiers for the same goal. When the agent says (or thinks) ‘I need X to P ’, she chooses which of the satisfiers to try and achieve in order to then achieve P . Needs seem then to depend on goals and on beliefs (about the best satisfier for that specific goal).

Furthermore, we should be careful not to confuse two different aspects of needs’ conceptual analysis, namely the ontological and the epistemological one. From an ontological point of view, as has just been said, needs are motivational attitudes. Epistemologically speaking, needs are instead the outcome of an inferential process (based on the agent’s beliefs) which involves making a choice between alternative satisfiers with regard to a certain goal to reach. Once the choice is made, the “need for X ” becomes an *instrumental goal* related to an end goal P .

We can now have a look to the wider BDI general picture, also including needs and satisfiers. In the previous description, we were left with an intention to achieve a goal and with the start of the planning process, which consists in detailing the intention. Once the agent has committed to the execution of the (still partial) plan, she has to take into consideration some possible ways to pursue the goal (the alternative satisfiers) and to choose one among them. Such choice amounts to say what she needs in order to achieve the selected goal. At this point the planning process can go on, as a new intention is directed towards the specifically chosen satisfier, which becomes now a goal (or, more precisely, an aimed state) on its own. The agent can now form a new intention about the state that was previously a satisfier and that has become a goal in the new context. The process can now be iterated as much as necessary, until the agent realizes (believes) to have all she needs: the plan is complete and it is now time for action.

A simple example could help here. Gina has a desire to go to the seaside. She believes, since she has read the weather forecasts on the internet, that on Saturday it will

¹²We prefer the term “instrumental goal” to “sub-goal” or “means”, as we would really like to stress the fact that they help structuring the functional steps in a decision process.

¹³This is another reason why we deem the definition of needs as “instrumental goals” particularly appropriate: they are about states that are satisfiers w.r.t. the end goal and that become themselves states an intention can be about (and so also goals, although instrumental).

be sunny in Villasimius¹⁴ and that she will be free and going to the seaside it's the best thing she can do for herself. The desire becomes thus a goal that she adopts. She then starts planning, first forming the intention to go to Villasimius. She begins to reason on possible ways to reach Villasimius and two come to her mind: either by taking the bus or by taking the car. She believes that going by bus will take too long and she won't fully enjoy the day. She thus chooses, among the possible satisfiers, the one she believes to be the best according to some perspective. She needs to take the car to go to Villasimius. Taking the car becomes now a goal and then an intention. But she believes not to own a car (and not even a driving license!). Among the possible satisfiers, there is either renting a car with a driver or asking some friends (with a car and a driving license) to go together. Since the former would be too expensive and less funny, she chooses the latter. She needs to ask a friend to take the car. And so on, she will choose which friend to ask and then she will be ready to put her plan into action.

Since our final aim is to apply this analysis of needs in information systems that could help the PA to structure its service offering on the basis of citizens' needs, let us consider, for explanatory purposes, a simple example in the domain of social services, starting with a citizen's self-attributed need.

Maria is a single woman with two young children and she is going to undergo a heart surgical operation. Maria believes that she will be hospitalized for a month and that, during this period, she will not be able to take care of her children and that there are no friends or relatives that can do it for her, as she has just moved to a new place, far away from where she used to live and it would be too much of a burden to ask anyone. Obviously, Maria desires the wellness of her children, she wants that they are fit, well-fed and keep going to school throughout her rehab period. Reasonably, Maria's desire becomes an adopted goal to achieve.

Notice that from a BDI perspective, in order to achieve a goal, it is necessary (yet not sufficient) to have a commitment toward the goal, namely, it is necessary to have an intention. Therefore, suppose that Maria has an intention which is about the above-mentioned goal. Once Maria has formed the intention, a means-end problem is posed: how will her children be taken care of?

At this point, Maria starts thinking she needs someone who will be able to look after her children, and she reasons about possible satisfiers and, based on her beliefs, she makes a choice, which is to ask for the help of a social worker to social services. Now, the need for a social worker becomes an instrumental goal with respect to Maria's end goal and, as soon as an intention is formed, she will be ready to act and go asking to PA¹⁵.

So far we have talked about Maria's self-attributed need but, given that Maria cannot satisfy her need by herself, this must be expressed to someone so as to obtain the related end goal¹⁶. Therefore, imagine that Maria proceeds to the social services departments for

¹⁴A place with wonderful beaches in Sardinia.

¹⁵Obviously, the process of means-end reasoning must be means-end coherent. For example, Maria can't include in her plan the intention to ask her husband to look after the children, because she is a single woman and the means in this case are not coherent with her beliefs about her current state.

¹⁶It must be emphasized that, ontologically speaking, the *expressed need* is different from the need itself. The former is a *triggering event* (as defined in [19]), an input which produces an entry into the services system and alerts the PA to take charge of some citizens' needs, while the latter is in our framework a mental state. A need can be expressed also on the basis of an "hetero-attributed need", which means that it can be highlighted by another citizen, institution or the PA itself through its monitoring processes; moreover, it is not necessary that the agent who expresses the need and the one who first attributes it coincide. For instance, a teacher could

a preliminary interview with a PA's employee, in which she has the opportunity to express her need. We can suppose that the employee listens carefully to Maria's expressed need and that he asks for clarifications about it. Then, basically, two alternative cases may occur: (i) The employee attributes the need to Maria; (ii) The employee does not attribute the need to Maria.

Regarding (i), we can assume that Maria's expressed need falls within the employee's competence and that he has previously checked that Maria meets the specific requirements for the activation of the social assistance service. Therefore, in this case, the employee will proceed with service activation.

With respect to (ii), the employee could believe that Maria's need is not within his remit or he may not be able, for some reason, to identify or understand the need in question. In this case, we can suppose that Maria's expressed need won't be satisfied (in the way she expected and has requested), but her data will be anyway registered and sent to some competent office that maybe could attribute a different need (a different instrumental goal to be satisfied in order for her children to be taken care of) and activate a related service.

However, in both cases, if Maria does not meet the specific requirements for the activation of the social service which is related to her need, the employee will not proceed with service activation. The latter is an institutional fact which concerns laws, rights, and rules that are, from the ontological standpoint, social objects, so they fall outside the scope of the "internal" perspective we are focusing on in this paper.

4. Related works and main contributions

To the best of our knowledge, few ontological frameworks trying to model needs' driven services have been proposed so far. Exceptions worth to be mentioned are [20], [21] and [22]. Though with different aims, these works try to model the whole service's life-cycle and assume an already available theory of needs ([20] builds on Kotler's theory [23], centered on marketing, [21] on Maslow's hierarchy of needs [7], and [22] on Max-Neef's works [1]). They are thus more interested in classifying specific kinds of needs in a taxonomy and connecting them to services, but they all take the concept of need as given, without providing a foundational analysis of it. Hence, the main contribution of this paper in the debate is towards a deeper understanding of the concept of need, so as to better specify its semantics before using it in a service system representation. In addition, we have faced the issue of the epistemological gap created by the difference between first-person knowledge and third person-knowledge about needs, proposing a conceptual distinction between self-attributed and hetero-attributed need, which could be helpful in accounting for citizens' satisfaction and expectation in the design of public services. Future work shall be dedicated to provide a logical account of our conceptual analysis of needs, their properties and relations with other mental attitudes. Moreover, it could be interesting to analyse also the concept of expectation and its connection with goal frustration.

attribute the need for psychological assistance to a student who seems to be depressed; she could then express such need to some authority or talk with the student who, after having self-attributed the need to himself on the basis of a hetero-attribution, decides to express it. Moreover, it is worth noting that both for self- and hetero-attributed need, the attribution could be wrong.

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