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ТЕОРИЯ ПОТРЕБНОСТЕЙ И ПРОБЛЕМ

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Объективизм рассматривает внешний мир, как данность, существующую независимо от человека. Субъективизм настаивает на обратном. Прагматизм берет в расчет только полезность объектов внешнего мира. Последователи Людвига Витгенштейна фокусируются на фактах. Данная статья представляет Теорию потребностей и проблем, как точку зрения, объединяющую вышеперечисленные системы восприятия мира и способствующую развитию таких важных направлений современных информационных технологий, как «Повсеместный компьютинг» и «Интернет вещей».

Ключевые слова: *потребность; проблема; ресурс; сознание; рассуждение; «Повсеместный компьютинг»; «Интернет вещей»*

Objectivism considers an external world as mind-independent. Subjectivism has the opposite opinion. Pragmatics takes into account only usefulness of external objects. Followers of Ludwig Wittgenstein focus only the facts. This paper introduces and prospects a Theory of Needs and Problems as a point of view that unites all above listed perceptions of the world and grounds leading trends of modern Informational Technologies such as Pervasive Computing and Internet of Things.

Key words: *need; problem; resource; consciousness; reasoning; Pervasive computing; Internet of Things.*

1. Introduction

It would seem modern technologies grow irrelatively of philosophical conceptions. But it's not so.

Philosophical Objectivity considers that real objects, their features and behaviors as well as concepts, ideas, opinions and knowledge exist outside and independently of the subject and are mind-independent. This point of view latently is spread by traditional education that considers knowledge as something that exists by oneself. Its adepts believe that knowledge and truth are an objective reality, which learners are obliged to replicate in their consciousness.

During the last three decades philosophical Objectivity penetrates into all spheres of society by means of Object-Oriented Programming (OOP). According to Objectivism, OOP considers reality as a set of independent entities (objects) encapsulated with their behaviours (methods). Ontology is declared as something independent from user and context, and even something independent from applications [1]. Ontologies constitute Web spaces of names and actively ground simulation of a reality that doesn't satisfy needs of Internet users.

However, changes will come soon.

Modern society lays a new claim to education, namely, a competence. A competence provides an accurate contribution of knowledge or skills to the activity implementation. Thus education should be an activity-oriented rather than knowledge-oriented. Therefore to provide competences we should formalize an activity description.

Internet of things (IoT) is designed to trace a condition, movement and behavior of objects of everyday life, of objects involved in professional activities, of goods, and also of people by means

of embedded or implanted sensors.

At present IoT grows on the experimental field [2] and will constitute soon with Web a new reality.

Herewith IoT entails new needs. The first of them is activity recognition [3; 4; 5]. The need for activity recognition appears, when it is necessary to realize what occurs with observed equipment or what people do at the moment with the purpose of prevention, supervision or a prediction of next steps. To recognize an activity, we should possess its representation.

Today's informational traffic continuously changes operational environment and forces people to obtain new skills, knowledge and experience.

Under the circumstances the need for comprehensive support of people's life activity becomes more and more called-for. Pervasive computing is destined for the satisfaction of this need everywhere and in anytime. But Pervasive computing may be launched only based on the representation of human activity.

What is a human activity and why until now there is no means for its representation?

Human activity always is a satisfaction of certain need or a problem solving. To satisfy a need or to solve a problem we should create a scenario of required activity. Herewith we use available experience. An experience consists of scenarios of activities, fulfilled in the past.

Since concrete persons (organizations, communities, countries or mankind) always operate with the purpose of private needs' satisfaction under concurrence of private circumstances, any experience always is private, not objective. Particularly, it cannot be described by means of OOP or by Web languages as well as formalized in the general (scientific) sense, as science deals with ideal objects.

How to formalize private experience? In other words, how to unite objectivism and subjectivism?

Immanuel Kant [6], Jean Piaget [7], Frederic Bartlett [8], David Rumelhart [9], Richard Anderson [10] and others philosophers and psychologists have contributed to the overcoming of this barrier. Thanks to them we know that knowledge is represented as schemata in our mind. Any private experience is based on certain objective schemata, as its owner follows causal relations. Causality lies in the basis of human behavior, since it grounds laws of both external (objective) and internal (subjective) reality [11]. This implies that laws of external and internal reality are objective. Their uses are subjective.

Thus objectivity doesn't contrast with subjectivity. Objects are comprehended subjectively, and subjectivity can be analyzed objectively.

The crossing of objective and subjective is schemata.

Schemata of objects are included in schemata of experience. Schemata of experience are included in the schemata of the need. Schemata of the need are included in the private hierarchy of needs.

Another point of view to the reality is advanced by adepts of Pragmatism.

According to Pragmatical maxim, an essence of any object is its practical application.

Since practical application of objects occurs in the course of activities, Pragmatism considers objects as instruments or resources of purposeful activities, whereas purposeful activities themselves are considered as the central feature of human nature [12].

Given that any activity satisfies certain private need or solves a problem, Pragmatism serves the needs' satisfaction. *Thus Pragmatism contributes to a harmonization of objective and subjective.*

Ludwig Wittgenstein in *Tractatus Logico'philosohicus* [13] postulated that "Facts in the logic space constitute the world". According to this realizing of world any object has certain set of known properties, is defined on certain set of possible situations and can be used in so-called State of affairs, which form Facts.

Describing a system of the World, Wittgenstein uses schemata: "The way, by means of which objects connect with each other in the State of affairs, is Structure of this State of affairs." Herewith "The Fact structure is defined by Structure of States of affairs." In addition, "We create to ourselves models of the Facts." Wittgenstein meant that we create models of an experience (and of objects) and operate with them. Moreover, he realized that models of objects can be subjective.

As we see, all leading World-view systems represent knowledge in form of schemata, recognize semantics of objects as their contribution

to purposeful activities, *and in harmony coexist in our mind*.

Nevertheless, nor together nor separately they don't describe the World completely.

Why it occurs?

The point is that people are not interested in objects as such. They even are not interested in objects for actions, since people are not interested in any activity as such.

People act and use objects with the purpose of own needs' satisfaction.

Therefore not objects, subjects, pragmatics or facts are in the focus of people's attention.

People think and act only under an influence of perceived needs.

In each case needs are ranged in concordance with priorities and preferences of an individual, an organization, a community or society.

Every time these priorities and preferences are conditioned by the private hierarchy of needs.

A realizing of any need initiates reasoning, aimed to the satisfaction of given need. Reasoning operates with available experience under private system of priorities, under influence of private circumstances and produces a scenario of an activity that satisfies a given need. Fulfilled scenario is memorized as a positive or negative private experience.

Moreover, people differ from each other by different hierarchy of needs and different experience. This implies that all what people know about World is limited by their private hierarchy of needs. The same applies to organizations, communities and societies.

Therefore it is difficult to overestimate importance of research in the field of needs, include needs' formation, needs' relations, and also experience of needs' satisfaction.

The rest of this article is structured as follows: Section 2 defines basic concepts of Theory of Needs and Problems; Section 3 breaks up needs into two groups; Section 4 investigates an origin of needs, introduces a key stereotype of consciousness and defines corresponding types of reasoning; Section 5 defines types of needs; Section 6 introduces and investigates a concept "Problem"; Section 7 investigates a representation of need in the human mind; Section 8 introduces Need Satisfaction Domain (NSD) as semantically complete segment of an experience; Section 9 deals with NSD ontology and introduces NSD analysis; Section 10 summarizes basic statements of Theory of Needs and Problems.

2. Primary definitions

A discovering of a need is a starting point of human behaviour.

Let's consider some concepts that usually relate to the needs' area.

A need is a necessity to obtain something that is vital important for the person, for the social group, or for the society as a whole.

A problem is a need for a renewal of a process of given need's satisfaction in cases of its interruption or irregular intermediate results.

Motive is a fact of a presence of the need's signs.

Motive itself doesn't launch the need's satisfaction, since the need's satisfaction should meet moral criterions, financial and other possibilities, and also an absence of higher-priority needs in the current moment. An analysis of these circumstances entails (or doesn't entail) *a motivation*.

A motivation is a prompting to the need's satisfaction.

Emotions accompany the need's related process from a need's detection to a need's satisfaction. Herewith they can impact on human behaviour both negatively and positively. Particularly, an emotion impacts negatively, when it substitutes for a motivation.

Wrong motivation prompts a person, as a rule, to begin a need's satisfaction process to the detriment of the higher-priority needs or without necessary resources or to the detriment of common sense.

On the other hand, an emotion can help, for example, to mobilize all physic and moral resources for an action.

In any event a human should manage emotions, not vice versa.

Strong system of priorities can save a human from supremacy of emotions.

Strong system of priorities always is provided by well-structured hierarchy of needs.

Therefore a key human task is a forming a well-structured hierarchy of needs and strict compliance with the relevant system of priorities.

Following common sense, a person unites together data related to a need. Let's name such information cluster by Need Satisfaction Domain (*NSD for short*).

Any NSD contains information of the need's

origin, methods of the need's detection, available set of need's satisfactions (workflows) under different resources and also known possible problems that appear in the course of need's detection or during workflow.

Since a traditional education helps people to build NSDs only mediately and partly, every person forms their independently during life, and therefore considers their as a private property.

Private NSDs are limited by personal experience, and, as a rule, deal with narrow subset of real NSDs.

Modern Web technologies provide an opportunity to build real complete NSDs by collaborative efforts of all interested parties (let's name their *NSD communities*).

NSD communities can exist in form of social networks, where any actor (such as individual or organization) contributes his own experience and can be available on-line.

Complete NSD should ground an interpretation of IoT data and thus provide pervasive computing.

3. Social and personal needs

For the subsequent considerations it is important to note that a motivation has a strong impact on the forming of Complete NSD.

A motivation is passed from higher-priority need to the lower need.

Let's name this motivation feature by *inheritance of motivation* (hereafter, *inheritance*).

For example, the motivation to change a place of residence prompts a person to seek a new place of employment. Here a motivation of a new place of employment is inherited from a motivation of a new place of residence.

Just an absence of motivation makes the primary and secondary education in the highest degree arduous for majority of people.

Abraham Maslow has distinguished 7 basis classes of human needs [3]:

Biological and Physiological needs — air, food, drink, shelter, warmth, sex, sleep, means of conveyance, leisure etc.

Safety needs — protection from elements, security, order, law, limits, stability, etc.

Belongingness and Love needs — work group, family, affection, relationships, etc.

Esteem needs — self-esteem, achievement, mastery, independence, status, dominance, prestige, managerial responsibility, etc.

Cognitive needs — knowledge, meaning, etc.

Aesthetic needs — appreciation and search for beauty, balance, form, etc.

Self-Actualization needs — realizing personal potential, self-fulfillment, seeking personal growth and peak experiences.

An analysis of this list results in at least three important outcomes.

Firstly, all needs, partially beginning from "Safety needs" (*Status Needs* for short), are inherited from the first group of needs, since they regulate and provide stabile social status of the individuality, required for the satisfaction of his (her) Biological, Physiological needs and (partially) Safety needs (*Basic Needs* for short). It seems as seditious thought, since it is considered that Status needs (especially sixth and seventh groups of needs) is a superstructure of the Basic Needs.

Basic needs (through a motivation) delegate authority to Status Needs through the inheritance. Just via Status needs (that stipulate, particularly, professional activities) people obtain meals, clothes, a shelter, means of conveyance and so on. Thus we resolutely turn Maslow's pyramid over.

This doesn't mean that Basic Needs dominate the spiritual life. A fundamental spiritual need is a need for harmony both internal and external. It can be achieved, as a rule, on conditions that Basic needs are satisfied.

The inheritance of motivation increases Basic Needs by Status needs. This implies that a harmonization becomes possible after (or in the scope of) Status needs' satisfaction.

If a person due to some circumstances lives outside of society, and he (she) satisfies Basis needs, he (she) harmonizes with an environment.

Therefore a complete needs' system looks as a rhomb (Figure 2).

Social status provides a stability of the Basic Needs' satisfaction. But status is not something invariable. Therefore each person applies *efforts to keep current social position and to enhance it*, i. e. to improve his (her) social status.

Any Social status stipulates certain standard of the well-being (i.e. a certain financial, cultural, family, and educational conditions). *Inheritance of motivation stipulates the carrying out a set of activities aimed at this standard's achievement.*

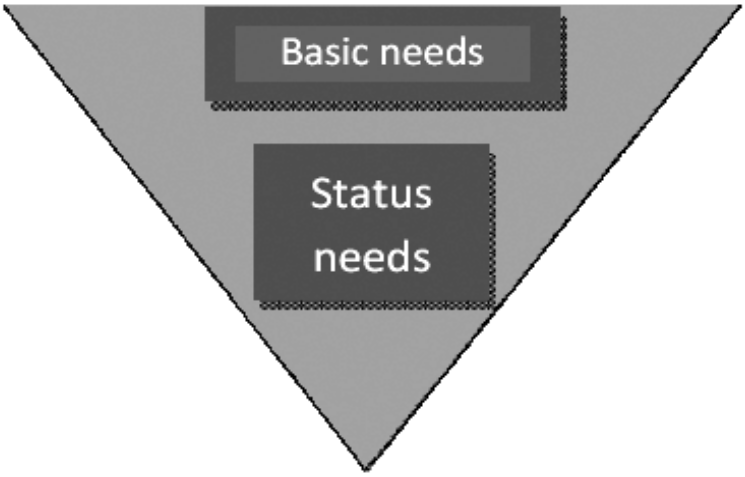

Fig. 1. Inverted Maslow's pyramid

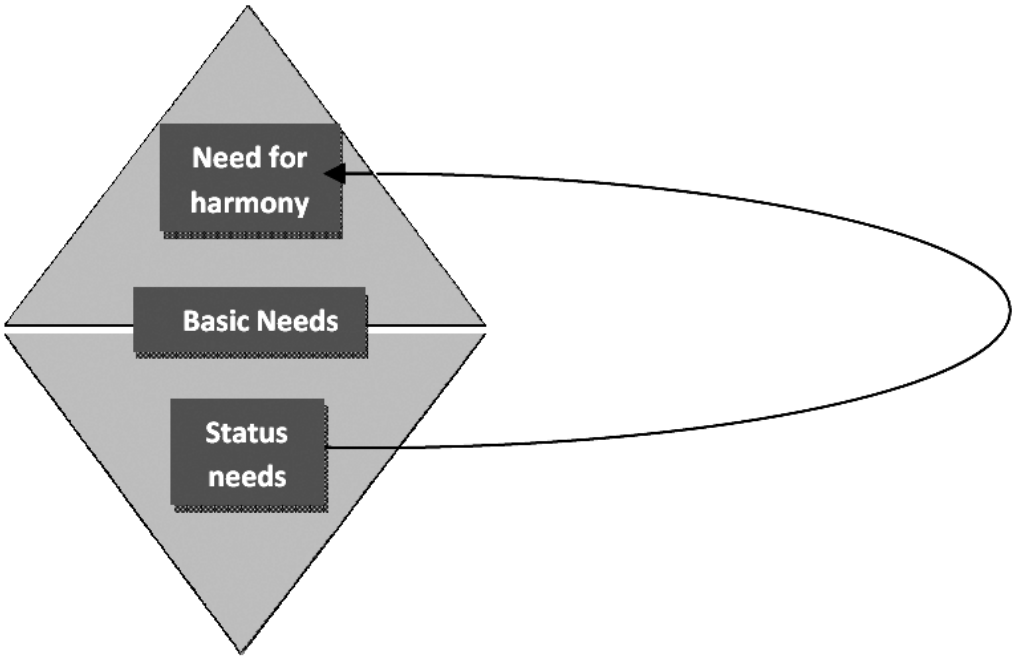

Fig. 2. A complete needs' system

Secondly, all Status Needs are satisfied by means of social actions, and therefore they are socially regulated. Regulated actions can be formalized and represented in form available for software agents.

Thirdly, *any individuality is expressed by a set of his needs and by features of these needs' satisfaction*.

Society has institutions to satisfy Basic Needs. A person acquires social status during consumption and/or a production of goods and/or service under these institutions.

4. Origin of needs

a. A key stereotype of a human consciousness

Human carries out his life activity in the two environments simultaneously. The first is a nature. The second is a society. Both environments force a human to follow their laws and conditions.

Note that hereafter we speak about humans, which desire to live.

This desire motivates a human to harmonize with facts and to fit the situation at any moment.

A correspondent behavior we name *a survival*.

Thus an original need is a need for survival. Its satisfaction is aimed to removing every breach of internal harmony, every physical disbalance and every disturbance. That concerns any person, any community and humanity as a whole.

Generally speaking, a need for survival is a need for stabilization of steady state of human's life activity. Factors, without which our life activity is impossible, constitute a set of Basic Needs

— Need for Meals;
— Need for Health;
— Need for Clothes;
— Need for Shoes;
— Need for Sex;
— Need for Accommodation;
— Need for Education;
— Need for Means of conveyance;
— Need for Communication;
— Need for Leisure;
— Need for Safety.

Due to an inheritance of motivation one need originates another. *Therefore all human needs are derived from a need for survival.*

Human consciousness makes this important job.

Both environments don't provide people with everything required for life.

A correction of this disbalance is a driving motive of Human consciousness. A presence of disbalances forces Human consciousness to detect known situations, to analyze causes, to memorize an experience in the internal form (i.e. in the form of schemata), to launch a mental experiment, to create new models of behavior, to generalize and privatize an experience (Figure 3).

Discovering a need, reasoning considers as input data the following: causes of a situation, a situation itself and available resources (including time/place/budget resources that depend on other current activities). On this stage we see that a satisfaction of a need both by a person and by an organization cannot follow standard models, since input data includes such private factors, as current sharing of resources between running activities, habits and preferences of concrete performers.

Both a person and an organization often acts illogically on the third-party glance, as his (its) behavior obeys private hidden conditions.

Realizing of current need launches a reasoning activity aimed to produce a scenario of satisfaction of this need. If the reasoning doesn't cope with this job, the thinking process steps in.

Thinking, together with reasoning, produces a scenario of the need's satisfaction and supervises its execution (they process, in particular, emergency situations by generating and executing problem-solving scenarios). The need satisfaction's activity (executed successfully or unsuccessfully) is stored in the Experience Base in form of schemata.

On all stages of the need's satisfaction we use the available experience that is stored in our mind in form of schemata.

Since we have mentioned here a reasoning process, it seems suitable to touch this topic at greater length.

A consciousness acts by means of a thinking and a reasoning.

Nature of the thinking is unknown as yet.

The reasoning represents four procedures, namely: *an understanding, a search, a semantic sorting* and *a management*.

An understanding is a mode of reasoning,

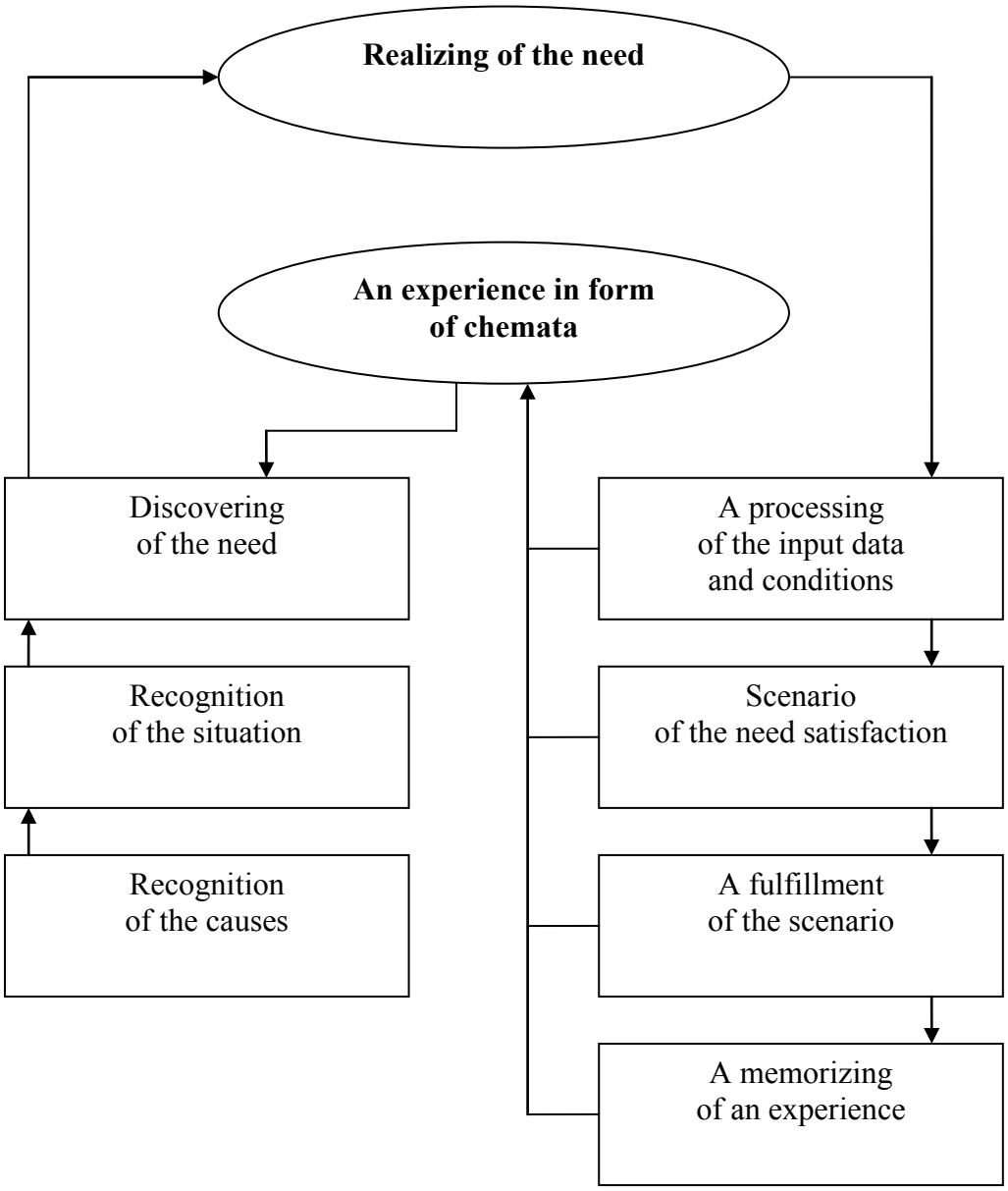

Fig. 3. A key stereotype of consciousness

which glues together a detection of current situation (and its origin), actual needs, ways of satisfaction of these needs as well as possible after-effects.

A search is a mode of reasoning, which uses information about actual need with the purpose of discovering data that are necessary for the given need's satisfaction.

A semantic sorting is a mode of reasoning, which places data according to the accepted semantic framework.

A management is a mode of reasoning, which is responsible for the planning of obtaining and allocation of available resources for the need's satisfaction and for the control the need's satisfaction process itself.

All above-mentioned reasoning modes are grounded by an ability to focus an attention on current stage of the consciousness' stereotype.

This implies that a key stereotype of consciousness motivates a need for an ability to concentrate and meditate.

West civilization doesn't form properly these basic human skills, which in a large extent define a social status of every person.

A need for recognition of the causes as well

as a need for producing a scenario of the need satisfaction generates a need for learning. A need for the needs' satisfaction itself generates a need for studying standards of interrelations, code of behavior and so on.

b. Implicit upbringing of needs

An environment forces a person to acquire stereotypes of Basic Needs' satisfaction.

These stereotypes, associated behaviors and their attributes ground a formation of Status Needs.

A child gets accustomed to certain meals, clothes, housing, imitates and adopts behavior of near relatives in different situations, which becomes necessary for him. During adapting to the behavior of near relatives, a child adapts also to their system of priorities, *which is an echo of their hierarchy of needs*. Thus a child tries on ready-made system of needs and adapts to it.

c. Explicit upbringing of needs

Recognizing that a structure of individuality is his hierarchy of needs, a state can develop and inculcate (via education and child/teenager/youth organizations) desired hierarchy of needs, thus forming a standard of personality. All totalitarian regimes act in such way.

Kids, teenagers and young people seek a system of navigation, self-identification in the unknown environment and also a strong structure of personality. Hierarchy of needs is a sought-for system as it provides both self-identification and solid structure of personality. Skilful use of this motivation, as a rule, results in a scheduled type of personality.

d. Generated needs

During the need's satisfaction a person encounters with a necessity of its upgrading in connection with a changing of technology, of resources, of a staff, of input data and market requirements.

In the conditions of modern world this necessity became a component of hierarchy of Status Needs.

New resources and services also become needs and obtain places in the hierarchy of Status Needs. The same relates to the frequently appeared problems' solutions. For example, a person, liable to a bronchial asthma's fit, acquires a need for inhaler.

e. Need for a new status

The best method of social status' stabilization is its improvement, i. e. an acquisition of new, more socially meaningful position. An improvement of social status involves reconstruction of a hierarchy of Status Needs, sometimes by means of additional activities (for example, by means of training).

The same relates to the step-down of social status. And in last case a person carries out reconstruction of a hierarchy of Status Needs, but it's accompanied by emotional torments.

5. Types of a need

We distinguish the following types of needs:

— A regular need (definition): *A regular need is a need that provides a satisfaction of other needs and is invariant to the environment*.

There are three key regular needs, namely, a need for retention of focus of attention (i.e. a need for the concentration and meditation), a need for the discovering a need and a need for the discovering a problem.

— A heritable need (definition): *A heritable need is a need to satisfy the kind of given need.*

For example, *Private and Social needs on the Figure 4.*

— A derivative need (definition): *A derivative need is a need to obtain something that is necessary for the given need's satisfaction.* A motivation of this need is inherited from a given (top) need.

If, for example, available resources are insufficient or the need satisfaction's activity cannot start without certain conditions and recourses, it is necessary to provide missing resources and conditions. Thus needs for Resources (see at Figure 5) are derivative needs.

— A compound need (definition): *A compound need is a need composed of a number of sub-needs.*

For example, a need for house includes a need for a house footing, a need for walls, a need for roof, a need for utility lines, etc.

As a rule, a composition of sub-needs grounds a core of the workflow of the need's

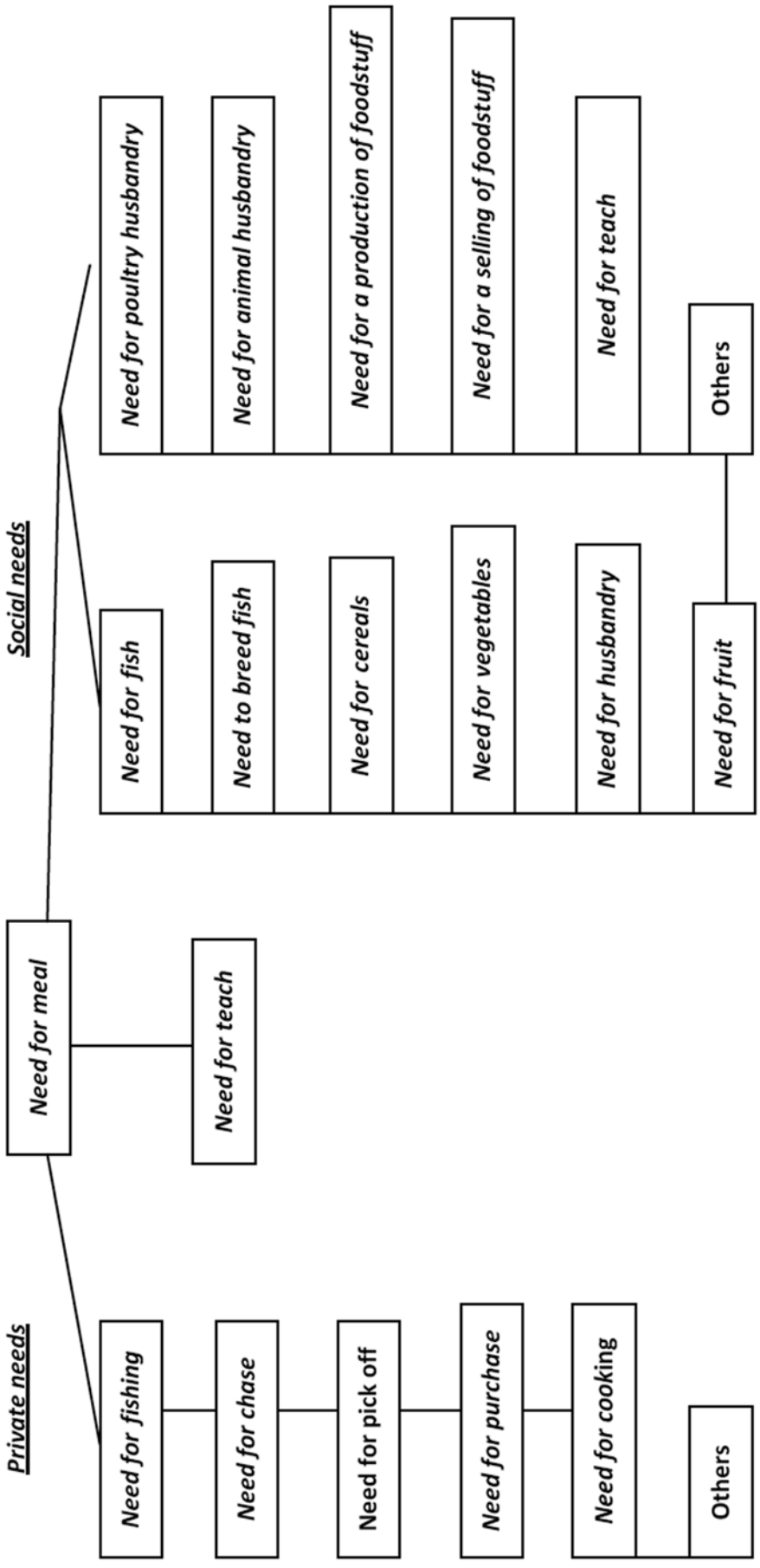

Fig. 4. Need for meal

satisfaction (Figure 6).

— A personal need (definition): *Any need of a person (a personal need) is a derivative need of his own need for survival.*

— A social need (definition): *A social need is a generalization of personal need that is topical for separated community or society as a whole.*

Satisfaction of personal needs is one way or another closely associated with a social activity of a person, namely:

— *a person acts as a consumer of work's results of other people,*

— *a person satisfies his needs owing to his purposeful social activity (i.e. professional, educational, etc.),*

— *a person satisfies his needs in the course of his purposeful social activity.*

6. Problems

An inability to satisfy a need because of an inadequacy or insufficiency of resources or because of an inadequacy of an activity, aimed to a need satisfaction, or owing to any breaking of steady state of life activity means a presence of a problem. In turn, a sub-need's satisfaction can cause problems and so on.

Note that life activity is a consecutive satisfaction of needs.

— A problem (definition): *A problem is a need for a renewal of a steady state of a need satisfaction process.*

A problem's solution becomes a component of a need's satisfaction process.

We can redefine a need, using above-mentioned a problem's definition: A need is a problem, which solution is an obligatory (objectively or subjectively) for a human life activity.

If a problem appears constantly during the need's satisfaction, the problem becomes a sub-need of the given need.

Discovering of a problem becomes a regular need in the modern world.

There are many industrial and service sectors, destination of which is a solving of problems. All of them relate to repair (repair of constructions, machine support service, repair of equipment and devices). Medicine and corresponding industrial sectors are devoted to the repair of Human organism's functions.

A problem can be considered as a derivative need.

As a need, a problem consists of the following sub-needs: a need for detection of an abnormality, a need for a capturing of available evidences of the abnormality, a need for diagnostics of a problem, a need for the problem's solution, a need for resources of the problem solution (Figure 5). A satisfaction of above-mentioned sub-needs requires professional skills that are acquired from an experience and education.

A problem's solution is represented by means of standard semantic framework (Figure 6)

Note that a satisfaction of a need can be a problem, and on the other hand, a solution of a problem can become a need.

Thus a need and a problem form a dialectical unity.

7. Representation of a need

For the beginning let's change some accents.

It is accepted that *reasoning serves knowledge.*

It is not true.

According to the key stereotype of consciousness (Figure 3) *knowledge is a tool of reasoning.*

Reasoning serves the needs' satisfaction.

Needs are related one with another and constitute hierarchy that can be represented in form of graph.

Any person (or an organization, or a community, or a society) is characterized by a set of needs that are topical for him.

All that any person (or a society, or humanity as a whole) knows depends on needs, which are topical for him or were topical in the past.

Therefore well-represented needs are a necessary condition of any knowledge-based system's success. We advocate here the key stereotype of consciousness as a foundation of the need representation (Figure 6).

In accordance with the key stereotype of consciousness a need representation describes a process of a need's discovering, resources processing, and a satisfaction of a need.

Any needs' satisfaction represents an activity that consists in consecutive or/and parallel satisfaction of sub-needs, which connect also by means of control statements.

An expert describes knowledge related to the need coupled with all problems that are

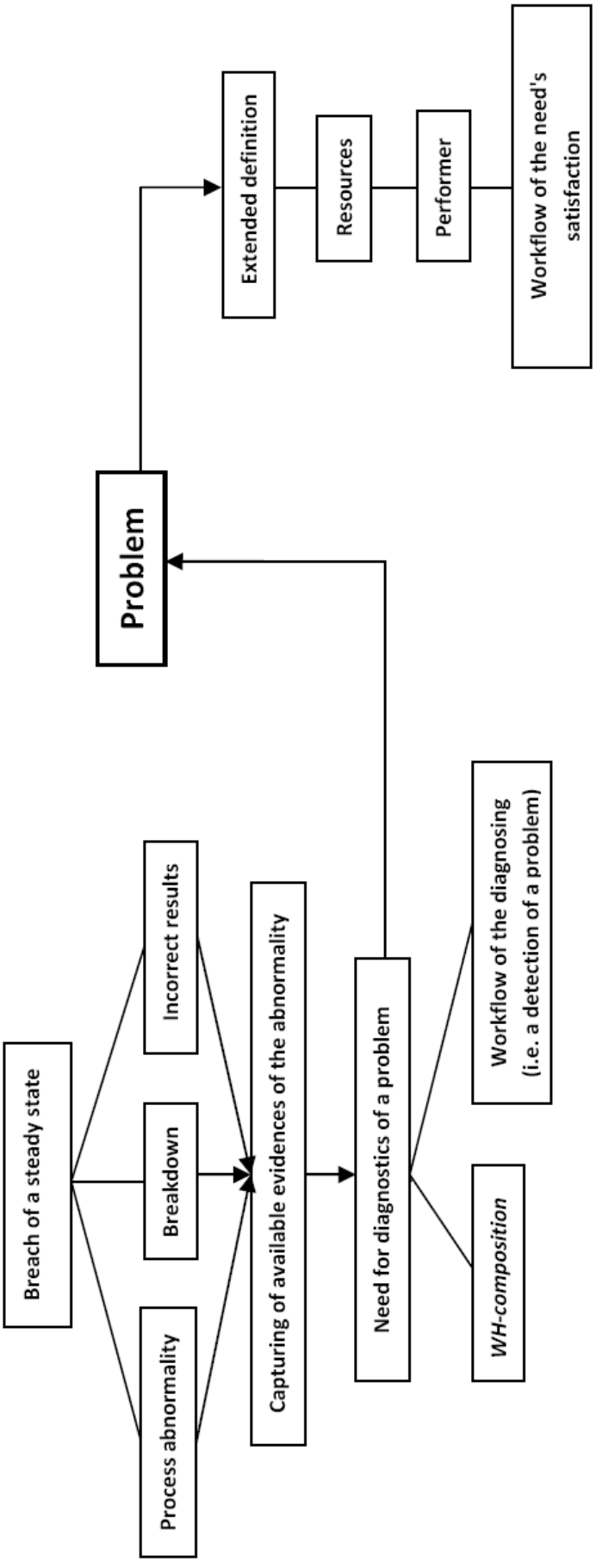

Fig. 5. Representation of a problem (general)

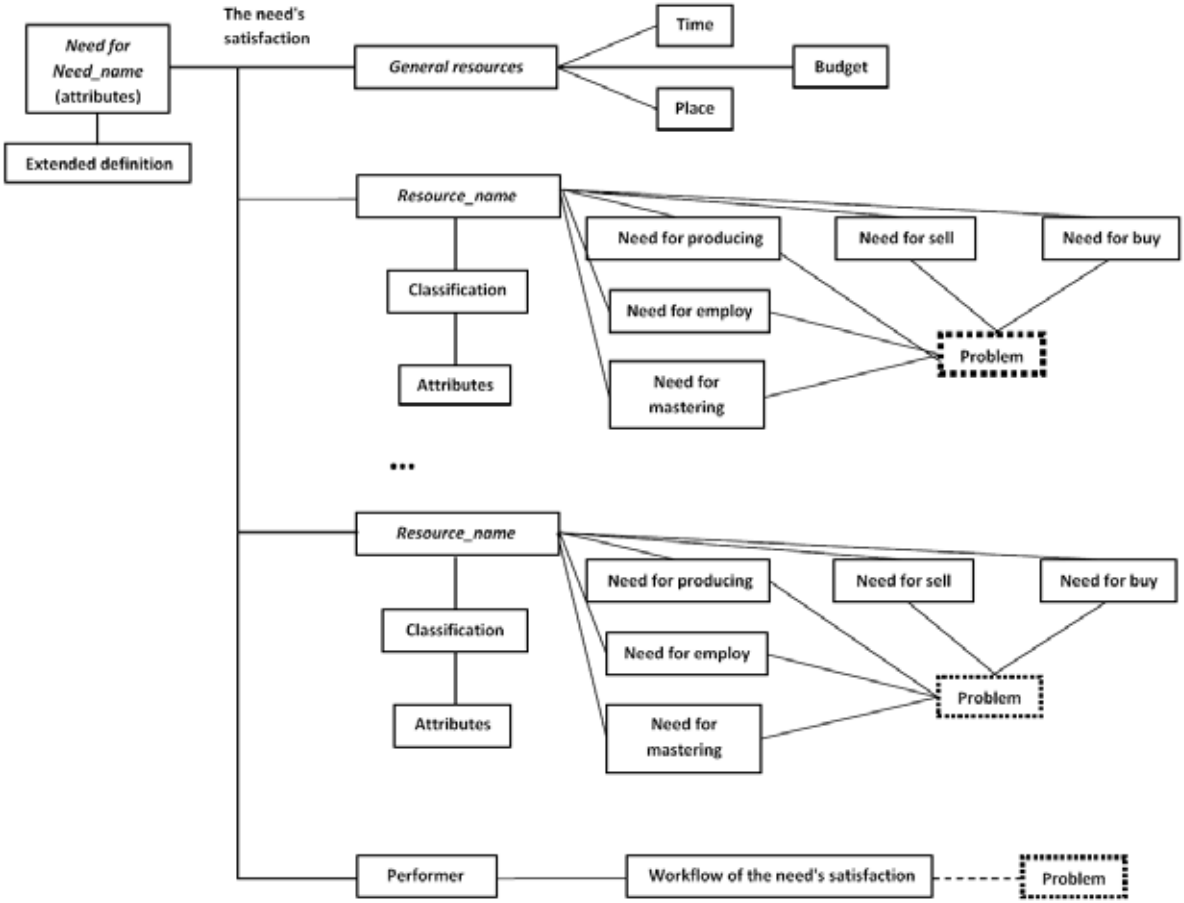

Fig. 6. General schemata of a need

known to him.

A satisfaction of any need and any problem is an activity, represented in form of schemata, top level of which includes scheme of resources, WH-composition, Workflow of the need's satisfaction (Workflow for short) and known problems.

WH-composition supplements Workflow with necessary details of the need's satisfaction (hereafter "Activity") that include information about an executor of Activity, a subject of Activity, a reason of Activity, a place of Activity, a time of Activity, Activity's budget and other general resources.

Any sub-need's description includes WH-composition by all means.

You might say that Workflow answers to the question "How?", when WH-composition answers to questions "Who?", "What?", "Why?" "When?", "Where?", "By means of what?".

Components of WH-composition are included in "Extended definition", "Performer" and resources related schemata.

Scheme "Performer" answers to question "Who?". Scheme "Extended definition" (Figure 7) answers to questions "What?" and "Why?". Schemes "General resources" and "Resource_name" answer to question "By means of what?".

For example, a need for the house construction may be caused by the Need for Housing, by the need for investment or by the need for urban expansion. In these cases an origin of the need is a Top need. Herewith the construction starts from the laying of a foundation.

If a need for the house construction is caused by an earthquake, by mistake of the design, or by a bombing, then the construction starts from an analysis of possibility to use the old foundation, or a preparation of the ground area. That is schemes "Causes" and "Top needs" of the "Extended definition" answer to the question "Why". Schemes "Description of the need", "Sub-needs" and "Requirements", included to "Extended definition", answer to the question "What?", depending on the content of schemes

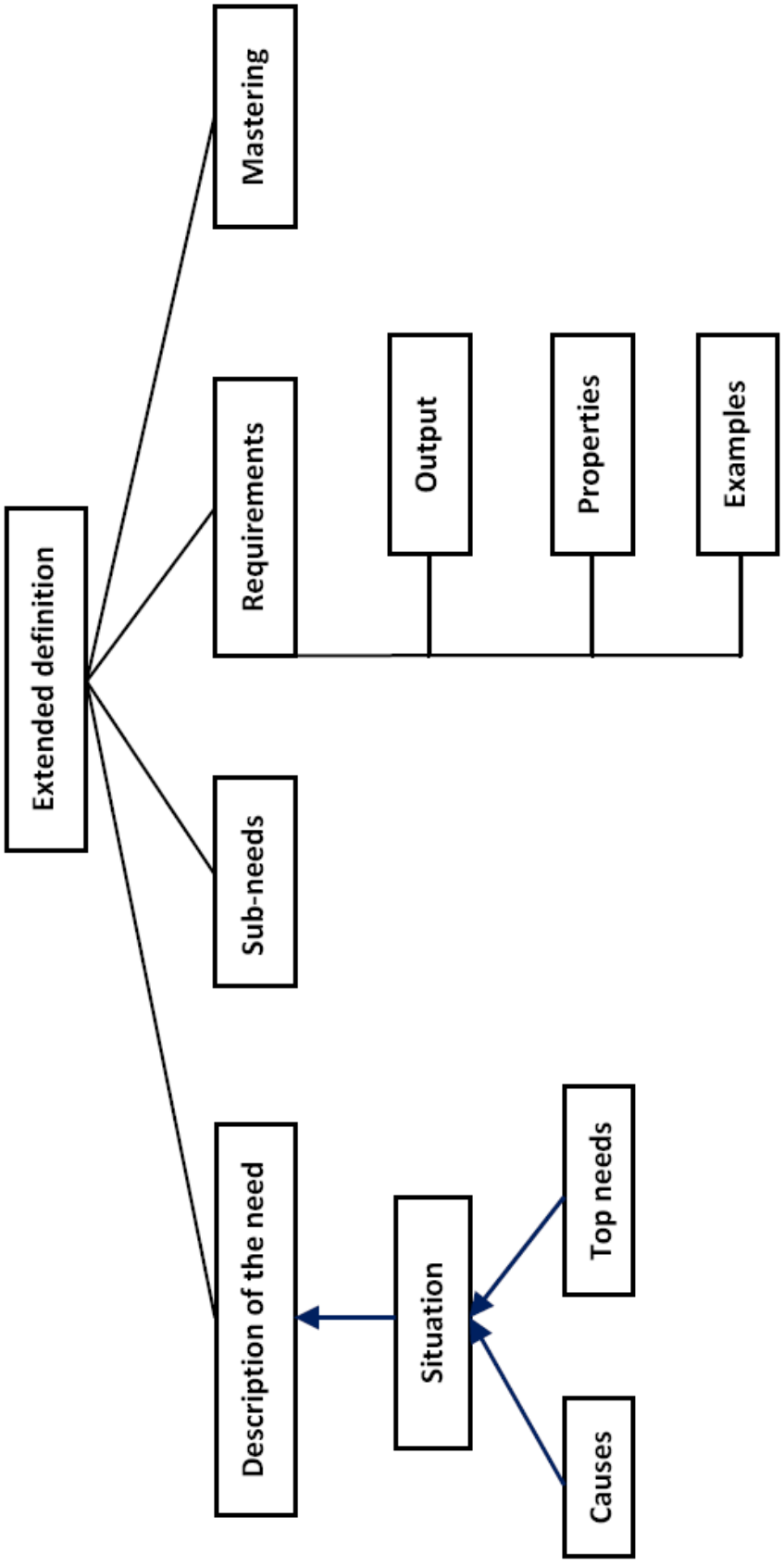

Fig. 7. Extended definition

"Causes" and "Top needs".

Every case of initial conditions claims different resources for the need satisfaction. Schemata "General resources" clarifies necessary budget, time and place of the Workflow. Schemata "Resource_name" contain information regarding necessary tools and equipment. Thus schemata "General resources" and "Resource_name" (Figure 6) answer to the question "By means of what?".

8. Need Satisfaction Domain

In the course of time satisfaction of certain need, fulfilled many times in similar situations, leads to the elaboration of optimal (hereafter, *generic*) schemata of the need. The same result can be quickly achieved in the network of software development, if professional community is involved to the needs' representation.

It should be said that a person, as a rule, doesn't start from scratch.

Generally, we produce a need's satisfaction schemata as a result of an analysis of available experience.

Every case of certain need's satisfaction is memorized if it optimizes existing generic schemata, or differs from it by new components (new situation, new resource, new configuration of resources, new sub-need, new workflow). Herewith new components connect with old ones from existing schemata in the manner of hyperlinks in the Web.

All schemata that relate to the same need are memorized in our mind as a separated component of the private hierarchy of needs. We name any such component as Need Satisfaction Domain (*NSD* for short). *NSD represents semantically complete segment of an experience.*

Complete General schema of a need (Figure 6) contains all known combinations of WH-compositions and Workflows. Figure 6 shows that *NSDs are embedded one into another.*

Combinations of WH-compositions and Workflows are linked by a following way (Figure 8):

— any situation links to a bundle of sets of resources;

— any set of resources links to a certain need's Workflow,

— any Workflow represents algorithmically linked sub-needs.

Realizing the need, we choose the appropriate set of resources. The absence of an appropriate

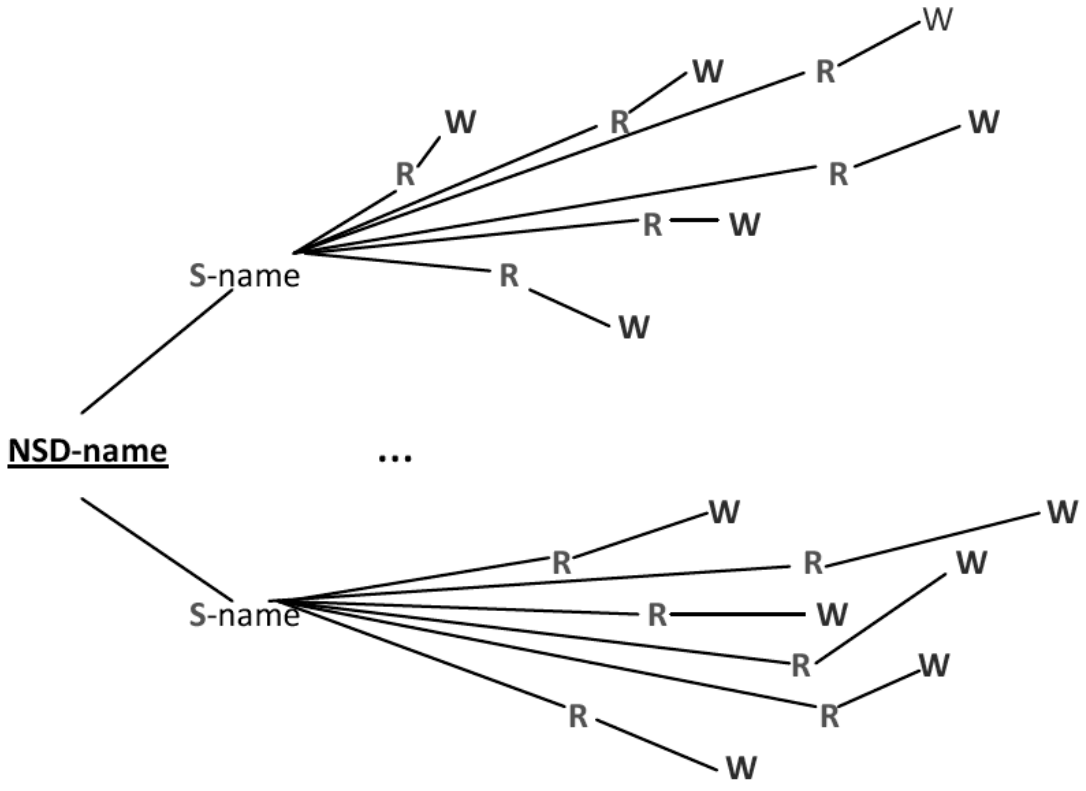

Fig. 8. Need Satisfaction Domain schemata

set or non-compliance of one or more resources with the declared requirements *means a problem.*

On the Figure 8 *S* stands for Situation, *W* stands for Workflow, *R* stands for a set of resources.

On a number of occasions the need's causes, related resources and performers are interpreted as broadened situation, as input data for the satisfaction activity.

Herewith "Extended definition" declares required output data. From this point of view any NSD is a bundle of the need's satisfaction activities, each of which is encapsulated with unique set of input data.

9. NSD ontology and NSD analysis

We use here concept "ontology" as *a space of semantic links to the different fragments of needs' satisfaction activities*.

NSD schemata (Figure 8) specify a semantic sharing of need related ontology. Any NSD ontology's unit is a name (generally speaking, a sentence) that indicates a need, a problem or any other component of NSD schemata.

In everyday life causes and effects are not always evident.

Therefore recognition of a current need is a permanently topical regular human need.

To satisfy this need, people often are guided by the separated signs and symptoms of current situation that are at random in the focus of attention.

These signs and symptoms constitute discrete fragment of ontology, belonged to different NSDs, and entail *expectations of needs*. Analyzing every discovered possibility, we increase obtained ontology (for account of the given need's ontology) and confirm or disprove a presence of a need.

This process is approximately described by Roger C. Schenk [14].

Roger C. Schenk defined Memory Organization Packets. These blocks are clusters of events, which are called as scenes. Scenes are sets of the high-organized components. Memory Organization Packets unite in themselves a set of scenes and add specific contextual data.

Schenk's Dynamical theory of memory has made progress in the field of knowledge representation, brilliantly developed *Frederic Bartlett's ideas* about memorizing knowledge in form of schemes [8].

Despite all its advantages it doesn't allow to acquire and forecast human activity in response of incoming sensors data (Internet of Things) as well as it doesn't provide a comprehensive support of human professional activity and human life activity as a whole (Pervasive computing).

Representation of causally ordered NSDs is based on the ideas of all contributors to the Scheme Theory and allows fulfilling both Activity acquisition and Pervasive computing.

Thus NSDs schemata help people to understand the current situation, detect and satisfy current needs and problems.

Moreover, *NSDs schemata help to understand other Subjects of social relations* (i. e. persons, communities, organizations and states).

Indeed, a transformation of incoming data about any subject of social relations into NSDs ontology, a generation of expectations of needs and their confirmation (or disproof) results in a realizing the Subject's hierarchy of needs.

Let's call this process *NSD analysis.*

NSD analysis returns private needs' hierarchy of subject of the social relations. Knowing it, we can predict, supervise and operate the Subject of the social relations.

10. Conclusion

Theory of needs and problems postulates a need as a cornerstone of personal and social consciousness. The core need is a need for survival. It motivates all other needs.

There are three key regular human needs.

The first is a need for retention of focus of attention. A satisfaction of this need provides a fulfillment of a key consciousness stereotype.

The second regular need is a need for the discovering of an actual need in the modern intensive traffic of events and information.

The third regular need is a need for the discovering of a problem.

The first regular need can be satisfied by meditative practice harmonized with private conditions of a person's life activity.

The second regular need can be satisfied by NSD analysis. NSD analysis is a reasoning mode that uses Need Satisfaction Domain (NSD) as a definitional domain.

The third regular need is satisfied by means of specific extensions of a need's general sche-

mata, on the one hand, and by applying of NSD analysis, on the other hand.

Theory of needs and problem determines relations between a need, reasoning, knowledge and provides formalism for their representation.

Any discovered need launches reasoning. Reasoning uses available experience as a tool.

An experience represents knowledge of objects, events and actions in the context of needs' satisfaction activities.

All knowledge related to a need (Need Satisfaction Domain) is memorized in form of schemata according to a key consciousness stereotype. These schemata represent a logic tree, and provide knowledge in a top-down direction.

The schemata based formalism of a need representation provides computer-aided implementation of Theory of needs and problems. It can be used as a Global platform for Human Experience [15] accumulation, Top-Down e-Learning [16], Internet of Things, Pervasive computing.

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