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OSL - OBJECT SPECIFICATION LANGUAGE -

(object structure and relations)[1]   ver.23.07.27

Abstract
OSL© is a   descriptive language for the description of any object in terms of structure and behavior, invented as a tool for   structured and unstructured modeling. In this paper- as a proof of universality- we present very different objects: geometric objects, IT system, business and human-being.

Keywords
structured modeling and design, OSL, object specification language, human descriptive language, factual markup, geometric view, object specification, GSO -geometrically structured objects.

I. INTRODUCTION

Generally, a free structured modeling   is a collection of methods, techniques and tools for modeling the variable structure and multi-structure as an opposite to the widely used "well-structured" approach focused on top-down hierarchical decomposition. It is assumed that system boundaries are not finally defined, because the system is never to be completed and components are are ready to be modified at any time.
OSL is dedicated to present the various structures of objects, their relations and dynamics (events, actions and processes).

OSL is nongraphical conceptual language so it is very different from such diagrammatic language as Unified Modeling Language UML[10] even   if UML is enriched with textual Object Constraint Language (OCL) [11]. We have no objections against graphical visualization but in our approach we prefer concise description by typewriting technology.

OSL is open and flexible (for example you can add new keywords). It covers not only main objects (subjects) but also whole environment all around defined globally (at kernel) and locally (at subject level). There are no borders of definition. One could imagine description of universe or more (let's call it "galaxy") even. OSL includes also open objects which could be incorporated in any "place" like free electrons from atom.

Another feature of OSL is an object orientation. Objects may be concrete (physically existent) and abstract (conceptual, virtual). The physical objects are viewed ontologically. Any object has at least its own name, identifier, properties, structure, interface and relations to other objects, own behaviour and "life-history".

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OSL does not concentrate on data structure and documents but on descriptive statements in a classical wording specification (with geometric conceptual figures) focused on the layout and behaviour of objects.

A geometric view has two profiles. Profile 1 expresses standard OSL geometric view and consists of many conceptual geometrical figures. Profile2 includes flat figures like flowcharts showing input-output and function or program (in computer job sequence) and diagrams presenting the structure (e.g. class diagram in UML[9]. These profile2 items are of classic type and can be easily made manually or generated from detail specification.

A geometric view could be an inspiration for new type of data in the cognitive computing or bigdata mining, as geometric shapes may be discovered by analysis of various massive information. We assumed that geometric interpretation might be be more accurate and more evocative because it shows imaginably (particularly in case of spiral) the nature of objects at least in terms of space and time.

There are many geometric figures. Some of them are uncommon (swarm, bunch, blackhole, wormhole, freespace) and become a challenge to be taken up in conceptual modeling.

1. Spiral differs from classic iteration in that sense, that every scroll can possess   different "engine" and content. Quite "powerful" are multistrand spirals. Examples of strands in business could be profit, competitiveness, credit ability etc. Such spiral in a business may illustrate for example the bankruptcy of company which falls into spiral that airplane pilots called the "death spiral". A special type of spiral is an irregular hyperbolic spiral intersecting an asymptote infinitely many times.
Spiral approach is known in software development where the spiral has four phases (planning, risk analysis, engineering, evaluation) and   project repeatedly passes through these phases in every iteration.

2. Swarm relates to the homogeneous relocatable dense population. The path of moving swarm is a good illustration of global expansion of business or moving a business from one country to another, from one branch (industry) to another.

3. Free space means unstructured construction (every mixed configuration is allowed)

4. Tunnel is three-dimensional population with the value X (e.g. the sum of credits) along the time Y and densed acording to the third factor Z (e.g. credit ability).

5. Cylinder differs from the tunnel with the feature that it carries the values on the surface while the tunnel keeps them in the interior.

6. Triangle coud represent "shadows" of object on its 3 angles surface (a-axis, b-axis, c-axis), e.g. for employees population angles are age, education, sex. The father of a triadic approach was famous philosopher G.W.F.Hegel (1770-1831) who used triangle to visualize a 'system of science' as a triangle with angles: logic, nature, spirit.[19]

7. Blackhole marks the irreversible disappearance of the object (e.g. the bankruptcy of the company) and shows the „strength of drawing in" (e.g. a speed of the bankruptcy).

8. <u>Darkbox</u> is a place for a dark (or deeply hidden) information.
9. <u>Cloud</u> means a container located in remote space equipped with secure gate to enter it.

10. <u>Artificial neural networks</u> are networks of interconnected layers and nodes, which process information as a response to external inputs using methods unavailable in traditional calculations. Very known applications of neural networks are human face recognition and signature verification. In business they are used when solution is not based on a predetermined and preweighted criteria but on the past experience (e.g. in banking area - failures in loan granting, forecast time dependent variables such as net income for each month of a year. Neural networks are applied also in finding trends in large quantities of data (currency, stock exchange prediction).

11. <u>Fractals</u>
a) fractal geometry in multifractal stochastic volatility models that work in the context of dynamic turbulance used for example for modeling market fluctuations. [7].Fractal analysis can roughly be thought of as a way to characterize and investigate the properties (e.g. selfsimilarity) of irregular sets.
b) fractal networks useful to express fractal populations like franchising networks.

12. <u>nD</u> multi-dimensional space of object

13. <u>4D</u> four-dimensional space of object (3 space dimensions + time)

II. OSL NOTATION

<...>	*container*
<! >	*comment*
<def > </def>	*start-end of definition*
<spec> </spec>	start-end of specification
<beg> <end>	start-end of section
:	equivalent
=	value assignment
[..] {..}	list of assigned words
(..)	list of items
|name|	executive/operational object
	Relations
::	belongs to
⇒	mapping or multitrack relation
↔	bidirectional passive unary relation 1:1
→	forward unary passive relation - no change
<=>	complex many to many active relations
<=, =>	backward, forward active relations>
�	external link (like url)
M	moving (mogile) object
/ &	or and
a/b/c/../x/	only one element can be used
a&/b&/c&/..	any combination can be used
,.. ,...	more , much more
UUUU.xxxx	xxxx belongs to UUUU
<!xxxxxxxxxx>	comment
	Topology:
●(name)	located in object
ə (name)	located in cloud
»«	located outside
{.[.(..).].}	nested list of items
¥	output>
	Attributes:
@	mark of special attribute,feature,property
@dark	unknown, to obtain, to discover
@ai	generated by artificial inteligence
@rq	requested
@ans	answered on request
@dsq	disqualified
¦	optional

⏐±	replaceable
⊣⏐	blocked
‖	isolated
?	questionable
#	number of

III. OSL   KERNEL

The kernel   contains standard phrases and keywords common for all areas (subsets) and environment. A special attention is paid to relations between objects. Jay W.Forrester author of fundamental work "Industrial Dynamics"[4] considers in [18] the importance of relations by statement that "the structure of interconnections and the interactions are often far more important than the parts of system".

<**def OSL**>
    <def ENVIRONMENT: ENV>
       ENV[regulations, infrastructure:INFR]
       regulations[legalacts,resolutions,decisions]
       INFR[it,org,hr]:[itINFR,orgINFR,hrINFR]
       itINFR[servers,opersystems,applications,databases,users,prlanguages]
       orgINFR<!org. structure of subject>
       hrINFR<!human resources>
    </def>
    <def globalMapping>
       def subLang[BSL,HSL,SSL]<!subsets of OSL>
       objList<!list of objects>[area,subject,problem,decision,<defined objects>]
       defList<!list of definitions>
       specList<!list of specifications>
    </def>
  class<!class tree>

<u><!object definition></u>
<def subject <NAME><!main object name>
<def <name><!ordinary object/item name>
 object.id<!object identifier>
 object.type[eObject<!elementary atomic object >,
         dObject<!dynamic object >,
         iObject<!informational object >,
         vObject<!virtual object >,
         sObject<!smart object)>,
         oObject<!open object>,
         incObject<!incarnation of object>,
         astrObject<!astral quantum object>
         binObject:BINDER<!collection of integrated objects>,
         copyObject<!copy of object>
         problObject:PROBLEM<!task to be performed>,
         interObject<object created by intersection of objects>,
         capsObject:CAPSULE<!portion of information reserved for a given user>]

    interObject[(list of objects) when <condition>]
    sObject[noiceReduction,selfTeach,selfRepair,selfKill,selfRestore,selfRestart]
    oObject[input(parameters,data),output(info,messages),
        structure(addComponent,addRelations)]

</def>

<!dynamics definition>
  event:ev<!elementary "atomic" fact >
  operation:op
  action:ac<!sequence of operations or events>
  process:pr<!sequence of actions and events>
  pr[trigger,<actions><events>,endEvent]
  dynamics[event,operation/transaction,action,process]
  dynamics[ev,op/tr,ac,pr]<!short notation>
  dynamics.scenario[evSc,opSc,acSc,prSc]<!event scenario,….>
  trans<!transaction in terms of operating system monitor>
  ftrans<!financial transaction>
  reverseMode[rev,rAc,rOp,rTr]<!back to the previous state>
  scenario:sc<!predicted sequence of actions and events>
  scenario.rank[best,middle,worst]
  object.Info<!information visible at the moment of access>
  keywords:kwords<!additional keywords in def>
  olh<!object life history>[timeline,events,aging-curve]

<!interactions-relations>

  role[interface,integrator,component,monitor,commander,
     driver,trigger,agent,executor,generator,locator
    ,executor/performer,initiator,terminator,destructor,constructor,
    participator,owner,stockholder,customer,supplier;partner,employee]

  relations[activated by,activates,assisted by,built from ,
      appearence depends on ,belongs to/is owned by ,
      exists as satellite of <object>,calls <object> (<interface>),
      consists of <parts>,contained in/contains,
      controlled by/controls,derived from,
      being (depended on, when/in/for),
      included in,linked to,
      refers to,relates to,related by affinity,
      represented by/represents,involved in,
      shared by/shares,used by/uses]

  state[active,inactive,dark,dormant,suspended,aborted,in-contact,
     variable,invariable,idle/waiting,lost,expected,deleted,homeless]
  status[generic,real,virtual,undefined]
  reaction[answer(acceptance,rejection),silence,collaboration,..]
  rank[critical,necessary,most wanted,optional,worst,best]
  rule[decision-table,when-if,formula].

<u>layout[shape(gProfile1),gProfile2,sparcity,density,variability]</u>

<def gProfile1><!standard-geometric profile>
    [free-space,swarm,bunch,network,neural-network,hierachy,line,triangle,tunnel,
     curve,spiral,spring,circle,ellipse,cylinder,sphere,ellipsoid,con,doublecon,prism,
     fractal,fractal-networks,squarepiramid,container,blackhole,wormhole,cloud,darkbox]

  <def spiral>
    spiral[single-strand(spring),multi-strand]
    spiral[helix,logarithmic,hyperbolic,polygonal,rational,golden,
         spherical,conical,circle-involute,cornu,daisy,epispiral,
         archimedian,fermat,nielsen,ulam,poinsot,phyllotaxis]
     helix<!a curve for which the tangent makes a constant angle with a fixed line>
     spiral.parameters[center-point,number-of-rotation,
         number-of-band,starting-radius,points-per-rotation,
         growth-per-rotation(horizontal,vertical)]
  </def spiral>

    swarm<!moveable homogeneous population with variable density>
    bunch<!nonmoveable homogeneous population>
    circle[edgeCircle<!population on the edge>,
       insCircle<!population on the surface>]
    ellipse[surEllipse, edgeEllipse]
    cylinder[edgeCylinder,insCylinder:tunnel]
       edgeCylinder<!population on the edge of Cylinder>
       insCylinder<!population inside of cylinder>
    triangle<!layout defined by 3 factors always existed and related together>
    container<!trunk, regular 3-dimensional figure>
    blackhole<!off the face of the surface>
    wormhole<!place injected with foreign/strange information>
    free space<!no limits, no predefined structure)
    line[single,multiline]
    curve[parabola,hyperbola,….]
    point<!something that may exist only as a single event e.g. big bang>
      objPoint<!single event for a given object e.g. birthday>
    solids[sphere,cone,pyramid,cube,cylinder]
    polygons[rectangle,square,pentagon,hexagon,octagon]

  <def artificial-neural-network>
    neural-network.type[(single-layer,multi-layer),Kohonen,Hopfield,convolutional,..]
    neural-network.parameters[layers(input,intermediate,output)(hidden/visible),
    connection-between-layers(backpropagation,...),variables,expected-values,
    connection-strength:weights,nodes-sensivity;bias,rules-for-modifying-weights,
    activation-function,mode[learning(supervised,unsupervised,reinforcement))/generative]][2]
  </def >
</def gProfile1>

2Only the basic features of neural networks to show OSL capabilities.

```
<def gProfile2><!flowchart,diagram>
  [flowchart(prFlowchart<!program functions>,jobFlowchart<!sequence of programs>),
   diagram(<flat structure diagrams>)]
</def  gProfile2>

<def control-flow>
    ac(ev1,ev2,ev3, ..)<!action-sequence of events>
    pr(ac1,ac2,ac3,...)<!process>
    s(ev1,ev2,ev3, ..)<!sequential flow of events>
    p(ev1,ev2,ev3, ..)<!parallel flow of events>
    pr(s(ac1,s(ev1,ev2,ev3),ac2(p(ev4,ev5,ev6),(ev7,ev8,..))<!mixed flow>
    repetition[algebraic-iteration,spring,spiral]
    activated by <..> with <initial-value> at <time-point>
             when  <condition>
    finished at < > with <...> when  <..>
 </def>

 <def  body>
    body[Contents,Script,gprofile]
    contents<!e.g. document, program code>
    executive-script(written,generated<! upon the pattern of  behaviour >)
    <beg><!sections of  body>
       <beg>
         …..
        <end>
    <end>
  </def  body>
</def  kernel>
```

An OSL extension for selected areas is defined in subsets: OSL-B(business), OSL-H (human-being), and OSL-S (IT system). A subset is   a shell assigned for a group of users allowing them to use their own commands and keywords.

IV.   OSL-H   OSL FOR HUMAN

Subset OSL-H named **HSL** (Human Specification Language) is a semiformal notation for structure and processes of human being. It may be used by professionals dealing with human resources or anyone interested in psychotechnology.   Further development of HSL toward psychology and medicine could be achieved with close collaboration with psychologists, medical professionals, neuroscientists etc.

Human being is   an "open system which maintains a constant state while the matter and energy which enter it keep changing"[5 p.11]. Human plays many roles in decision taking, execution, communication etc.

One possible usage of HSL language is creation of a human resources database in a corporation or even on an international scale for locating   individuals which meet certain psychological, intellectual and professional requirements.

Similarly to other subsets of OSL this one contains only additional phrases and keywords that do not exist in the OSL kernel. A scope of human specification may be expanded by many other interesting topics like „human thought - the physiological process of mentation" and „ bodily and facial gestures as a factor in communication" included in HUML (Human Markup Language) [17].

```
 <def HSL>
 <def subject HUMAN>
      class1[animals.mammalia.primates.homidae]
      class2[nation.ethnic-group.profession.person]
      kwords[life-space,behaviour,scope]
      scope[biophysical,geogr,cultural,social, legal]
 <def ENV><!environment>
      ENV[WORLD,CONTINENT,COUNTRY,REGION,SITE]
      ENV.legal<!Legal acts, resolutions, decisions>
      ENV.cultural[tradition, history, education,religion, ideology, art, radio-tv]
      ENV.biophysical[animals.homosapiens]
      ENV.geogr[homeAddress,company/school]
</def>


<def>Person
 { object.nfo[id,sex,birth-data]
      invariables[id,sex,birth-data]
      homeaddress[country,site,street,house,flat]
  [genetic-id[fingerprints,DNA,sex-chromosomes (XX<!females>, XY<! males>),
                genotype(AA,AO,BB,BO,AB,OO),phenotype(height,eye-color,skin-color,blood-type,..)]
   [consciousness,mind,emotions(elementary,complex), behaviour(relations,actions,...),state,life-space,..]
    mind[wisdom(thinking,reasoning,learning,recognizing,communicative-competence),knowledge,...)]
    complexEmotion[love,hate,satisfaction,frustration,agression,enjoyment/pleasure,anger,meditation,
                   complexFeeling(fear-of-insupport,regression,inferiority,persecution)..]
    elementaryEmotion[hunger,thirst,chills,pain,..]
    relations to/with (self,family-members,environment,..)
```

```
    state[active,inactive,grounded³,dormant,suspended,aborted,idle,lost,dead,
          homeless,retired,married/divorced/single,ignored,misused,abused, ]
    life-space[psychological,social,educational,professional,financial,..]
    living-space(2D<!physically handicapped people>,4D,nD<!in case of schizophrenia>),....)
    behaviour[marriage,friendship,career,ilness,aging,..]
    olh:=[birth,aging-curve,social-events,health-illness-events,
          educ-events,job-events,critical-events,death]<!object-life-history>
    psychological-cluster[self,character,attitude,leadership,ability,
              extraversion,anxiety,independence,healthState,
              lifeStyle,creativePotential,satisfaction-level,BipolarPersonality]}

    body[weight,height,eyes-colour,defects]
    family[gentree,parent,child,son,daughter,
          grandSon,grandDaughter,granMa,granPa]
    emotion[love,hate,satisfaction,frustration,agression,enjoyment,anger]
    psychComplex[fear-of-insupport,regression,inferiority,persecution]
    habit,hobby,profession,
    health[measures,physical-examinations,illness-history],
    role[advisor,consultant,manager,patron,partner,customer,
         supervisor,participator,owner,supplier,
         user,analyst,designer,programer,operator] <!plus 'role' in kernel>    ,
    appearence depends on,assisted by,belongs to,matched/matches,
    relations<!plus relations  in kernel>
    relates to <family-members>used by,uses,not used,misused,abused,
    state[active,inactive,dormant,suspended,aborted,idle,lost,dead,
          homeless,retired,married/divorced/single,ignored]
    place[point, area,everywhere,nowhere]
    life-space[psychological,social,educational,professional,financial]
    behaviour<!flow of processes of the object >
    behaviour.rational[selfrealization,need,satisfaction]
    behaviour[marriage,friendship,career,ilness,aging]
    genotype,fenotype
    olh:=[birth,aging-curve,social_events,health_illness-events,
          educ-events,job-events,critical_events,death]<!object-life-history
</def>
<def body sensors>
{[sight(eyes),sounds(ears),smell(nose),taste(tonque),touch(skin),pressure,itch,
          temperature(thermoceptor), body-position(muscle_sensors),muscle-tension(muscle_sensors),
          balance(innerear),blood-acidity,pain(nociception),body-awareness(proprioception),
          blood-hormones&drugs(chemoreceptors),magnetoreceptor,time-receptor]}
</def>
```

---

3 Lowen[44] introduced the concept of grounding that describes contact with reality and level of security. A grounded person is a person who is able to respond to external situations in a mature and situationally appropriate manner. So groundedness is the ability to stand on one's own feet and experience foot contact with the ground. It turns out that the intensity with which we touch the ground reflects our contact with reality. There are two types of grounding: grounding in the body and in space. Grounding in the body means that we are in contact with every part of our body, grounding in space is precisely the confidence with which we stand, walk and touch the ground.

```
<def  self>
      { self-recognition[self-identity,self-assesment,self-sentiment,self-esteem,
            self-regard,self-reliance,self-control,self-security,self-image,self-extension,self-structure]
        self-inside[thought,perception(reality/illusion,like/dislike,efficasy,aim,..),evaluation]
            <!A self-efficacy refers to feelings of adequacy, efficiency, and competence in coping with life.>
        self-aim[rational(selfrealization,need,satisfaction,selfsecurity),regressive])
        leadership[assertive,creative,facilitative,independent,
                    stable,permissive,leadership(Style,Potential]
        ability[toughMinded/openMinded,creative,fast/slow,
              toleratesDisorder/perfectionistic,grounded/abstracted,
              improving own learning,problem solving, IQ, ......]
        need[biological(food,medical,emergency,rescue, coping),
            cultural,psychological(love,esteem,selfrealization),social(freedom,..)
            financial,security]
       }
</def>

<def> cluster<!GlobalFactor estimated on the base of several particular factors>
        cluster[self,profile/type,attitude,leadership,ability,
                extraversion,anxiety,independence,healthState,
                lifeStyle,creativePotential,happiness,BipolarPersonality]
        self[self-identity,self-assesment,self-sentiment,self-esteem,
            self-regard,self-reliance,self-control,
            self-image,self-extension,self-structure]
        leadership[assertive,creative,facilitative,independent,
                    stable,permissive,leadership(Style,Potential]
        ability[toughMinded/openMinded,creative,fast/slow,
              toleratesDisorder/perfectionistic,grounded/abstracted,
              improving own learning,problem solving, IQ, ......]
        need[biological(food,medical,emergency,rescue, coping),
            cultural,psychological(love,esteem,selfrealization),
            financial-resources,security]
        BipolarPersonality[
            Warmth(reserved/warm)
            Reasoning(concrete/abstract)
            EmotionalStability(emotional/stable)
            Concillation(concillatory/aggressive)
            Dominance(deferential/dominant)
            Liveliness(serious/lively)
            Openness(extraversive/introversive)
            Tension(relaxed/tense)
            Rule-Consciousness(expedient/rule-Conscious)
            SocialBoldness(shy/socially-bold)
            Sensitivity(utilitarian/sensitive)
            Vigilance(trusting/vigilant)
            Abstractedness(grounded/abstracted)
            Privateness(forthright/private)
            Apprehension(self-assured/apprehensive)
            OpennessToChange(traditional/open-to-change)
```

Self-Reliance(group-oriented/self-reliant)
Perfectionism(tolerates disorder/perfectionistic)
        </def>

</def >

<def>BRAIN
{**brain**[forebrain,midbrain,hindbrain]
   forebrain[thalamus,hypothalamus),basal-ganglia(caudate-nucleus,putamen,globus-pallidum),
          cerebral-cortex]
   midbrain[tectum,colliculus(superior,inferior),tegmentum,substantia-nigra]
   hindbrain(brainstem:reptilian-brain,cerebellum,medulla,pons)
   brain-area[cortical-region,subcortical-region,nucleus(clump/layer)]
   cortical-region[primary-visual,entorhinal,inferior-temporal,orbitofrontal,
          lateral-prefrontal,inferior-parietal,..]
   subcortical-region[thalamus,globus-patlidus,putamen,substantia-nigra,corpus-striatum,..]
   cerebral-cortex:neocortex[lobe(frontal,parietal,occipital,temporal)]
   functional-cortex-area(visual,sensory,tactile,auditory, ..)
   somatosensory-system[subsystem1(touch,pressure,pain,tickle,itch,vibration,temperature,
          proprioception,kinesthesis),subsystem2(sight,hearing,taste,smell)]
   multifunctional-cortex-area
      [limbic-system(amygdala,hippocampus,hypothalamus,septum,cingulate-gyrus)]
      A limbic system is involved in the regulation of emotion, but affective processes spread out
      also on ventromedial regions in the prefrontal cortex.

  neuron{
   [soma-nucleous(perycarion(Golgi-apparatus,tigroid,mithochondria)),membrane,cytoplasm,vesicle),
    myelin-sheath,schwann-cell,axon(hillock,initial-segmenty,body,myelin-layer,telodendron),dendrite],
     #active-synapse(*<connections>*), »« synapse(excitatory,inhibitory)
    activity-level(input,trigger,conduction,fire-output) *<!actual function of neuron>*
    input(electrosignal,chemical-pharmacological,natural-signal(light,sound,pressure),..)]
    form(multipolar,bipolar,unipolar),creation-type(primary,new-born,»mirror[4])]}
    function-type(motor,sensory,interneuronal,..)

 brain-basic-function[sensory(vision,hearing,smell,touch,...),
         motor(eye-movement,voluntary-movement, ..)]
 brain-mental-function**{**
  mental-basic-function**(**association,speech,emotion,language-comprehension,coordination,...),
  mental-complex-function[consciousness(self,..),cognitive-activity,wisdom,intuition,.].
  cognitive-activity(attention-coordinating,decision-making,movement-selection)
  mental-hidden-function(intuition,premonition,..)}
  engine[thinking,emotions,info-retrieval,memorizing,communication,...]
  communication-signal[(electrical,magnetic,electromagnetic(photon,..),chemical,natural)]
  communication-layer(single,multichannel)

4"copy" from outside (during communication with another person)

<spec>**BN- biological-network**

{int-comm[(**Σ**,Θ,μT,Ω),biochemical,species-interactions,.)

<! Internal communication(**Σ** *neural network*,Θ *gene-network*,μT *cellular microtubules network*,Ω *peptide network*)>

    biochemical(metabolic,protein,gene,..),

    species-interactions(food-web(prey,predator)),host-parasite networks),

    space-interactions(intracell,regional,multiregional,dispersed,....)

    regulatory-biomolecules(enzymes,proteins,...)…

    micro-part[neuron,synapse,receptor,unpaired-electron,neurotransmitter,glia-cell,

                microtubule,MAP:microtubule-associated-protein.]

              <!microtubules are in dynamic turnover state, subject to treadmilling and dynamic instability>

    quantum-stream[cellular-microtubules(photons,unpaired-electrons,…)

    quantum-actions{[cell-actions(motility,mitosis,intracellular transport,.)]}

</spec>

<spec>***Selected neural networks***

  <! • located in , Σ neural network, Q quantum network, Ξ layer, ¥ output , Φ function>

  neural-networks(corpus-callosum,visual,memory,basic-functions,retina,language,social,..)[5]

    [nerve-tracts(commissural•*corpus-callosum*,association•*hemisphere*),

             projection(cortex <=> subcortical structures)]

   Σ/Qcorpus-callosum[Ξ/≈left-cerebral-hemisphere <=> Ξ/≈right-cerebral-hemisphere]

       <!essential for integration of cognitive and emotional functioning>

   Σvisual[Ξretina(Ξphotoreceptors,Ξ interneurons,Ξganglion-cells)

       ≡> Ξthalamus(messages) ≡> Ξvisual area •*occipital lobe*]

     <! puts together the color, motion, orientation, depth information to "see" the image>

   Σmemory(Ξhippocampus<=>Ξparahippocampal)

   Σbasic-functions(Ξmedula<=>Ξspinal-cord) *<!swallowing,heart rate,breathing>*

   Σsocial(Ξmedial-prefrontal-cortex<=>Ξposterior-superior-temporal-sulcus)

   Σlanguage{left-hemisphere[lobe(temporal,occipital,parietal) ≈convergence(auditory,visual,sensory)]

    ¥≡>(wernicke's-area,broke's-area,..) [right-hemisphere ≈feature-of-speech(emotional,prosodic)]}

   Σmotor/muscles[6]{primary-motor-cortex[tract(dorsolateral:pyramidal,ventromedial)] ≡> spinal-cord}

   Σspatial-attention(posterior-parietal-cortex,frontal-eye-fields)[7]

   Σface-recognition(middle-cortex, temporal-cortex)

   Σself(posterior-cingulate-cortex,medial-prefrontal-cortex,inferior-posterior-lobe)[8]

   Σconsciousness(?posterior-cortex/?prefrontal-cortex/?thalamic-reticular-network)

   ΣRAS[Ξspinal-cord(reticulospinal tracts) <=>Ξ(hypothalamus.brainstem)]

   <!RAS:Reticular Activating System- functions(autonomic,motor,sensory,behavioral,cognitive,mood-related)>

 </spec>

</def>

 </def HSL>

<spec HUMAN(John Example)><! simplified specification>

---

5   some of widely known brain neural networks.

6[14]

7[15]

8[16]

        sex=male,state(retired, active),
        family=(married,#9,parent of 3, grandfather of 6)
        cluster.self=average
        ability(openMinded,creative,fast,abstracted)
        need= selfrealization
        temperament(emotional,sensitive,introversive,tense,reserved)
        IQ=> http://www.iq-test.com/
</spec>

V. OSL-S FOR SYSTEM

Subset OSL-S is dedicated to IT system specification and is oriented on the free structured design aimed to making adaptative software for ill and well structured problems. The essense of this approach is a creation of the library of building blocks, tuning them and assembling into application packages according to actual needs of users. So this method prefers bottom-up aproach but the integrity is provided by good specification of objects and problems (made mainly by top-down approach).

One way to build flexibility is designing skeletal programs that have standardized (but multifunctional) control flow and are equipped with many "modifiers" that should be tuned before use. The tuner may perform such operations as inserting data names and parameter values, choosing entry points, generating CALL statements, generating empty modules (driver or stub type), inserting expressions into macrostatements and invoking database schema.

There are following steps in a free structured design:
1. specification of objects (conceptual level)
2. preconstruction – creating of building blocks library (physical level)
3. problem driven design – problem decomposition of up to the tuning requirements and
   assembling them at logical and physical levels
4. making the software package which meets the problem requirements (physical level)
5. iteration (1-4 steps) – and adaptation according to changes in the problem.

<def SSL>
<**def subject** itSYSTEM>

 itINFR[servers,operSystems,applications,transDataBases,dataWarehouses,
        clouds,networkMgtSystem,users,prLanguages]
 <NAME>[SYSTEM.subsystem.module.program.pr-block]
 pr-block<!building block,generic program/subprogram>
 kwords[version,interface,run,runTime,integrated,standalone,inDevelopment,accepted,
        notAccepted,library,creatDate,updDate,tested,rejected,pcode,ecode,callValue,
        trace,errorCode,inItems,outItems,flow,read-only,cloud]
 trace[path,callValue,outValue,errorCode]
 process[trigger,action(<events>),endEvent]<!when process is invoked simultaneously by many
 programs each instance is recognized by pcode, each event by ecode>

<def program (name)>
     object.Info[pr-name,version,author,creatDate,updDate,prLanguage,operSystem]
   <def control-flow>

```
        refers to <flowchart-name>
        activated  by  <program/procedure-name> with
       <initial-value> at <time-point > when  <condition>
        finished at (< time-point /no-of-repetition>,<date>)
        runs for  (<time>,<time-intervals>,for-query)
        with  <value/output> when <condition>
        condition [forAll,forFirst,forLast,for#]
    </def>
</def>

<def PR-BLOCK(name)<!reenterable ProcName)>
    objectInfo[name,version,author,updDate,codeSize,prLanguage,operSystem]
    resources[dataBuffer,eventTrace,stackHandler]
  <def  flow>
        call
      ac(verif)  <!verification]
         ev(checkPassword,callVerif)
            when callVerif  failed exit
       ac(initial) when first call
          ev(bufferDecl,stackDecl),
      act(tuning)
         ev(paramAnalysis,transform,generateExecutable)
      ac(activate)
         ev(paramAnalysis,tuner),
      ac(run)
          ev(load,perform,releaseResources,exit)
       </def>
     <def interface>
      <!at run-time interface retains an actual  state of resources  for each call>
        call[<callingName>,<calledName>,<tunerName>
           <password><!optional>,<entryPoint>,
          (<parameters,modifiers>),inItems,outItems]
      </def>
  </def>

<def  IT.TEAM>
   member[user,analyst,designer,programmer,tester,consultant,team-leader]
    member.requirements[perceptive-listener,
                         communication-skills,strong-interest-in-job,
                         persistent,having-stamina,disciplined,creative,open-minded]
</def>
```

VI   OSL-B   OSL FOR BUSINESS

Subset OSL-B named **BSL** (Business Specification Language) is   focused on business objects. There are many businesses. The widest spectrum of activities exists in   manufacturing industry. In [4]   are specified six main flows: material, energy, ,orders,finance, human resources and information. Information flow links all streams giving   the overall picture of enterprise.

Banking belongs to very complicated business if taking into account not only simple products like accounts, deposits and loans but also derivatives, forex, flow cash projection and risk management.

In our specification we present some sections of this activity for illustration only. The full specification should contain also such objects   as headoffice, branch, channel of product delivery, many products and types of transactions, executive operational objects, like account manager, teller, dealer and IT infrastructure.

<**def BSL**>

BUSINESS[BANKING,INDUSTRY,TRADE, SERVICES]

<**def subject** BANKING>

BANKING[RETAIL,WHOSALE,UNIVERSAL,MONEY-MARKET,DERIVATES,SHARES]
<def ENV>
    bank.id(BIC<!Bank Identification Code>,
    account.id[IBAN<!International Bank Account Number>,delivery-channels)
    itSystem(<system.subsystems.modules>)
    dataTables[Libor,OperatingCurrences,ExchangeRates,
   delivery-channels[internet-accounts(computer,smartphone,iTV),phoneline,branch,ATM]]
</def>

kwords[customer.id,account,listAccount,accountCurrency,creationDate,cashFlow]
     fTrans<!financial-transaction>,fTransLimit]

problem[capital-assets-level,new-product-demand,customer-satisfaction]

<**def** BANKING.retail>
     retail.product[currACCOUNT,DEPOSIT,LOAN]

<**def subject** BANK>
     object.Info[BIC,country,bCurrency<!base currency>,
              FinancialYear,#branches <!number of branches>]
     dataTables[corrBanks,Branches,calendarWorkingDays,
              bkAccountChart,productList,interestRateTable]
     kwords[branchNo,idCustomer,accountNo,rate,balance,balanceSheet]
     OperationalObjects|teller,accountMgr,customerMgr,productMgr,trader|
     Bank.objects[product,currency,limit,account]
     limit[country,industry,customer,currency]
     cluster[profit-rate,growth-rate,competitiveness]<!Global factors for subject>
     iObject[customerPosition,monthlyBalancesheet]<!for each customer>
     typeBank[dmBank<!domestic>,frBank≡><!foreign>,corrBank≡><!correspondent>]
     bkAccount[bsAccount<!balance-sheet>,nbsAccount<!nonbalance-sheetAccount>]
     batchOperations[eodOperation<!at end of day>,eomOperation<!at end of month>,

eoyOperation**<!**at end of year>,eopOperation<!at end of product>]

<def currACCOUNT><!current account>
    objectInfo[Account id,owner,co-owner,minBalance,actualBalance,historyStatement]
    Relates to idCustomer
    rtTrans[Open,Quit,Cash-in,Cash-out,transfer]<!real time transaction>
    eomOperation[monthlyStatement]
  </def>

  <def CUSTOMER>
    Belongs to <customer-segment> evaluated by dataMining/neural-network
    listAccount:(<list of accounts>),
    LOAN activated when accepted,
    customerPosition(#account,cashFlow,overDrafts)
</def>
 </def subject>
 </def Banking.RETAIL>

other areas in a business:

<def AREA(INDUSTRY)><!to be defined>
   <!objects, material flow,energy flow,order flow,
    financial flow,information flow,HR>
</def>
<def AREA(TRADE)><!to be defined>
   <!objects, services flow,
    financial flow,information flow,HR>
</def>
<def AREA(SERVICES)><!to be defined>
   <!objects, services flow,
    financial flow,information flow,HR>
</def></def bsl>

 <**spec** Banking.RETAIL(WelcomeBank)<!basic-info- example>
    BIC=ALBPXLPW
    customer.**id=XXXXXXX**
    current.account.**id**=PL 99 9999 9999 9999 9999
    owner=John Stale
    co-owner=Jane Stale
    baseAccount.currency =USD
    creation.date=.<...>
    transaction-limit=<...>
    info.set(account) <balance and list of transactions for each account>
    info.set(products)<list of accounts>
    info.set(channels)<branches used,echannels used>
  </**spec>**

VII. CONCLUSIONS

The scope of this paper covers conceptual and physical modeling of the complex object (system) including the interfaces between a system and its environment and psychological factors concerning its interfaces with humans.

OSL is a language for defining the „object-world" in terms of the structure, behaviour and relations. An interesting feature of it is modeling using GSO (Geometricallly Structured Objects).This universal language can be used for specification of business, IT systems and any other area.

OSL-S (OSL for System) may document core features of IT system before, during or/and after design and - if implemented with supporting software - would be a tool of ASF (Automatic System Factory). It mentions a way how to create systems with variable structure using a library of tuneable blocks - in this case could be a "hybrid" solution both for the specification as well as for execution.

OSL-B (OSL for Business) may cover variety of businesses in terms of information flow, procedures, products and financial flow.

OSL-H (Human Specification Language- HSL) would be useful as notation of full specification of people for HR services in terms of precise search of specialists with certain psychological characteristics.

Implementation of OSL requires to build dictionary of keywords and phrases, database of objects, application programs generator, tools for converting geometrics and relations to graphics to present overall picture of relations between objects.We assume that presented here a conceptual (non-grahical) view may be easily applied in each stage of system analysis and design.

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