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OSL - Object Specification Language (v.3b)

Abstract

OSL© is a markup descriptive language for a simple formal description of any object in terms of structure (including new one called "geometric") and behavior. In this paper we present a kernel and subsets for IT system, business and human-being.

Keywords

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

I. INTRODUCTION

OSL is dedicated to present the various structures of objects, their relations and dynamics (events, actions and processes). This language may be counted among markup languages. The fundamentals of markup languages were created in SGML (Standard Generalized Markup Language) [W1] descended from GML (name comes from first letters of surnames of authors: Goldfarb, Mosher, Lorie, later renamed as Generalized Markup Language) developed at IBM [W8].

Markups are usually focused on:

- documents (tags: title, abstract, keywords, menu, footnote etc.) e.g. latex [W7],
- objects (e.g. OSL),
- internet pages (tags used in html, xml – based on SGML [W1] rules),
- data (e.g. structured data markup: microdata, microformat, RFDa [W5],YAML [W4]).

A markup is an annotation (tag, label) that is syntactically distinguishable in the contents.

There are several types of markup:

- 1.descriptive markup used to label parts of the document written in LaTeX, HTML (Hypertext Markup Language) and XML (Extensible Markup Language),
- 2.presentational markup in form of hidden binary codes embedded within document text and dedicated to produce the WYSIWYG effect.
- 3.procedural markups e.g. names of macros or subroutines to be invoked by program,
4. factual markups that are integral part of contents e.g. phrases of OSL

Specification languages differ in many ways (notation, scope, presentation etc.).

OSL is nongraphical conceptual language so it is very different from such diagrammatic language as Unified Modeling Language UML[W3] even if UML is enriched with textual Object Constraint Language (OCL) [W4]. We have no objections against graphical visualization - it could be assumed that diagrams and geometric figures could be generated from OSL expressions at the implementation stage using tools like IDL [B3].

OSL has been built as open and flexible. 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".

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. Profile 2 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).. These profile 2 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 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 pilots call 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.
3. Free space means unstructured or with no rules of structuring.
4. Tunnel is three-dimensional population with the value X (e.g. the sum of credits) along the time Y and densed according 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 could 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. Darkbox is a place for a dark (or hidden) information.
9. Cloud means an external container equipped with secure gate to enter it.
10. Neural networks are networks of interconnected layers and nodes, which process information as a response to external inputs using methods unavailable in traditional calculations.
11. Fractals
 - a) fractal geometry in multifractal stochastic volatility models that work in the context of dynamic turbulence used for example for modeling market fluctuations. [B4].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.

II. OSL NOTATION ¹

@	mark of special attribute	@dark	unknown, to obtain, to discover
<!...>	comment	ppppXxxx	item Xxxx with prefix 'pppp'
< >	container	UUUU.xxxx	xxxx belongs to UUUU
⇒	link to outside	& /	conjunctions 'and' 'or'
<def> </def>	start-end of definition	<-> or ↔	bidirectional passive unary relation 1:1
[..] or {...}	list of assigned items	-> or →	forward unary passive relation
(..)	list of items	<=>	many to many active relations
xxxx(..)	name of list	<=	backward active relations
:	equivalent name	=>	forward active relations
<i=> <i= =>	Intrusive relations ²	u↔ u→ ←u	undefined relations
=	value assignment	..	more
::	belongs to	...	much more
#	number of	?	to be verified
Σ	Networks	ΣΞ	Multilayer-networks
Π	Hierarchic structure	Ψ	Upside-down hierarchic structure

III. OSL KERNEL

The kernel contains phrases and keywords common for all areas and environment. Subset defines ones specific for a given area.

<def OSL>

<def ENVIRONMENT: ENV>

¹ notation and kernel of this version differ considerably from ones published in [A3].

² relation associated with compulsory change

```

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>

<!object definition>
<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>},
  sObject[noiseReduction,selfTeach,selfRepair,selfKill,selfRestore,selfRestart],
  oObject<!open object>,
  oObject[tuning(input(parameters,data),output(info,messages),
    structure(addComponent,addRelations))]
  incObject<!incarnation of object>,
  binObject:BINDER<!collection of integrated objects>,
  copyObject<!copy of object>
  probObject: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>
  involvedObject[(list of objects) when <condition>]}
</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]

<!Object interactions-relations>

Types of relations[dynamic(thru processes, actions, events),
-structural (whole, component),(active(intrusive,accepted),passive)

relations[role,relation,relator]

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

relation[activated by,activates,assisted by,built from ,
appearance 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,
existence depends on,exists when/in/for,
included in,linked to ...by/links,
refers to,relates to,related by affinity,
represented by/represents,involved in,
shared by/shares,used by/uses]

relator <!maker of relation>

relator(marriage,employment,.....)

relation:[<item1><phrase><item2><!item1 may be assumed as defined before>

relation{[singular,iterative(standard,recursive)],[sequential,parallel(many-data_sources),mixed]}

<! if not specified – singular and sequential are assumed>

<!iterative but not necessarily approximative

<!iterative normativ – result of each iteration is taken>

<!iterative approximativ – final result is taken - for example when teaching of neural network>

state[active,inactive,dark,dormant,suspended,aborted,
variable,invariable,idle/waiting,lost,expected,deleted,homeless]

status[generic,real,virtual,undef ined]

reactor[acceptance,rejection,constructor]

rank[critical,necessary,most wanted,optional,worst,best]

rule[decision-table,when-if,formula].

layout[shape(gProfile1),gProfile2,sparcity,density,variability]

<def gProfile1><!standard-geometric profile>

[free-space,swarm,bunch,network,neural-network,hierachy,line,triangle,tunnel,
curve,spiral,spring,ellipse,cylinder,sphere,ellipsoid,con,doublecon,prism,
fractal,fractal networks,squarepiramid,container,blackhole,wormhole,cloud,darkbox]

<def spiral>

```

spiral[single-strand,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>

spring<!simple iteration>
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 neural-network>
neural-network.category[biological/artificial]
neural-network-layer.type {[singlelayer(perceptron,adeline),multilayer],
    (feedforward, recurrent)}
neural-network-specific-type
    [convolutional,learning vector quantization neural network ,
    fuzzy neural network,gaussian-kernel & radial basis function neural network
    bayesian logistic regression neural network,gamma dynamic neural network,
    finite impulse response neural network,hopfield, ... ]
neural-network.parameters[layers(input,intermediate,output)(hidden/visible),
    connection-between-layers(backpropagation,...),variables,expected-values,
    weights,rules-for-modifying-weights,learning-method(supervised,unsupervised)]3
</def neural-network>
</def gProfile1>

```

³We show here some basic features of neural networks to show OSL capabilities. An extended specification of it is a task for experts.

```

<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(standard,recursive),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>
  script<!script 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 (systems). A subset is similar is a shell assigned for a group of users allowing them to use its own commands and keywords.

IV. 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 essence 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 approach 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>

keywords[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 pr-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>
```

V 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 [B1] 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,OperatingCurrenecs,ExchangeRates,
  delivery-channels[internet-accounts(computer,smartphone,iTV),phonenumber,branch,ATM]]
```

```
</def>
```

```
keywords[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]
  keywords[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(IndustryBank)<!simplified 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>
```

VI. OSL-H OSL FOR HUMAN

Subset OSL-H named **HSL** (Human Specification Language) is a semiformal notation for a human being and may be a tool dedicated to 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 and medical professionals.

Human being is the most important object of system and himself may be treated as an “open system which maintains a constant state while the matter and energy which enter it keep changing” [B2 p11]. 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. Particularly it could be useful to form well collaborating teams in process of system analysis, design, programming and implementation.

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) [W10].

<def HSL>

<def subject HUMAN>

class1[animals.mammalia.primates.homidae]
class2[nation.ethnic-group.profession.person]
keywords[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]
sex=(male/female/x)
body[(brain,liver,kidney,joints,..) weight,height,eyes-colour,defects]

mind[wisdom(thinking,reasoning,learning,recognizing,communication-skill),
knowledge,...)]

<!mind is an informative object i.e. the flow of information through the nervous
system and can be conceptually separated from the brain which is biophysical matter>.

interfaces(BCI-id, BMI-id) <!Brain Computer Interface,Brain Mind Interface>

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> ,

appearance 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> 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,Reasoning,EmotionalStability
Concillation,Dominance,Liveliness,Openness,
Tension,Rule-Consciousness,SocialBoldness,
Sensitivity,Vigilance,Abstractedness,
Privateness,Apprehension,OpennessToChange,
Self-Reliance,Perfectionism]

</def>

```

<def> BipolarPersonality
  Warmth(reserved/warm)
  Reasoning(concrete/abstract)
  EmotionalStability(emotional/stable)
  Concillation(conciliatory/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)
  Privatness(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>

```

```

  brainId(personId &/biologicalId,type)

```

```

  mainpart[forebrain(cerebrum(hemisphere,thalamus,hypothalamus),midbrain,hindbrain]

```

```

  area[cortical-region,nucleus(clump/layer)<!region of gray matter> ]

```

```

  part[cerebral-cortex,basal,dienceph,brainstem,cerebellum,hippocampus,spinal-cord]

```

```

  cerebral-cortex {lobe[frontal,parietal,limbic,occipital,temporal(hippocampus, ..)]}

```

```

  cortical-region[primary-visual,entorhinal,inferior-temporal,orbitofrontal,
    lateral-prefrontal,inferior-parietal,..]

```

```

  cortex-functional-area[visual,sensory,tactile,auditory, ..]

```

```

  detail-part[neuron,synapse,receptor,unpaired-electron,neurotransmitter,glia-cell,..]

```

```

  neuron {[nucleous(mitochondria,membrane,cytoplasm,vesicle,perycarion),
    myelin-sheath,schwann-cell,axon,dendrite],

```

```

    input(electrosignal,chemical-pharmacological,natural-signal(light,sound,pressure))}
    form(multipolar,bipolar,unipolar)}]

```

```

  brain-basic-function[sensory(vision,hearing,smell,touch,...),

```

```

    mental(association,speech,language-comprehension,coordination,...),

```

```

    motor(eye-movement,voluntary-movement, ..)

```

```

    hidden(intuition,premonition,..)]

```

```

  brain-complex-function[consciousness(self,..),cognitive-activity,wisdom,intuition,..].

```

```

  cognitive-activity(attention coordinating,decision making,movement selection)

```

```

  mapping[engine → view, view => engine]

```

```

    view {natural[electrophysiological,biochemical,psychophysical,..]

```

```

      conceptual(semantic,psychological,mathematical,ontological,..)}

```

```

    engine[thinking,emotions,info-retrieval,memorizing,communication,..]

```

```

  communication[c-layer[stream[message(carrier,protocol,pattern),signal]]]

```

```

  signal(electrical,chemical,natural),communication-layer(single,multichannel)

```

```

  neurotransmitter(acetylcholine,glutamate,y-aminobutyric-acid,glycine,..)

```

diseases[general(mild-cognitive-impairment,alzheimer,parkinson,tourette-syndrome,
stroke,concussion,delirium,atrophy,obsessive-compulsive disorder,..)
hypothalamic(bulimia,anorexia-nervosa),
severed-corpuscallosum(split-brain), ..]

<!split-brain: two personal identities: one in the left hemisphere and one in the right)

</def brain>

view[active/passive (biological,chemical,energetic,geometric,physical,medical,
logical,semantic,psychological,mathematical,ontological)]

<!active view is based on brain neural-network>

engine[thinking,emotions,info-retrieval,memorizing,intuition(trust,love,hate),
communication,total,.....]

emotionEngine => psychologicalView

emotionEngine[Lob.frontal(electrode-placements/neural network-area)]

*psychologicalView[love,hate,satisfaction,frustration,aggression,enjoyment,anger,
fear of insupport,regression,inferiority,persecution]* </def>

totalEngine => medView

totalEngine(brainArea/neural network-area,disease-pattern)

medView(disease(neurodegenerative,neurological,..),injury)

neurodegenerative(dementia/alzheimers,parkinsons,huntingtons,..)

*neurological(autism-spectrum,tumor,migraine,multiplesclerosis,epilepsy,
stroke,..)*

medView <=i> <brain-area> <!intrusive relation – treatment>

<treatment-method>BCI(name) <specification><BCI-Brain Computer Interface>

totalEngine =>/ → ontologicalView

totalEngine(brainStructure,brainContents)

*ontologicalView(brainId,brainAging(neurons(dead,born)),diseasesHistory,
brainVolume(curve,..),brainUsage)*

totalEngine =>/ → energeticView

totalEngine(brainStructure,brainContents)

energeticView(brainId,power-consumption vs aging,power-supply-disturbances)

<def **BCI-COMMUNICATION**>

bci.resources(bio-neuralnetworks(simulator/emulator),medDevices/comp/bio-hybrid-comp,...)

<! medComp could be universal computer with medical functionality>

bci.category[basic,hybrid(<bci-1>,<bci-2>,...),advanced]

bci.hybrid(multi-brainpatterns,multi-sensory-stimuli,multi-modal-signals,multi-intelligent.).

<def **basicBci**>

structureBci[SourceObject,stream(message), ReceivingObject]

SourceObject[personId[cortical-region[layer]/electrode-placement-code]]

ReceivingObject[medical-device /& computer]

{stream(<source><receiver/device>,[message[signal[impulse]],flow-type]}

```

    parameters[standard(type,id, encryptionCode,securityCode,timeStamp)
        extended(timeInterval,duration,populationShape,dynamics,dispersion,
            measureUnit,accuracy,disturbance)]
        trigger(event/ERP,time,demand, )...}
<!stream is one/multi-channel collection of messages directed to one receiving device>
<!message is one-channel sequence of signals issued at a given time >
<!signal is a set of electrical impulses that flows on groups of active neurons >
message[cp,data]<!cp:comm:communication protocol>
signal(EEG,MEG,fMRI,NIRS,EOG,EMG,sEMG,ECG,EcoG,..)
signal-type(magnetic,electro-magnetic,electrical,chemical,fluid/blood-flow),
signal.Electrical(potential(SCP,ERP(P300,..))
cp(tcp/ip,udp,i2c,spi,can,hart,ethernet,wifi,rf,bluetooth,nfc,satellite,6lowpan,
    mqtt,zigbee,coap,z-wave,uart,modbus,device-embedded, BCI-p,...)
flow {type[cerebral-fluid,cerebral-impulse,blood-flow,...]
    activated/triggered by <.> with <value> at <time-point>/when <condition>
    finished at <> with <...> when <.> } </def basicBci>
<def advancedBci>
[engine-view-mapping,intrusion,ext-cp <!extended communication protocol>]
mapping(<engine => view> /& <view →engine>,intrusion)
    <! engines and views should belong to the same person>
intrusion(actions => <brain>)
    <!active mode( => <=> <= )    passive mode( → ↔ ← )>
view[active/passive (biological,chemical,energic,geometric,physical,medical,
    logical,semantic,psychological,mathematical,ontological)]
    <!active view is based on brain neural-network>
engine[thinking,emotions,info-retrieval,memorizing,intuition(trust,love,hate),
    communication,total,.....]}
</def>
<dev DEVICES>
type[medDevice /& medComp],id,name,
signal-aquisition-method,comm(embedded,external),software(embedded,external),
technical-info(manufacturer,first-instal-year, wear%,configuration-settings,
    reliability(OEE (MTTF,MTBF,MTTR),operating-instruction/protocol ...),
medical-info[diseases,effects(direct-effects,side-effects..),contraindications,
    precautions,patient-state(before,after)],
risk-of-use(risk-classes),conformity(directives-standards,technical-requirements),
signal-aquisition-method[sensor(electrode(type),chip,...),
    invasive/semiinvasive/noninvasive),
    cortical-region/point-of-contact/placement-code],
medDevice.function(recording,diagnosis,monitoring,treatment,alleviation,...),
medDevice-category[stationary,mobile,
    linked-stand-alone(touch,cable,bluetooth,wifi,internet)],
medDevice[triggered-by(event,time,demand, ...),link-mode(<=>,<= ,=>,<←,→ )],
mobile-medDevice[smartphone,wearables(smartwatch,smartband,headset,...)],
stationary-medDevice-name(EcoG,EEG,fMRI,fNIRS,INR,MEG,PET,MRT, ....),
embedded-software(pacemaker,noise-artifact-removal, frequency-filtering, ...),

```

```

    potential(ERP(P300..),SCP,TTD,...),
    noise-artifacts(movement-related,eye-blinking,heart-related,...) ,
    medComp(super-comp,mini-comp,micro-comp,bio-comp,bio-hybrid-comp...)
</def Devices>
<def BCI communication>
</def brain>

<def IT.TEAM> <!this definition may be a part of OSL-S>
    member[user,analyst,designer,programer,tester,consultant]
    member.requirements[perceptive-listener,communication-
        skills,strong-interest-in-job,persistent,having-stamina,
        disciplined,creative,open-minded]
</def>
</def HSL>

```

VII. CONCLUSION

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

OSL is a factual markups language for defining the „object-world” in terms of the structure, behaviour and relations. An interesting feature of it is modeling using GSO (Geometrically Structured Objects). This 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 - would be a tool of ASF (Automatic System Factory). It shows a way how to create systems with variable structure using a library of tuneable blocks. So in this case OSL 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) would be useful for HR services in terms of precise search of specialists with certain psychological and professional characteristics.

Implementation of OSL requires to build dictionary of keywords and phrases, database of objects, 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) geometric view may be more accurate and flexible in many cases.

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Post Scriptum.

This paper is published to encourage any person or research institute to continue the OSL project towards the implementation. This work has not been supported by any organization and may be used under Creative Commons – 3.0 Licence.