Zygmunt Ryznar

HSL - Human Specification Language

(extended version)

Abstract

OSL (Object Specification Language) is a descriptive language for simple formal description of any object in terms of structure and behavior. In this paper we present a human-being as a proof of universality of it. Human Specification Language is a subset of OSL dedicated to professionals dealing with human resources or anyone interested in psychotechnology or in interdisciplinary view, for example, on the computer-brain interface.

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.

Keywords

free structured modelling and design, OSL, object specification, human specification, brain specification.

I. INTRODUCTION

A free structured modelling is a collection of methods, techniques and tools for modelling the variable structure as an opposite to the widely used “well-structured” approach usually focused on top-down hierarchical decomposition. In free approach the system boundaries are not finally defined, because it is assumed as never to be completed and because of that its components may be modified at any time.

OSL is dedicated to present the various structures of objects, their relations and dynamics (events, actions and processes).

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.

II. OSL NOTATION v.simplified [1]

<!...>	comment
< >	phrase
≡>	link to something external (outside area)
<def > </def>	start-end of definition
<spec> </spec>	start-end of specification
<beg> <end>	start-end of section
[..] or {..} [2]	list of keywords, defined objects
(..)	list of items
xxxx(..)	name of items list
XXXX[…]	name of keywords list
=	value assignment
@	mark of special attribute,feature,property
@dark	unknown, to obtain, to discover
::	belongs to
:	equivalent name (e.g.shortname)
#	number of
|name|	executive/operational object
ppppXxxx	name of item Xxxx with prefix ‘pppp ‘
XXXX	basic object
UUUU.xxxx	xxxx object belonged to UUUU object class
& /	conjunctions ‘and’ ‘or’
<->[3] or ↔	Bidirectional unitary relation 1:1
<- or ←	Back directional unitary relation 1:1
-> or →	Forward directional unitary relation 1:1
<=> <= =>	Many to many relations

III. OSL KERNEL v.h

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 the importance of relations by statement “the structure of interconnections and the interactions are often far more important than the parts of system”.

[1] Notation and kernel of this version differ considerably from ones published in [3].

[2] If using Latex editor we suggest [..] brackets instead of {..}.

[3] If typing on keyboard

```
<def  OSL>
     <def  ENVIRONMENT: ENV>
             ENV[regulations, infrastructure:INFR]
             regulations[legalacts,resolutions,decisions]
             INFR[it,org]
             itINFR[networks,servers,opersystems,applications,databases,users,prlanguages]
             orgINFR<!structure of  company/institution>
     </def>
     <def View>
             view[global,conceptual,body/hardware,software,human]
      </def>
     <def  globalView>
            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>
      <def Engine>
               engine[computer-engine(program-tuner,translator,...),human-engine,...]
      </def>
      <def Mapping>
        mapping-machine[view => engine, …]
      </def>

 <!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)>,
                    oObject<!open object>,
                    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>]
                    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,reactor,agent,executor,generator
        locator,executor/performer,initiator,terminator,destructor,
        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,
               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]

 state[active,inactive,dark,dormant,suspended,aborted,
        variable,invariable,idle/waiting,lost,expected,deleted,homeless]
 status[generic,real,virtual,undefined]
 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,circle,elipse,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>]
     elipse[surElipse, edgeElipse]
     cylinder[edgeCylinder,insCylinder:tunnel]
               edgeCylinder<!population on the edge of Cylinder>
               insCylinder<!population inside of cylinder>
     triangle<!ayout 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.type[singlelayer,multilayer,Kohonen,Hopfield,convolutional]
     neural-network.parameters[layers(input,intermediate,output)(hidden/visible),
     connection-between-layers(backpropagation,...),variables,expected-values,
     weights,rules-for-modifying-weights,learning-method][4]
  </def  neural-network>
</def  gProfile1>

<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>
```

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

```
   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>
    script<!script generated   upon the pattern of   behaviour >
    <beg><!sections of  body>
         <beg>
           …..
          <end>
    <end>
  </def  body>
</def  kernel>
```

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”[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. 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”.

```
 <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 BODY[head(brain,...),....]>

  <def  BRAIN>
       brain[[lob,cortical-region],[neuron,synapse,receptor,unpaired-electron,
           neurotransmitter],state-of-health,investigation(MRI,CT,...)]]
       lob[[Cerebral-Cortex,Basal-forebrain,Hippocampus]/
            [frontal,parietal,limbic,occipital,temporal]/
            [Cerebral-Cortex,Basal,Dienceph,Brainstem,Cerebellum,Spinal-cord]
            <!variety of descriptions above>]]
       cortical-region[primary-visual,entorhinal,inferior-temporal,orbitofrontal,
                        lateral-prefrontal,inferior-parietal]
       function[sensory(vision,hearing,smell,touch,...),
                mental(association,speech,language-comprehension,coordination,...),
                motor{eye-movement,voluntary-movement, ...)]
        neuron[[nucleous(mithochondria,membrane,cytoplasm,vesicle,perycarion),
                 myelin-sheath,schwann-cell,axon,dendrite],
                form(multipolar,bipolar,unipolar)]
        mapping-machine[view -> engine]
        view[conceptual,body/hardware,software,human,...]
        human-view[biological,chemical,energic,geometric,physical,
               logical,semantic,psychological,mathematical,..]
        human-engine[thinking,emotions,info-retrieval,memorizing,communication,...]
        communication[layer[stream[message[carrier,protocol,pattern]][signal]]]
                        <!message is recognized by unique pattern of signals
                           between sender and receiver>
                        signal(electrical,chemical),
                        layer(single,multichannel)
                       <(list of messages-between (cortical-regions)>]
                      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>
                          p(pr1,pr2,pr3,….)<!parallel flow of processes>
```

```
                              pr(s(ac1,s(ev1,ev2,ev3),ac2(p(ev4,ev5,ev6),(ev7,ev8,..))<!mixed flow>
                             activated by <..> with <initial-value> at <time-point>
                             when  <condition>   finished at < > with <...> when  <..>
                            <!process(<actions(events))>]
       neurotransmitter(acetylcholine,glutamate,y-aminobutyric-acid,glycine,..)
       state-of-health(health-level,diseases)
       diseases(mild-cognitive-impartment,alzheimer,parkinson,
              stroke,concussion,delirium,atrophy…)
    </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]
       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> 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(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  IT.TEAM> <!this definition may be the 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>

<spec HUMAN(John Example)><!very simplified>
        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>
```

VII. CONCLUSION

HSL (Human Specification Language) would be a metalanguage that facilitates communication between people from very different fields and useful for HR services in terms of precise search of specialists with certain psychological and professional attributes.

Implementation of OSL requires a keywords-phrases dictionary and a database with an extended search facility.

Further development of HSL toward psychology and medicine could be achieved with close collaboration with psychologists and medical professionals.

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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.