DESIGN QUALITY USING THE OO PARADIGM

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“How is it that one system is more effective, appealing, satisfying and/or more beautiful than another to its stakeholder community?”


How is it that one object model is better than another?

What determines design quality in an object model?
defining design quality

**quality** |ˈkwɔːləti| noun
1 the standard of something as measured against other things of a similar kind; the degree of excellence of something: *an improvement in product quality | people today enjoy a better quality of life.*

- general excellence of standard or level: *a masterpiece for connoisseurs of quality | [as modifier] : a wide choice of quality beers.*

2 a distinctive attribute or characteristic possessed by someone or something: *he shows strong leadership qualities | the plant’s aphrodisiac qualities.*

**design** |dɛˈzɪn| verb [with obj.]
decide upon the look and functioning of (a building, garment, or other object), typically by making a detailed drawing of it: *a number of architectural students were designing a factory | [as adj. with submodifier] (designed) : specially designed buildings.*

- do or plan (something) with a specific purpose or intention in mind: *the tax changes were designed to stimulate economic growth.*

**modeling choices** are design decisions!
Quality results from applying quality principles in the choices used to create artifacts
the individual’s experience of design quality

implementation
the assembled artifact’s realization that creates the opportunity for observation

threshold
the point of encounter between the expectation and the system’s features

expectation
the subset of the observer’s mindset (conscious or unconscious) that is specifically relevant to the event

mindset
the “mental picture” the observer brings to the experience within which they will “understand” the experience
The community’s experience of design quality

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What determines design quality in an object model?
The Design Process

Stakeholder Intentions
requirement elements
model elements
design elements

Representational paradigm or Ontology

Resulting Design Elements

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These choice properties propose a coherent, descriptive language including:

- a vocabulary for describing and comparing aspects of system components and structures, and
- design actions to guide design choices leading to desirable system characteristics.
<table>
<thead>
<tr>
<th>Choice Property</th>
<th>Modeling Action</th>
<th>Action Rendition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Stepwise Refinement</td>
<td>elaborate</td>
<td>develop or present (a theory, policy, or system) in detail</td>
</tr>
<tr>
<td>2 Cohesion</td>
<td>factor</td>
<td>express as a product of factors</td>
</tr>
<tr>
<td>3 Encapsulation</td>
<td>encapsulate</td>
<td>enclose the essential features of something succinctly by a protective coating or membrane</td>
</tr>
<tr>
<td>4 Extensibility</td>
<td>extend</td>
<td>render something capable of expansion in scope, effect, or meaning</td>
</tr>
<tr>
<td>5 Modularization</td>
<td>modularize</td>
<td>employing or involving a module or modules as the basis of design or construction</td>
</tr>
<tr>
<td>6 Correctness</td>
<td>align</td>
<td>put (things) into correct or appropriate relative positions</td>
</tr>
<tr>
<td>7 Transparency</td>
<td>expose</td>
<td>reveal the presence of (a quality or feeling)</td>
</tr>
<tr>
<td>8 Composition of Function</td>
<td>assemble</td>
<td>fit together the separate component parts of (a machine or other object)</td>
</tr>
<tr>
<td>9 Identity</td>
<td>identify</td>
<td>establish or indicate who or what (someone or something) is</td>
</tr>
<tr>
<td>10 Scale</td>
<td>focus</td>
<td>(of a person or their eyes) adapt to the prevailing level of light [abstraction] and become able to see clearly</td>
</tr>
<tr>
<td>11 User Friendliness</td>
<td>accommodate</td>
<td>fit in with the wishes or needs of</td>
</tr>
<tr>
<td>12 Patterns</td>
<td>pattern</td>
<td>give a regular or intelligible form to</td>
</tr>
<tr>
<td>13 Programmability</td>
<td>generalize</td>
<td>make or become more widely or generally applicable</td>
</tr>
<tr>
<td>14 Reliability</td>
<td>normalize</td>
<td>make something more normal, which typically means conforming to some regularity or rule</td>
</tr>
<tr>
<td>15 Elegance</td>
<td>coordinate</td>
<td>bring the different elements of (a complex activity or organization) into a relationship that will ensure efficiency or harmony</td>
</tr>
<tr>
<td>Choice Property</td>
<td>Modeling Action</td>
<td>Object Modeling Design Choice Example</td>
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<td>---------------------------------------</td>
</tr>
<tr>
<td>1     Stepwise Refinement</td>
<td>elaborate</td>
<td>employing class inheritance to expose and elaborate responsibilities and information management through levels of abstraction</td>
</tr>
<tr>
<td>2     Cohesion</td>
<td>factor</td>
<td>locating both service and data attributes for independent sufficiency</td>
</tr>
<tr>
<td>3     Encapsulation</td>
<td>encapsulate</td>
<td>delineate the responsibilities, knowledge, and interface of objects</td>
</tr>
<tr>
<td>4     Extensibility</td>
<td>extend</td>
<td>service abstractions that enable and control polymorphic extension</td>
</tr>
<tr>
<td>5     Modularization</td>
<td>modularize</td>
<td>individual and successive applications of encapsulation to compartmentalize design decisions and abstract system structure</td>
</tr>
<tr>
<td>6     Correctness</td>
<td>align</td>
<td>self-validating object interfaces that implement verification behavior</td>
</tr>
<tr>
<td>7     Transparency</td>
<td>expose</td>
<td>structural &amp; behavioral relationships the show “fit” and “cooperation”</td>
</tr>
<tr>
<td>8     Composition of Function</td>
<td>assemble</td>
<td>design favoring simple parts combined for sophisticated function</td>
</tr>
<tr>
<td>9     Identity</td>
<td>identify</td>
<td>stakeholder visible constructs reflected in classes and relationships</td>
</tr>
<tr>
<td>10    Scale</td>
<td>focus</td>
<td>grouping objects &amp; relationships in simplifying wrappers and facades</td>
</tr>
<tr>
<td>11    User Friendliness</td>
<td>accommodate</td>
<td>using user’s terminology and visible topology to maintain a familiarity that invites users into validation and verification</td>
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<tr>
<td>12    Patterns</td>
<td>pattern</td>
<td>nurturing familiarity and empowering evolution through polymorphism</td>
</tr>
<tr>
<td>13    Programmability</td>
<td>generalize</td>
<td>predicting and enabling adaptation of behavior without construction</td>
</tr>
<tr>
<td>14    Reliability</td>
<td>normalize</td>
<td>clearly distinguishing essential elements derived from business rules from artifacts necessary for technological compatibility or platform</td>
</tr>
<tr>
<td>15    Elegance</td>
<td>coordinate</td>
<td>satisfaction from an intuitively obvious design based not on having nothing else to add, but rather having nothing else that can be left out</td>
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design quality across the system models

implementation
software & process architecture

threshold
user interfaces

effectuation
requirements engineering & business rules

mindset
object oriented “systems think”

Choice Property-Driven Design Principles
WALLY, HAVE YOU MADE ANY PROGRESS CODING YOUR MODULE?

PROGRESS IS DIFFICULT TO MEASURE IN THE SOFTWARE REALM.

YOU COULD MEASURE THE LINES OF CODE I PRODUCE, BUT THAT WOULD REWARD INEFFICIENCY.

THE ART OF THIS JOB IS BINDING THE RARE MOMENTS OF INSPIRATION TO KNOWLEDGE AND MACHINES.

IN FACT, JUST A MINUTE AGO I COULD FEEL THE INSPIRATION WELLING UP INSIDE ME.

BUT THEN YOU INTERRUPTED ME WITH YOUR NAIVE QUESTION AND THE MOMENT WAS LOST.

MAYBE YOU SHOULD GO BACK TO YOUR OFFICE AND REFLECT ON THE DAMAGE YOU’VE DONE HERE TODAY.

THERE GOES THE ONE PERSON WHO HAS LESS OF A REAL JOB THAN I DO.
Dogbert is a Creativity Consultant

We don't need any of your "intuition" mumbo jumbo. We need quantitative data!

The only way to make decisions is to pull numbers out of the air, call them "assumptions," and calculate the net present value.

Of course, you have to use the right discount rate, otherwise it's meaningless.

Go away.