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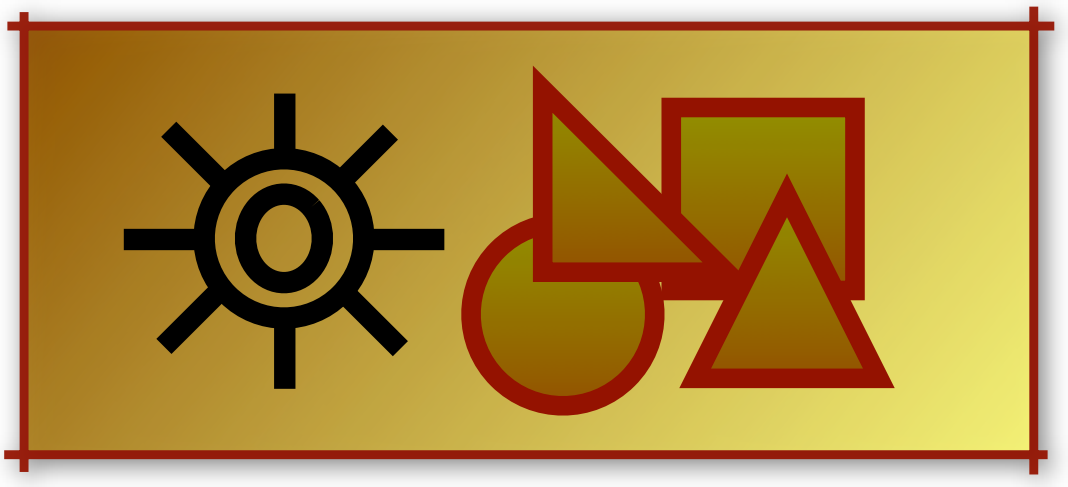
*Project White Paper*
*October 11, 2010*

# MODELING ACTIONS STRENGTHENING LIFE



Leslie J. Waguespack, Jr. Ph.D.

Professor of Computer Information Systems

Bentley University

Waltham, Massachusetts 02154-4705 • telephone: 781-891-2584 • 978-779-5322 • LWaguespack@Bentley.edu

# Achieving Order Through Choice Properties

**Achieving Versus Observing Choice Properties**

None of the fifteen properties can be experienced completely in isolation from all the others. This is also true in assessing the property strength of any particular choice. The properties always combine in the field-effect of choice strength. This largely proceeds from Alexander's own explanation of properties supporting properties. In this regard it is perhaps more natural to think of the choice properties as something that is primarily "discovered" or "witnessed" through inspection of a pre-existing system or structure. In understanding the properties of centers or choices the first and most natural experience is observation.

The order in nature that these properties exhibit (and explain) results from eons of evolution, the trial and error of natural selection (animal, vegetable, mineral, and cosmic) that over countless centuries has weeded out those structures and relationships that do not possess the order that permits survival; those that do not exhibit sustainable order.

The task at hand is to determine if sustainable order, only through living structure, can be achieved through engineering rather than eons of trial and error. This chapter explores achieving strength in the fifteen choice properties through design or modeling actions. The fifteen choice properties along with their antecedent center properties are again reviewed (see Table 4 below) with the addition of action verbs that summarize and characterize the formative process applied through a choice to achieve property strength. A terse description of the action in this context accompanies each verb.

In the sections that follow each verb is explored to characterize its impact on choice formation. Each is accompanied by its supporting properties list. The reader is again reminded that the properties are not achievable in isolation and that these modeling action verbs will regularly occur in combination and iteration.

| | Alexander's Property | Choice Property | Modeling Action | plausible action definition |
|---|---|---|---|---|
| 1 | Levels of Scale | Stepwise Refinement | elaborate | develop or present (a theory, policy, or system) in detail |
| 2 | Strong Centers | Cohesion | factor | express as a product of factors |
| 3 | Boundaries | Encapsulation | encapsulate | enclose the essential features of something succinctly by a protective coating or membrane |
| 4 | Alternating Repetition | Extensibility | extend | render something capable of expansion in scope, effect, or meaning |
| 5 | Positive Space | Modularization | modularize | employing or involving a module or modules as the basis of design or construction |
| 6 | Good Shape | Correctness | align | put (things) into correct or appropriate relative positions |
| 7 | Local Symmetries | Transparency | expose | reveal the presence of (a quality or feeling) |
| 8 | Deep Interlock and Ambiguity | Composition of Function | assemble | fit together the separate component parts of (a machine or other object) |
| 9 | Contrast | Identity | identify | establish or indicate who or what (someone or something) is |
| 10 | Gradients | Scale | focus | (of a person or their eyes) adapt to the prevailing level of light [abstraction] and become able to see clearly |
| 11 | Roughness | User Friendliness | accommodate | fit in with the wishes or needs of |
| 12 | Echoes | Patterns | pattern | give a regular or intelligible form to |
| 13 | The Void | Programmability | generalize | make or become more widely or generally applicable |
| 14 | Simplicity and Inner Calm | Reliability | normalize | make something more normal, which typically means conforming to some regularity or rule |
| 15 | Not Separateness | Elegance | coordinate | bring the different elements of (a complex activity or organization) into a relationship that will ensure efficiency or harmony |

Modeling Actions Attributable to Strengthening Choice Properties

**(1) Stepwise Refinement (to elaborate)**

Stepwise Refinement: to develop or present (a theory, policy, or system) in detail.

supported by

***Cohesion***: to express as a product of factors.

***Encapsulation***: to enclose the essential features of something succinctly by a protective coating or membrane.

***Correctness***: to put (things) into correct or appropriate relative positions.

***Identity***: to establish or indicate who or what (someone or something) is.

Strengthening the choice property of stepwise refinement is the exposure of system features in digestible increments in a spiral of incremental explanation as in a pedagogy. The model designer's task is to deliver a succession of reinforcing representations that explain the parts within an outline of the whole, an elaboration of system elements that shapes the observers' understanding consistent with the system's stakeholder intensions, and an exposition of structure as parts assembled to form the whole. In a sense this strengthening this property is analogous to revealing the observable refinements evidenced in evolution.

**(2) Cohesion (to factor)**

Cohesion: to express as a product of factors.

supported by

***Extensibility***: to render something capable of expansion in scope, effect, or meaning.

***Transparency***: to reveal the presence of (a quality or feeling).

***Identity***: to establish or indicate who or what (someone or something) is.

***Scale***: to (of a person or their eyes) adapt to the prevailing level of light [abstraction] and become able to see clearly.

***Programmability***: to make or become more widely or generally applicable.

***Elegance***: to bring the different elements of (a complex activity or organization) into a relationship that will ensure efficiency or harmony.

Strengthening the choice property of cohesion results from factorization of the fundamental system features. The model designer's tasks are to identify the fundamental, to distill the idea, to isolate the concept, to separate and distinguish the part, to name the primitive, to minimize coupling and to define the elemental component. And in so doing the model designer renders the choice individually and distinguishably complete in its own purpose.

**(3) Encapsulation (to encapsulate)**

Encapsulation: to enclose the essential features of something succinctly by a protective coating or membrane.

supported by

***Cohesion***: to express as a product of factors.

***Extensibility***: to render something capable of expansion in scope, effect, or meaning.

***Transparency***: to reveal the presence of (a quality or feeling)}

***Composition of Function***: to fit together the separate component parts of (a machine or other object).

***Identity***: to establish or indicate who or what (someone or something) is.

***Scale***: to (of a person or their eyes) adapt to the prevailing level of light [abstraction] and become able to see clearly.

Strengthening the choice property of encapsulation results from identifying and insulating essential features while controlling access through disciplined, contractual interfaces. The model designer's tasks are to protect, to compartmentalize, to relegate, to steward, to cast, to recast, to virtualize, to package, to mask, to portray, to "component-ize," to characterize, to abstract and to hold inviolate. And in so doing not only are the internals "protected," but the choice's clients are freed from any obligatory knowledge of the details of the choice's internals.

**(4) Extensibility (to render extendable)**

Extensibility: to render something capable of expansion in scope, effect, or meaning.

supported by

***Cohesion***: to express as a product of factors.

***Modularization:*** to employ or involve a module or modules as the basis of design or construction.

***Correctness***: to put (things) into correct or appropriate relative positions.

***Composition of Function***: to fit together the separate component parts of (a machine or other object).

***Identity***: to establish or indicate who or what (someone or something) is.

***Elegance***: to bring the different elements of (a complex activity or organization) into a relationship that will ensure efficiency or harmony.

Strengthening the choice property of extensibility results in model features so crafted that extended functionality or additional features may be added with a minimum of cost or disruption to the whole. The model designer's tasks are to expose the "common denominators" of feature functionality, to sharpen the "articulation points" that accentuate the "creases" in the unfolding structure / behavior of the model and to expose the potential for "partnering" among the model choices.

**(5) Modularization (to modularize)**

Modularization: to employ or involve a module or modules as the basis of design or construction.

supported by

***Stepwise Refinement***: to develop or present (a theory, policy, or system) in detail.

***Cohesion***: to express as a product of factors.

***Encapsulation***: to enclose the essential features of something succinctly by a protective coating or membrane.

***Correctness***: to put (things) into correct or appropriate relative positions.

***Transparency***: to reveal the presence of (a quality or feeling)}

***Identity***: to establish or indicate who or what (someone or something) is.

***User Friendliness***: to fit in with the wishes or needs of.

***Programmability***: to make or become more widely or generally applicable}: to make or become more widely or generally applicable.

Strengthening the choice property of modularization is to partition and associate system knowledge that facilitates "divide and conquer" problem solving or the graduated exposure of system features aligned to the stakeholders' intension. The model designer's tasks are to compartmentalize, to aggregate, and to express the system as wholes and parts.

**(6) Correctness (to align)**

Correctness: to put (things) into correct or appropriate relative positions.

supported by

***Stepwise Refinement***: to develop or present (a theory, policy, or system) in detail.

***Cohesion***: to express as a product of factors.

***Modularization:*** to employ or involve a module or modules as the basis of design or construction.

***Correctness***: to put (things) into correct or appropriate relative positions.

***Composition of Function***: to fit together the separate component parts of (a machine or other object).

***Scale***: to (of a person or their eyes) adapt to the prevailing level of light [abstraction] and become able to see clearly.

***Patterns***: to give a regular or intelligible form to.

***Reliability***: to make something more normal, which typically means conforming to some regularity or rule.

Strengthening the choice property of correctness results from relevant, complete, clear and concise representation of the stakeholders' intensions in model features. The model designer's tasks are to represent stakeholder intensions faithfully, to reflect them consistently, to eschew contradictions, to reflect expectations, to conform to beliefs, to satisfy the stakeholders' intensions, and to effectively model concerns.

**(7) Transparency (to expose)**

Transparency: to reveal the presence of (a quality or feeling).

supported by

***Stepwise Refinement***: to develop or present (a theory, policy, or system) in detail.

***Modularization:*** to employ or involve a module or modules as the basis of design or construction.

***Identity***: to establish or indicate who or what (someone or something) is.

***Programmability***: to make or become more widely or generally applicable.

Strengthening the choice property of transparency exposes the intention rendered in a model and thus eschews obfuscation. The designer's tasks are to reveal, to render visible, to portray as to interpret, to disclose, to shed light upon, to unfold, to uncover, to lay bare, to bear witness to the stakeholders' intensions, to be true to those intensions, to make self-evident, to make self-explanatory, to publish and to promote the underlying intensions. And to this end the model designer avoids obscuring stakeholder intentions in the elaboration of a choice or the application of extensions.

**(8) Composition of Function (to assemble)**

Composition of Function: to fit together the separate component parts of (a machine or other object).

supported by

***Extensibility***: to render something capable of expansion in scope, effect, or meaning.

***Modularization:*** to employ or involve a module or modules as the basis of design or construction.

***Identity***: to establish or indicate who or what (someone or something) is.

***User Friendliness***: to fit in with the wishes or needs of.

***Patterns***: to give a regular or intelligible form to.

***Programmability***: to make or become more widely or generally applicable.

Strengthening the choice property of composition of function recognizes the constituent potential of model choices combining them as individual contributors to a new and distinctive element. In so doing the designer's task is to build, to compose, to manufacture, to piece together, to assemble, to construct, to combine, to package, to fabricate, to erect, to connect or join. And in so doing the designer exercises the potential of producing a whole that is "greater than the sum of its parts."

**(9) Identity (to identify)**

Identity: to establish or indicate who or what (someone or something) is.

supported by

***Encapsulation***: to enclose the essential features of something succinctly by a protective coating or membrane.

***Modularization:*** to employ or involve a module or modules as the basis of design or construction.

***Composition of Function***: to fit together the separate component parts of (a machine or other object).

***Scale***: to (of a person or their eyes) adapt to the prevailing level of light [abstraction] and become able to see clearly.

***Programmability***: to make or become more widely or generally applicable.

***Elegance***: to bring the different elements of (a complex activity or organization) into a relationship that will ensure efficiency or harmony.

Strengthening the choice property of identity results when the naming of a model element adds to the vocabulary of describing and explaining that element's role or purpose in the overall model. To "name" something is to "know" it, to distinguish it among the rest, to justify its individual existence, to recognize its distinctiveness, to carve out a subset of the universe and label same, to collect its attributes and package them as a defined concept. To establish element identity is the core of language; that a "name" can take the place of all that is known about an element and carry that knowledge through an explanation or analysis. A "name" may be completely distinguishing or categorical expressing either individuality or a shared context. In any case a "name" is a handle with which to grasp and carry a concept within a conversation be it noun (subject), verb (predicate) or adjective (modifier).

**(10) Scale (to focus)**

Scale: to (of a person or their eyes) adapt to the prevailing level of light [abstraction] and become able to see clearly.

supported by

***Stepwise Refinement***: to develop or present (a theory, policy, or system) in detail.

***Cohesion***: to express as a product of factors.

***Transparency***: to reveal the presence of (a quality or feeling).

***Identity***: to establish or indicate who or what (someone or something) is.

***User Friendliness***: to fit in with the wishes or needs of.

***Patterns***: to give a regular or intelligible form to.

***Elegance***: to bring the different elements of (a complex activity or organization) into a relationship that will ensure efficiency or harmony.

Strengthening the choice property of scale results from the imposition of a telescoping sense of focus that may be directed to an observer's purpose and renders in clarity the system features relevant to that purpose. The model designer's tasks are to direct attention, to highlight, to draw attention to, to lend perspective, to acquaint, to draw parallels with, to contextualize, to put into perspective, to lead an observer through the unfolding, to familiarize, to introduce, to bring into focus, to zero in, to target and to "point to." And in so doing the model designer provides a telescoping granularity of comprehensibility to suit the requirements of a variety of observers.

**(11) User Friendliness (to accommodate)**

User Friendliness: to fit in with the wishes or needs of.

supported by

***Cohesion***: to express as a product of factors.

***Modularization:*** to employ or involve a module or modules as the basis of design or construction.

***Correctness***: to put (things) into correct or appropriate relative positions.

***Scale***: to (of a person or their eyes) adapt to the prevailing level of light [abstraction] and become able to see clearly.

***Reliability***: to make something more normal, which typically means conforming to some regularity or rule.

***Elegance***: to bring the different elements of (a complex activity or organization) into a relationship that will ensure efficiency or harmony.

Strengthening the choice property of user friendliness results when the system's features accommodate the stakeholders' intension. The model designer's tasks are to promote comfort, to foster self-evidence, to facilitate recognition, to promote explicit consistency, to distinguish among differences, to represent the familiar, to satisfy the observer, to reinforce the connectedness of observer and the system, and to reinforce the observer's sense of the system's conformance with his or her belief. And in so doing the model choices appears to the stakeholder as convenient.

**(12) Patterns (to pattern)**

Patterns: to give a regular or intelligible form to.

supported by

***Stepwise Refinement***: to develop or present (a theory, policy, or system) in detail.

***Correctness***: to put (things) into correct or appropriate relative positions.

***Transparency***: to reveal the presence of (a quality or feeling).

***Scale***: to (of a person or their eyes) adapt to the prevailing level of light [abstraction] and become able to see clearly.

***User Friendliness***: to fit in with the wishes or needs of.

***Elegance***: to bring the different elements of (a complex activity or organization) into a relationship that will ensure efficiency or harmony.

Strengthening the choice property of patterns results from discovery and/or designation of explicit similarity and difference. The model designer's tasks are to characterize similarity, to expose repetition, to map consistency, to reuse the familiar, to prescribe the evolution, to weave, to interlock, to establish a rhythm, to facilitate a path of lesser resistance, to foreshadow, to anticipate, to lead, to invite, to predict, to train and to condition. And in so doing the pattern strength of the choice both invites and conditions the observer's attention to reuse.

**(13) Programmability (to generalize)**

Programmability: to make or become more widely or generally applicable.

supported by

***Stepwise Refinement***: to develop or present (a theory, policy, or system) in detail.

***Encapsulation***: to enclose the essential features of something succinctly by a protective coating or membrane.

***Modularization:*** to employ or involve a module or modules as the basis of design or construction.

***Transparency***: to reveal the presence of (a quality or feeling)}

***Identity***: to establish or indicate who or what (someone or something) is.

***Reliability***: to make something more normal, which typically means conforming to some regularity or rule.

Strengthening the choice property of programmability is to contrast that which is the rule from that which is the option such that the range of options complement the rule. The model designer's tasks are to to formalize a language of versatility, to expose the versatility of, to control the exposure of that versatility, to regularize the alternatives of, abstract the interface of, to delay the binding of, to extend an interface's representation beyond a "binary switch" toward a "conversational dialogue." And in so doing the options become extensions of the rule that give flexibility to the stakeholders' application of system features to their perception of the "problem solving" tasks.

**(14) Reliability (to normalize)**

Reliability: to make something more normal, which typically means conforming to some regularity or rule.

supported by

***Correctness***: to put (things) into correct or appropriate relative positions.

***Transparency***: to reveal the presence of (a quality or feeling)}

***Patterns***: to give a regular or intelligible form to}

***Programmability***: to make or become more widely or generally applicable.

***Elegance***: to bring the different elements of (a complex activity or organization) into a relationship that will ensure efficiency or harmony.

Strengthening the choice property of reliability results from an economy of model features limited to the stakeholders' intensions devoid of extraneous embellishments. The model designer's tasks are to regularize, to bring into conformance, to align with stakeholder rules, to represent as aligned with rules, to promote predictability, to render explainable, to conform to the expected, and to eschew the unexpected.

**(15) Elegance (to coordinate)**

Elegance: to bring the different elements of (a complex activity or organization) into a relationship that will ensure efficiency or harmony.

supported by

***Encapsulation***: to enclose the essential features of something succinctly by a protective coating or membrane.

***Modularization:*** to employ or involve a module or modules as the basis of design or construction.

***Composition of Function***: to fit together the separate component parts of (a machine or other object).

***Scale***: to (of a person or their eyes) adapt to the prevailing level of light [abstraction] and become able to see clearly.

***User Friendliness***: to fit in with the wishes or needs of.

***Programmability***: to make or become more widely or generally applicable.

***Reliability***: to make something more normal, which typically means conforming to some regularity or rule.

Strengthening the choice property of elegance results from coordinating choices to produce an arrangement where each mutually reinforces the other as they fuse into the unifying intention of the whole. The designer's tasks are to harmonize, to orchestrate, to make whole, to complete, to render the system acceptable by validating the stakeholders' intensions through the system's features. And in so doing the system's features in the whole resonate with the stakeholders' expectation and conception of a system as satisfying to their needs.

**Modeling Actions: Syntax and Semantics**

It can be noted that several of the action verbs discussed above find direct syntactic correlations in dialects of modeling and programming languages commonly used in system development. In many instances the language design goals and objectives are bent specifically to facilitate the ease of achieving these various properties in system description.

Specific modeling paradigms often favor a particular subset of the fifteen properties in their representational philosophy. And in so doing they make some modeling tasks more or less attuned to promoting that subset of properties. The less favored properties are usually not prohibited by a paradigm's nature, but require additional effort on the part of the modeler or designer to achieve them. This phenomenon of property favoritism is illustrated in an exercise of describing the development of living structure using respectively the object-oriented and relational paradigms of information system modeling.[1] [2]

In any case the "tools" provided in any particular dialect's syntax and semantics are indeed only implements that may be applied through enlightened consciousness to achieve the stakeholders' intensions in a system of living structure. The "tools" cannot compensate in any way for a weak or absent consciousness of the stakeholders' intensions.

[1] Promoting Life Using the OO Paradigm.pdf

[2] Promoting Life Using the Relational Paradigm.pdf