Lecture 9

Patterns and Creativity

There is, it seems to us,
At best, only a limited value
In the knowledge derived from experience.
The knowledge imposes a pattern, and falsifies,
For the pattern is new in every moment
And every moment is a new and shocking
Valuation of all we have been.

—T. S. Eliot, The Four Quartets
Reflections

Only recently have I begun to realize that the problem is not merely one of technical mastery or the competent application of the rules—like troweling a piece of concrete so that it’s really nice—but that there is actually something else which is guiding these rules. It actually involves a different level of mastery. It’s quite a different process to do it right; and every single act that you do can be done in that sense well or badly. But even assuming that you have got the technical part clear, the creation of this quality is a much more complicated process of the most utterly absorbing and fascinating dimensions. It is in fact a major creative or artistic act—every single little thing you do—and it is only in the years since the Mexican project that I have begun to see the dimensions of that fact.

~Christopher Alexander
Philosophical Interlude on Art and Design

“Art is the imposing of a pattern on experience, and our aesthetic enjoyment in recognition of the pattern”
--Alfred North Whitehead, Dialogues (1954)
What's This?
The Vallonia

Columbia, Illinois, 2001
Modeling: a la mode de Magritte
But neither is this...
Cinematic Interlude

• The design model for The Derek Zoolander Center for Kids Who Can’t Read Good
Why Do We Model?
What is a Model?

- A model is one interpretation of something (among others), it is in essence hermeneutical (ἑρμηνεύω)
- A model is drawn from a limited viewpoint
- A model helps us to see (picture an architect’s model of a new community)
- A model is a set of blueprints for building
- A model simplifies (and thus distorts)
- A model communicates and promotes communication
- A model renders an interpretation of something by giving us an abstract view into it
- A model hides and is not the real thing
- A model needs validation
Hermeneutics

- We model in order to understand

- A model is one *interpretation* of something (among others), it is in essence *hermeneutical* (ἐρμηνεύω)

- What is the goal of interpretation?

- Plato’s Cave

- The Story of Er
  - Hermes
  - The Plain of Oblivion
  - The River of Forgetfulness Λήθη (λήθη)

- Once again, with feeling: What is the goal of interpretation?
I want you to build me a Nautilus Submarine...
High Level Model
Conceptual Model
Physical Model
Nautilus Class Nuclear Submarine
Ok, guys, Boss wants a Nautilus...

(thinking to himself...daydreaming...) He must be talking about the Magic Kingdom...
But You Said You Wanted A Nautilus
Having a High Level Model Helps

That's Not Quite What I Was Looking For...
But I Heard You Say “Nautilus”...

That’s Not What I Meant...
Patterns in other Spaces: Database Patterns
A Worked Example:
Data Consistency Issues in Managing Contacts

- Say there are 1000 people (contacts) in XYZ Corp’s customer database, and the system is designed so that each customer will have the address of XYZ embedded in the Member Contact-Us record of the CRM database.

- The effect is that if the address of XYZ Hospital itself changes, all 1000 records must be updated with the embedded change.

- The core problem here is duplicate/redundant data, lacking a single (shared) source of truth.
Sample Worked Example:
How to Manage Contacts

Addresses aren’t “simple”—witness the withdrawal of the ISO Internal Standard 11180 for Postal Addressing after 11 years because of inherent complexities.

The more dynamic the environment, the more flexible the data model required.

An address is not a discrete location, as an address actually contains at least 4 geopolitical locations:
- City, State (or province...), Postal Area, Country
Sample Worked Example:
How to Manage Contacts

- Types of “contact mechanisms”:
  - Home, work, summer postal addresses: When available? Ship to? Bill to? And when?
  - Home, work, home office, work fax, home fax numbers: Text capable? Image capable?
  - Virtual addresses: blog address, iPhone SMS address, MySpace, Skype name, URL, Tweet address
  - And others yet to come we don’t even know about!
How To Contact Mark Shacklette
(idealized view)

708-834-1340

847-363-5432

847-625-2362

BuffaloBill568

mshack@post.harvard.edu

Hmm...

512 Inverway
Inverness, IL 60067
USA

University of Chicago
Ryerson Hall
Office 175A
1100 E. 58th St.
Chicago, IL 60637
USA

11 Beaver Run Rd.
Big Horn, WY

15 Turtle Tail Dr.
Providenciales
Turks & Caicos Islands
British West Indies

Island Home

Dec. only
No business conducted

Managed by
Island Properties, Inc.

Island

8476252362@txt.att.net

847-363-5432

847-363-5432

http://www.cs.uchicago.edu/mark

mark@cs.uchicago.edu

708-834-1340

Office Phone

iPhone

Permanent

office

work

ranch

Trout Oct.

Dec. only

No business conducted
Contact Mechanism: A Definition

- A contact mechanism is a relational mechanism by which two or more persons or parties or facilities are put in to communication with one another.

- The contact mechanism is not a device (iPhone)—the contact mechanism is the phone number.

- The contact mechanism is not a facility (the Company Headquarters on Smith Road).
  - Virtual vs. physical

- The contact mechanism may have purposes and rules associated with it, describing why and when the contact may be made.
Contact Mechanism Classifications:
- Type of usages (business or personal)
- Purpose of mechanism (bill to or ship to)
- Type of contact mechanism (fax, mobile, pager)
- Priority of mechanism (primary, secondary, holiday)
- Location of mechanism (home, work, home office)
- Exercise: How to model a fax number that is a shipment notification fax number only?
- Multiplicity: How many fax numbers can a party have?
- Rules of Engagement: What rules govern the relation between a business phone number and a party?
Contact Mechanism Metadata

There may be information maintained about the contact mechanism:

- Why (purpose) to contact
- How is the contact used?
- When (time) to contact (don’t call after 1800 GMT+6)
- Non-solicitation flag
- Telephone extension
- Directions (Google map)
Putting It All Together:
Define, Model, Build

- Modeling Patterns exist that simultaneously facilitate the modeling of complex associations and at the same time constrain that complexity.

- The result of these patterns is that you leverage already proven modeling solutions that are highly flexible and powerful and cheaper to maintain.

- The resultant models are used to build data models.
What’s Wrong with This Picture?

<table>
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<td>* PARTY NAME</td>
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<td>PRIMARY SUITE-APARTMENT</td>
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<td>PRIMARY ADDRESS PART 1</td>
<td>CHAR</td>
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<tr>
<td>PRIMARY POST OFFICE BOX</td>
<td>CHAR</td>
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<td>PRIMARY CITY</td>
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A Proper Pattern

- Contact Mechanism Pattern
- Geography Pattern
Patterns and Creativity

There is, it seems to us,
At best, only a limited value
In the knowledge derived from experience.
The knowledge imposes a pattern, and falsifies,
For the pattern is new in every moment
...

Do not let me hear
Of the wisdom of old men, but rather of their folly,
Their fear of fear and frenzy, their fear of possession,
Of belonging to another, or to others, or to God.
The only wisdom we can hope to acquire
Is the wisdom of humility: humility is endless.

~T. S. Eliot, *East Coker*
Considerations on Creativity

- If all your peers understand what you've done, it's not creative. - Henry Heimlich

- It is better to fail in originality than to succeed in imitation. - Herman Melville

- Genius...means little more than the faculty of perceiving in an unhabitual way. - William James
An Accident Waiting To Happen...

...one of the most striking features of recent discussions in the history and philosophy of science is the realization that events and developments ... occurred only because some thinkers either decided not to be bound by certain ‘obvious’ methodological rules, or because they unwittingly broke them.

This liberal practice, I repeat, is not just a fact of the history of science. It is both reasonable and absolutely necessary for the growth of knowledge. More specifically, one can show the following: given any rule, however ‘fundamental’ or ‘necessary’ for science, there are always circumstances when it is advisable not only to ignore the rule, but to adopt its opposite.

~Paul Feyerabend, Against Method
Design and Creativity

“Design is a creative act; so is the creation or application of a design pattern. If design is codified in patterns, does the need for creativity go away? Can we replace high-priced expensive designers with less sophisticated programmers who are guided by patterns? The answer is that creativity is still needed to shape the patterns to a given context. Just as a dressmaker tailors a pattern to an individual customer, and perhaps to a specific event where the dress is to be worn, so designers must be creative when using patterns. Patterns channel creativity; they neither replace nor constrain it.”

-James Coplien, Software Design Patterns: Common Questions and Answers
Traditions

- Copying (written or otherwise) is considered plagiarism
- We value “thinking outside the box” and we also value conformity (“code habitability”)
- Software reuse has always been touted as a good thing
Does Creativity Matter?

- Should the goal of software development be creativity?
  - To what degree is software a work of art?
  - Legally, software is covered under copyright law

- To what degree is leveraging patterns for the "beginner" a paint-by-numbers game?
  - What is the role of apprenticeship in software development?

- One could argue that you are being paid for delivery of function, not delivery of art
  - What is the value derived from creativity?
Further Reflections

- What are the implications of patterns usage on research efforts?

- To what degree are patterns in their infancy? We seem eager to stop with a Façade, but did we stop with the Quicksort?