Why modeling is crucial to designing & design research
Let’s begin with three embarrassing admissions.
Part 1

Design is stuck.
An example:
1985, AIGA, National Conference, Boston

Milton Glaser  Nicholas Negroponte
An example:
2005, AIGA, National Conference, Boston

Milton Glaser                Nicholas Negroponte
Most disciplines have well-established structures to build and share knowledge.
Design has few knowledge building and sharing structures.

- Apprentice 
  - corrected by?
  - watches?

- Master 
  - may publish (rarely)

- Findings 
  - ?

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Almost 20 years after awarding the first design PhD in the US, we still have not agreed on what design research is.
We don’t agree on what design knowledge is. Not everyone agrees there is such a thing.
Part 2

Design is stuck in a bad place:
We don’t know how to make successful products.
Even Apple and Steve Jobs are not always successful.
Product management—the art of making a successful product—is rarely taught in design schools or business schools.
People who make products don’t agree on how to do it.

– Who manages the schedule and the budget?
– How do you determine requirements?
– Who owns design? Who owns the spec?
– Who can say, ‘No’? Who can say, ‘Yes’?
Often, the ‘official’ process differs from reality:

The PRD is barely begun, but the engineers already have a prototype. That’s called being agile.
Agile processes work well in small start-ups building products for people like themselves.

e.g. 37 Signals’ Basecamp
Less clear is how to achieve coherence and scale—how to build platforms or interlocking systems—without rigorous planning. This is a religious debate.
Design schools and consulting firms promote research that helps us understand people and their contexts.

A few forward-thinking corporations support such ‘best practice’, but up-front research remains rare for most new products.
The value of research is in doubt.

"Design research is great when it comes to improving existing product categories, but essentially useless when it comes to breakthroughs . . . Although we would prefer to believe that conceptual breakthroughs occur because of a detailed consideration of human needs, especially fundamental but unspoken hidden needs so beloved by the design research community, the fact is that it simply doesn’t happen . . . Major innovation comes from technologists who have little understanding of all this research stuff.”

— Don Norman
Skeptics often cite Apple as making great products seemingly without formal research.

How do they do it?
Great products have integrity—a kind of coherence that stems from a clear product concept ruthlessly refined.
Product coherence comes from vision, will, and trust; it requires systems thinking.

A vision of what the product needs to be and why: a vision of who the product will serve and how it will fit into their world, a vision of the technology needed and a vision of how it will be funded.
Product visions are based on observation.

Observations need not be formal research, but they must transfer—
from observer to maker
from researcher to designer
from designer to engineer
from manager to team
and vice versa.
Often, that’s where formal research goes wrong. It fails to transfer.

It’s not that the research isn’t valid. Or that there are no useful insights.

But rather, the designers and product managers and engineers can’t connect the research insights to the product.
Part 3

Design is stuck in a bad place: We don’t know how to make successful products, and any experience we might have is less relevant because the very nature of products is changing as we move into a new epoch.
We are in the midst of a fundamental shift in how we view the world.
from Mechanical to Biological

Why modeling is crucial to designing & design research
Why modeling is crucial to designing & design research
from Industrial age to Information age

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The shift in world view is changing the nature of products.
from Hierarchical to Distributed
Why modeling is crucial to designing & design research
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from Complete edition to Continuous beta
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And the changing nature of products requires new approaches to designing.
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from Expert / patient to ‘Symmetry of ignorance’

— Horst Rittel

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from Author to Facilitator
Why modeling is crucial to designing & design research

from
Perfecting
to
Growing
We can no longer focus on the form of static objects; we must create conditions in which ecologies can flourish.

**Why** are we making this?
Context/Need
Pragmatic

**What** are we making?
Meaning/Definition
Semantic

**How** are we making it?
Form/Grammar
Syntactic

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Object
Component

System
Systems of components
Organism

Ecosystem
Systems of systems
Community
Market

Team
Explicit
Shared

Individual
Intuitive
Idiosyncratic

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Why modeling is crucial to designing & design research
Part 4

What is the solution to these problems?
Models.
How can we build knowledge in design practice?
How can we build knowledge in design practice?

By collecting and sharing models.
How can we make research actionable?
How can we make research actionable?
By collaborating on models.
How can we cope with the increasingly intangible nature of the systems and services that we are called on to design?
How can we cope with the increasingly intangible nature of the systems and services that we are called on to design? By modeling them.
Part 5

What is a model?
A model is an idea about how part of the world works; representing the idea aids its refinement.
“Models are our voodoo dolls. We do most of our thinking in models.”

— Alan Kay
Part 6

A few examples from practice.
Phases of a cold.
The requirements of health extend beyond traditional healthcare.

Goals

Quality of everyday living

Means / Goals

Health:
Complete physical, mental, and social well-being*

Means / Goals

Eliminate or minimize acute diseases and infirmities

Manage chronic conditions; avoid or slow deterioration leading to acute problems

Self-management supported by HCPs, family, friends, and peers

Other goal/means, such as:
– Love of family + friends
– Work valued by self + others
– Physical and financial security
– Fun + joy

Means

People actively involved in their own:
– Monitoring...
– Goal-setting
– Experimenting...
– Understanding...
– Reflecting...

Other means, such as:
– Employer practices
– Social policies
– Providing essentials: clean air + water, food + shelter, education + stability

...in relation to their:
– Bodies
– Diet
– Activities
– Relationships
– Environment

Why modeling is crucial to designing & design research
Connecting sensors with coaching offers a new blend of self-management or chronic care—imagine ‘QS + Facebook + University of Phoenix’.

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iPod = Hardware/Software/Networked Service/Marketplace

— Dubberly Design Office

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The iPhone will connect with Apple’s existing system of systems.

— Dubberly Design Office for Samsung, 2006
What set of models is necessary and sufficient to describe a new product?

Successful products require simultaneous optimization of customer, business, and technology opportunities and constraints.

Objective: a product that is desirable & viable & buildable

What do people desire?

What can we build?

What will sustain a business?

End Users

Customers

Primary user tasks

Competitive space / positioning

Solution space

System model

Application architecture

Network configuration

Data model

Business model

Management

Engineering

Release & marketing plan

Distribution process

Manufacturing process

Product development process

Organizational structure

Projected run-rate model

Why modeling is crucial to designing & design research
Without modeling, research & design will not be effective.
Saying that one understands a system is saying one has a model of the system.

No model: no understanding
Understanding implies an ability to accurately predict behavior.

No model: no predictions—
the system remains ‘a black box’
Understanding implies an ability to manage

No model: no management
Understanding implies an ability to ‘debug’

No model: no debugging
Understanding implies an ability to communicate.

No model: no conversation

models and stories are tools for thinking

are explained by

create

models and stories are tools for discussion
Part 7

How do models ‘work’ in design & research?
A model of modeling.
Designers bridge the gap between what ‘is’ & what ‘could be’
Why modeling is crucial to designing & design research

or ‘should be’
Models are the tools designers use to bridge between what is and what should be.

Analysis-Synthesis Bridge Model
Dubberly, Evenson & Robinson (2008)

Interpret
Abstract

Describe
Concrete

distilled to

Existing – Implicit (Current)

Preferred – Explicit (Future)

Model of what “is”
suggest

Model of what “could be”

What “is”

What “could be”

Why modeling is crucial to designing & design research
The bridge model has many variations and is shared by many others.
Robinson Model
Rick Robinson (2005)

Abstract

Concrete

Existing Implicit
“The Conditions”

New Explicit
“The Future”

Constructs: e.g. deep play

What is

What could be
Design Research Process
Rick Robinson & John Cain, E-Lab (1993)

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Beer Model
Stafford Beer
(1966)
Alexander Model
Christopher Alexander (1964)

**Context (C1)**

**Form (F1)**

**Actual world**

**Mental picture (C2)**

**Formal picture of mental picture (C3)**

**Form (F2)**

**Form (F3)**

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Kumar Model
Vijay Kumar
(2003)

Why modeling is crucial to designing & design research
Kaiser-IDEO Model
Kaiser Innovation Center + IDEO (2004)

Why modeling is crucial to designing & design research
Suri-IDEO Model
Jane Fulton Suri (2006)

Concrete

Abstract

Now  ←  Future

insights, patterns & themes
observations

frameworks & models
principals & opportunities
new offerings, products, services, spaces & communications

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Verplank’s Spiral
Bill Verplank
(2000)

paradigms

principles

idea

market
test

try it
hunch

hack

prototype

product(ion)

design(s)

plans

industries
The Jump Explore Process
Colleen Murphy, Jump Associates (2009)
Differentiation Model
Joanne Mendel
(2010)

Incremental improvement
Differentiation

Why modeling is crucial to designing & design research
Design Process
Sara Beckman (2010)

Frameworks (Insights)

Observations (Contexts)

Solutions (Experiences)

Abstract

Imperative (Ideas)

Why?

Concrete

How?
Learning bridges the gap between tacit & explicit
This model describes the learning process.

SECI model of knowledge creation
Ikujiro Nonaka
(1995)
Designing is analogous to learning.

Analysis-Synthesis Bridge Model
Dubberly, Evenson & Robison (2008)

SECI model of knowledge create
Ikujiro Nonaka (1995)
Experiential Learning
David Kolb (1975)

- Concrete experience
- Testing the new concepts
- Observation of and reflection on that experience
- Formation of abstract concepts based upon the reflection
Learning Styles
M. Tennant
(1997)

- **Converger** (moving from generalization to experimentation or application)
- **Assimilator** (moving from reflection to generalization)
- **Diverger** (moving from concrete experience to reflection)
- **Accommodator** (moving from experimentation to concrete experience)
Experiential Learning Cycle
McCaffery (1986)
Models are a form of ‘boundary object’—artifacts that bridge the gap between disciplines.
“Most scientific work is conducted by extremely diverse groups of actors . . . Simply put, scientific work is heterogeneous. At the same time, science requires cooperation—to create common understandings, to ensure reliability across domains and to gather information which retains its integrity across time, space, and local contingencies.”

— Susan Leigh Star and James R. Griesemer
“... boundary objects are produced when sponsors, theorists and amateurs collaborate to produce representations of nature. Among these objects are specimens, field notes, museums and maps of particular territories. Their boundary nature is reflected by the fact that they are simultaneously concrete and abstract, specific and general, conventionalized and customized.”

— Susan Leigh Star and James R. Griesemer
“Scientists have made headway in standardizing the interfaces between different worlds . . . by reaching agreements about methods, different participating worlds establish protocols which go beyond mere trading across unjoined world boundaries. They begin to devise a common coin which makes possible new kinds of joint endeavor.”

— Susan Leigh Star and James R. Griesemer
We need new kinds of joint endeavor.
We need to build bridges between research and design.
We need to build design knowledge.
We need to build great products.
We need to build systems and services.
We need to build more models.
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