

Negotiating the Terrain of Design Studies: Research, Reflection, Practice
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A Systems Perspective on Design Practice

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**We are in the midst of
a fundamental shift
in how we view the world—
and how we explain it.**

From ...

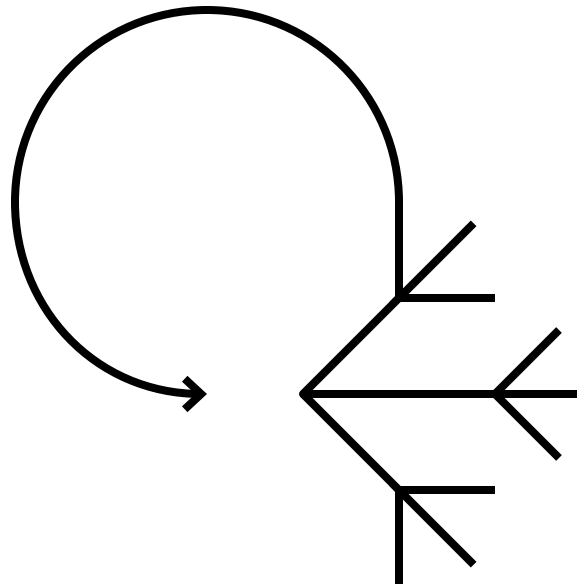
A causes B
and B causes C



To ...

A causes B, C, D, E, + F
and F causes G, H, I, J, + K
and K causes L, M, N, O, + P
and P loops around to cause A

**i.e. A causes B
and B causes A**



from
Mechanical

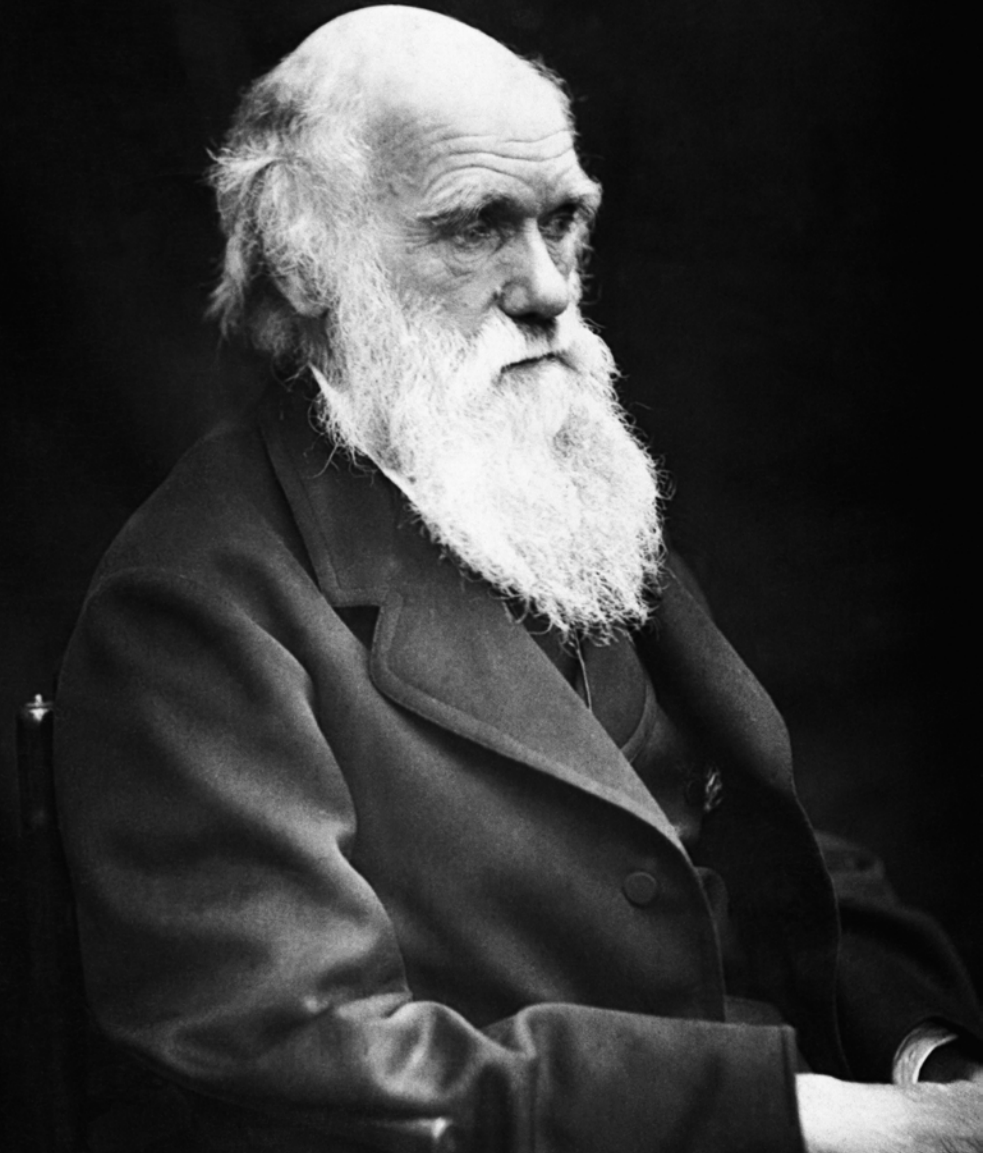
to
Biological



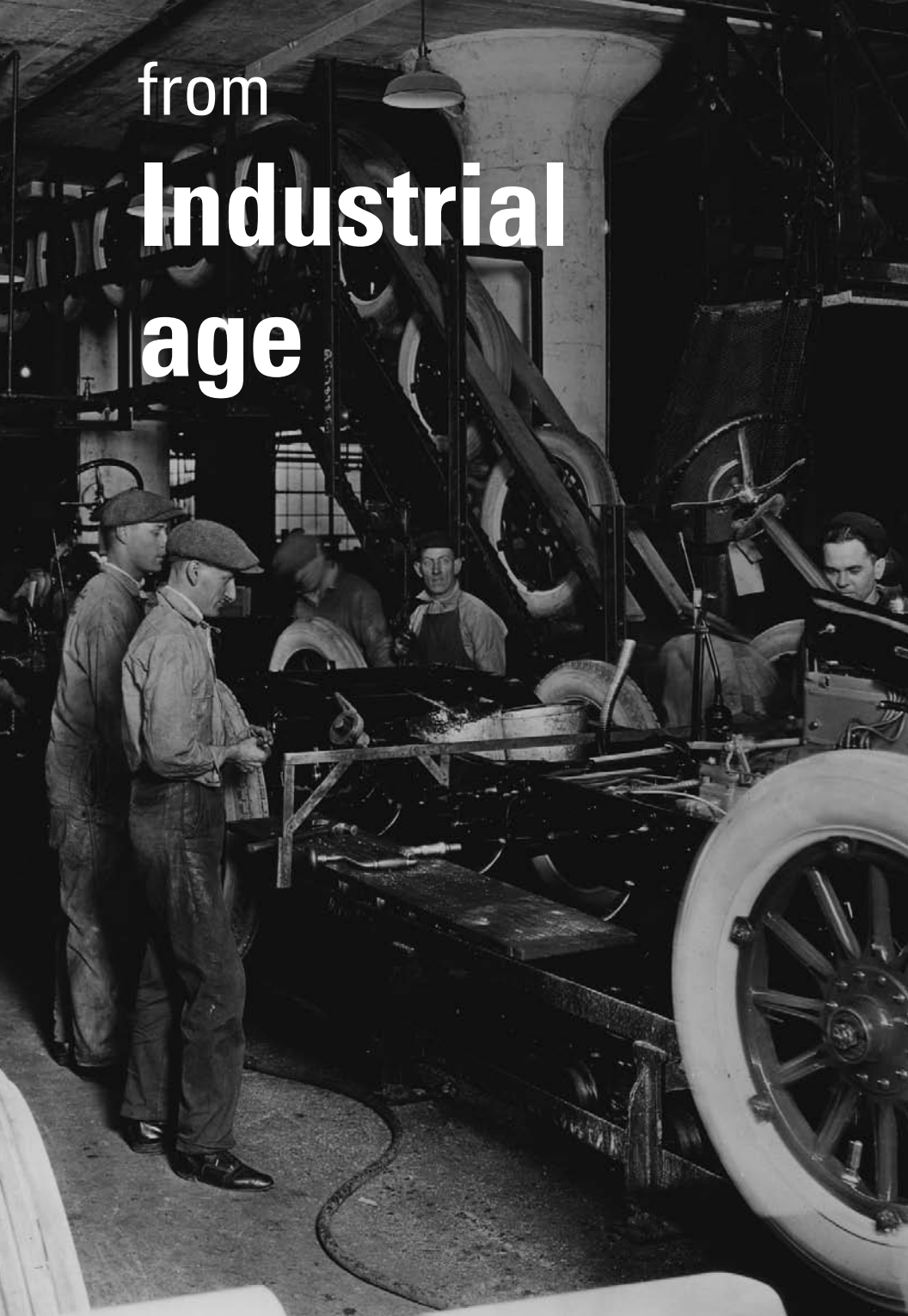
from
Newton



to
Darwin



from
**Industrial
age**



to
**Information
age**



**The shift in world view
coincides with a shift
in our view of products.**

*“... commercial products are best treated
as though they were services.*

*It's not what you sell a customer,
it's what you do for them.*

*It's not what something is,
it's what it's connected to, what it does.*

*Flows become more important than resources.
Behavior counts.”*

— Kevin Kelley, *Out of Control*

Thinking in terms of **whole systems** means

- Building **relationships** between products
e.g. roadmaps, product lines, platforms, APIs
- **Continuous change** + dynamic development
e.g. stocks, flows, lags, oscillation
- Enabling **feedback**
e.g. goal-action-measure-compare loops
- Adopting **metaphors from nature**
e.g. ecology, evolution, emergence

Systems are everywhere.



Columbia
Broadcasting
System (CBS)



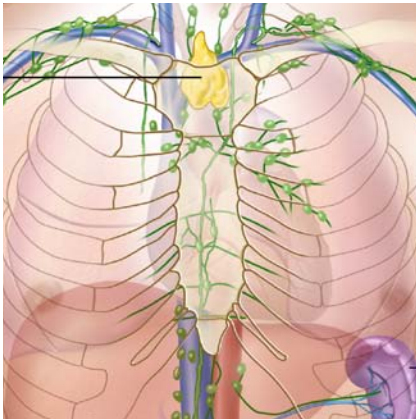
Federal Reserve
System



Herman-Miller
Action Office
System



Honor System



Immune System



Linux Operating
System



Mojave Desert
Ecosystem



Schiphol Airport
Signage System

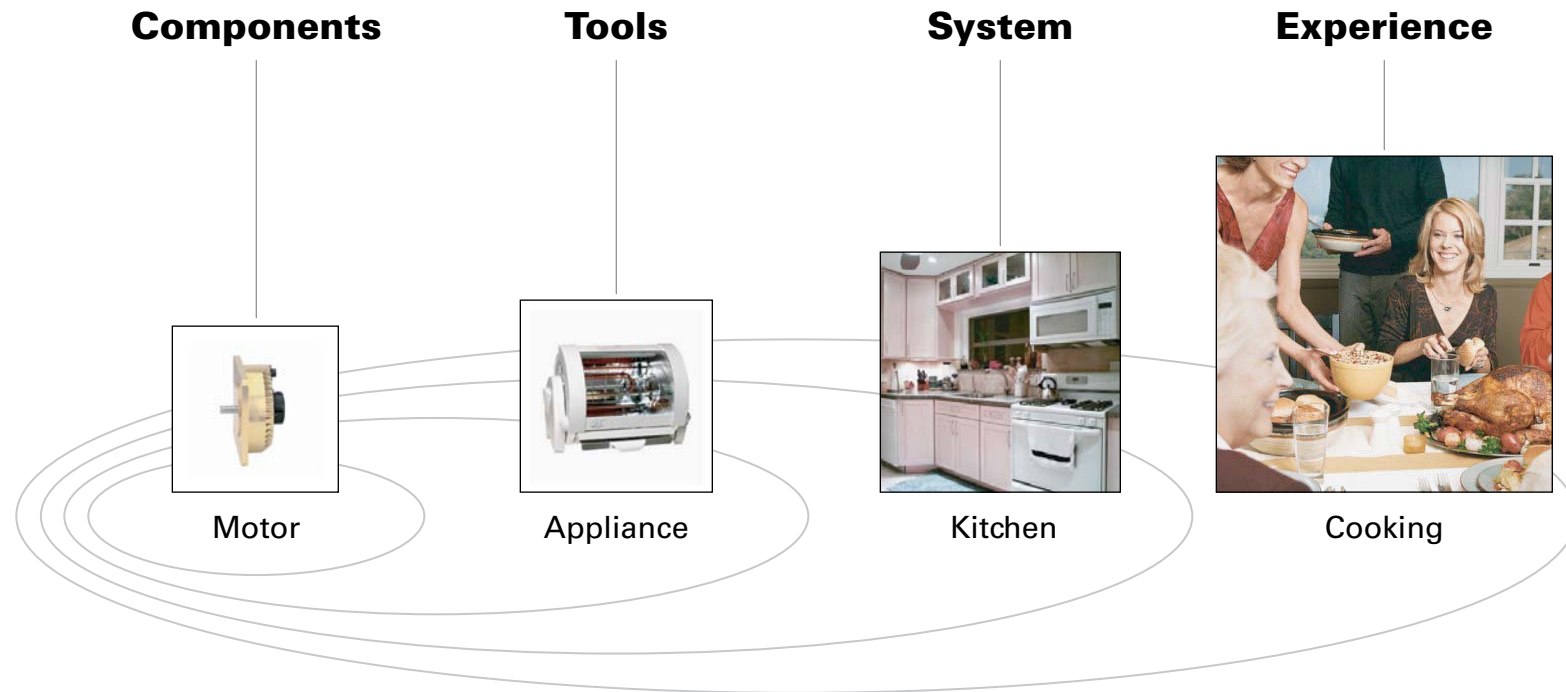
Systems affect many dimensions of design.

- Creating and managing (networked) **services**
- **Connecting** products + services
- **Integrating** across products
- Building a seamless **brand experience**
- Communicating with **consistency**
- Creating **sustainable** businesses (green design)

Hardware products are increasingly **tied to:**

- embedded **software**
- the **internet** and web-based applications
- human **services**
- the **organizations** which develop and deliver the products and services
- **communities** for which they provide infrastructure
- the **ecologies** in which they cooperate and compete

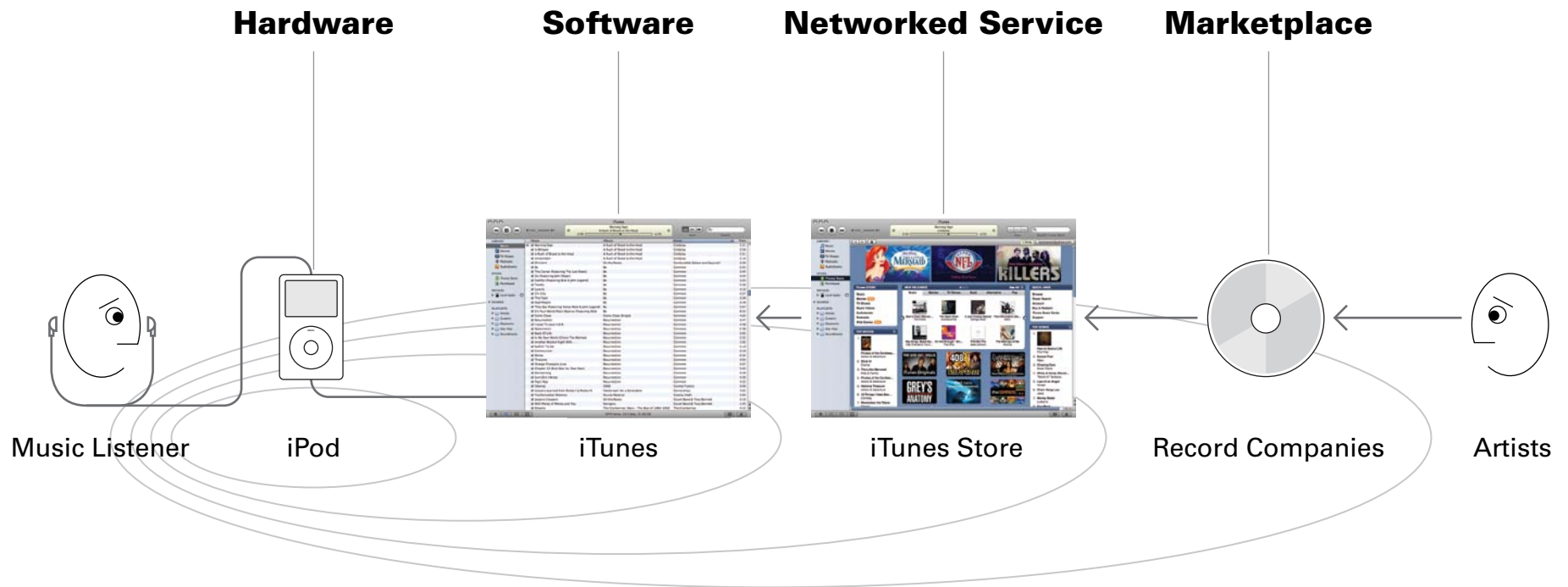
Value comes from interacting with larger systems— enabling an ecology.



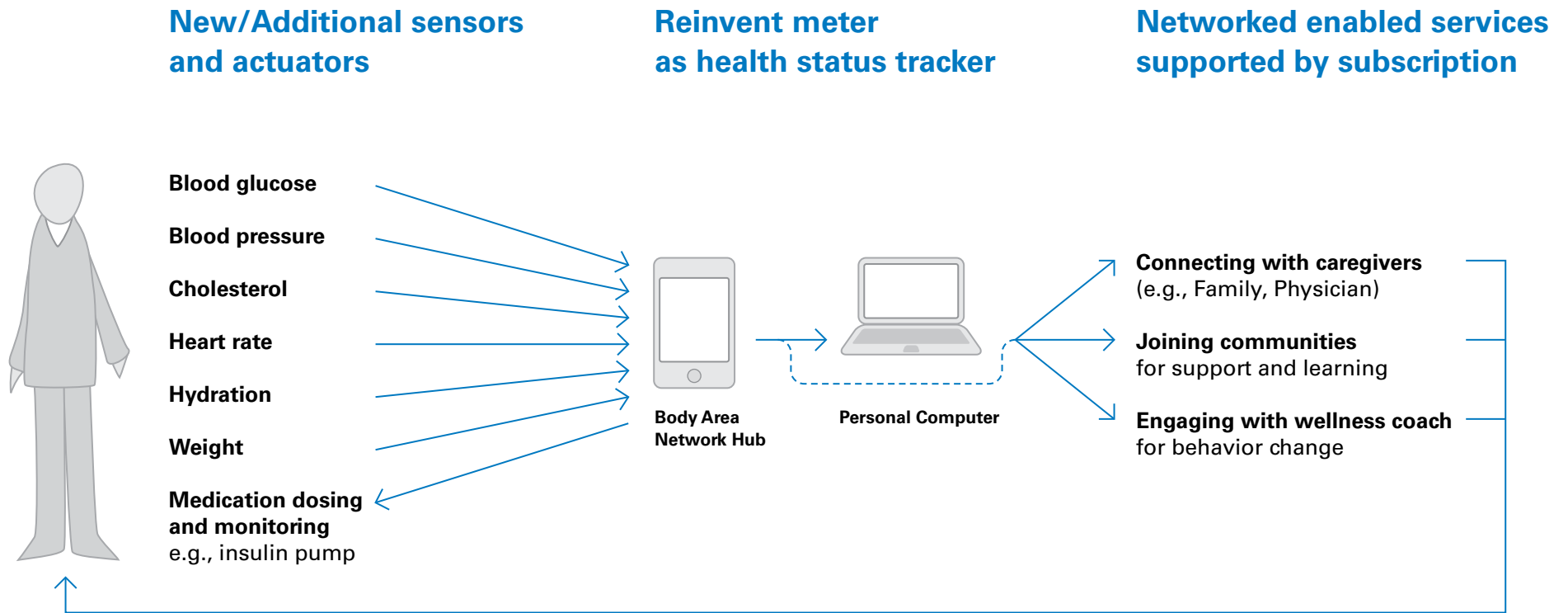
— John Rheinfrank & Fred Murrell

iPod is an **integrated system**.

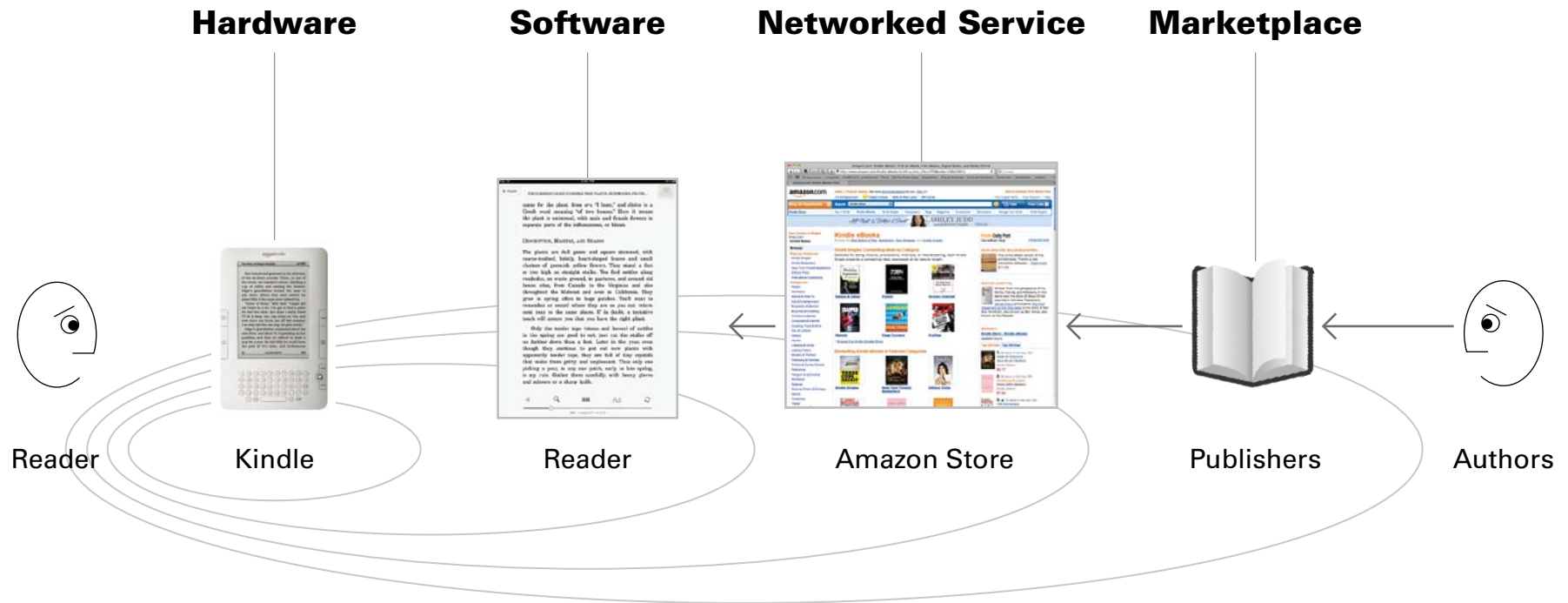
DRAM > mp3 player > music sharing service > my music



Smartphones are becoming hubs of body-area networks.



Amazon's Kindle-Reader-WisperNet-Store system is another **networked-services ecology**.



*“I think of [the Kindle] as a service.
Part of [it] is of course the hardware,
but really, it’s the software, the content,
it’s the seamless integration of those things.”*

— Jeff Bezos

**The shift
in the nature of products
requires a shift
in the way we design.**

From ...
escaping the past

Manufacturing Age

Objects/Things

Seek simplicity

Expert/Deciding

Direct

Almost perfect

More deterministic

Completed

To ...
inventing the future

Age of Biology

Systems/Behaviors

Embrace complexity

Collaborator/Facilitating

Mediated

Good enough for now

Less predictable

Adapting continuously

Focus

Values

Designer's role

Construction

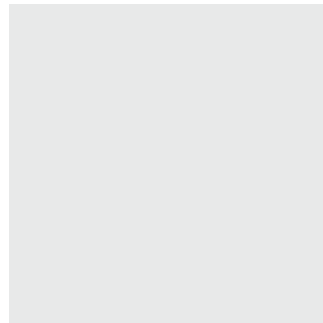
Stopping condition

Result

End state

Design education focuses on the **form of objects**; much of practice does likewise.

How are we making it?
Form/Grammar
Syntactic

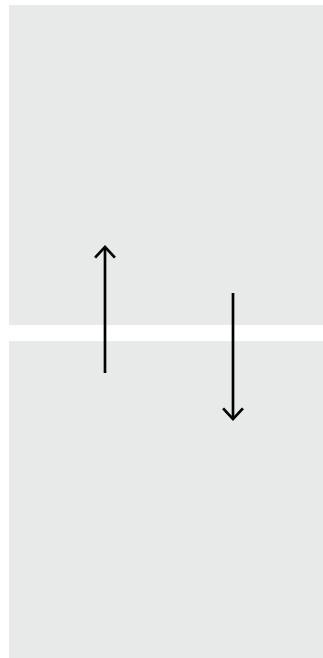


Object
Component

Form is governed by **meaning and structure**, though they are also affected by form.

What are we making?
Meaning/Definition
Semantic

How are we making it?
Form/Grammar
Syntactic



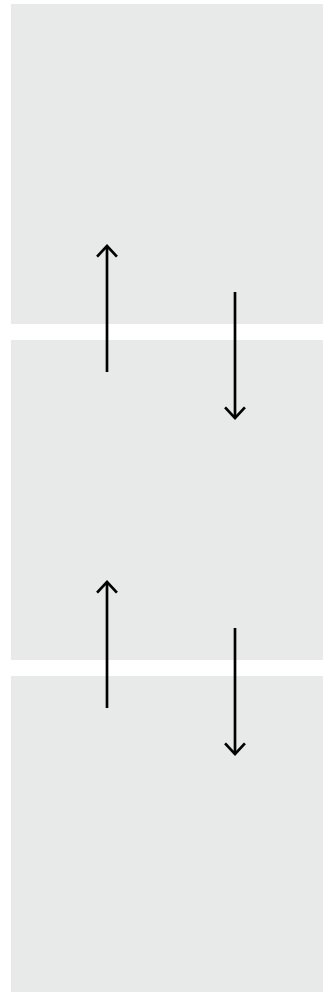
Object
Component

Meaning + structure are governed by **context**; **context** is also affected by meaning + structure.

Why are we making this?
Context/Need
Pragmatic

What are we making?
Meaning/Definition
Semantic

How are we making it?
Form/Grammar
Syntactic



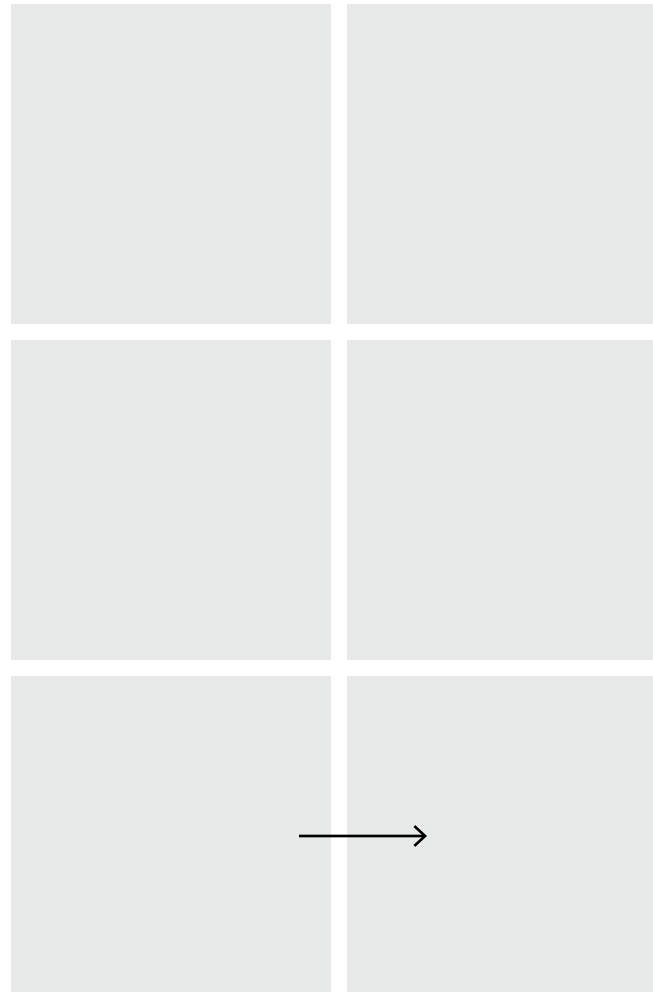
Object
Component

Objects are often embedded in **systems**.

Why are we making this?
Context/Need
Pragmatic

What are we making?
Meaning/Definition
Semantic

How are we making it?
Form/Grammar
Syntactic



Object
Component

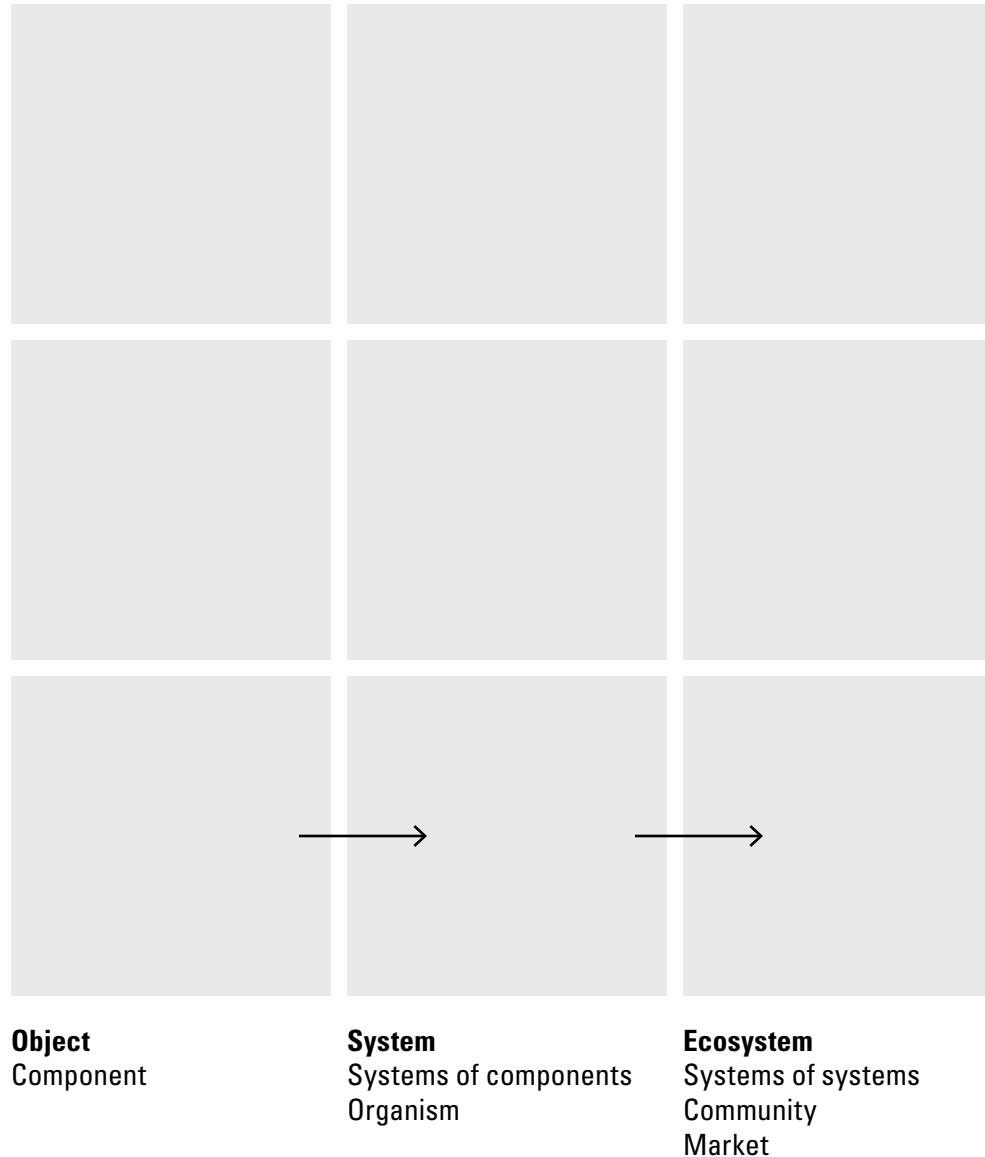
System
Systems of components
Organism

Systems are often embedded in **ecologies**— communities of systems.

Why are we making this?
Context/Need
Pragmatic

What are we making?
Meaning/Definition
Semantic

How are we making it?
Form/Grammar
Syntactic

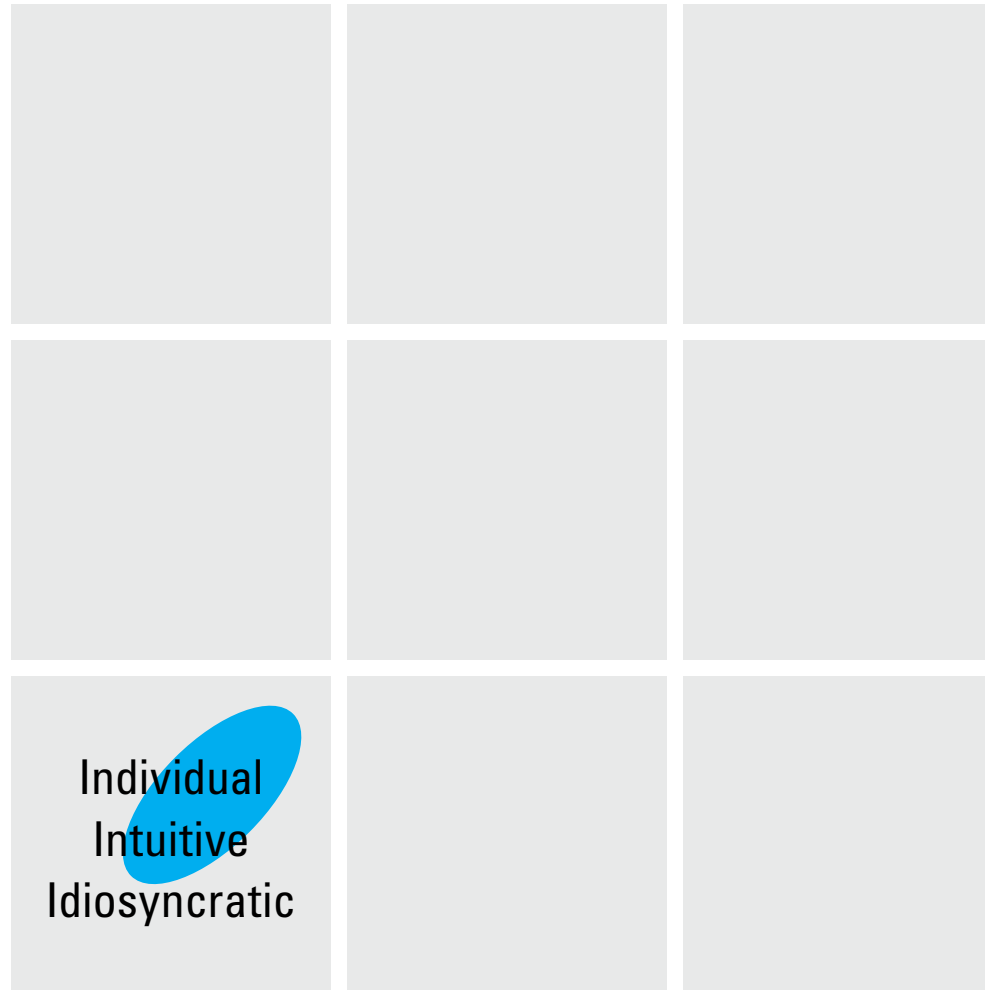


Practice focused on the form of objects can be **direct and unmediated**.

Why are we making this?
Context/Need
Pragmatic

What are we making?
Meaning/Definition
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How are we making it?
Form/Grammar
Syntactic



Object
Component

System
Systems of components
Organism

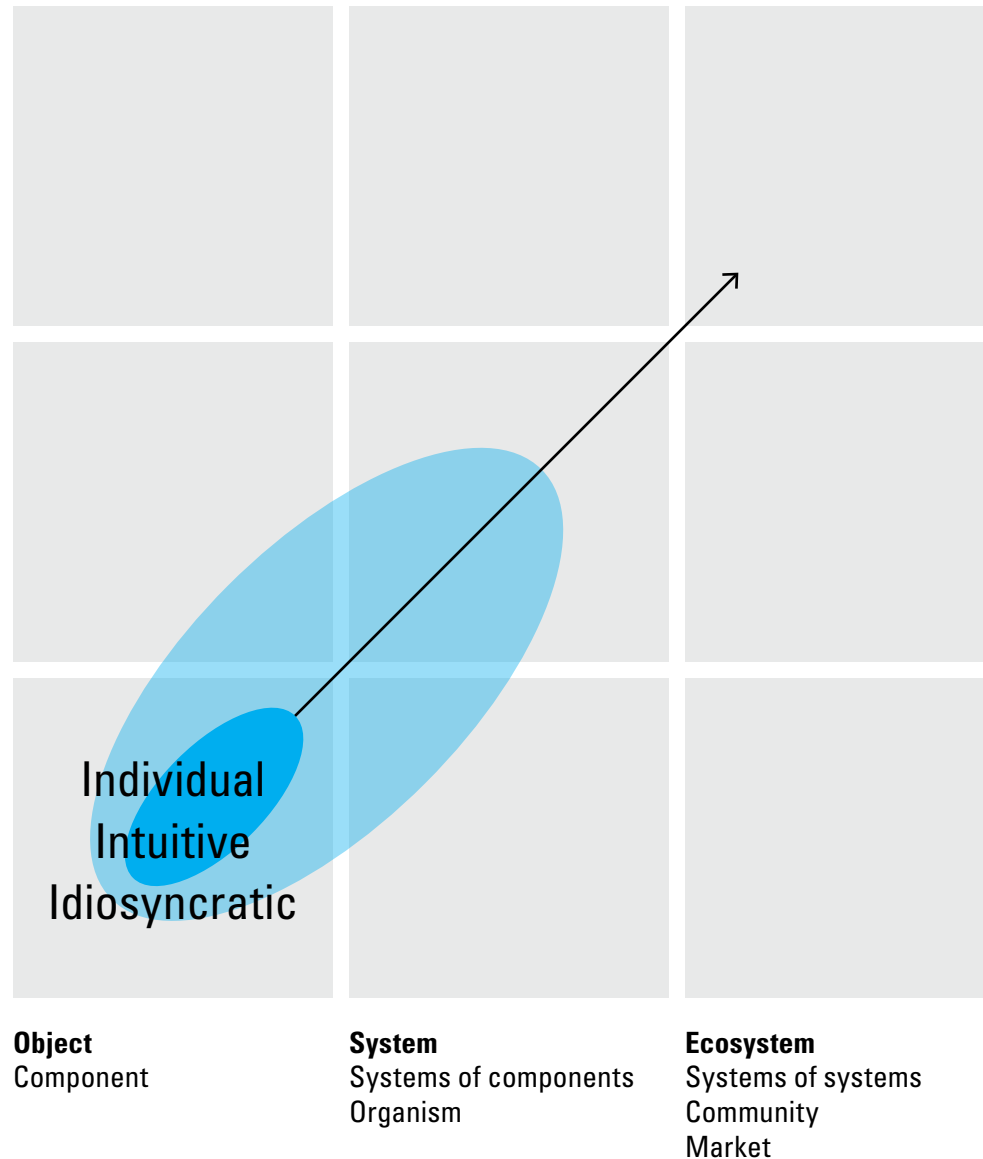
Ecosystem
Systems of systems
Community
Market

As practice expands, it becomes **more complex**.

Why are we making this?
Context/Need
Pragmatic

What are we making?
Meaning/Definition
Semantic

How are we making it?
Form/Grammar
Syntactic

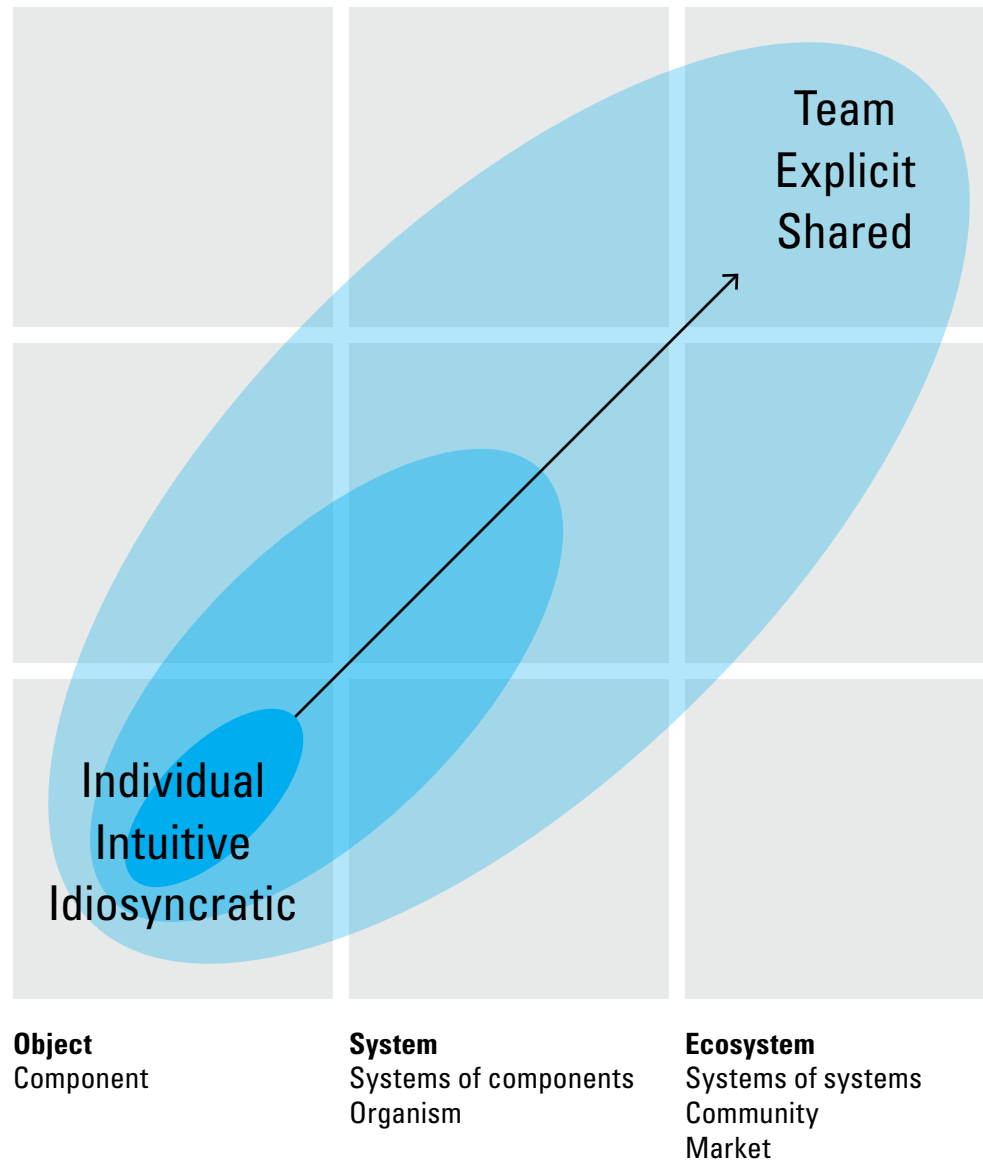


When practice also concerns context + ecologies, project **teams** require **many disciplines**.

Why are we making this?
Context/Need
Pragmatic

What are we making?
Meaning/Definition
Semantic

How are we making it?
Form/Grammar
Syntactic



Moving our focus from the form of objects to the behavior of systems requires research.

Why are we making this?
Context/Need
Pragmatic

What are we making?
Meaning/Definition
Semantic

How are we making it?
Form/Grammar
Syntactic



**Twentieth century design education
focused largely on the form of objects.**

**Twenty-first century design practice
already focuses largely
on the behavior of systems.**

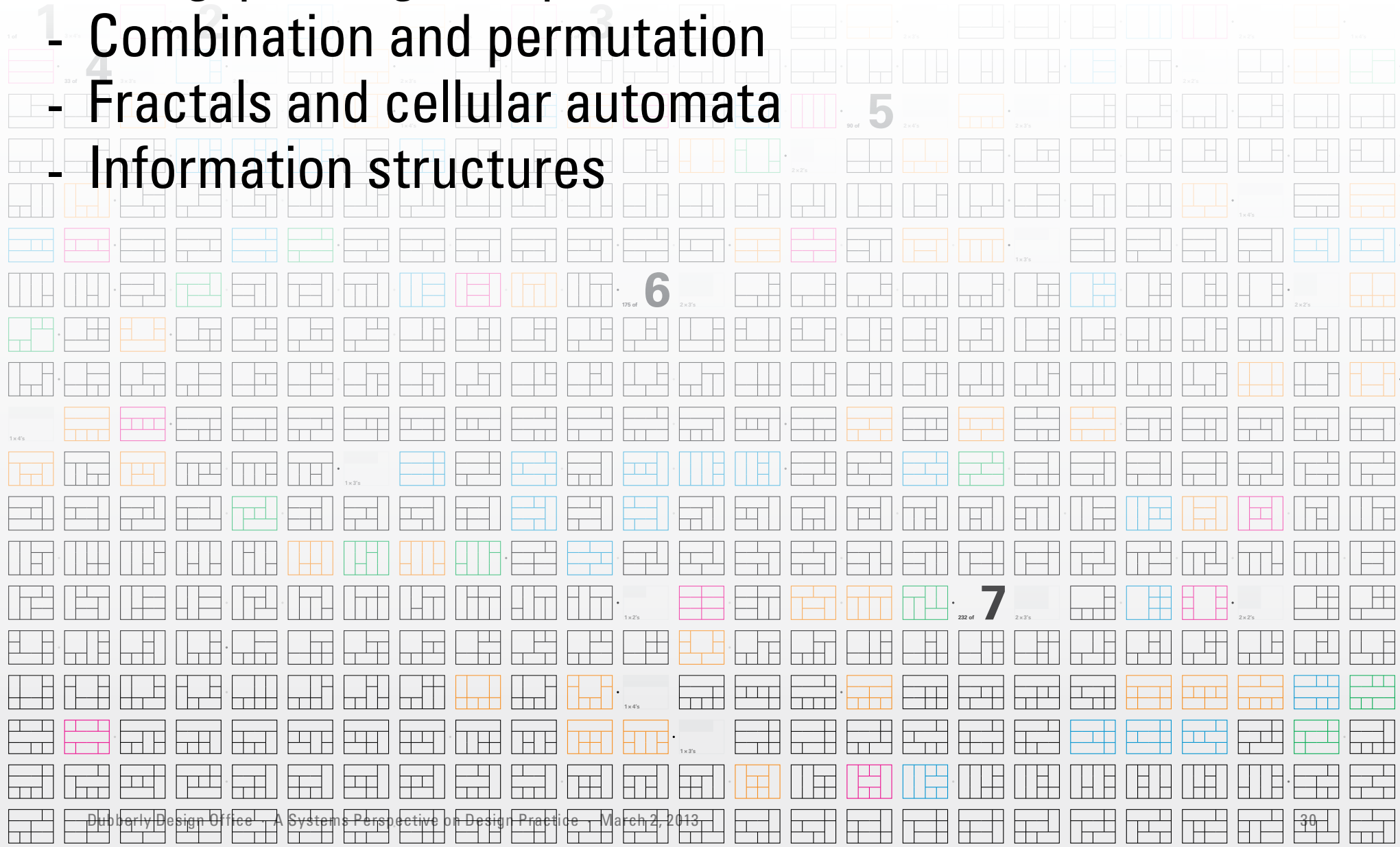
**Let's (re-) imagine design education
from a system's perspective.**

Systems courses might be organized into six broad categories:

- Formal
- Resource distribution
- Dynamic
- Control
- Living
- Conversation

Formal systems

- Sequence and proportion
- Tiling, packing, and patterns
- Combination and permutation
- Fractals and cellular automata
- Information structures



Systems for resource distribution

- Chance and probability
- Exchange systems
- Voting systems

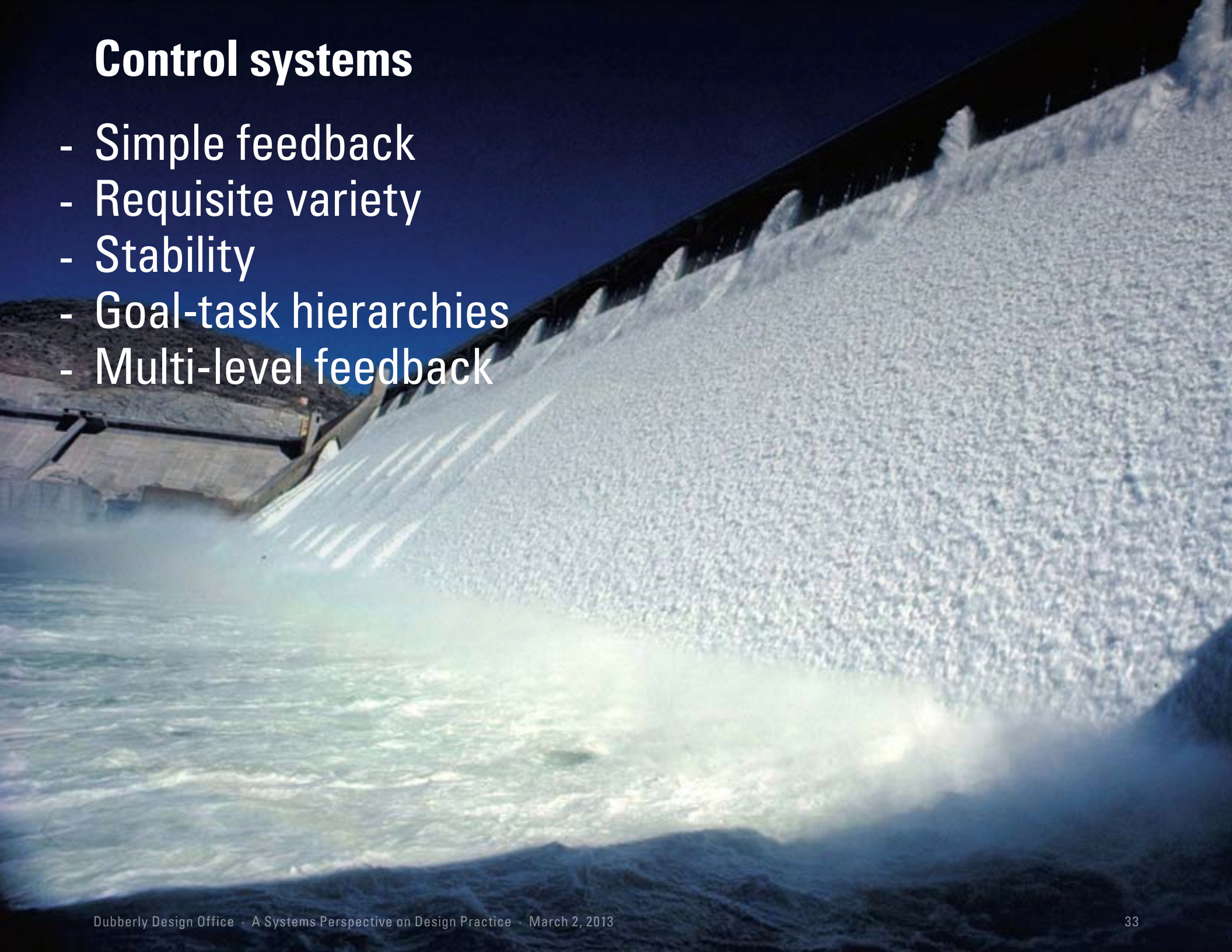


Dynamic systems

- Stocks and flows
- Resource cycles
- Lags and oscillations
- Explosions and collapses (vicious and virtuous cycles)
- Dynamic equilibrium and homeostasis

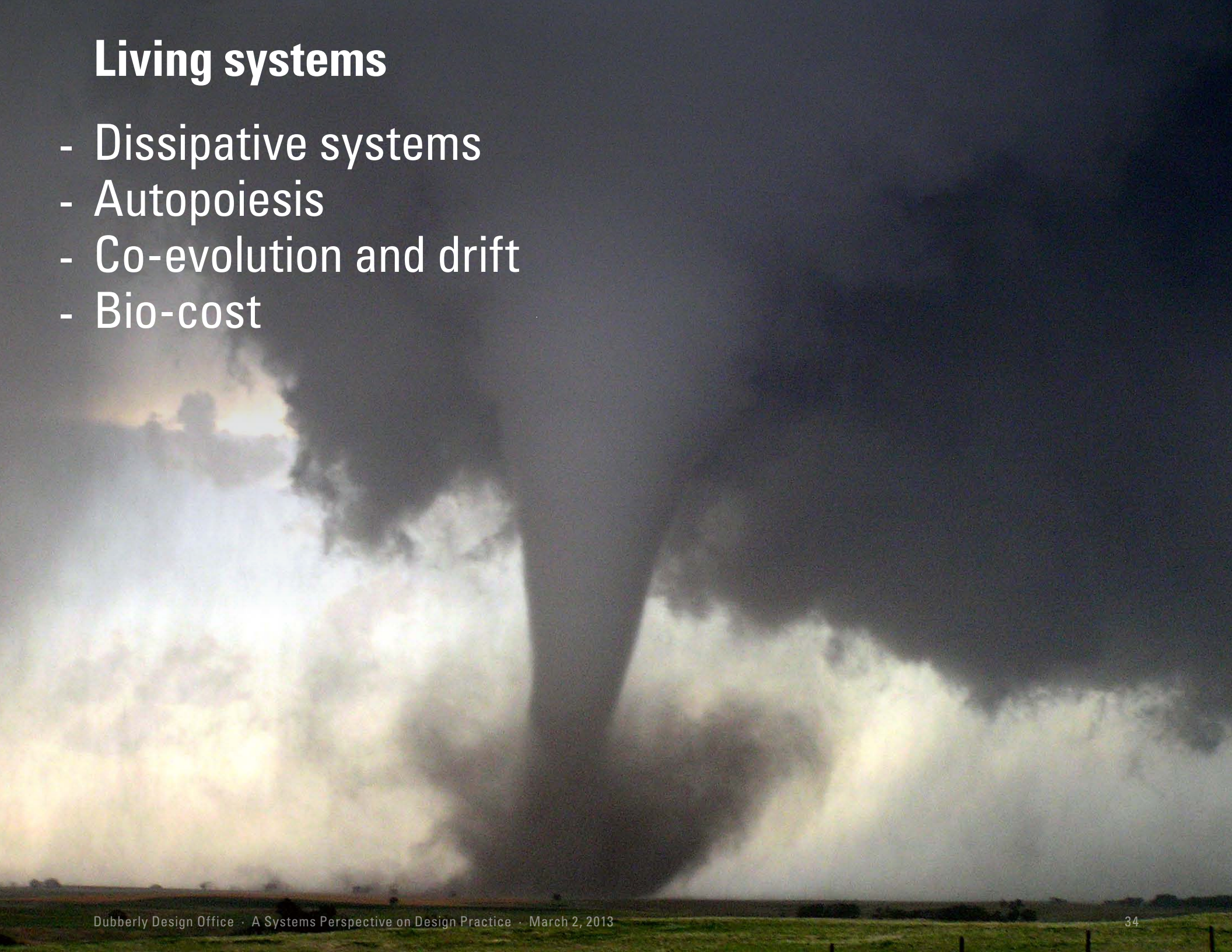
Control systems

- Simple feedback
- Requisite variety
- Stability
- Goal-task hierarchies
- Multi-level feedback



Living systems

- Dissipative systems
- Autopoiesis
- Co-evolution and drift
- Bio-cost



Systems for conversation

- Platforms, construction sets, and languages
- Understanding and agreement
- Learning and play
- Ethics, choice, and responsibility

Special thanks to
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Presentation posted at
www.dubberly.com/presentations/PDFs/parsons_systems.pdf