Designing Our World: 
Cybernetics as Conversation for Action

Heinz von Foerster Lecture ’17 
University of Vienna
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Heinz von Foerster Gesellschaft | Wien | Vienna

Heinz von Foerster 100
Self-Organization and Emergence

28. Oktober 2011
Selbstorganisation und Potenzgesetze in Ökonomie und Gesellschaft

9. November 2011
Understanding Heinz von Foerster and Ernst von Glasersfeld
Workshop der American Society for Cybernetics (ASC)

10. November 2011 | Wiener Vorlesungen | S.J. Schmidt (Münster)
Das Ende der Wirklichkeit im Konstruktivismus?

5th International Heinz von Foerster Conference | November 11th–13th 2011
### Knowledge – Organisation – Society

**Heinz von Foerster and the Biological Computer Laboratory**  
International Heinz von Foerster-Congress 2003 at the Wittgenstein-House

#### Thursday, November 13

- **9:00 a.m. - 11:00 a.m.**
  - Conference Openings
  - Pille Bunnell
  - Ilse König
  - Allenna Leonard
  - Andreas von Foerster
  - Thomas von Foerster
  - Moderator: Karl H. Müller

- **11:00 a.m. - 1:00 p.m.**
  - Ernst von Glasersfeld
  - The Constructivist View of Communication
  - Ranulph Glanville
  - Wonder
  - Moderator: Friedrich Stadler

#### Friday, November 14

- **Alfred Inselberg**  
  - BCL and the Visualization of Multidimensional Geometry

- **Lars Löfgren**  
  - From Wittgenstein’s Language-World Thesis to Holistic Language
  - Moderator: Allenna Leonard

#### Saturday, November 15

- **Robert Martin**  
  - Inventing the World One Conversation at a Time: the Once and Future Invitation of Heinz von Foerster

- **Paul Pangaro**  
  - The Past-Future of Cybernetics: Conversations, Von Foerster, and the BCL
  - Moderator: Pille Bunnell

#### Afternoon Sessions

- **Session I**  
  - Annual Conference of the American Society for Cybernetics

- **Session III**  
  - On the History of the BCL

- **Session V**  
  - Cybernetics and Cognitive Science Today
Saturday, November 15

Robert Martin
Inventing the World One
Conversation at a Time: the Once and Future Invitation of Heinz von Foerster

Paul Pangaro
The Past-Future of Cybernetics: Conversations, Von Foerster, and the BCL
Moderator: Pille Bunnell

Stuart Umpleby
What I Learned from Heinz von...
Paul Pangaro
The Past-Future of Cybernetics: Conversations, Von Foerster, and the BCL

http://pangaro.com/Heinz-von-Foerster/
Contributions to the Viennese Archive of Gordon Pask

https://vimeo.com/31987180
Invitation to Recursioning (for Heinz von Foerster)

https://vimeo.com/32011737
Heinz von Foerster

photo by Robert Knisely 1989
Mai von Foerster
Heinz von Foerster

photo by Paul Pangaro ~1999
Designing Our World: Cybernetics as Conversation for Action
Designing Our World
Learning is less about acquiring or transmitting information or existing ideas or values than it is about collectively designing a world that is worth living in.

—Edith Ackermann
Designing Our World
Designing Our World:
Conversation for Action
Ranulph Glanville

Photo from https://systemic-design.net/remembering-ranulph-glanville/
I can have a piece of paper and I can make a mark and go away and come back and look at it later.

And you know what happens when you draw on something and you come back and look at it later? It looks different than you thought you’d drawn it.

So... you’re taking two roles: the person who draws, the person who looks, the person who draws, the person who looks.

[This] is what is at the center of designing. This, for me, is the act that makes design design.

— Ranulph Glanville
Designing Our World: Cybernetics as Conversation for Action
Designing Our World: Cybernetics as Conversation for Action
“Everyone designs who devises courses of action aimed at changing existing situations into preferred ones.”

— Herbert Simon
“Design and cybernetics are really the same thing.”

— Ranulph Glanville
“Conversation is the bridge between cybernetics and design.”

— Ranulph Glanville
We construe design as a conversation for action — that is, as cybernetics.

— Dubberly & Pangaro, Cybernetics and Design: Conversations for Action, 2017
Cybernetics is a necessary foundation for 21st century design practice.

— Dubberly & Pangaro, Cybernetics and Design: Conversations for Action, 2017
If design, then systems:

- The prominence of digital technology in daily life cannot be denied (or reversed). Digital technology comprises systems of systems (Internet of Things).
- Design has expanded from giving-form to creating systems that support interactions. Human interactions span thinking and acting, whether mundane or metaphysical.

We must model and tame this complex mesh of mechanisms.

Therefore: systems literacy is a necessary foundation for design.
If design, then systems.

If systems, then cybernetics:

• Digital interactions comprise reliable connections, communication, and feedback. Human interactions comprise purpose, feedback, and learning.
• The science of communication and feedback, interaction and purpose, is cybernetics.

We must model communication and intention in a common frame. Therefore: cybernetics is a necessary foundation for design.
If design, then systems.

If systems, then cybernetics.

If cybernetics, then second-order cybernetics:

• Framing “wicked challenges” requires articulating human values and viewpoints. Values and viewpoints are subjective.
• Designers must offer a persuasive rationale for our subjective viewpoints.
• Modeling subjectivity is the province of second-order cybernetics.

We must embrace values and subjectivity at the heart of designing.

Therefore: second-order cybernetics is a necessary foundation for design.
If design, then systems.

If systems, then cybernetics.

If cybernetics, then second-order cybernetics.

If second-order cybernetics, then conversation:

- Taming “wicked challenges” must be grounded in argumentation.
- Argumentation requires conversation so that participants may understand and agree.
- Agreement is necessary for collaboration and effective action.

We must embrace argumentation and collaboration to the heart of 21st-century design. Therefore: conversation is a necessary foundation for design.
If design, then systems.

If systems, then cybernetics.

If cybernetics, then second-order cybernetics.

If second-order cybernetics, then conversation.

— Dubberly & Pangaro, Cybernetics and Design: Conversations for Action, 2017
“Design is the action; Second-order Cybernetics is the explanation.”

— Ranulph Glanville
Heinz von Foerster

photo by Robert Knisely 1989
Gordon Pask
Heinz von Foerster

photo by Robert Knisely 1989
Gordon Pask
Heinz von Foerster

photo by Robert Knisely 1989
Ranulph Glanville
Gordon Pask
G. Spencer-Brown

photo by Paul Pangaro 1990
Conversation
Conversation
Conversation
Conversation
Conversation
Conversation
Conversation
Conversation for Design
Conversation for Design
Conversations for Design

URBAN5: A Machine That Discusses Urban Design
Conversation for Design

URBAN 5:
A Machine That Discusses Urban Design

Nicholas Negroponte and Leon Groisser

International Business Machines
Cambridge Scientific Center and
Department of Architecture,
Massachusetts Institute of Technology
Cambridge, Massachusetts
Design...
Design... from Thinking to Conversation
What is the process of Design Thinking?

Observe

Brainstorm

Prototype
What Does that mean?

Ethnography

Open-ended idea generation

Making and testing

Observe

Brainstorm

Prototype
What Does that mean?

Observe
Brainstorm
Prototype

Evaluate
What Does that mean?

Observe

Brainstorm

Prototype

Iterate

Evaluate
Limitations

Specific?
Rigorous?
Repeatable?

Observe
Brainstorm
Prototype
Evaluate...

Measure Improvements for Users

Observe

Brainstorm

Prototype

Iterate

Evaluate
Iterate & Evaluate

Measure
Improvements for Users

Measure
Convergence on design goals

Observe

Brainstorm

Prototype
Iterate & Evaluate

Measure
Improvements
for Users

Measure
Convergence
on design goals

Conversation to
Agree on Means

Iterate
Evaluate
Conversation is the core

Measure Improvements for Users

Measure Convergence on design goals
Conversation is the core

Measure
Improvements
for Users

Measure
Convergence
on design goals

Conversation to
Agree on Means
Design… from Thinking to Conversation
Rethinking Design Thinking

Conversation to Agree on Means
Design as Conversation
Design as Conversation

Conversation to Agree on Means

Does doing this...

Iterate

Evaluate

Conversation to Agree on Goals

... achieve this?
Design as Conversation

Conversation to Agree on Goals

Conversation to Agree on Means
Design as Conversation

Conversation to Agree on Goals

Do we have sufficient variety…

to achieve this?

Conversation to Agree on Means
Design as Conversation

Conversation to Design the Designing

Iterate
Evaluate

Conversation to Agree on Goals

Do we have sufficient variety...

to achieve this?

Conversation to Agree on Means
Design as Conversation

Conversation to Design the Designing

Iterate
Evaluate

Conversation to Agree on Goals

Iterate
Evaluate

Conversation to Agree on Means
Design as Conversation

Conversation to Design the Designing
- Iterate
- Evaluate

Conversation to Agree on Goals
- Iterate
- Evaluate

Do we have sufficient variety... to achieve this?

Conversation to Agree on Means
Given the conversation we've just had, focus on the questions above to make the next conversation successful.

1. Bottom-up approach: Keep asking the important questions that ensure the right participants and the right information in every conversation.

In short, given where we want to go:

Who are the necessary and sufficient participants?

What is the necessary and sufficient information?

What did we learn?

What questions do we answer next?

Who can we continue to use who are still essential?

What expertise do we need to answer those questions?

What information do we need to answer those questions?
Given the conversation we've just had, focus on the questions above to make the next conversation successful.

What did we learn?

In short, given where we want to go:
- Who are the necessary and sufficient participants?
- What is the necessary and sufficient information?
- What did we learn?
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- **What did we learn?**
- **What questions do we answer next?**
- **Who can we continue to use who are still essential?**
- **What expertise do we need to answer those questions?**
- **What information do we need to answer those questions?**

**PARTICIPANTS BECOME**

**POSSIBLE PARTICIPANTS**

**BUILDS**

**NEW KNOWLEDGE**

**ESTABLISHES GOAL FOR**

**NEXT CONVERSATION**

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   - What information do we need to answer those questions?

   What questions do we answer next?
   - Who can we continue to use who are still essential?

   What questions do we answer next?
   - What information do we need to answer those questions?

   What new knowledge builds?
   - Establishes goal for determines criteria for selection mechanism.
   - Becomes possible participants.

   External information feeds.

   CONVERSATION e,e,e,...
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Participants become possible participants.

What did we learn?

What questions do we answer next?

Establishes goal for

Determines criteria for

Selection mechanism

What information do we need to answer those questions?

External information

Builds

New knowledge

NEXT CONVERSATION
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What did we learn?

What questions do we answer next?

Who can we continue to use who are still essential?

What expertise do we need to answer those questions?

What information do we need to answer those questions?

Client Engagement can be modeled as a series of stages—catalyst, ideation, solution, delivery, and evaluation—each with specific goals, and therefore specific requirements for participants and information to feed the next conversation.

The engagement lifecycle moves through a series of stages, albeit not always smoothly. Core roles—often the “triumvirate” of account, planning, and creative, but increasingly specialized to a given 360° engagement—are responsible for driving to results, and for communicating across stages and across agency and client groups.

Useful stages that apply across most engagement types are:
- catalyst stage (first interaction): initial contact with client
- ideation: building a model of desired outcomes
- solution: creating a plan to achieve the outcomes
- delivery: executing the plan, deploying the solution
- evaluation: measuring against goals, then adjusting.

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Design as Conversation

Conversation to Design the Designing

Conversation to Agree on Goals

Conversation to Agree on Means

?
Design as Conversation

Conversation to Design the Designing

Iterate
Evaluate

Conversation to Agree on Goals

Iterate
Evaluate

Conversation to Agree on Means

?

Iterate
Evaluate
Design as Conversation

Conversation to Design the Designing

Conversation to Agree on Goals

Iterate
Evalue

Iterate
Evaluate

Iterate
Evaluate

Iterate
Evaluate

Conversation to Agree on Means

Heinz von Foerster '17 / Vienna June 2017 / Paul Pangaro
Heinz von Foerster
Paul Pangaro
Michael Geoghegan

1993
Don Schön
Paul Pangaro
Michael Geoghegan
Gordon Pask
Frank Galuszka

1993
An organization is its language.

Ultimately, an organization consists of conversations: who talks to whom, about what.

Each conversation is recognized, selected, and amplified (or ignored) by the system. Decisions, actions, and a sense of valid purpose grow out of these conversations.

Conversation leads to agreement. Agreement leads to transaction.
Narrowing language increases efficiency.

Organizations create their own internal language to solve specific problems.

This language serves as a kind of shorthand: Managers use it every day, knowing they will be clearly understood.

Over time, this internal language grows increasingly specialized—and narrow.
Narrowing **language** also increases ignorance.

The organization’s internal language is designed to help managers facilitate present-day business—not look beyond it.

Using the internal language, managers increase efficiencies, but cannot recognize new fields of research, new discoveries, new approaches.
Managers understand the organization’s past behavior. But this knowledge, and the language that accompanies it, limit their vision of the organization’s potential future state.

Using the language of the past, managers may try to provide a vision for the future. But it is an old future—a memory of what the future could be.

Managers may strive for fundamental change, but their language prevents them from achieving it.
Expanding **language** increases opportunity.

The conversations necessary for generating new opportunities come from outside the system.

For an organization to survive, it must be able to acquire new, relevant language domains.
To regenerate, an organization creates a new language.

To support an organization's future viability, effective decision makers actively introduce change into the system.

They do so by generating new language that appropriate groups in the organization come to understand and embrace.

This new language does not overtly challenge the pre-existing, efficient system, but rather creates new distinctions and supportive relationships.
Design as Conversation

- Conversation to Design the Designing
  - Iterate
  - Evaluate

- Conversation to Agree on Goals
  - Iterate
  - Evaluate

- Conversation to Agree on Means
  - Iterate
  - Evaluate

- ?

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Design as Conversation

Conversation to Design the Designing
- Iterate
- Evaluate

Conversation to Agree on Goals
- Iterate
- Evaluate

Conversation to Create New Language
- Iterate
- Evaluate

Conversation to Agree on Means
- Iterate
- Evaluate
Paul Pangaro
Stafford Beer

1984
VSM — Viable System Model

Diagnosing the System for Organizations
Stafford Beer 1985
VSM — Viable System Model

Diagnosing the System for Organizations
Stafford Beer 1985
Conversation to Agree on Means
Conversation to Agree on Goals

Conversation to Agree on Means

FIVE: Homeostasis

This box is ONE of the next recursions
Heinz von Foerster’s Vienna June 2017 Paul Pangaro

Conversation to Design the Designing

Conversation to Create New Language

Conversation to Agree on Goals

Conversation to Agree on Means
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Conversations to Agree on Means

Conversations to Create New Language

Conversations to Agree on Goals

Designing

Create New Language

Goals

Conversation to Design the
Designing

TOTAL ENVIRONMENT

EMBEDDED ENVIRONMENT

TOTAL ENVIRONMENT

EMBEDDED ENVIRONMENT

Figure 37

THE VIABLE SYSTEM

- Stafford Beer

always stands for
Design as Conversation

- Conversation to Design the Designing
  - Iterate
  - Evaluate

- Conversation to Agree on Goals
  - Iterate
  - Evaluate

- Conversation to Create New Language
  - Iterate
  - Evaluate

- Conversation to Agree on Means
  - Iterate
  - Evaluate
We construe design as a conversation for action — that is, as cybernetics.
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Action may either conserve or change a situation.
We construe design as a conversation for action — that is, as cybernetics.

Action may either conserve or change a situation.

In other words, design is a conversation about what to conserve and what to change, a conversation about what we value.

— Dubberly & Pangaro, Cybernetics and Design: Conversations for Action, 2017
Conversation as Living Together in Languaging
Design = Conversations for Action

If we converse explicitly about goals, we are transparent about frames and values. (This is ethical.)

If we converse about the means to achieve those goals, we more fully engage participants and their abilities, improving outcomes. (This is collaborative.)

If we converse to co-evolve new language, we can escape the limitations of current viewpoints, and create new frames and new possibilities. (This is innovative.)

If we converse about the design process, we enter all our conversations as participants, answerable for our actions. (This is responsible.)
Design = Conversations for Action

If we converse explicitly about goals, we are transparent about frames and values.  
(To agree on goals is ethical.)

If we converse about the means to achieve those goals, we more fully engage participants and their abilities, improving outcomes.  
(To agree on means is collaborative.)

If we converse to co-evolve new language, we can escape the limitations of current viewpoints, and create new frames and new possibilities.  
(To create new language is innovative.)

If we converse about the design process, we enter all our conversations as participants, answerable for our actions.  
(To design the designing is responsible.)
(To agree on goals is ethical.)
(To agree on means is collaborative.)
(To create new language is innovative.)
(To design the designing is responsible.)
Design of Conversations for Action
Challenges of 21st-Century Design

- Energy
- Global warming
- Water
- Food
- Population
- Health
- Equality
- Social justice
Challenges to 21st-Century Design

- Energy
- Global warming
- Water
- Food
- Population
- Health
- Equality
- Social justice
Challenges to 21st-Century Design

Energy
Global warming
Water
Food
Population
Health
Equality
Social justice

Simple problems
Complex problems

“Wicked problems”*

* In the strict sense of Rittel & Webber
Second-order Design = Design for Conversation

The goal of second-order design is to facilitate the emergence of conditions in which others can design — to create conditions in which conversations can emerge — and thus to increase the number of choices open to all.

— Dubberly & Pangaro, Cybernetics and Design: Conversations for Action, 2017
“I shall act always so as to increase the total number of choices.”

— Ethical Imperative, Heinz von Foerster
“If you desire to see, learn how to act.”

— Aesthetic Imperative, Heinz von Foerster
Edith Ackermann

2014
https://vimeo.com/104178407
Thank you all.
Designing Our World: Cybernetics as Conversation for Action

Special Thanks to:
Albert Müller
Marianne Ertl
Allenna Leonard
Hugh Dubberly
Ranulph Glanville
Pooja Upadhyay

See pangaro.com/hvf17/ for slides and references

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MFA Interaction Design Program
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Questions for Heinz #1

What is the ratio of information vs. noise for 1 billion daily users on Facebook?

Questions for Heinz #2

As the population increases, what is the consequence of that ratio?
Thank you all.