

Design of Conversations for Resilience

Annual Conference 2017

American Society for Cybernetics

Salem, Massachusetts

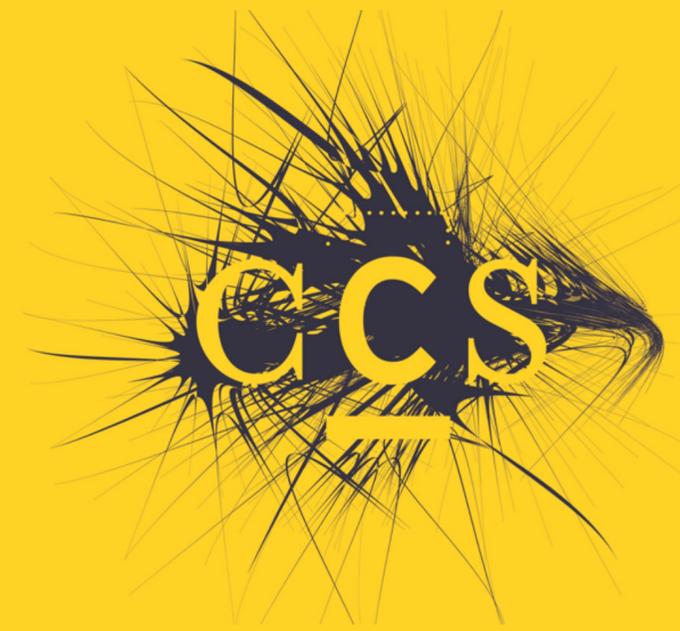
Paul Pangaro, Ph.D.

Chair and Associate Professor

MFA Interaction Design Program

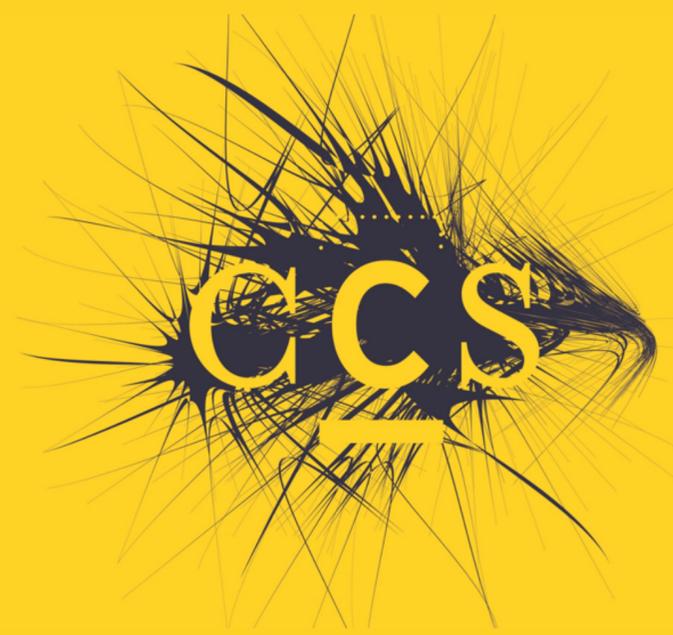
College for Creative Studies, Detroit

paul@pangaro.com

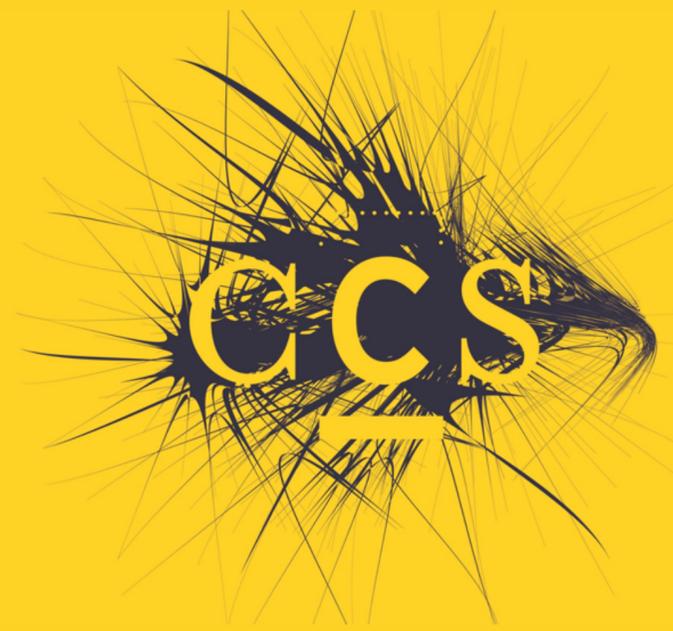


MFA Transportation Design
MFA Color & Materials Design
MFA Integrated Design
MFA Interaction Design
College for Creative Studies, Detroit

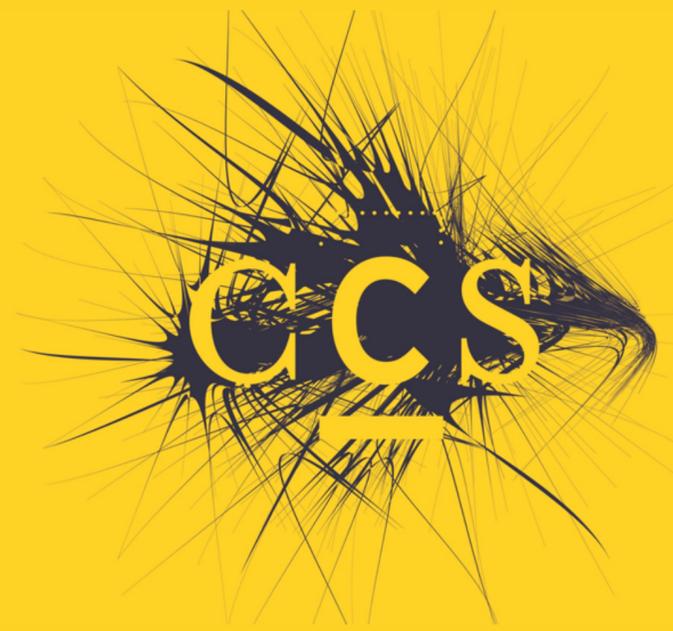
www.paulpangaro.com



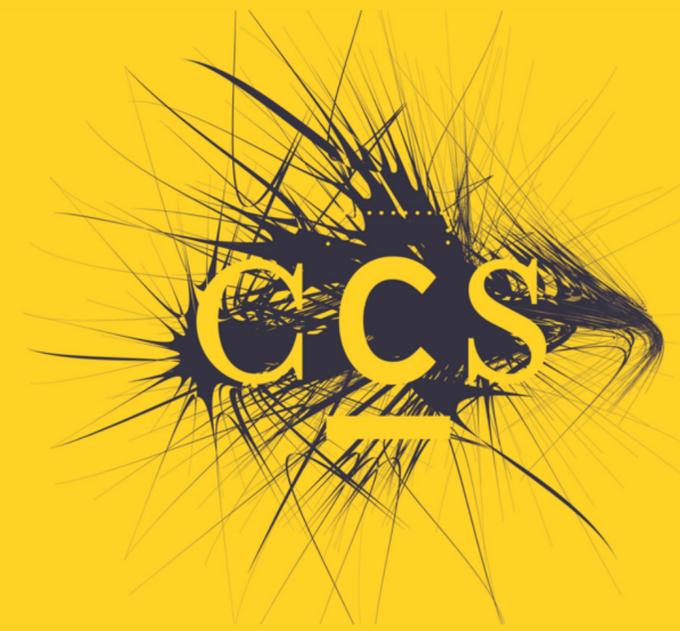
Paul Pangaro, Ph.D.
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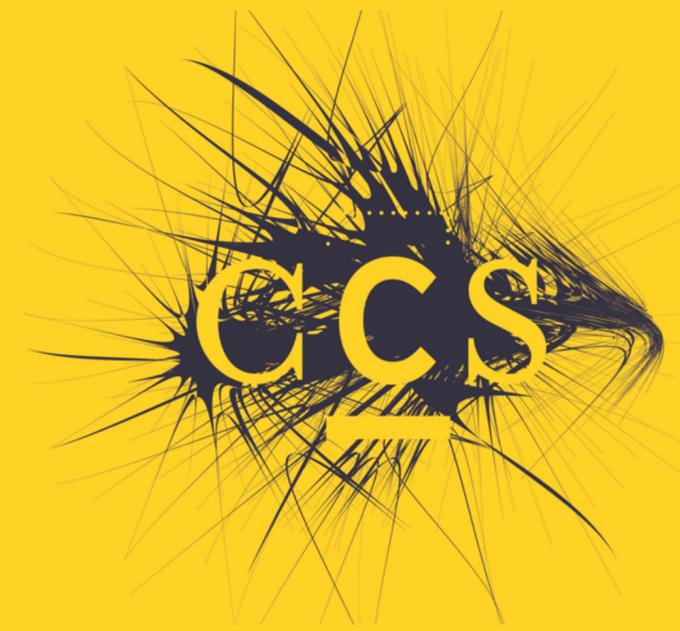
MFA Interaction Design



Interaction Design



Design of Conversations for Resilience



Design...



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

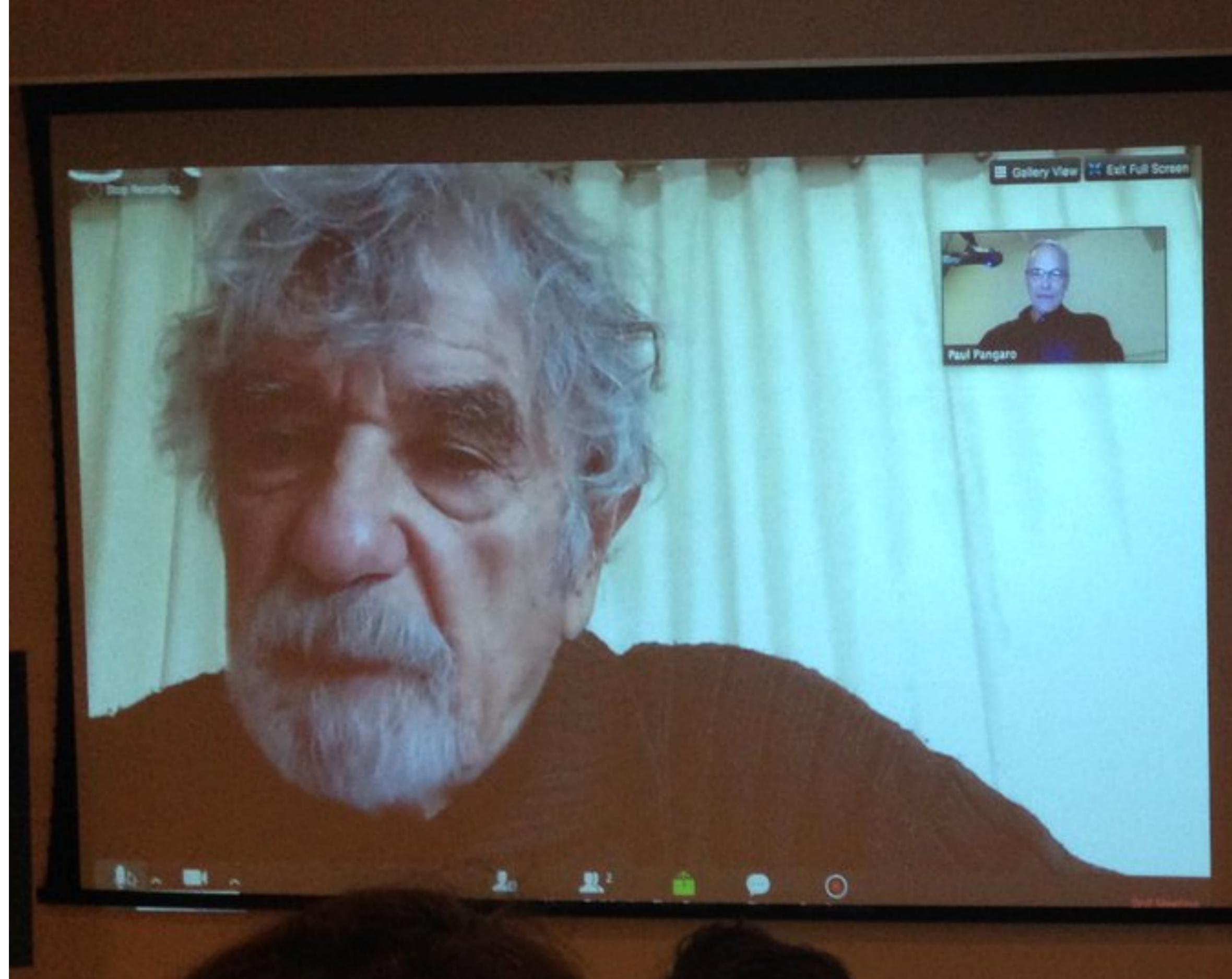
“Every time a set of elements begins to conserve certain relationships, it opens space for everything to change around the relationships that are conserved...”

— Humberto Maturana & Ximena Davila

Humberto Maturana

2016
<https://vimeo.com/189999302>

ASC 2017 / Salem, Massachusetts August 2017 / Paul Pangaro



Design...



Design + Cybernetics



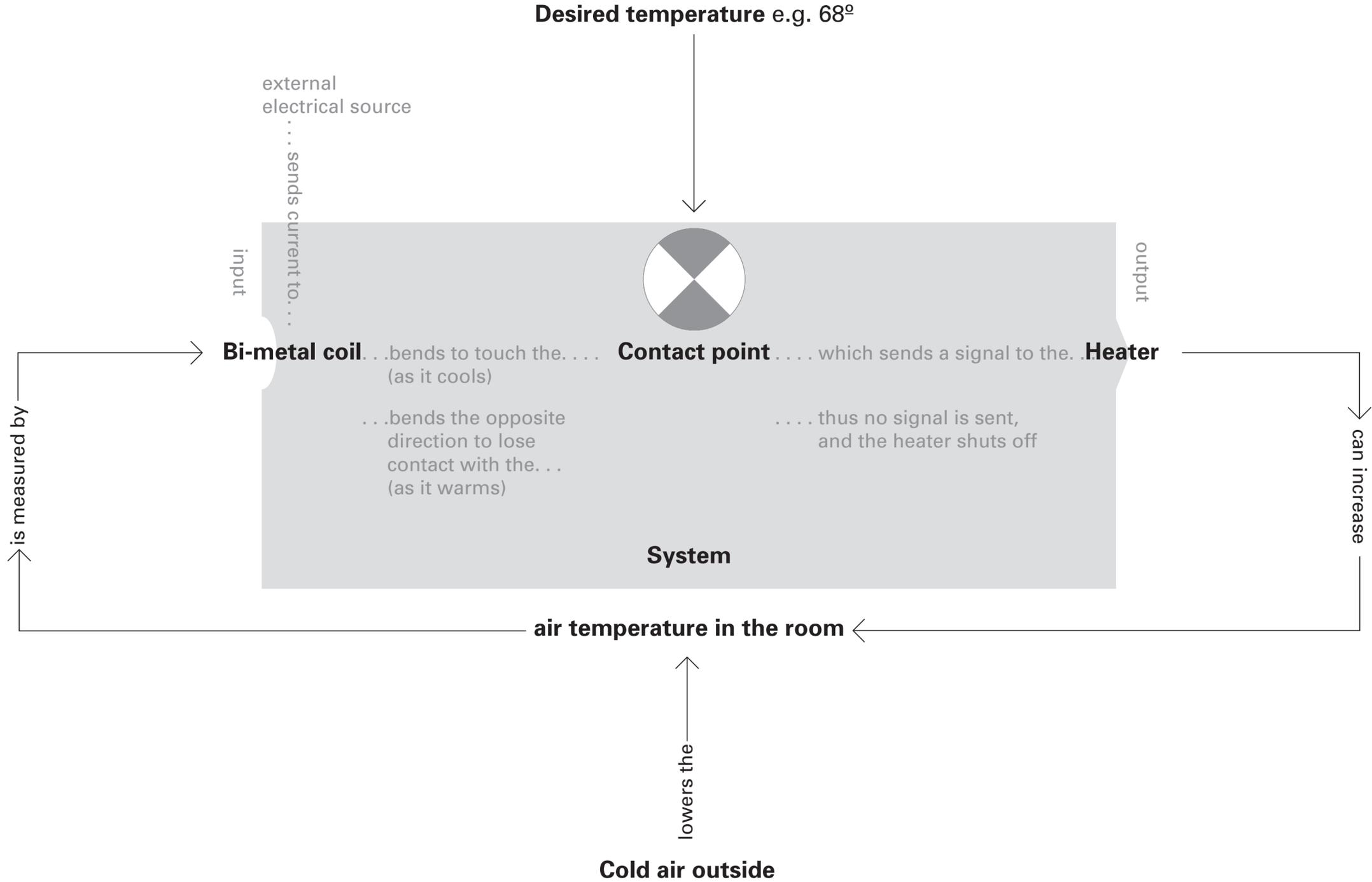
Cybernetics is “...the art of maintaining equilibrium in a world of constraints and possibilities.”

— Ernst von Glasersfeld

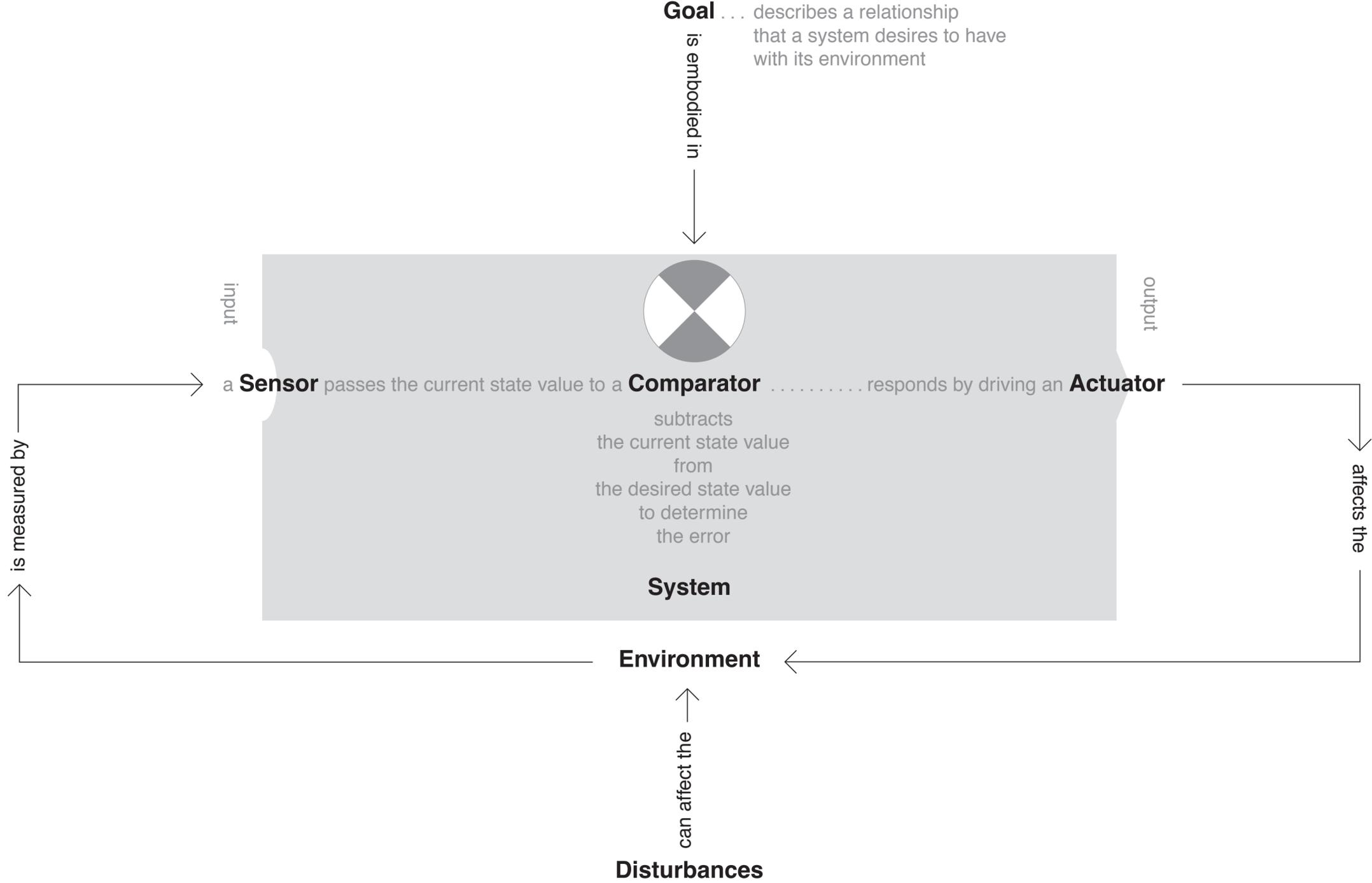
Feedback: Basics



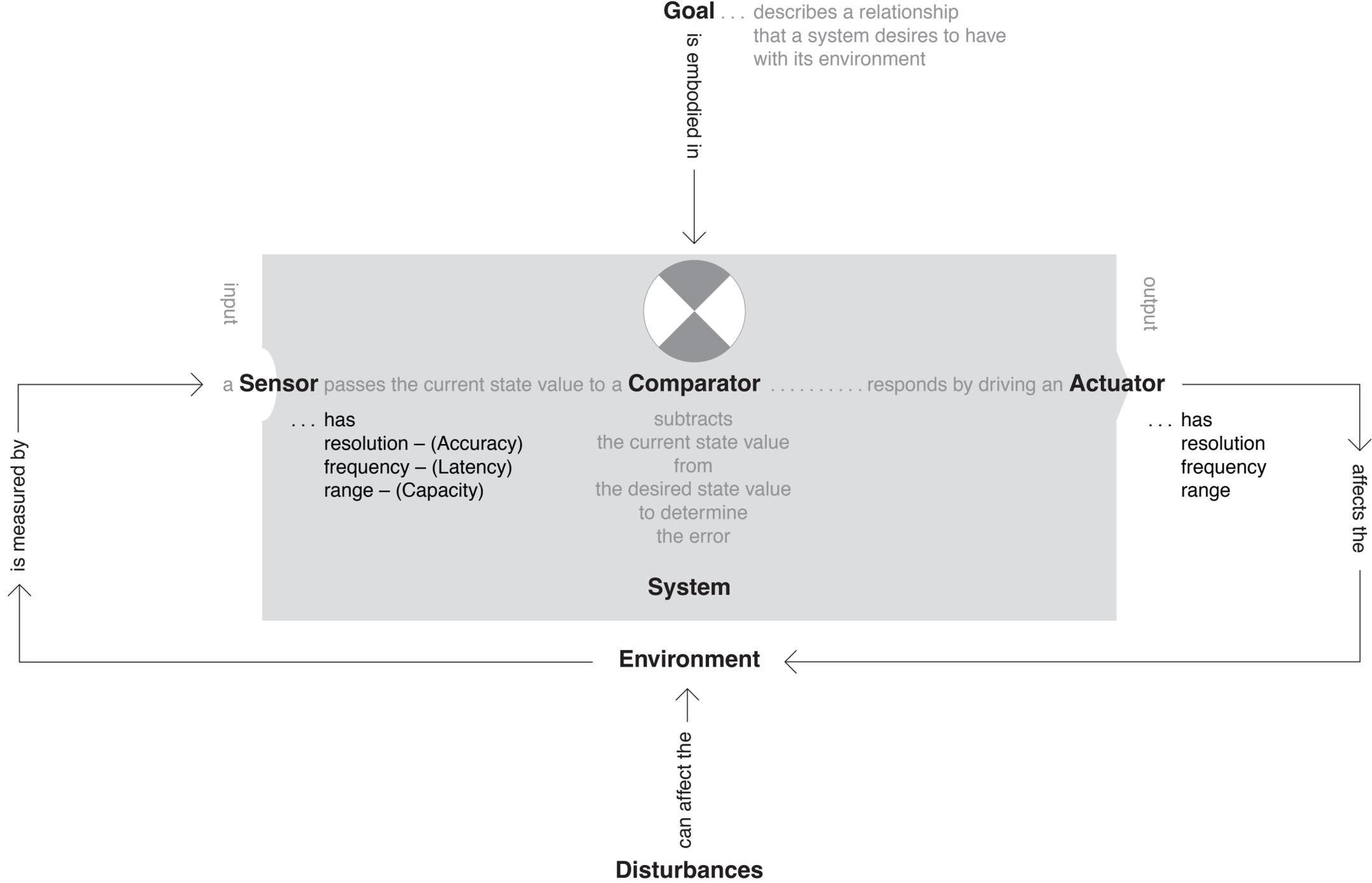
Feedback: Classic Example
 Thermostat regulating room temperature
 (via a heater)



Feedback: Formal Mechanism



Feedback: Concerns of Variety



is measured by



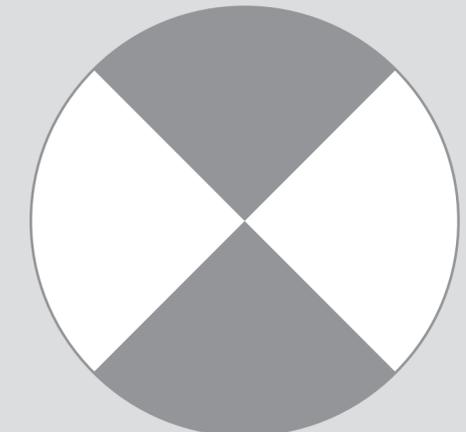
input

a **Sensor** passes the current state value to a **Comparator**

- . . . has
 - resolution – (Accuracy)
 - frequency – (Latency)
 - range – (Capacity)

subtracts
the current state value
from
the desired state value
to determine
the error

System





Controller responds by driving an **Actuator**

acts
state value
m
state value
rmine
error

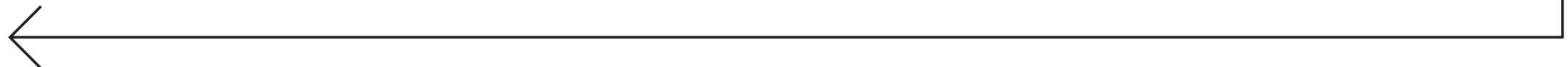
em

ment

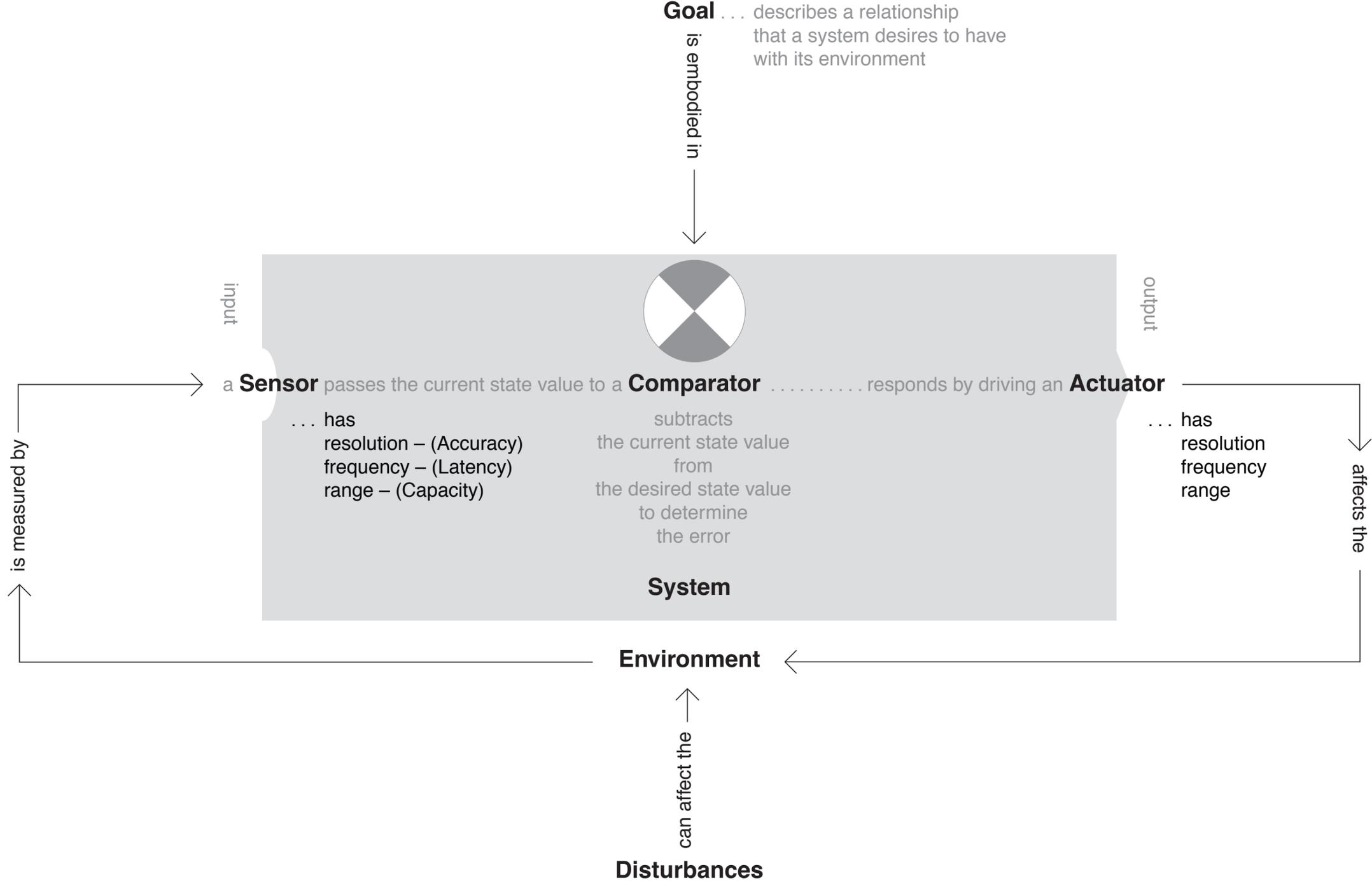
output

... has
resolution
frequency
range

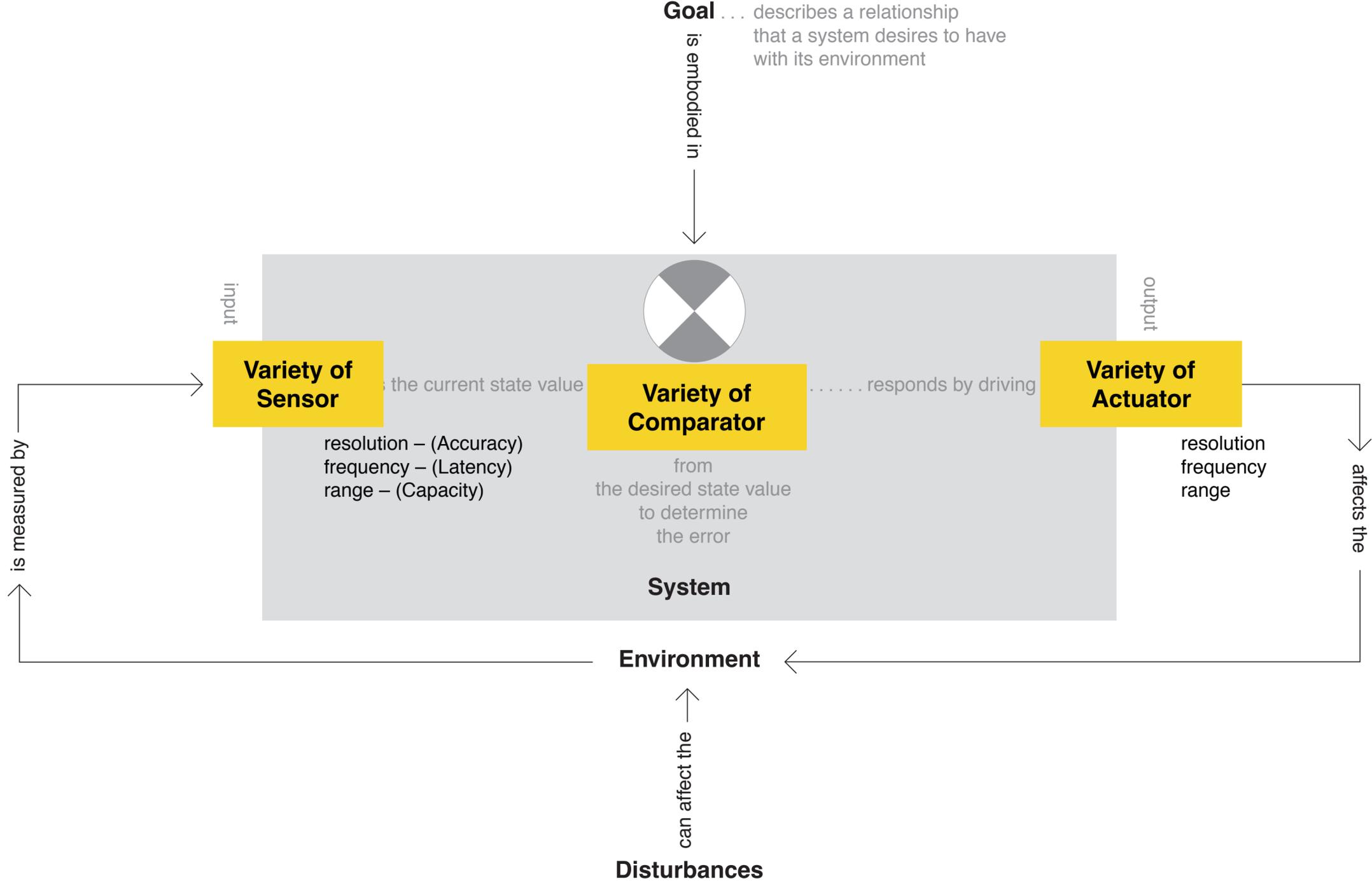
affects the



Feedback: Concerns of Variety



Feedback: Concerns of Variety



Variety, noun: speckled, variegated, hence manifold, diverse
From Old French, variier: alter, make different

1. difference; discrepancy

2. a number of different types of things, especially ones in the same general category

— Dictionary.com

Variety, in cybernetics:

“The total number of possible states of a system [...].”

***“The larger the variety of actions available to a control system,
the larger the variety of perturbations it is able to compensate.”***

***“The greater the variety within a system,
the greater its ability to reduce variety in its environment through regulation.”***

“Variety absorbs variety.”

— W. Ross Ashby

<https://firstlaw.wordpress.com/2011/10/18/ashbys-law/>

Variety, in cybernetics

Proposed, informally

The capabilities (breadth) and capacities (depth) of a system to respond to changes in its environment in order to reach its goals.

System Elements

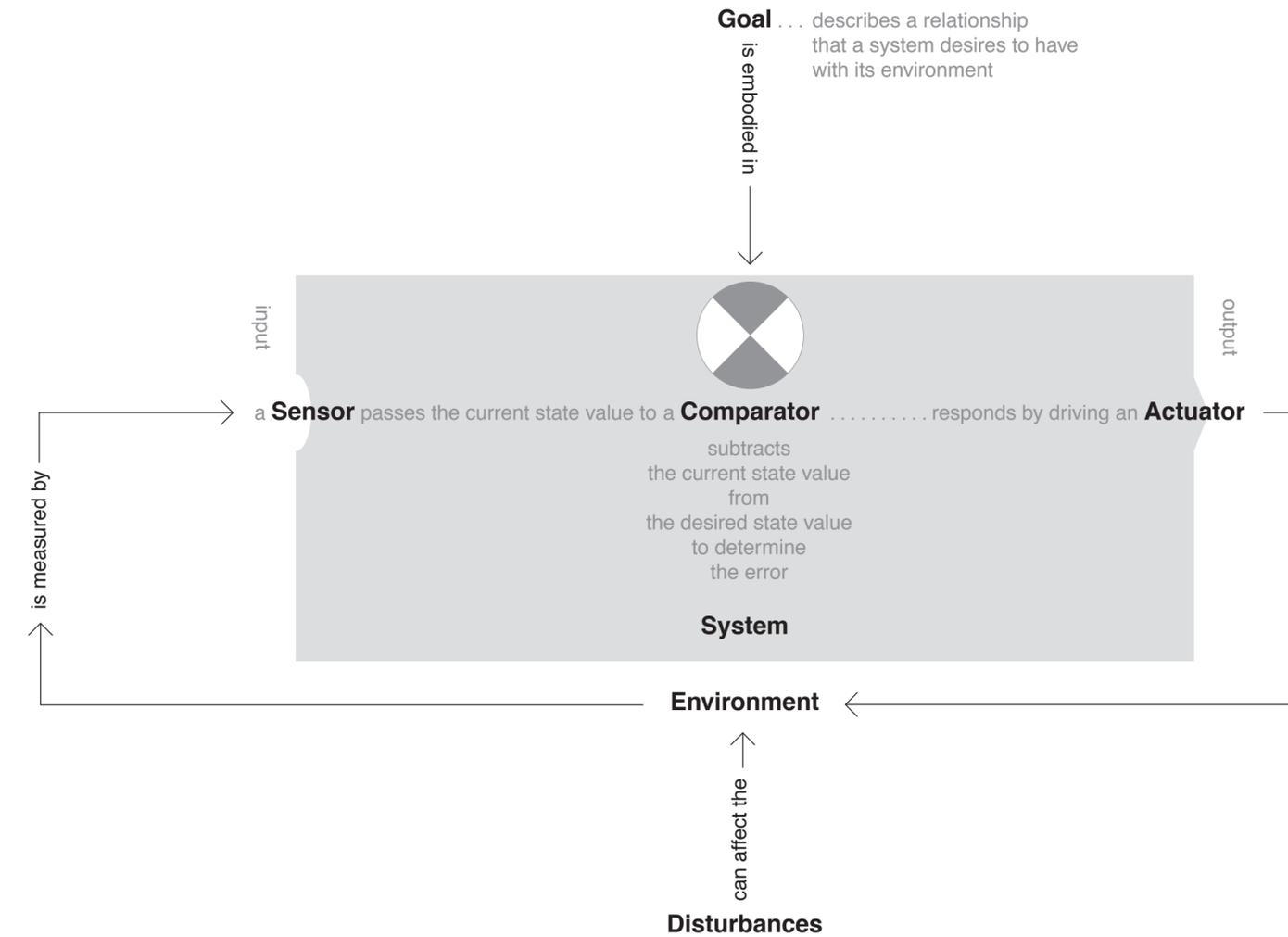
Setpoint (Goal)

Sensor

Comparator

Actuator

Essential Variables



<http://pangaro.com/design-for-a-self-regenerating-organization.html>

System Elements

Setpoint (Goal)

Business Targets & Values

Sensor

People & Processes

Comparator

People & Processes

Actuator

People & Processes

Essential Variables

Social Essential Variables
— Shared Truths

<http://pangaro.com/design-for-a-self-regenerating-organization.html>

System Elements

=

Sources of a System's Variety

Setpoint (Goal)

Business Targets & Values

Sensor

People & Processes

Comparator

People & Processes

Actuator

People & Processes

Essential Variables

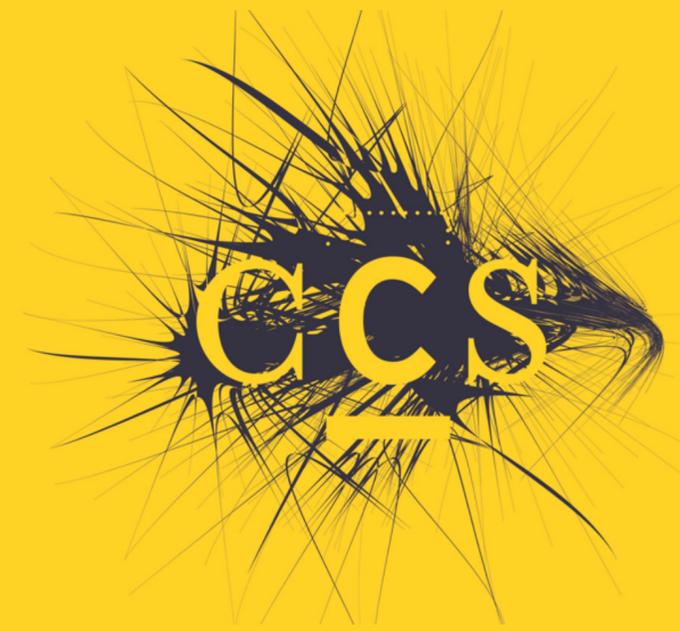
Social Essential Variables
— Shared Truths

<http://pangaro.com/design-for-a-self-regenerating-organization.html>

Design + Cybernetics



Design of Conversations for Resilience



Resilience



Resilience, noun: to spring back, rebound

From Latin, salire: to jump, leap

- 1. the power or ability to return to the original form, position, etc., after being bent, compressed, or stretched; elasticity***
- 2. ability to recover readily from illness, depression, adversity, or the like; buoyancy***

— Dictionary.com

Google Books Ngram Viewer

Graph these comma-separated phrases:

resilience, Resilience

case-insensitive

between

1800

and

2008

from the corpus

English

with smoothing of

7

[Search lots of books](#)



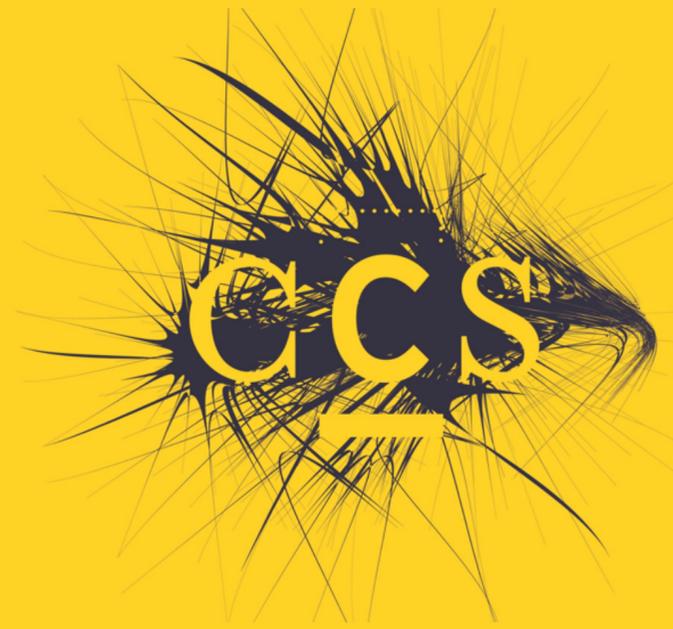
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Resilience, in cybernetics

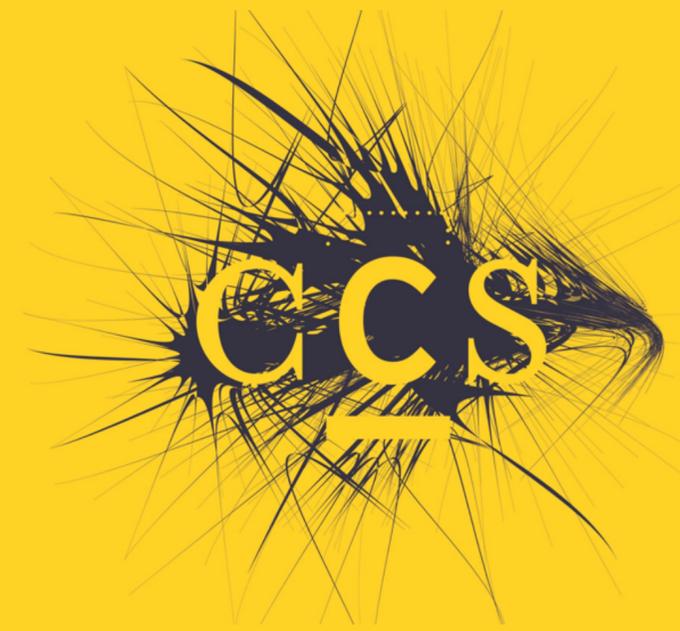
Proposed

- 1. the continuous regulation of variety**
- 2. designing for conversation in social systems, in order to achieve responsive, proactive internal change, as a means of maintaining stability in the face of continuous external change**

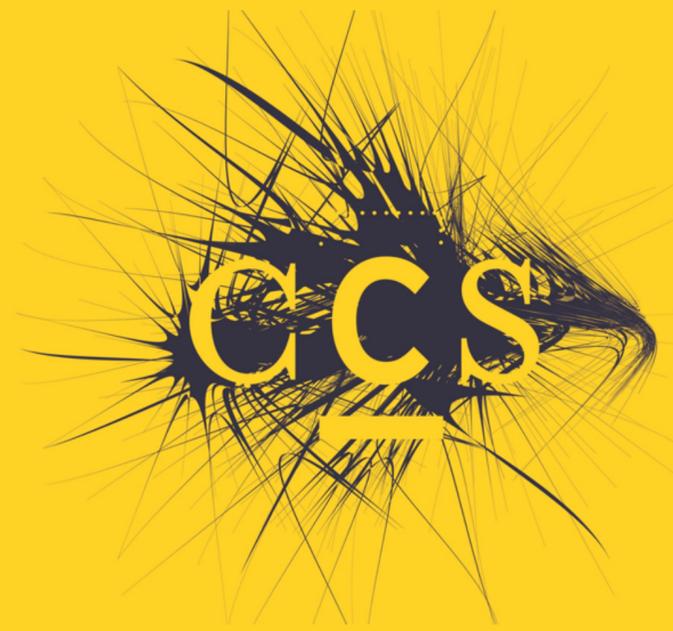
Resilience



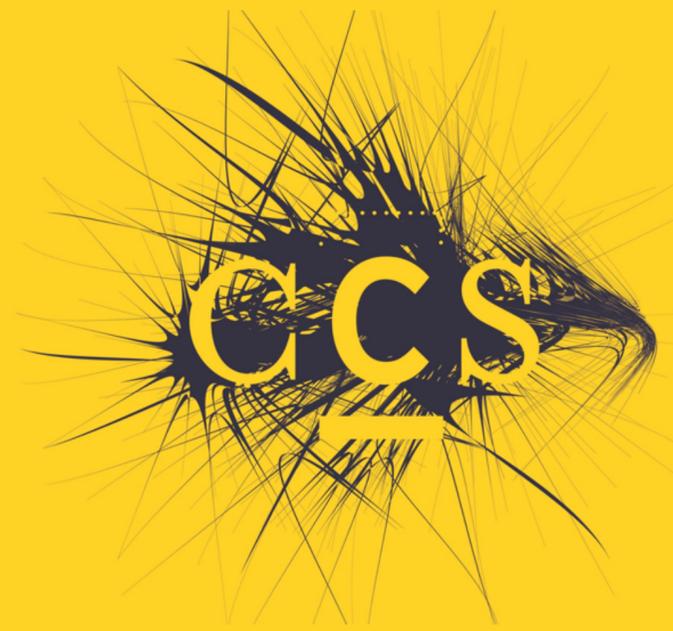
Variety



Design of Conversations for Variety



Design + Second-order Cybernetics



“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

Ranulph Glanville



Photo from
[https://systemic-design.net/
remembering-ranulph-glanville/](https://systemic-design.net/remembering-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 2017, *Cybernetics and Design: Conversations for Action*

Cybernetics is a necessary foundation for 21st century design practice...

— Dubberly & Pangaro 2017, *Cybernetics and Design: Conversations for Action*

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 2017, *Cybernetics and Design: Conversations for Action*

***“Design is the action;
Second-order Cybernetics is the explanation.”***

— Ranulph Glanville

Heinz von Foerster

photo by Robert Knisely 1989

ASC 2017 / Salem, Massachusetts August 2017 / Paul Pangaro



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

Ranulph Glanville
Gordon Pask
G. Spencer-Brown



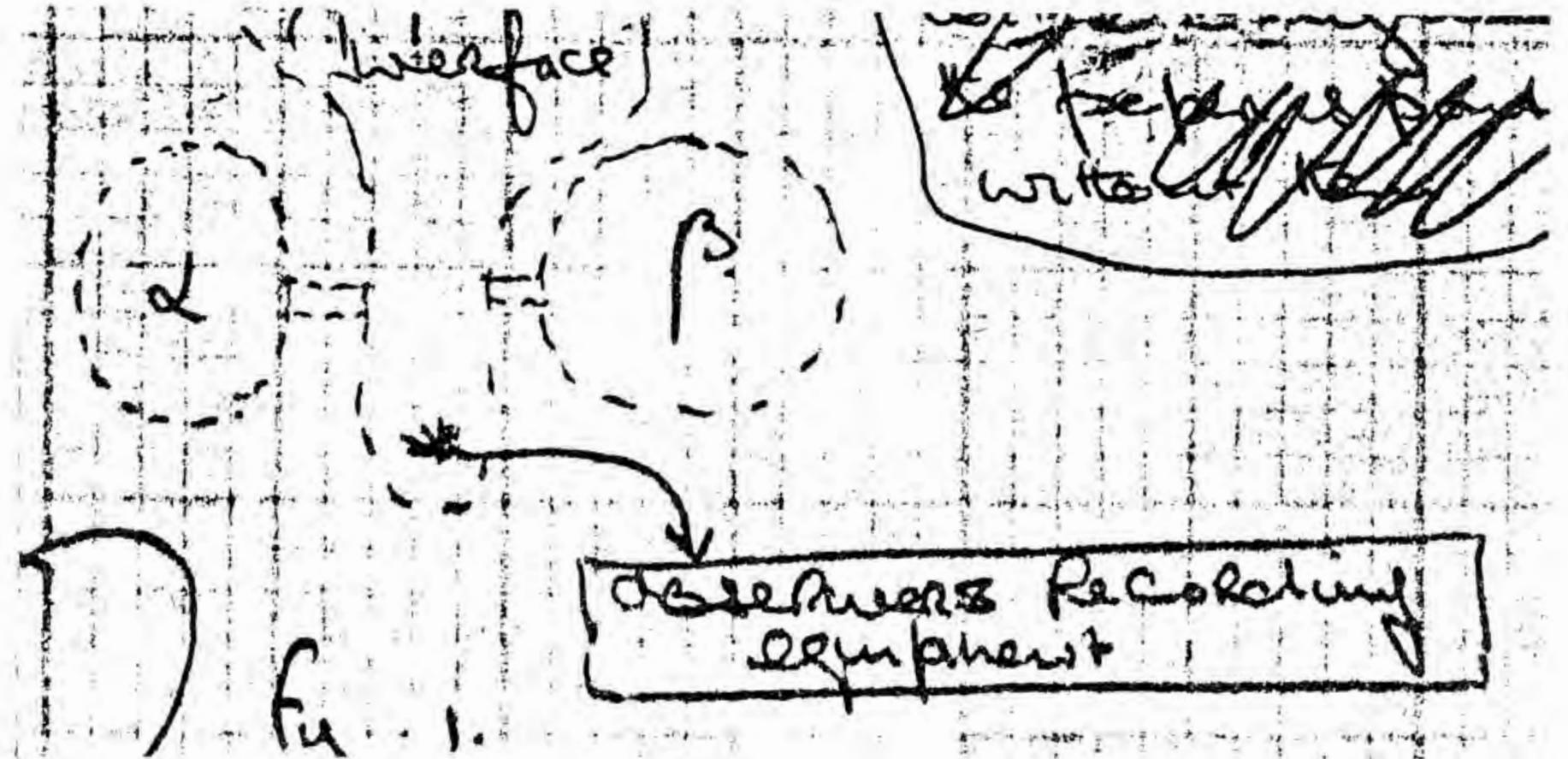
photo by Paul Pangaro 1990

Gordon Pask
Paul Pangaro

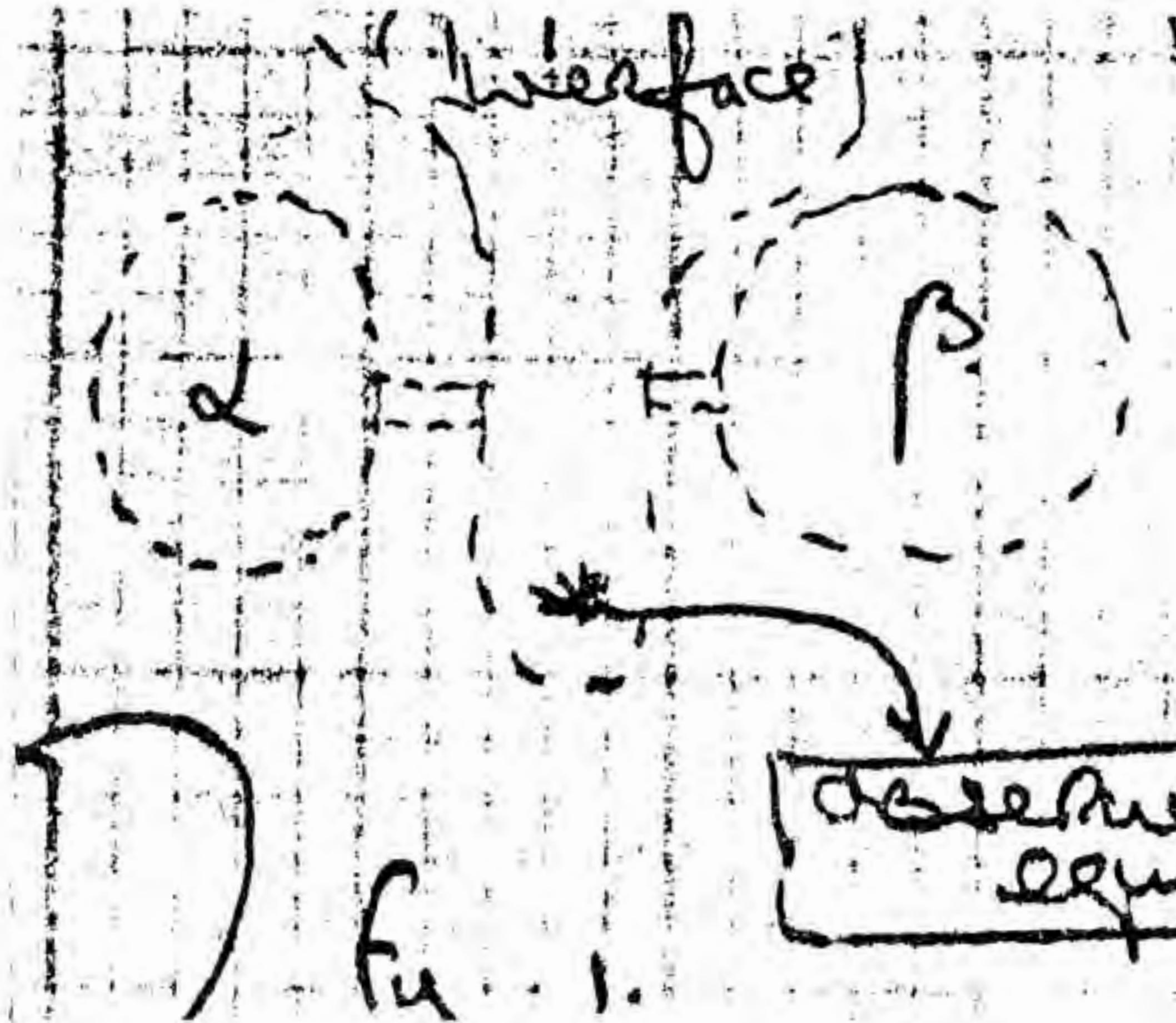


~1986

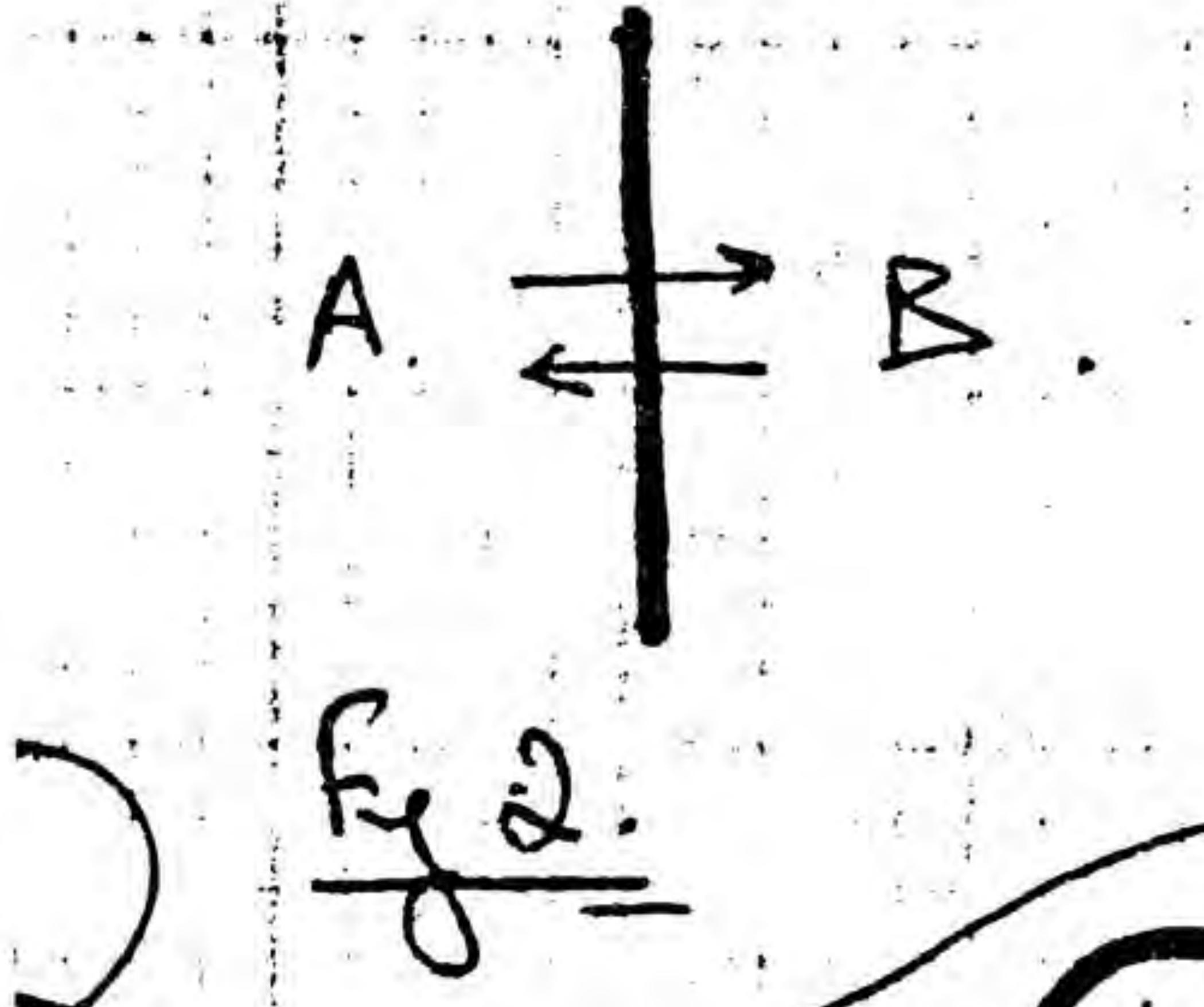
Conversation



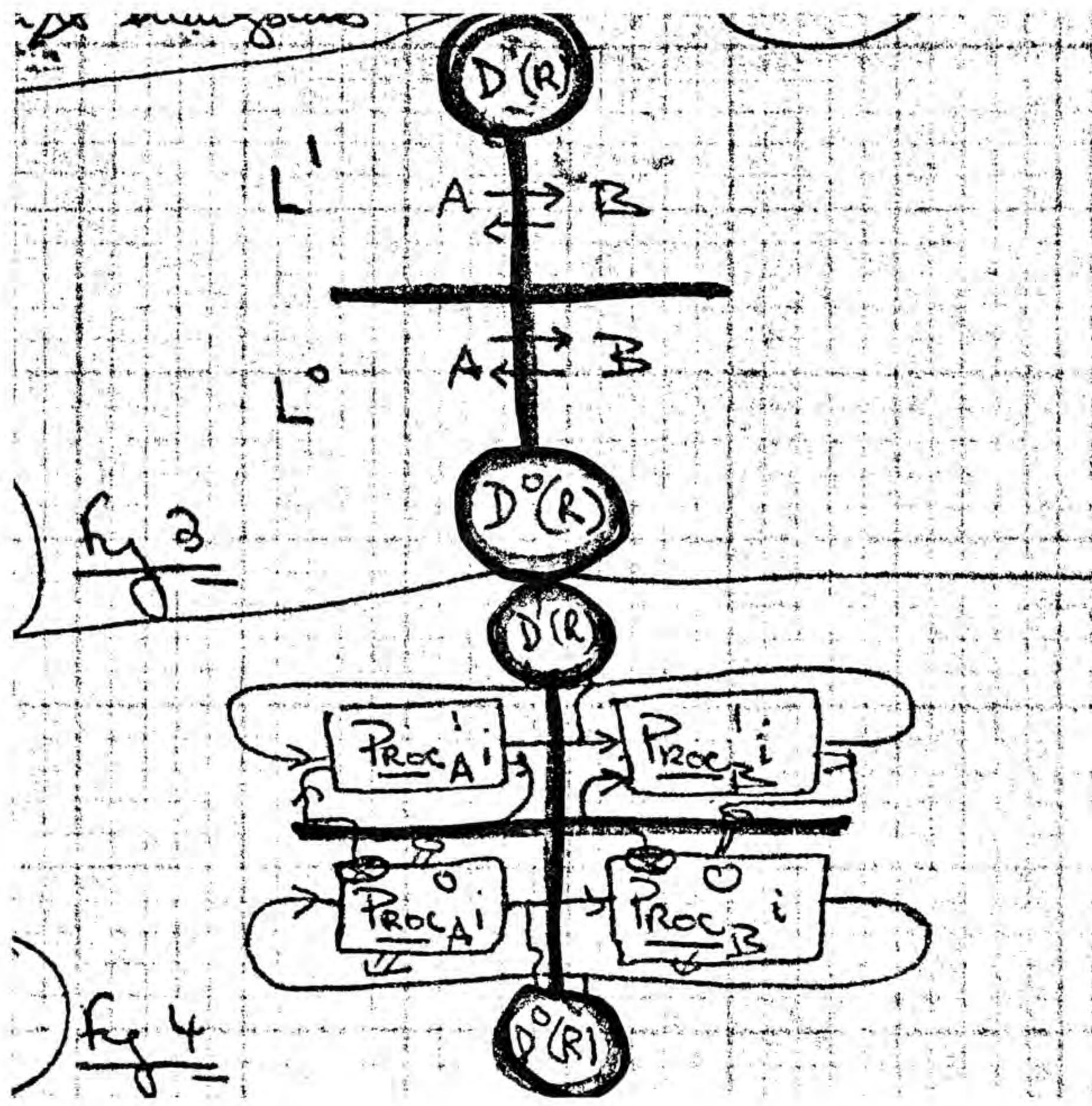
Conversation



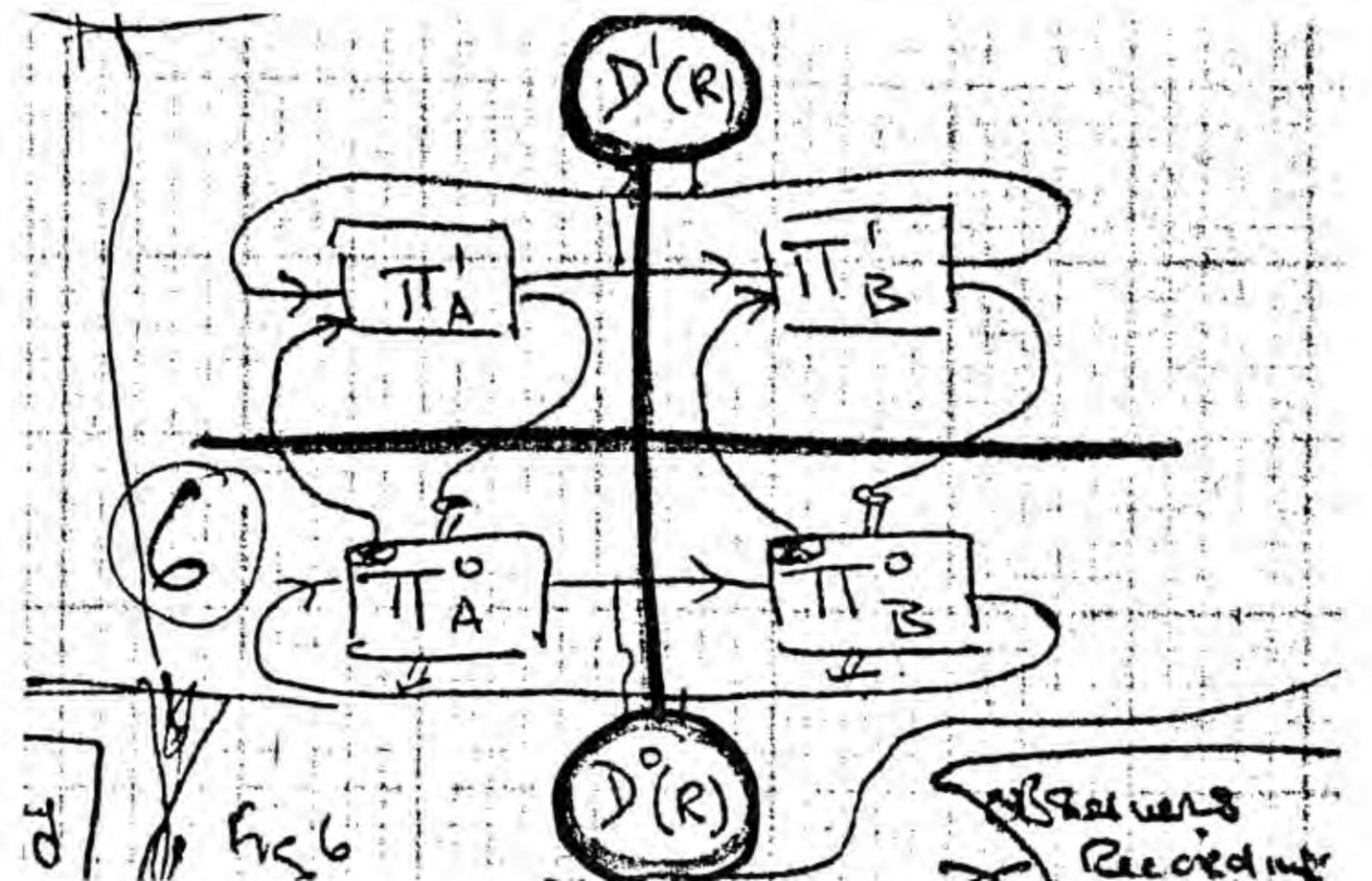
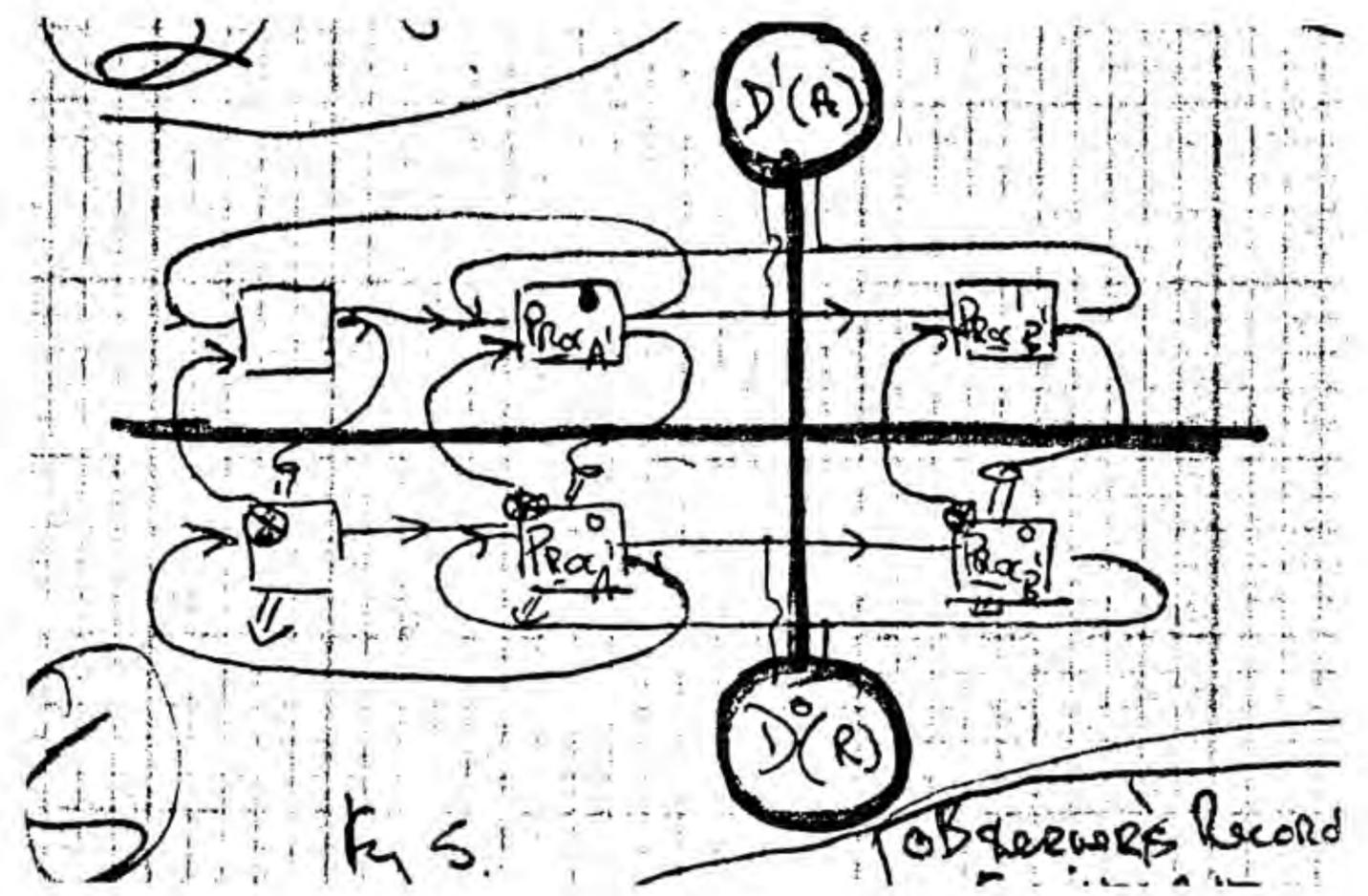
Conversation



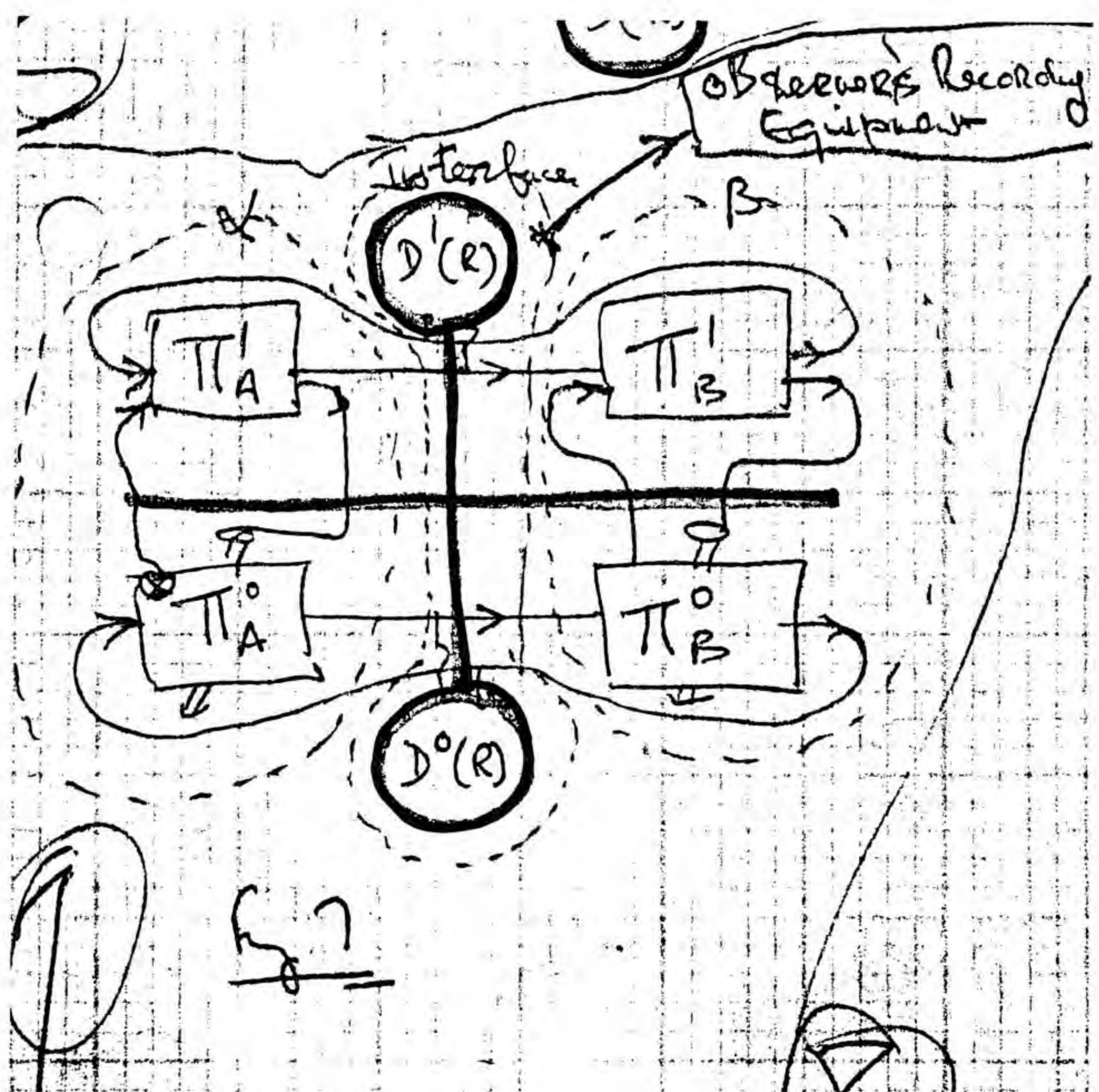
Conversation



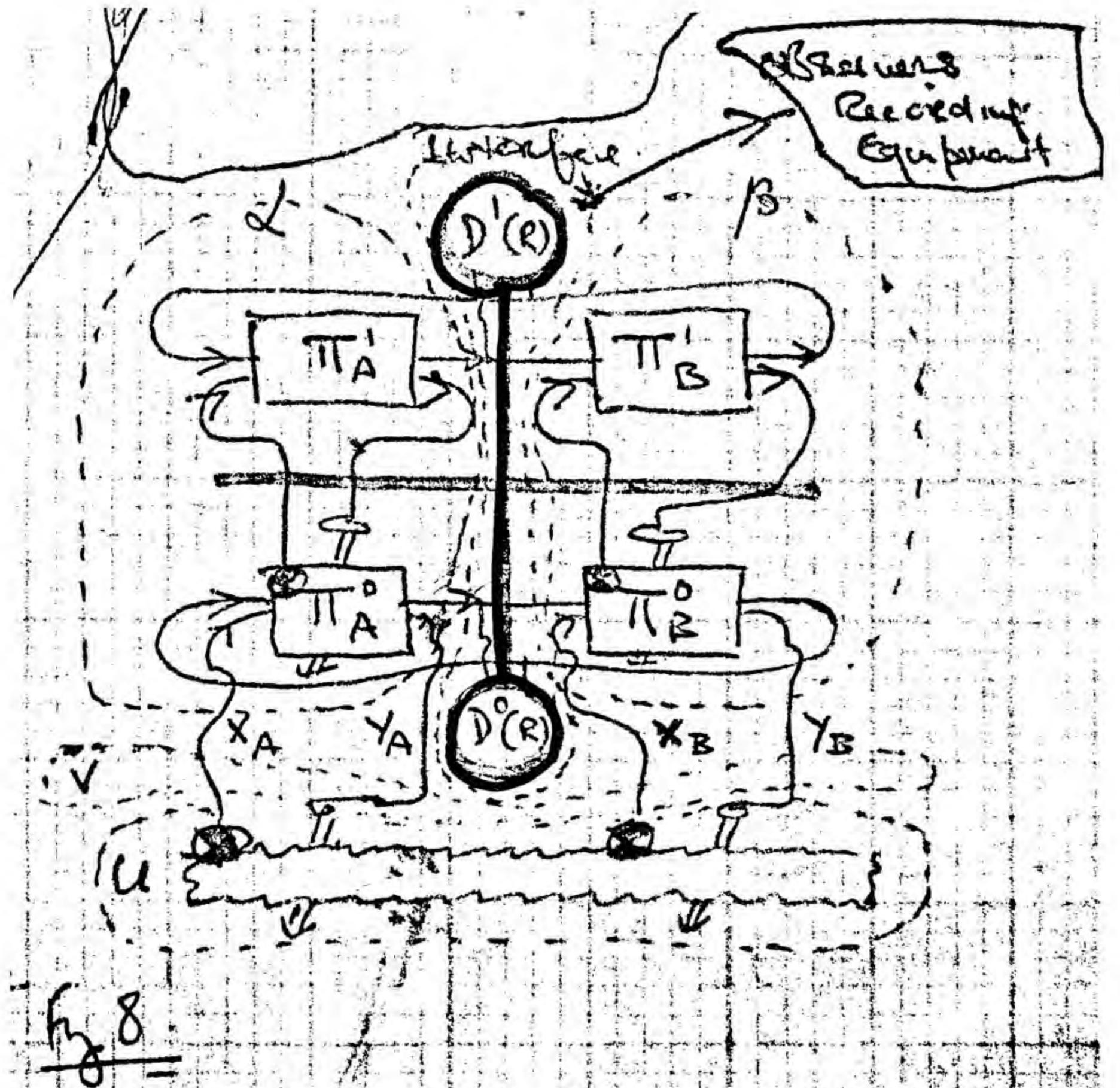
Conversation



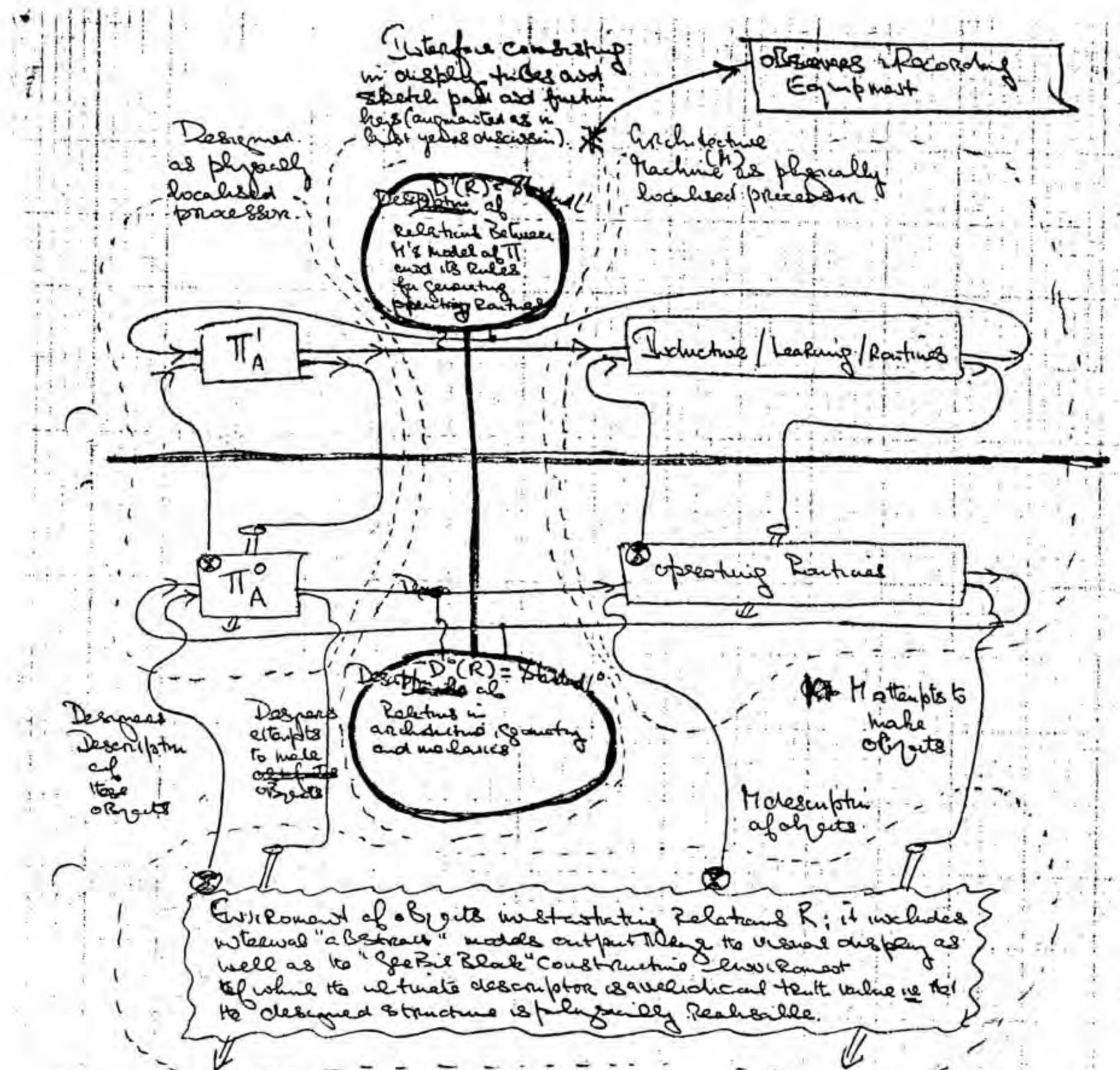
Conversation



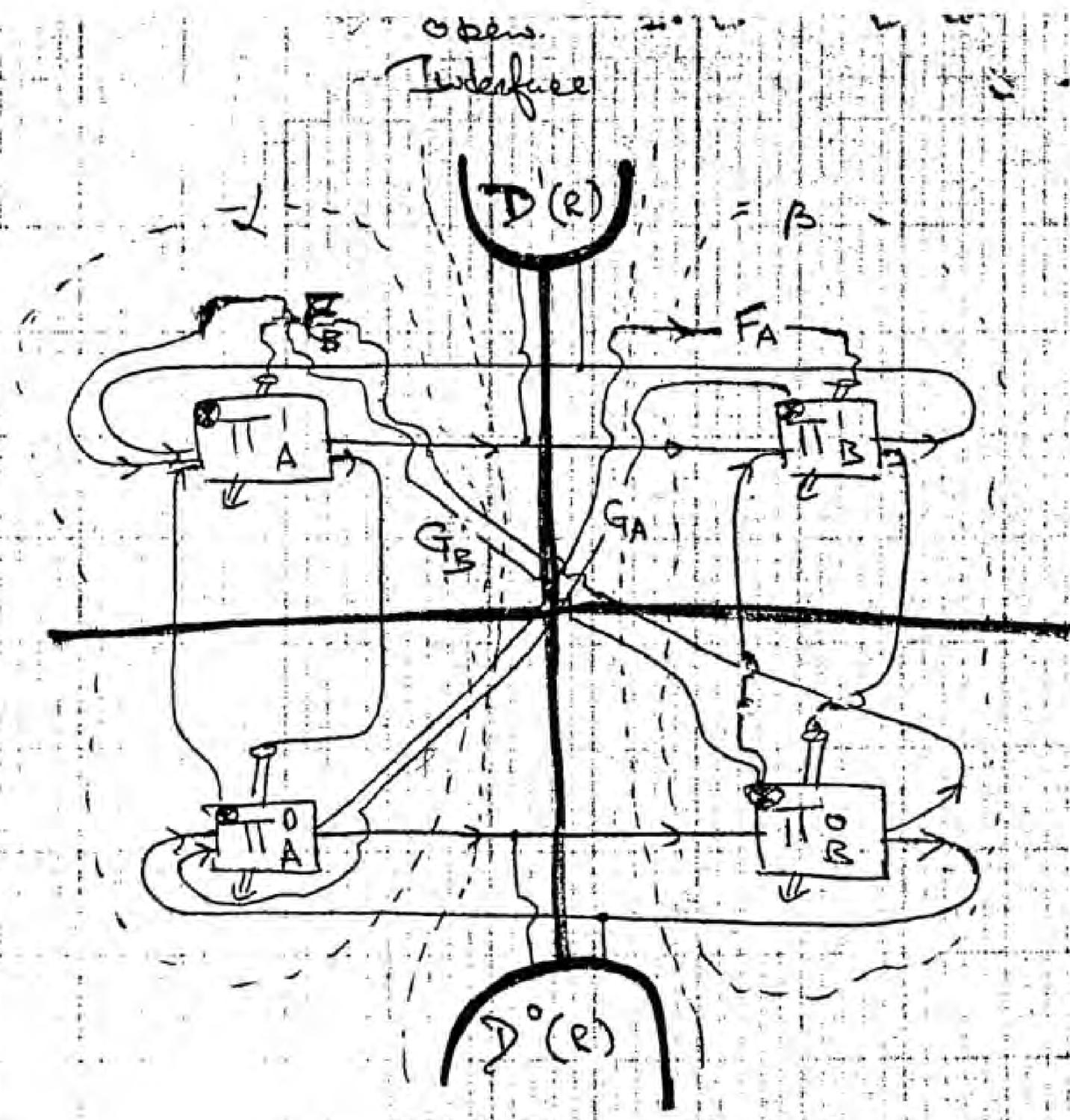
Conversation



Conversation for Design

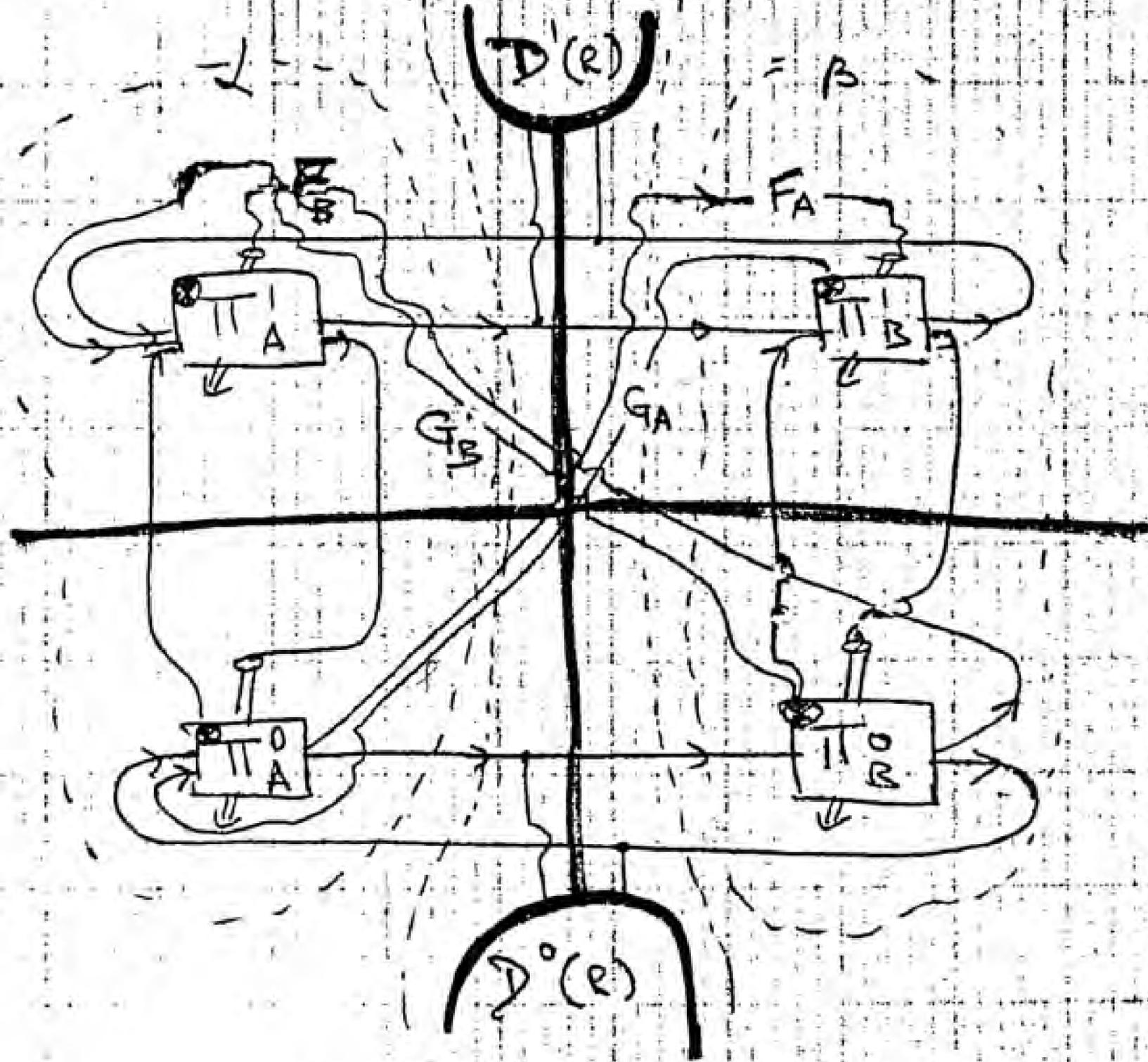


Conversation for Design

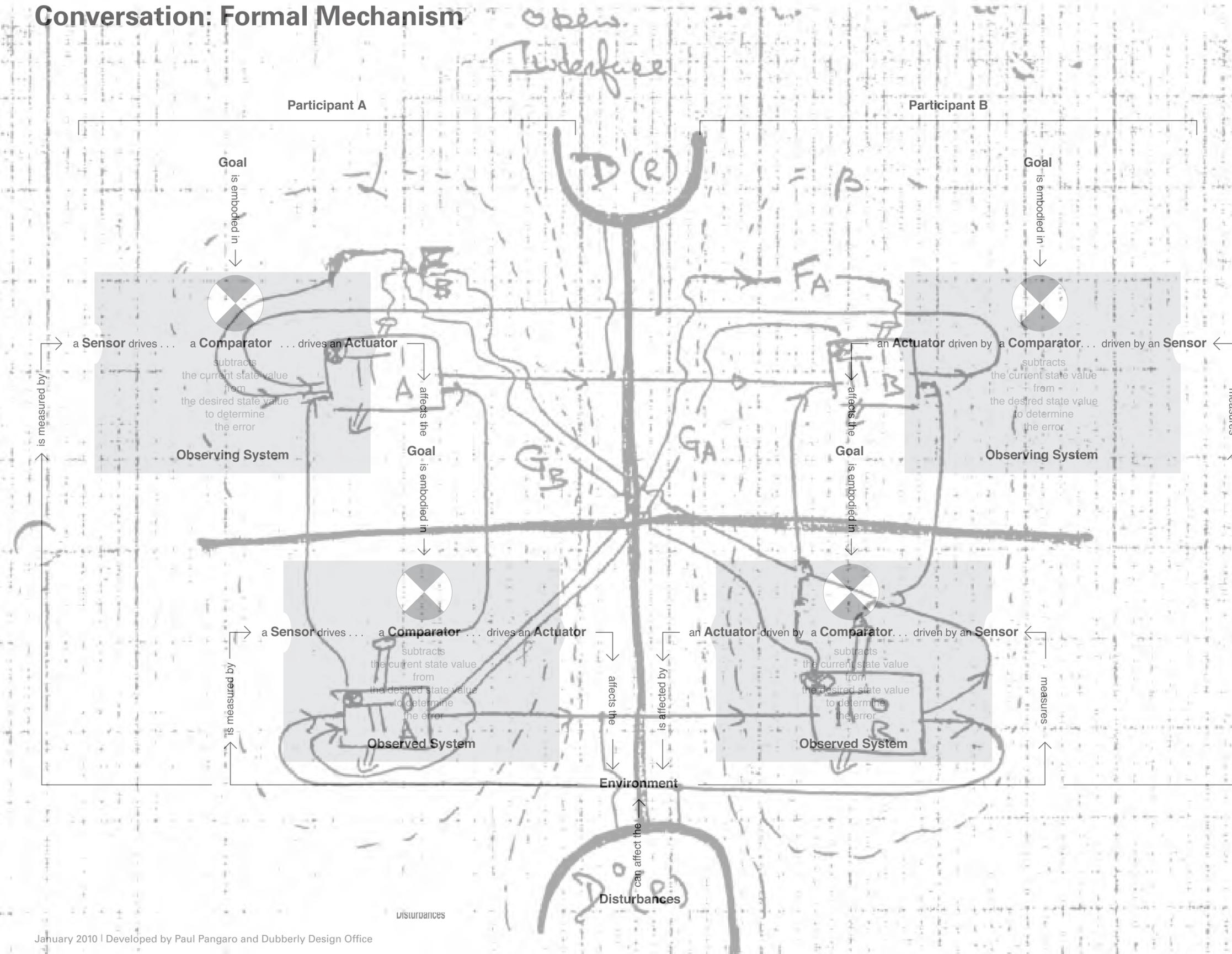


10. The conditions to be satisfied as a prerequisite for creative and innovative activity, the former may be exhibited by either of F_A, G_A or F_B, G_B and the latter by $D'(R)$ or $D^{\circ}(R)$.

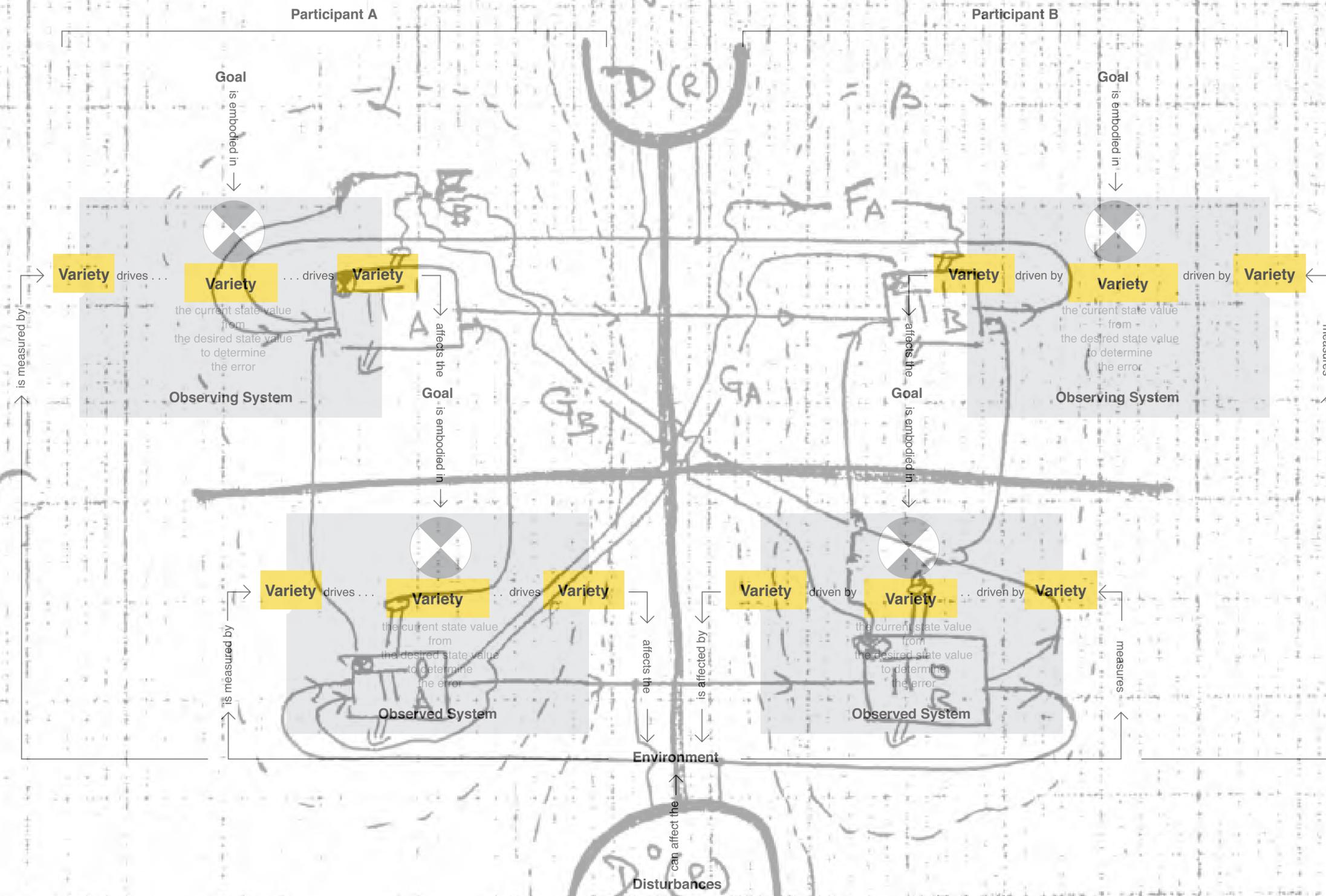
Open
Interface

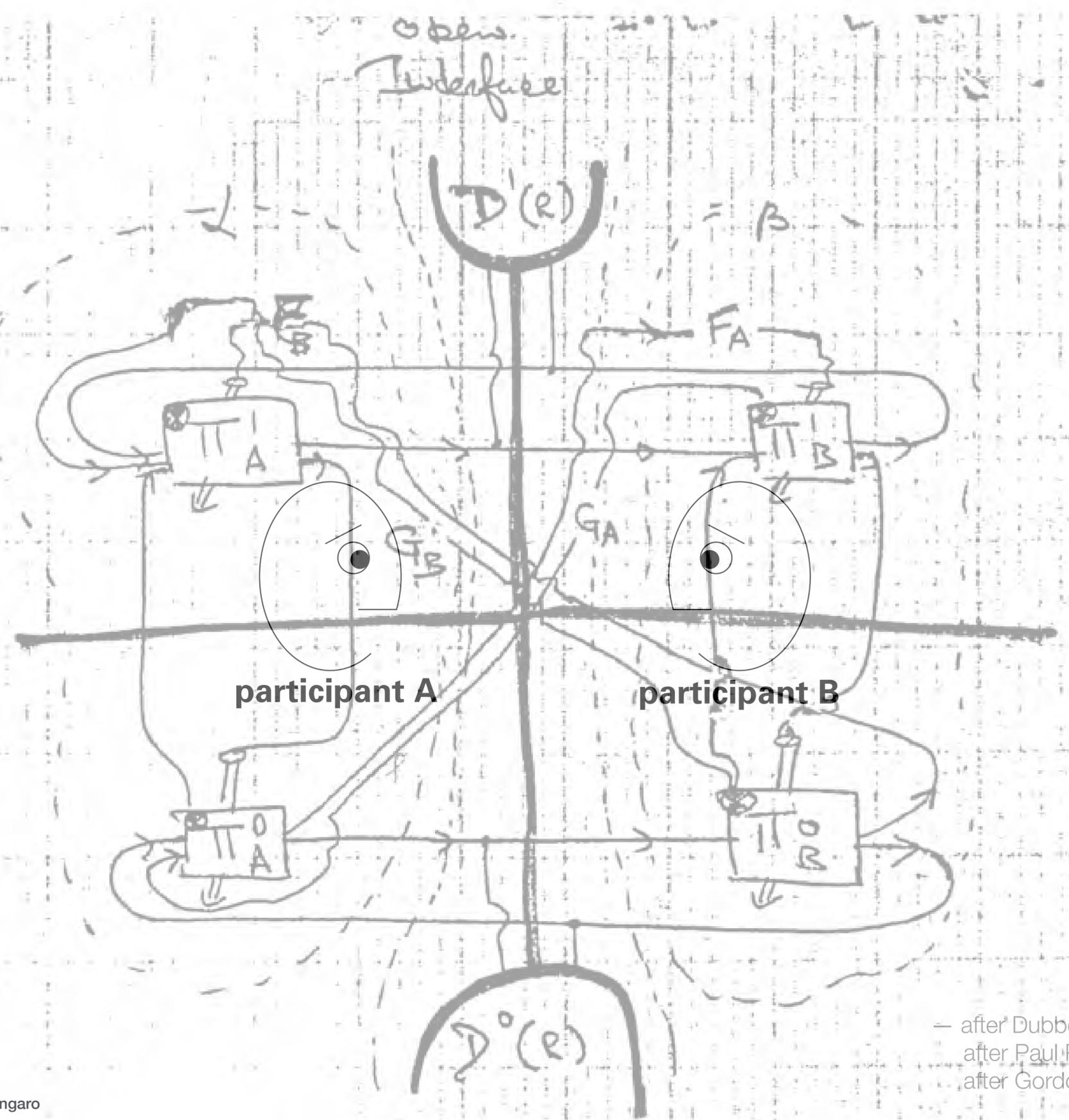


Conversation: Formal Mechanism



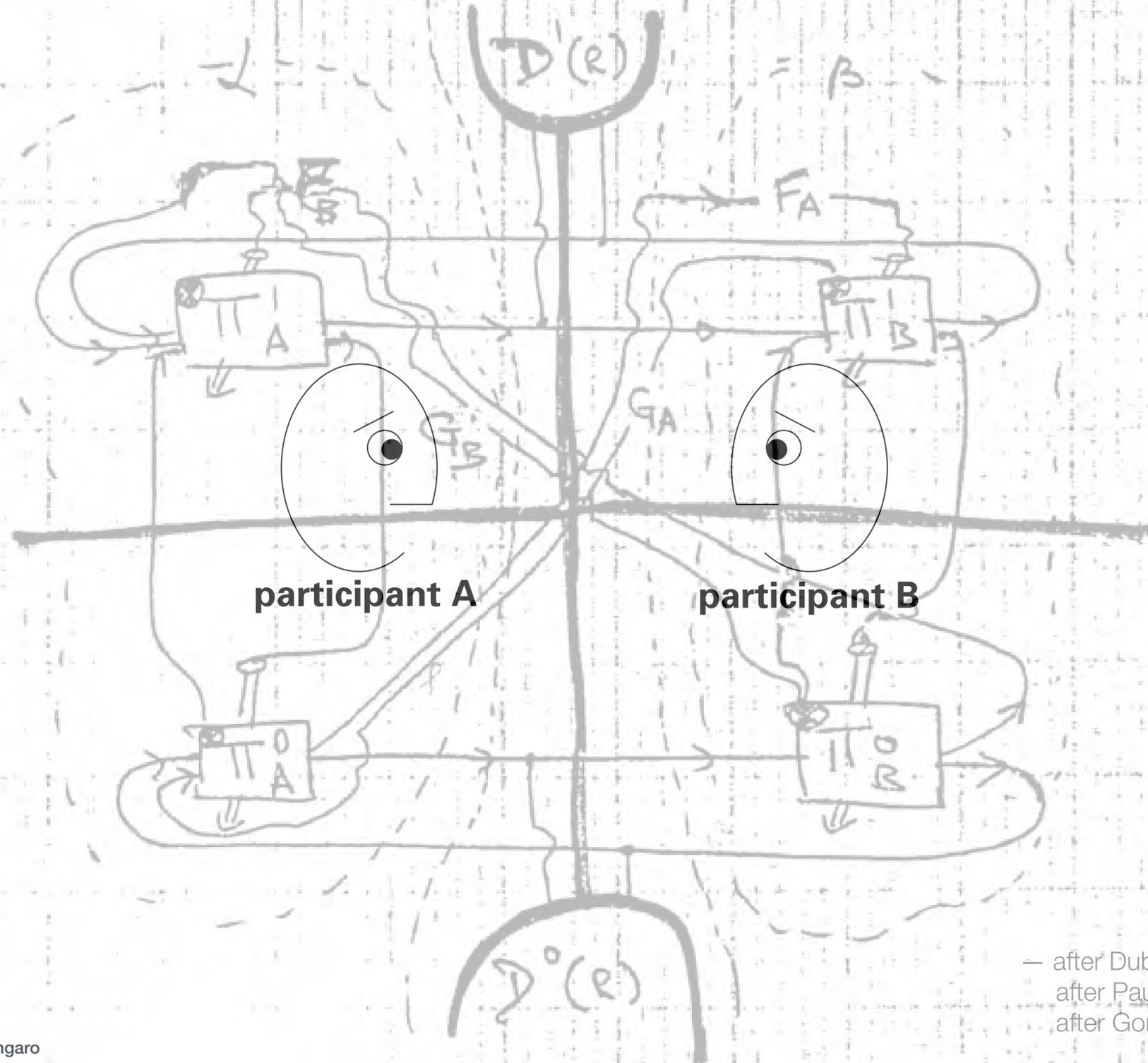
Conversation: Formal Mechanism





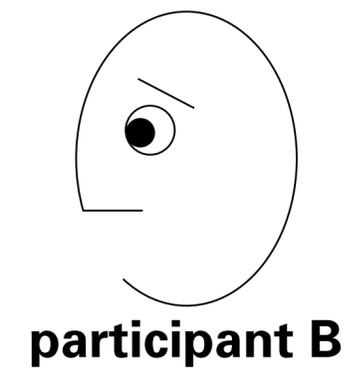
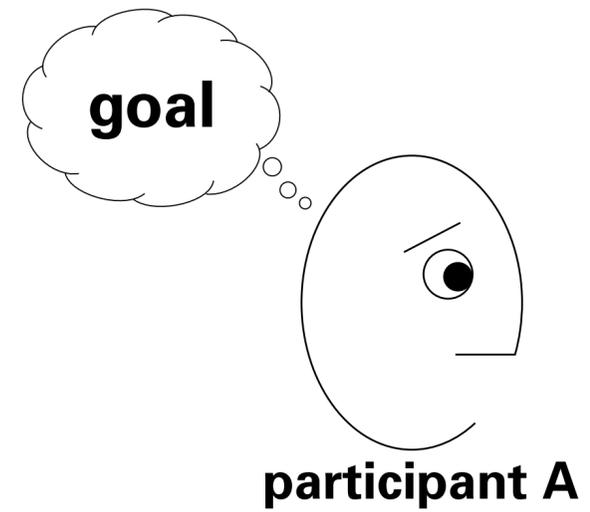
— after Dubberly Design Office 2008
 after Paul Pangaro
 after Gordon Pask

How does conversation work?

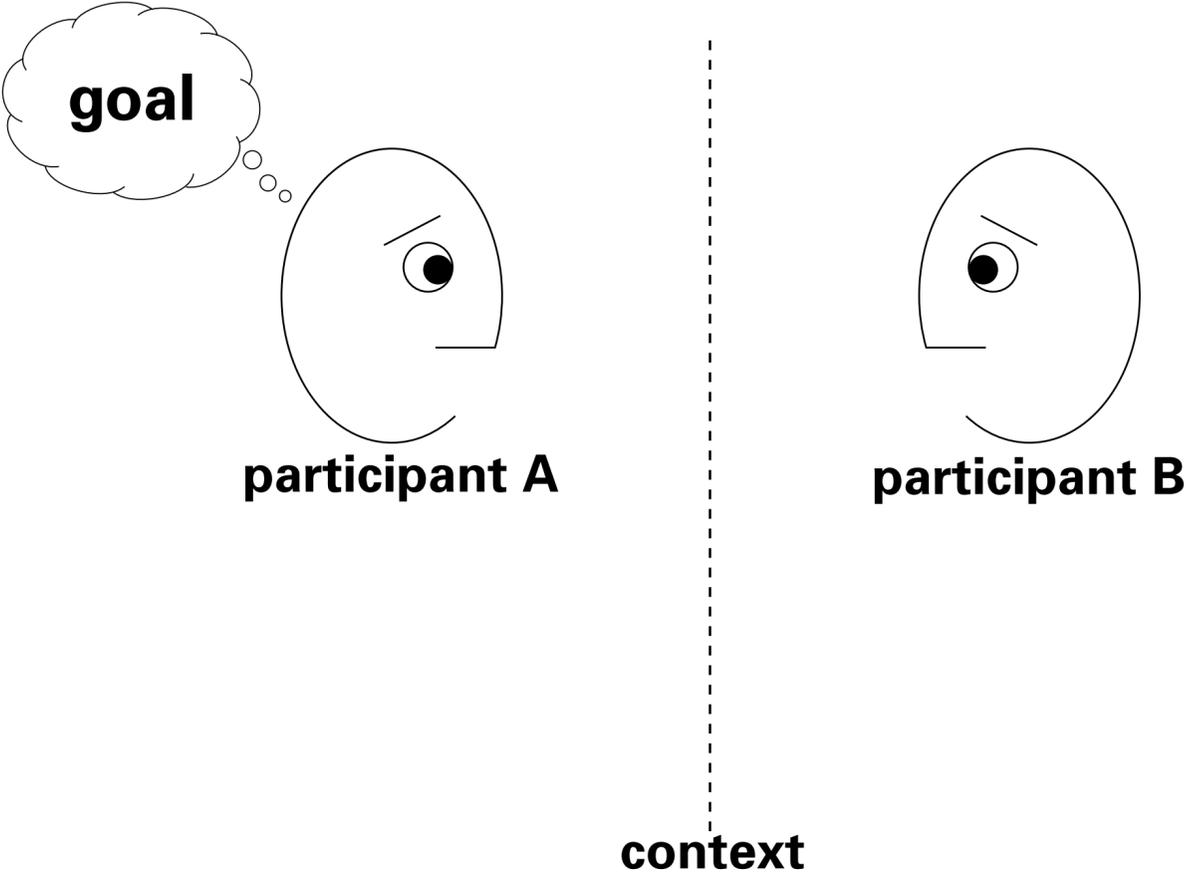


— after Dubberly Design Office 2008
after Paul Pangaro
after Gordon Pask

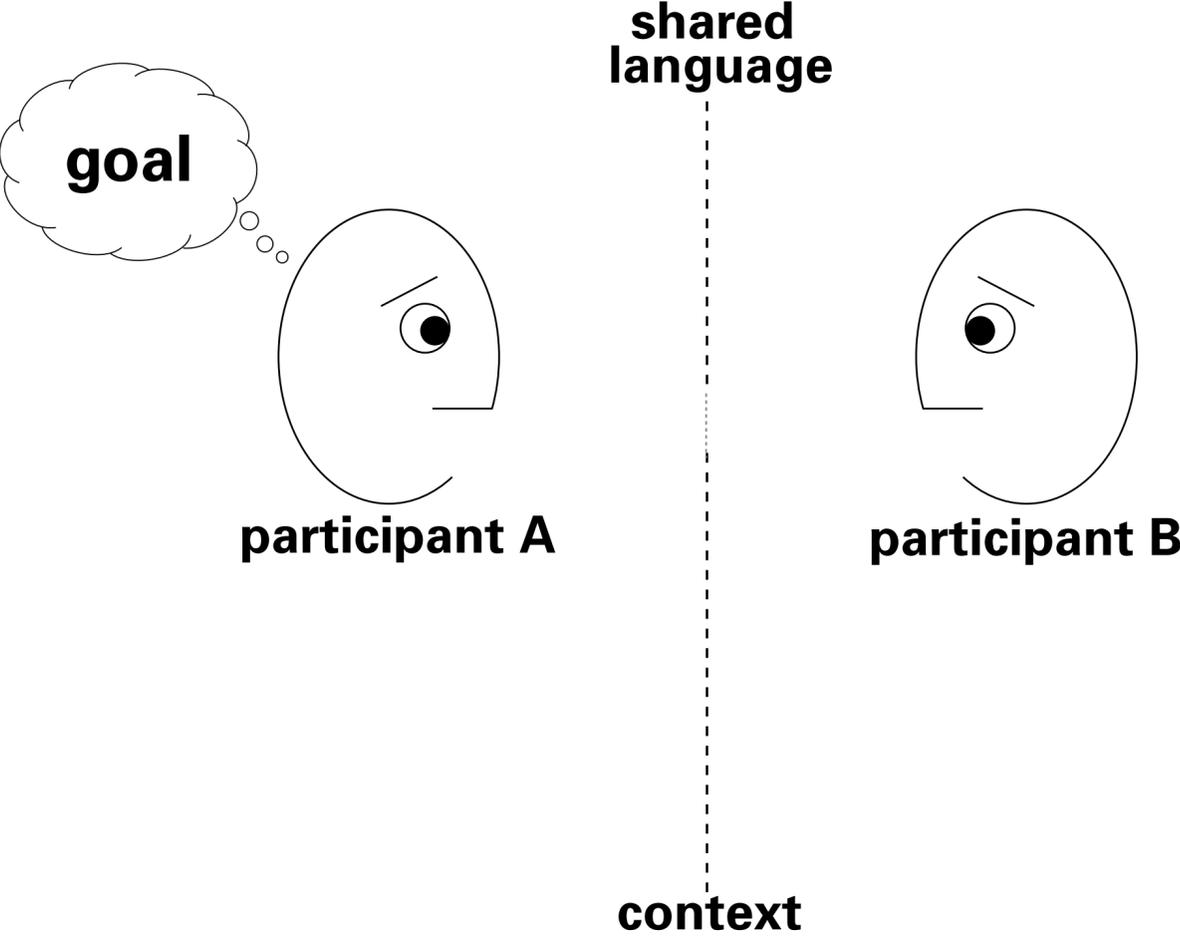
A participant has a goal.



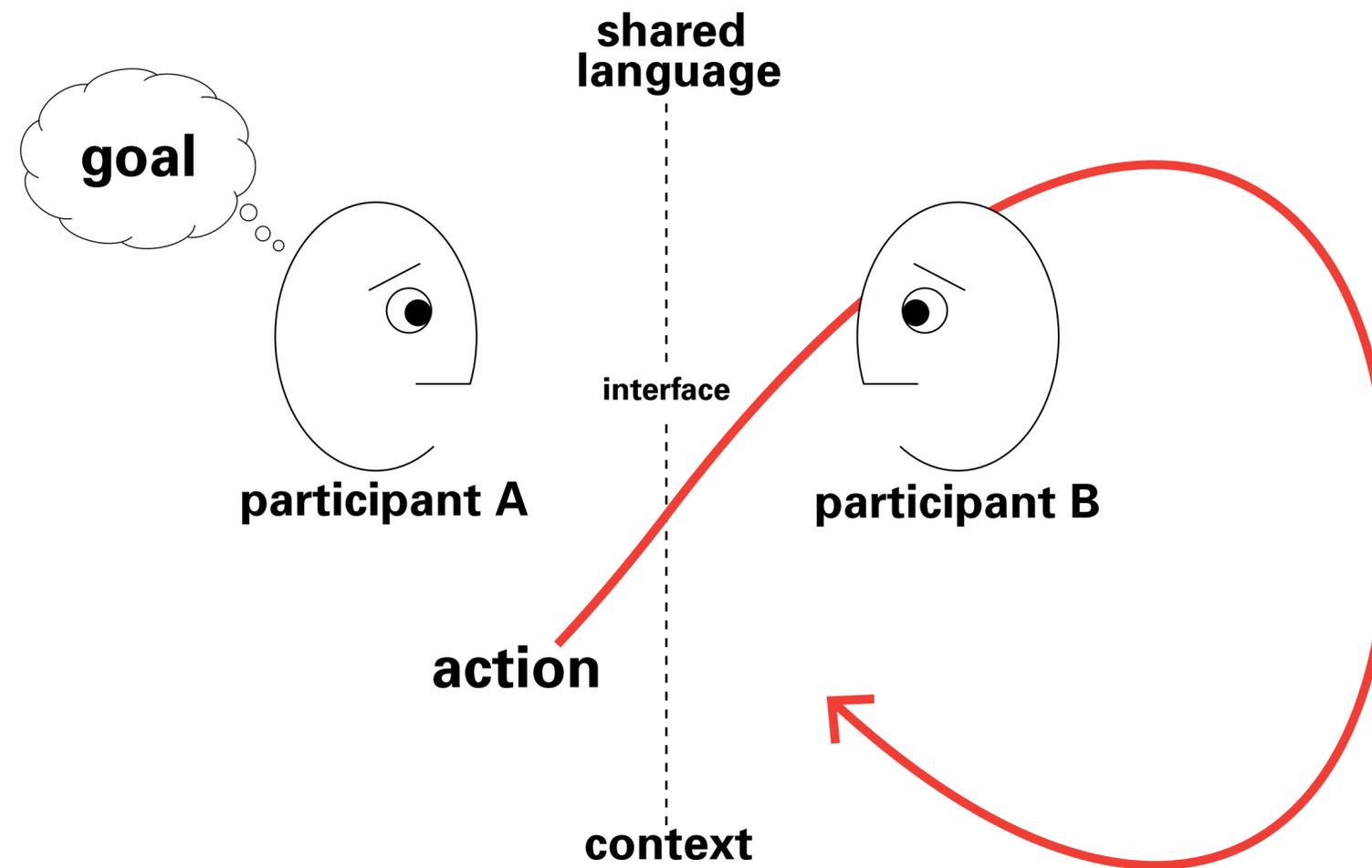
Chooses a context.



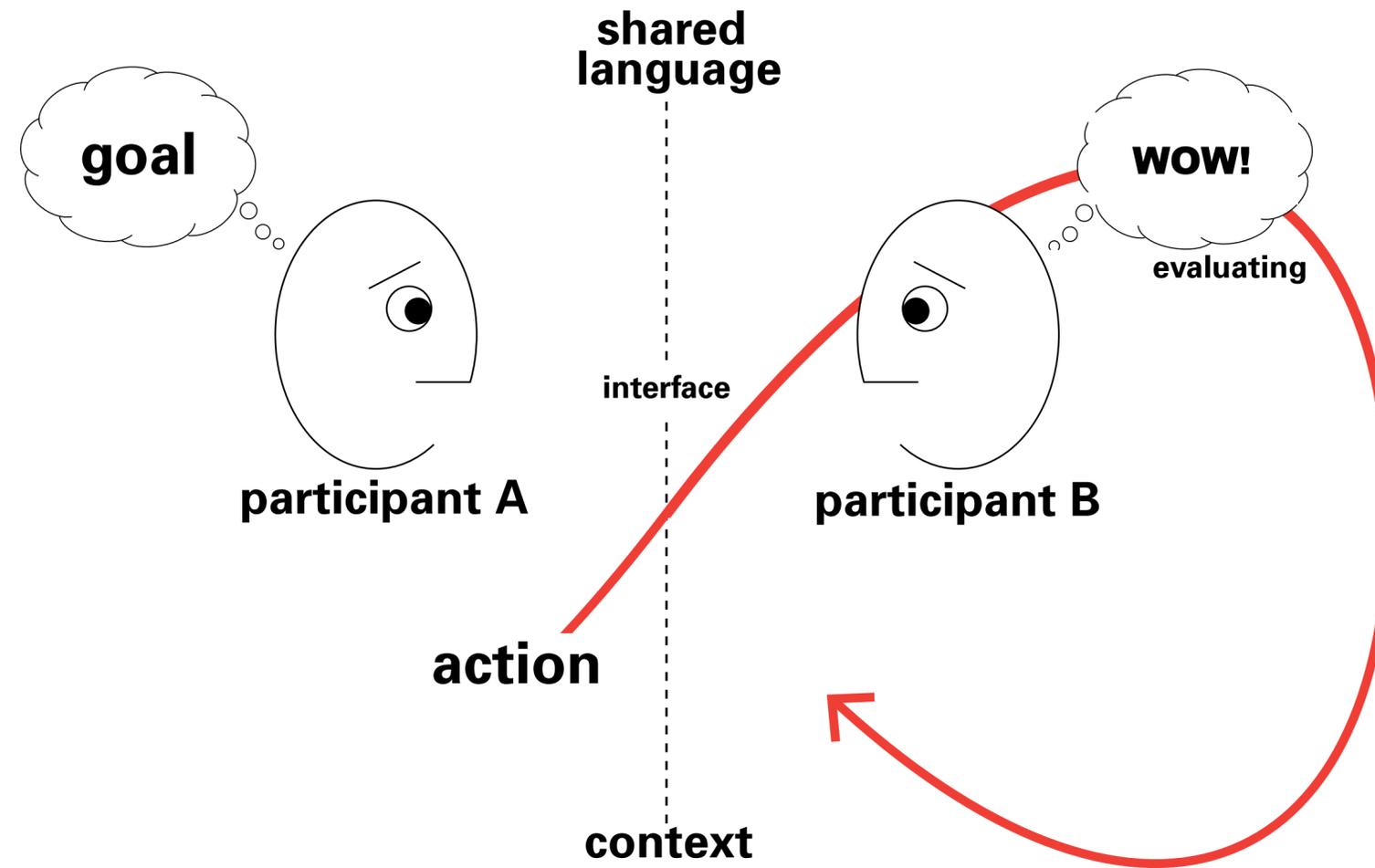
Chooses a language.



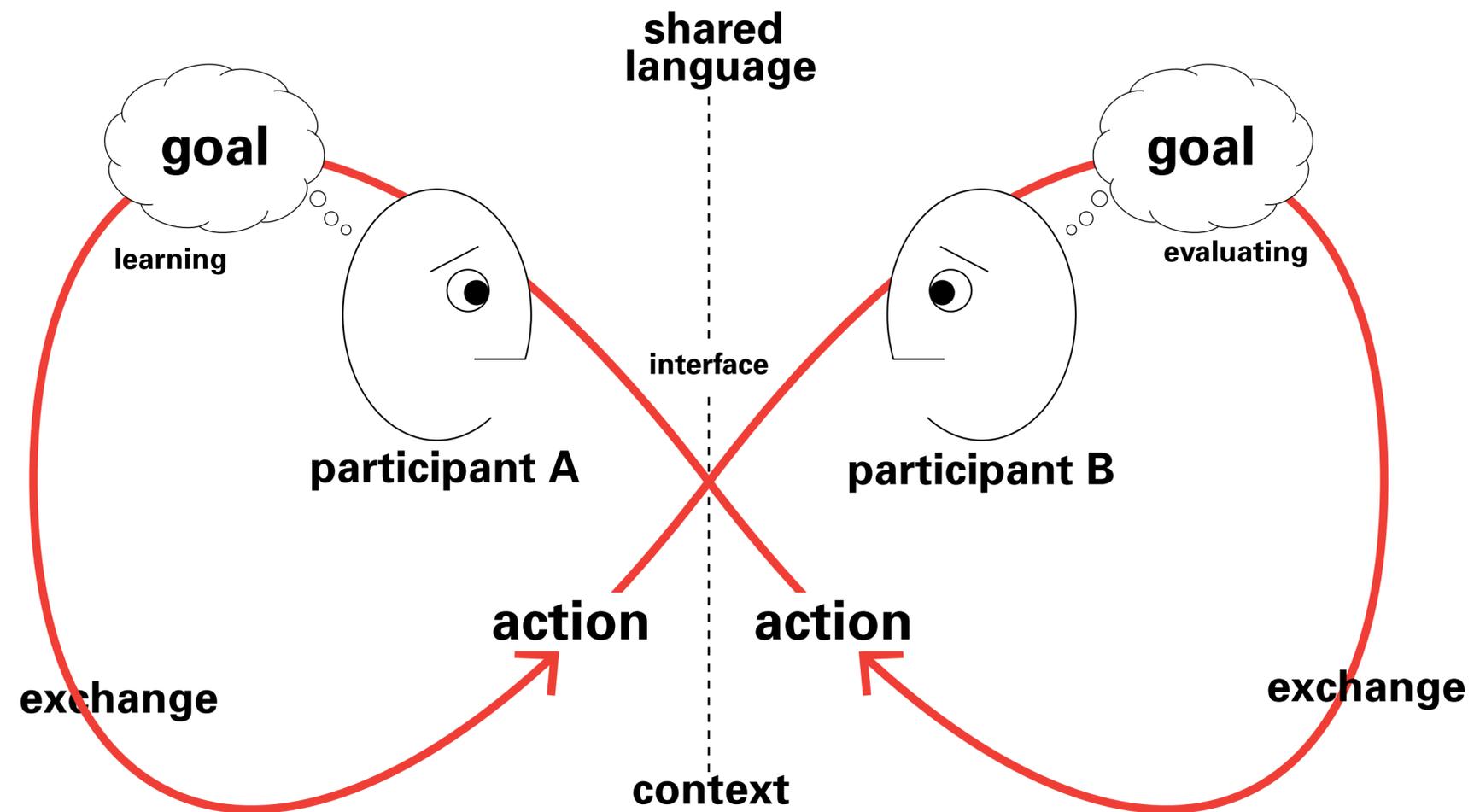
Begins an exchange.



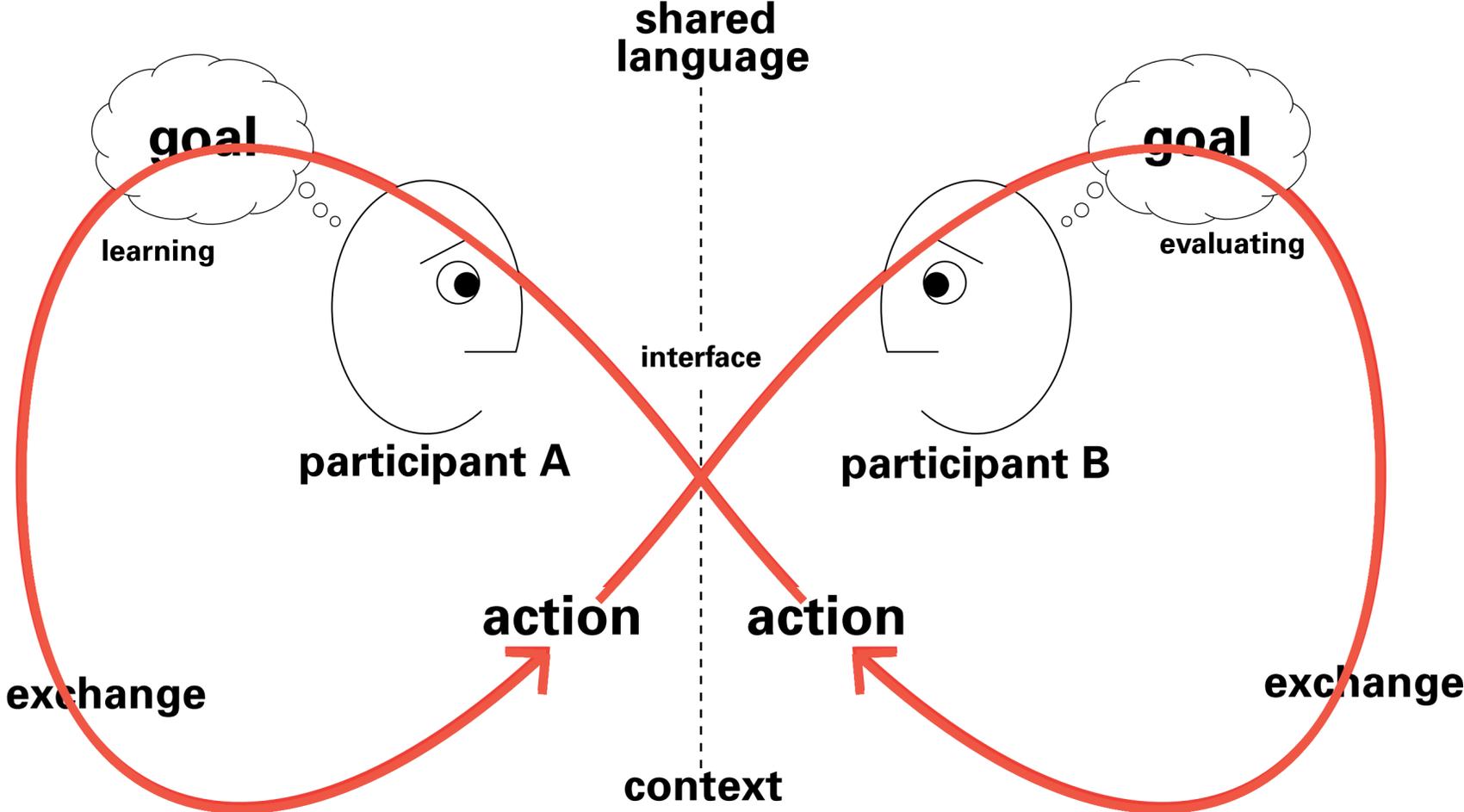
May evoke a response...



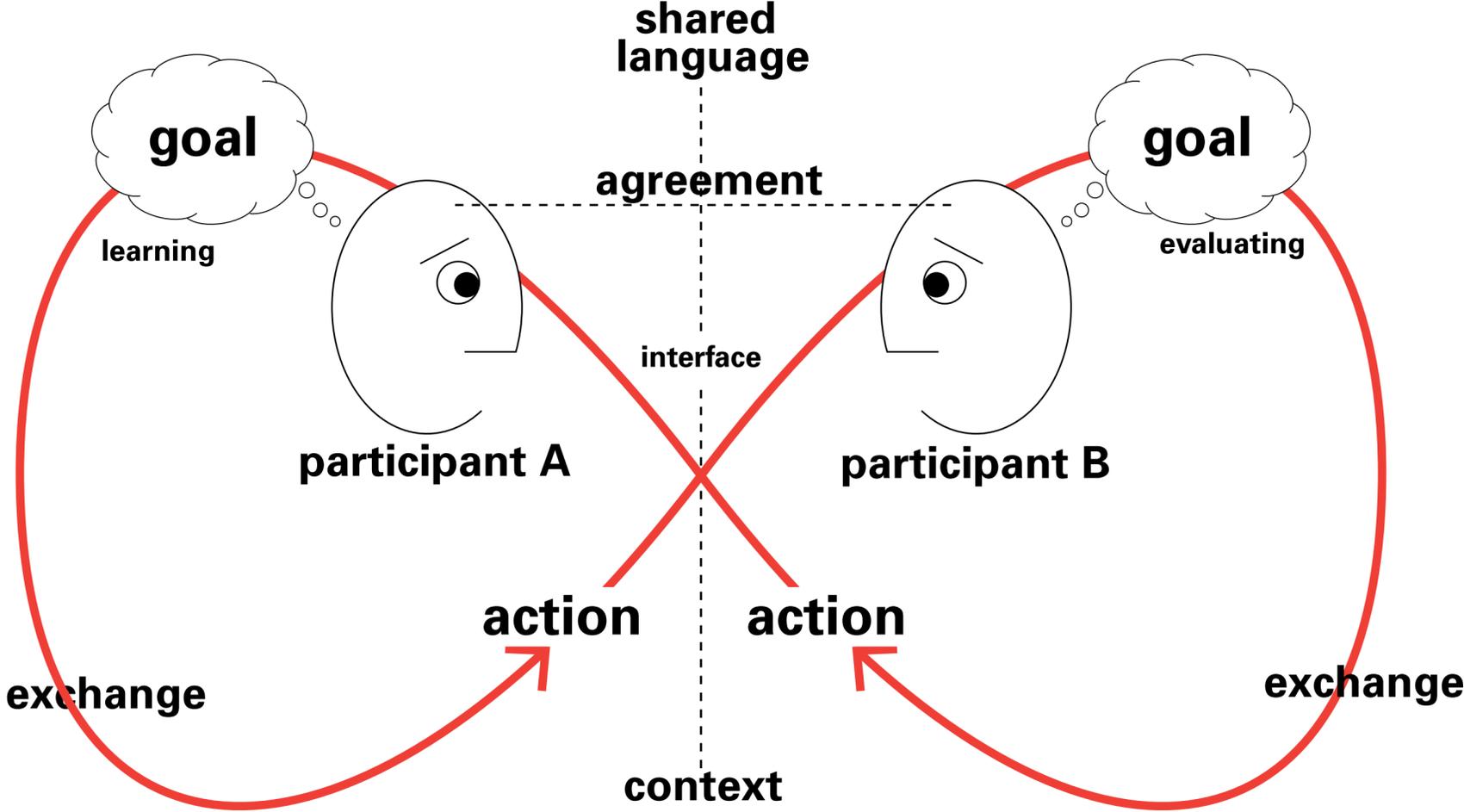
... and a reaction that evokes a reaction...



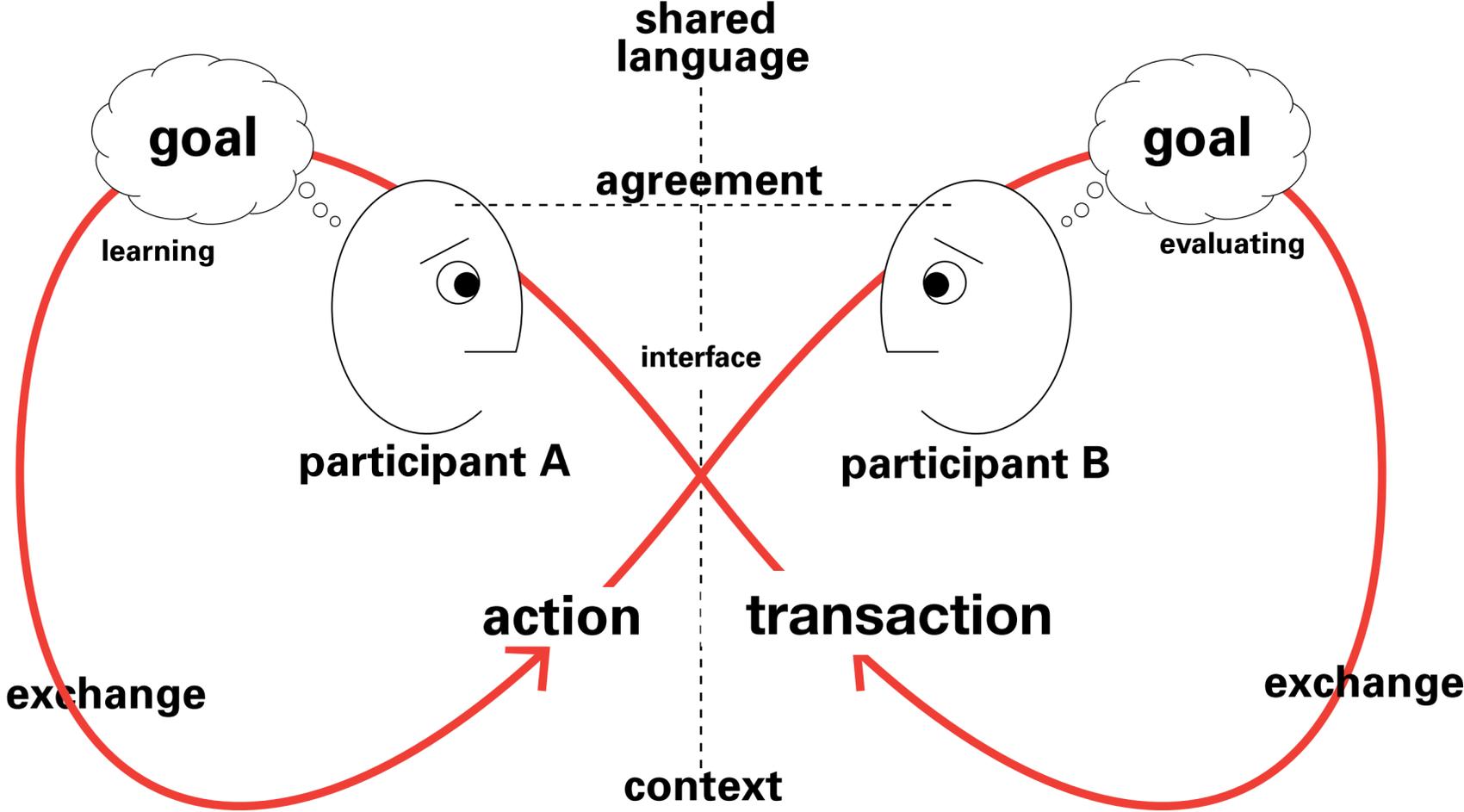
The engagement may continue.



An agreement may be reached.

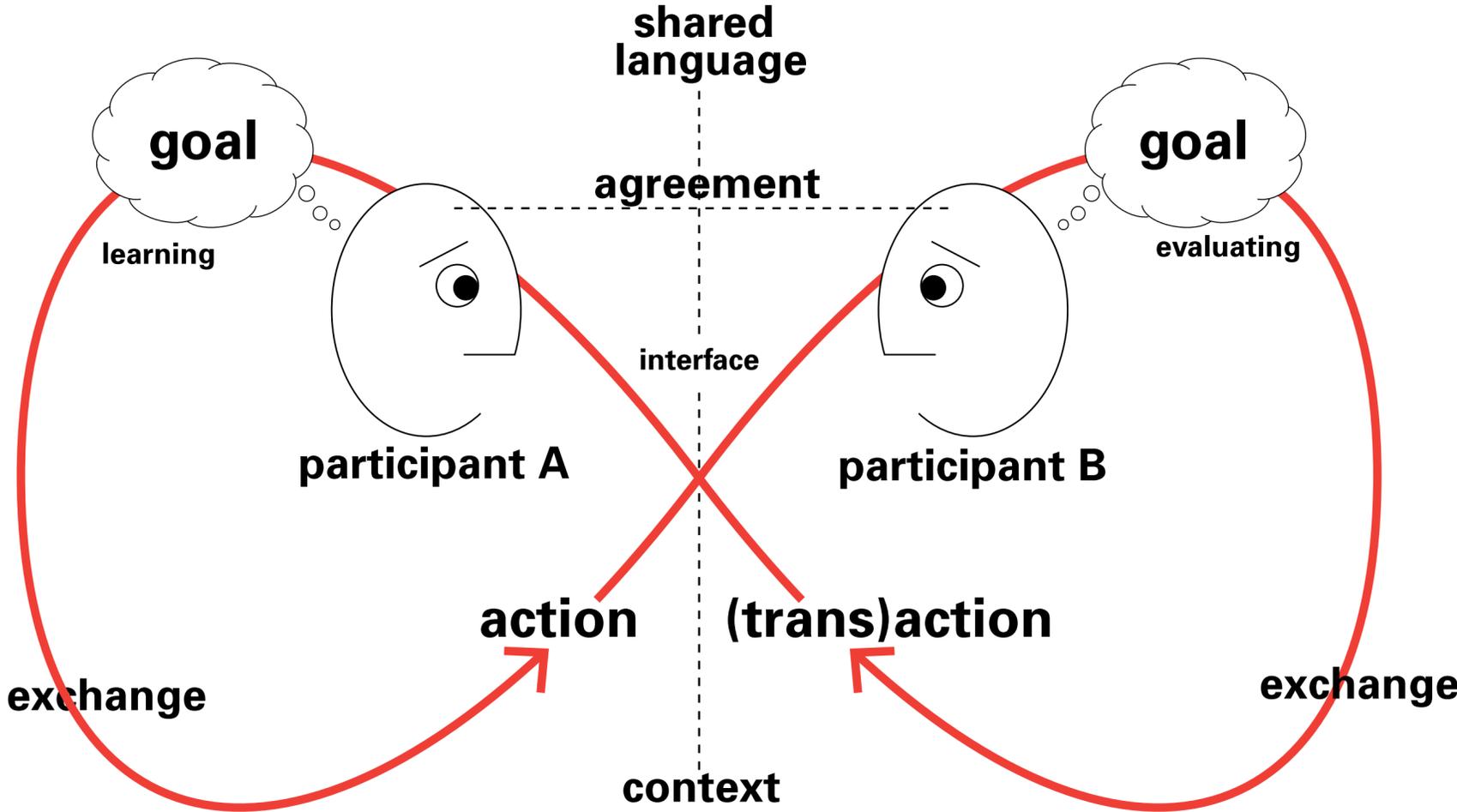


A transaction may occur.



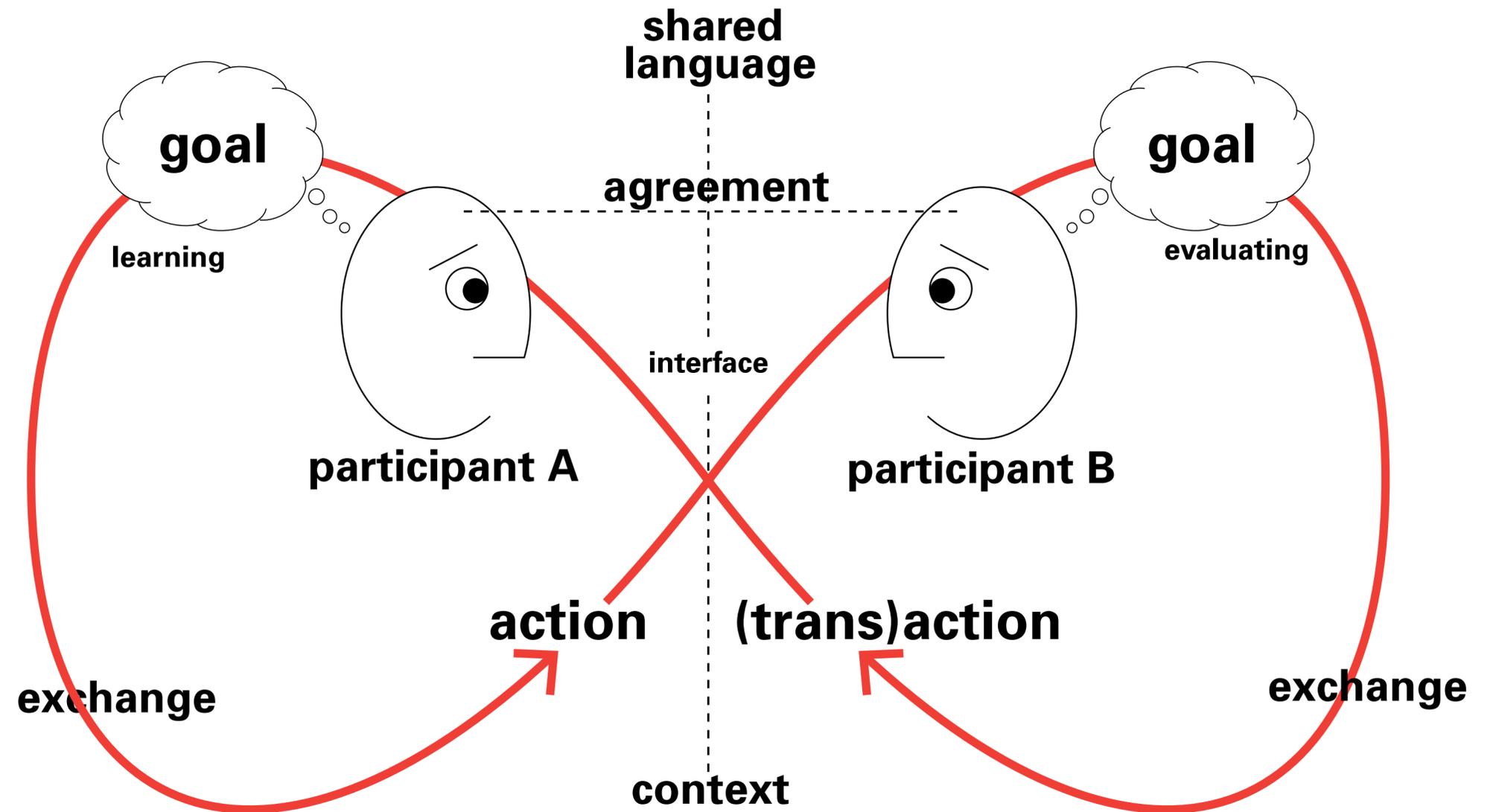
after Dubberly Design Office 2008

Conversation Redux

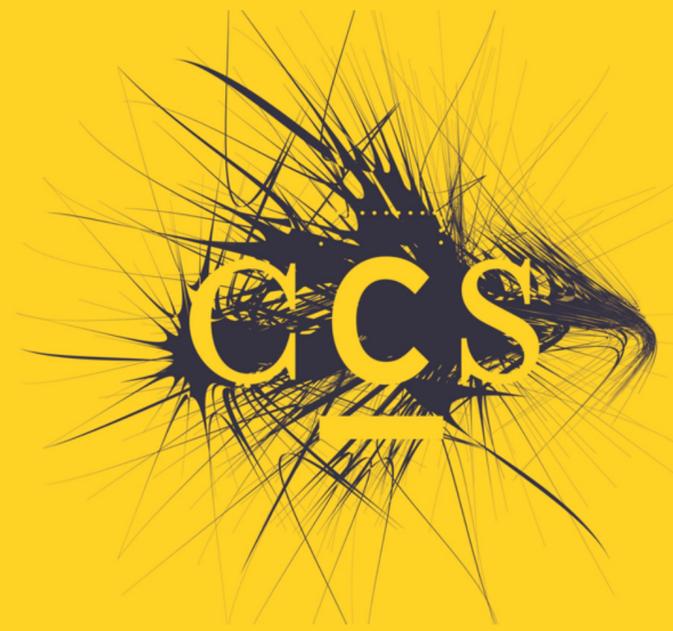


Conversation Redux — C-L-E-A-T

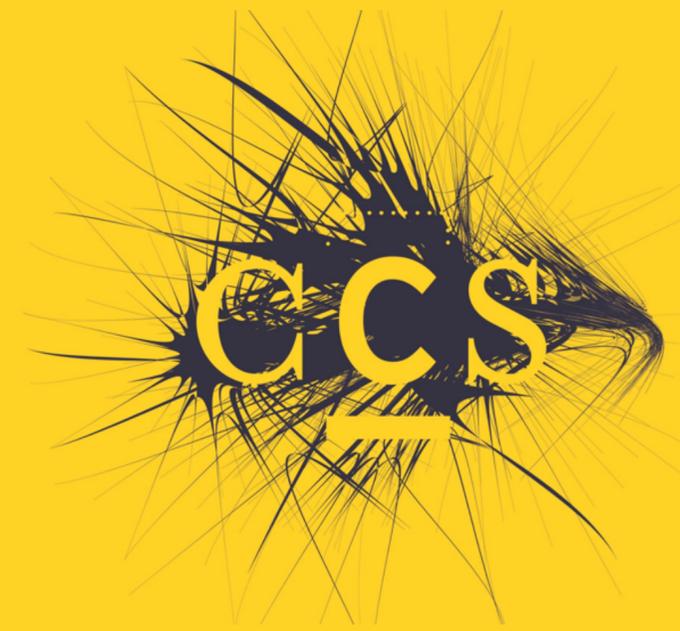
C – Context
L – Language
E – Engagement
A – Agreement
T – Transaction



Design + Second-order Cybernetics



Design of Conversations for Resilience

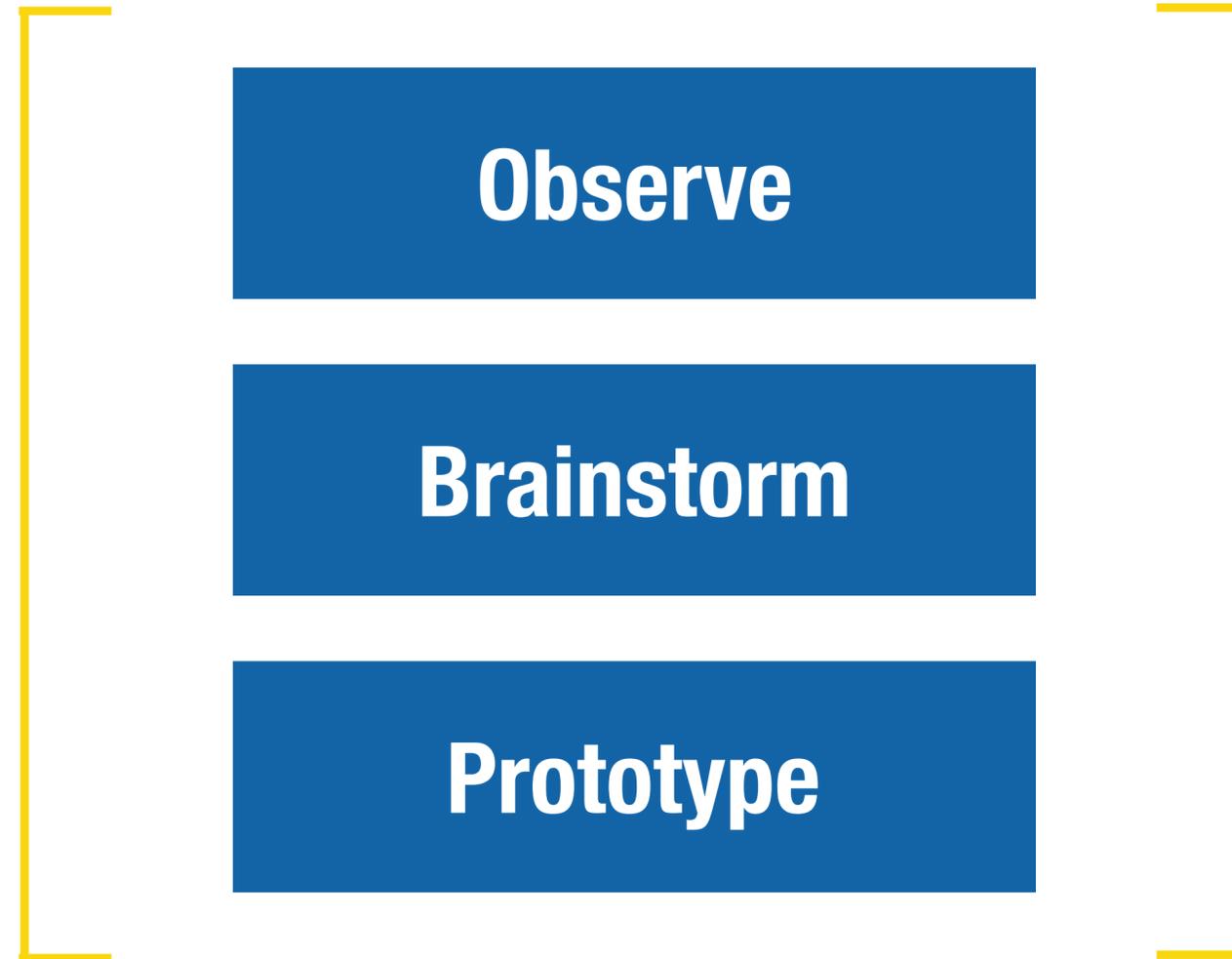


Design... from Thinking to Conversation



**Design
Thinking**

What is the process of Design Thinking?



What does that mean?

Ethnography

Observe

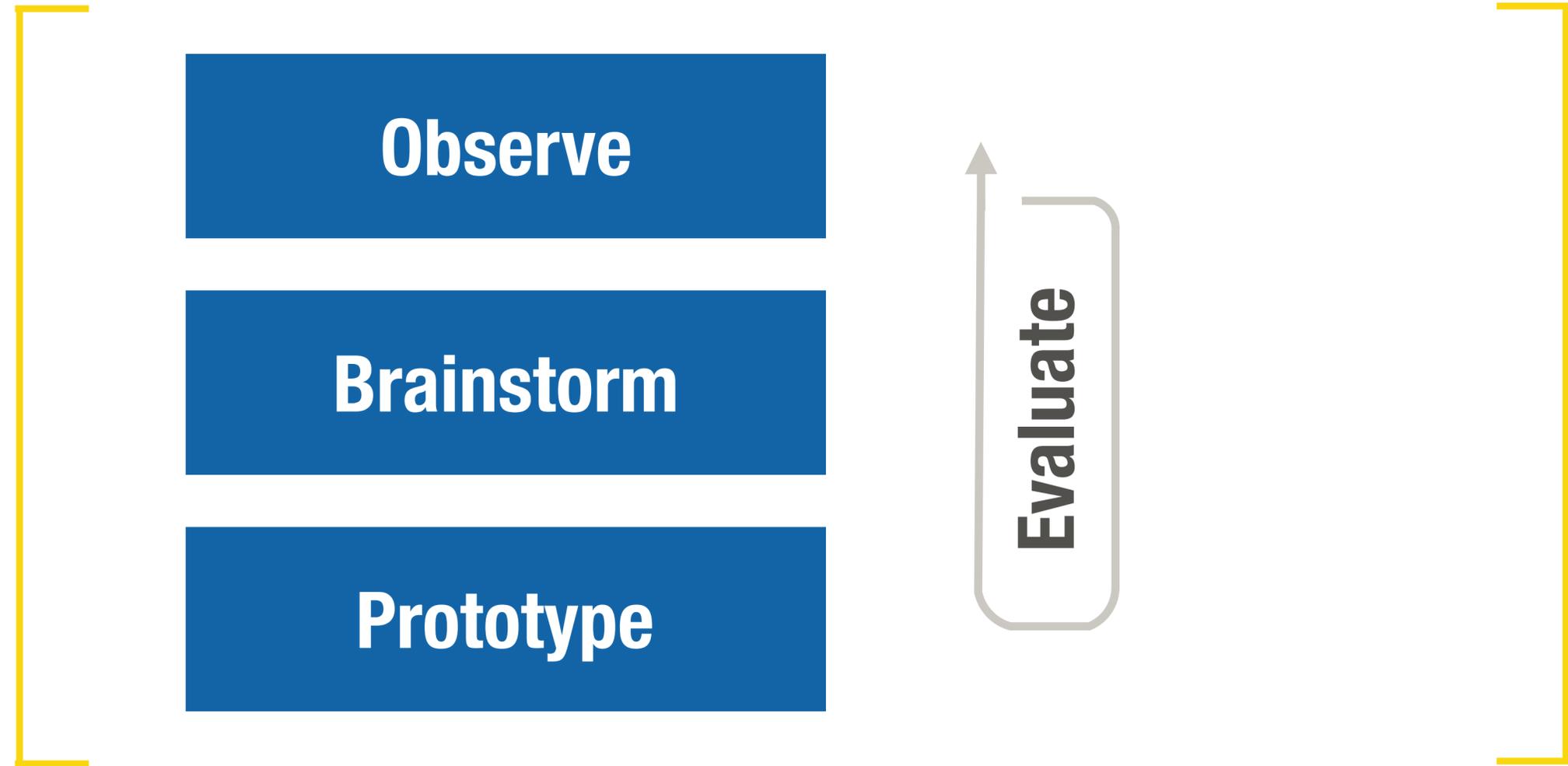
Open-ended idea
generation

Brainstorm

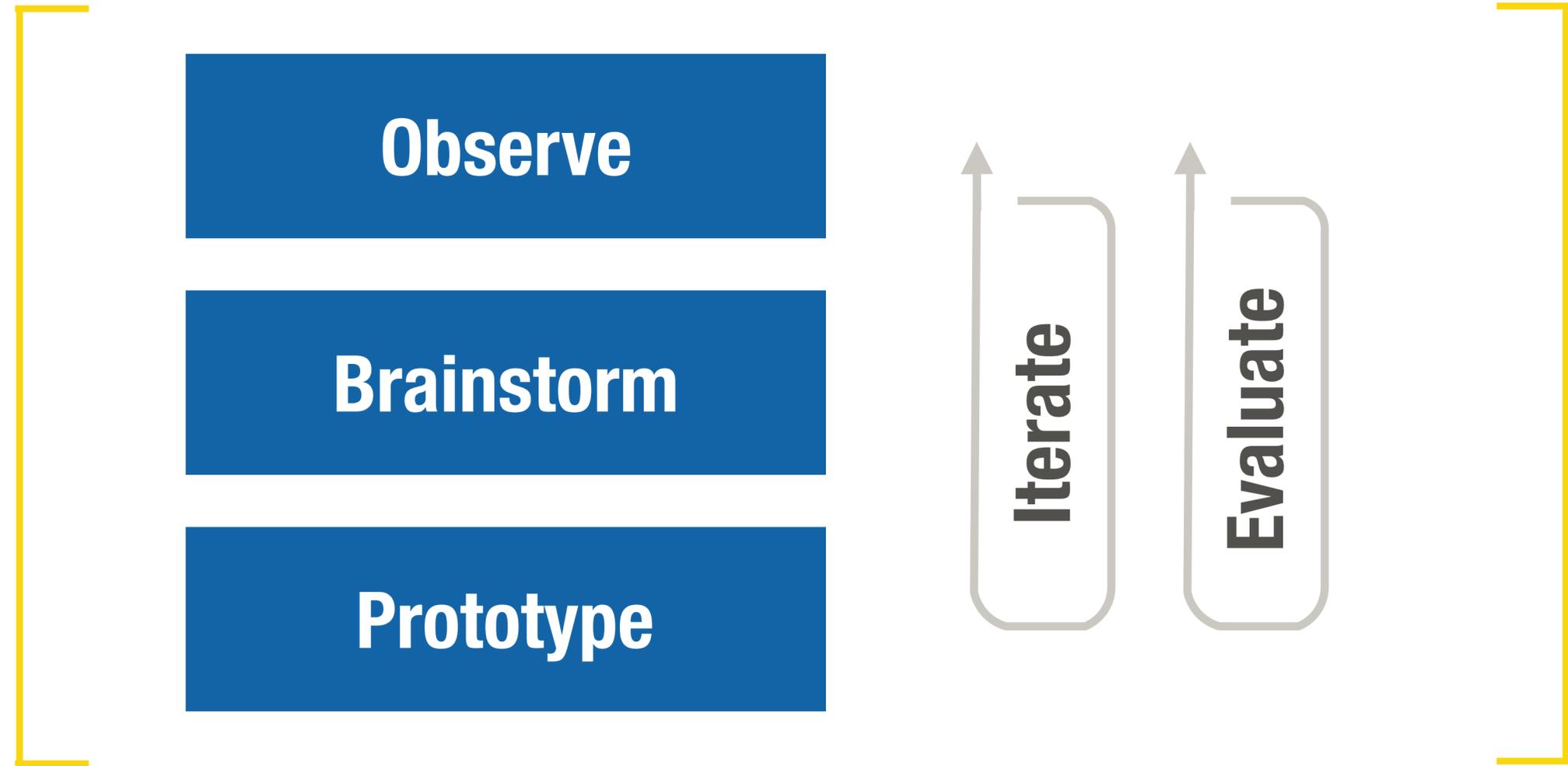
Making and
testing

Prototype

What does that mean?



What does that mean?



Limitations

Specific?

Rigorous?

Repeatable?

Observe

Brainstorm

Prototype

Iterate

Evaluate

Limitations

Specific?

Rigorous?

Repeatable?

Observe

Brainstorm

Prototype

Iterate

Evaluate

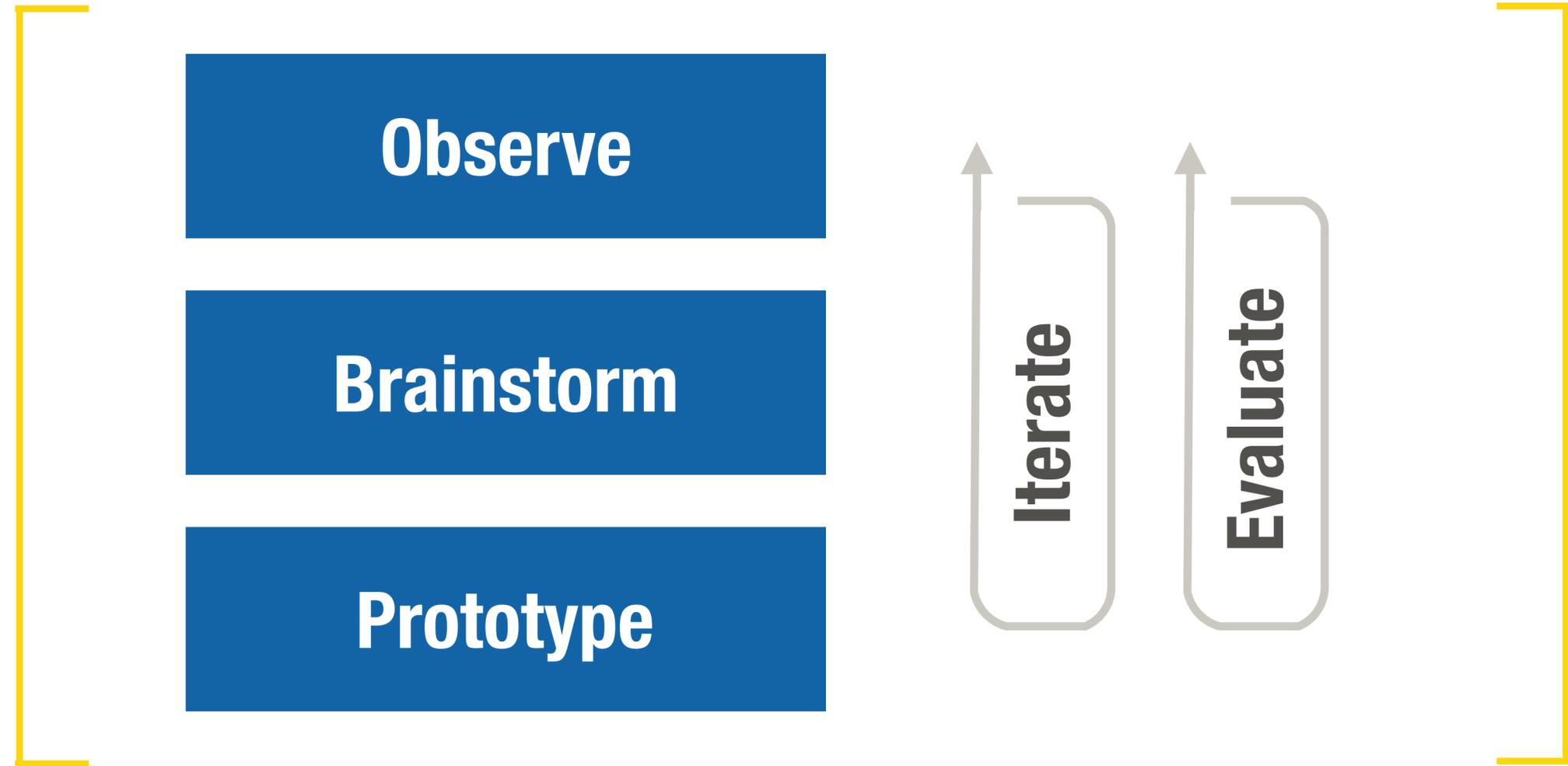
Clear?

Quantifiable?

Directed?

Iterate & Evaluate

Measure
Improvements
for Users



Iterate & Evaluate

Measure
Improvements
for Users

Measure
Convergence
on design goals

Observe

Brainstorm

Prototype

Iterate

Evaluate

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 to
Agree on Means**

Conversation is the core

Measure
Improvements
for Users

Measure
Convergence
on design goals

**Conversation to
Agree on Means**

Design... from Thinking to Conversation



**Design
Thinking**

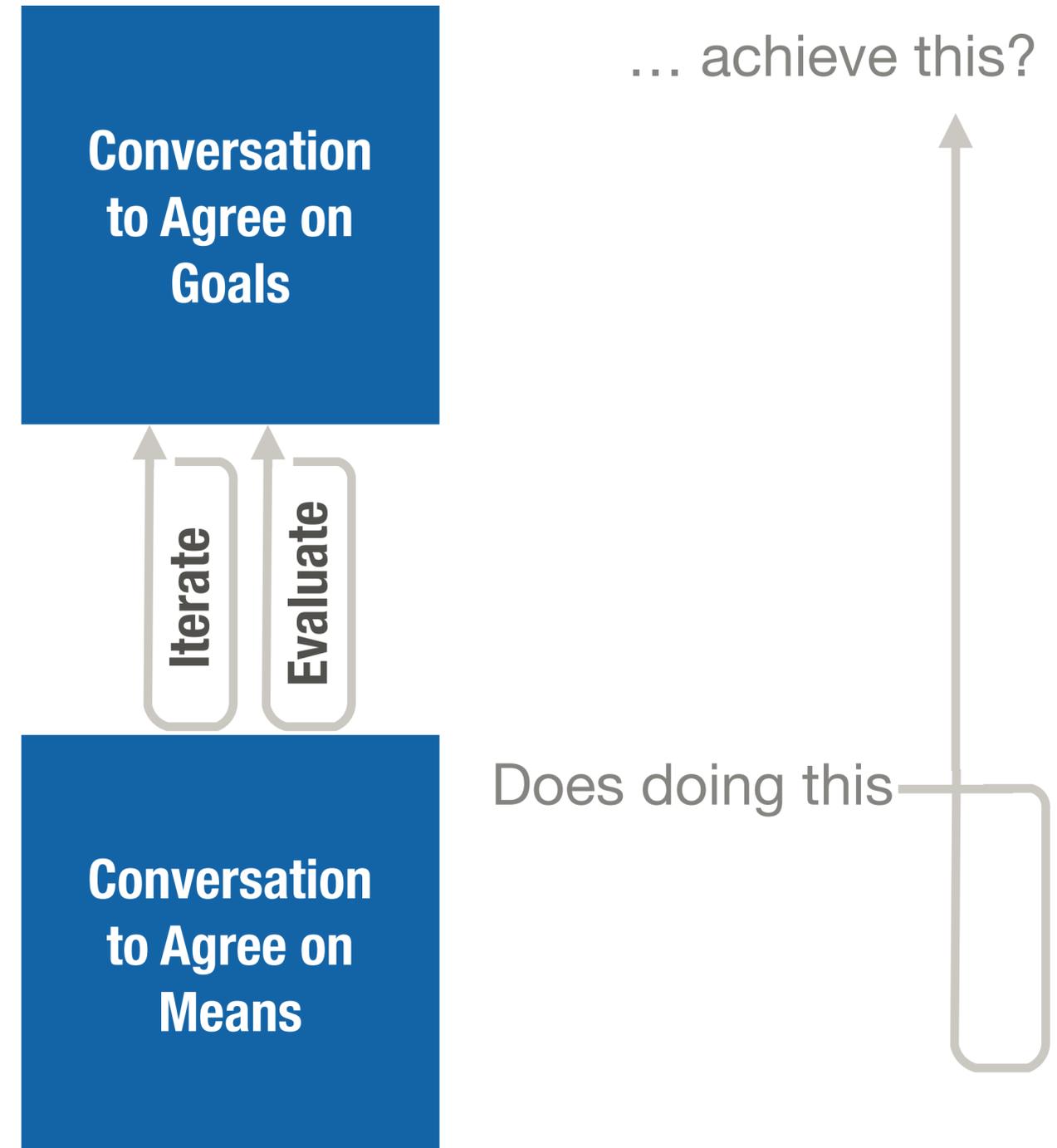
Rethinking Design Thinking

**Conversation
to Agree on Means**

Design as Conversation

**Conversation
to Agree on
Means**

Design as Conversation

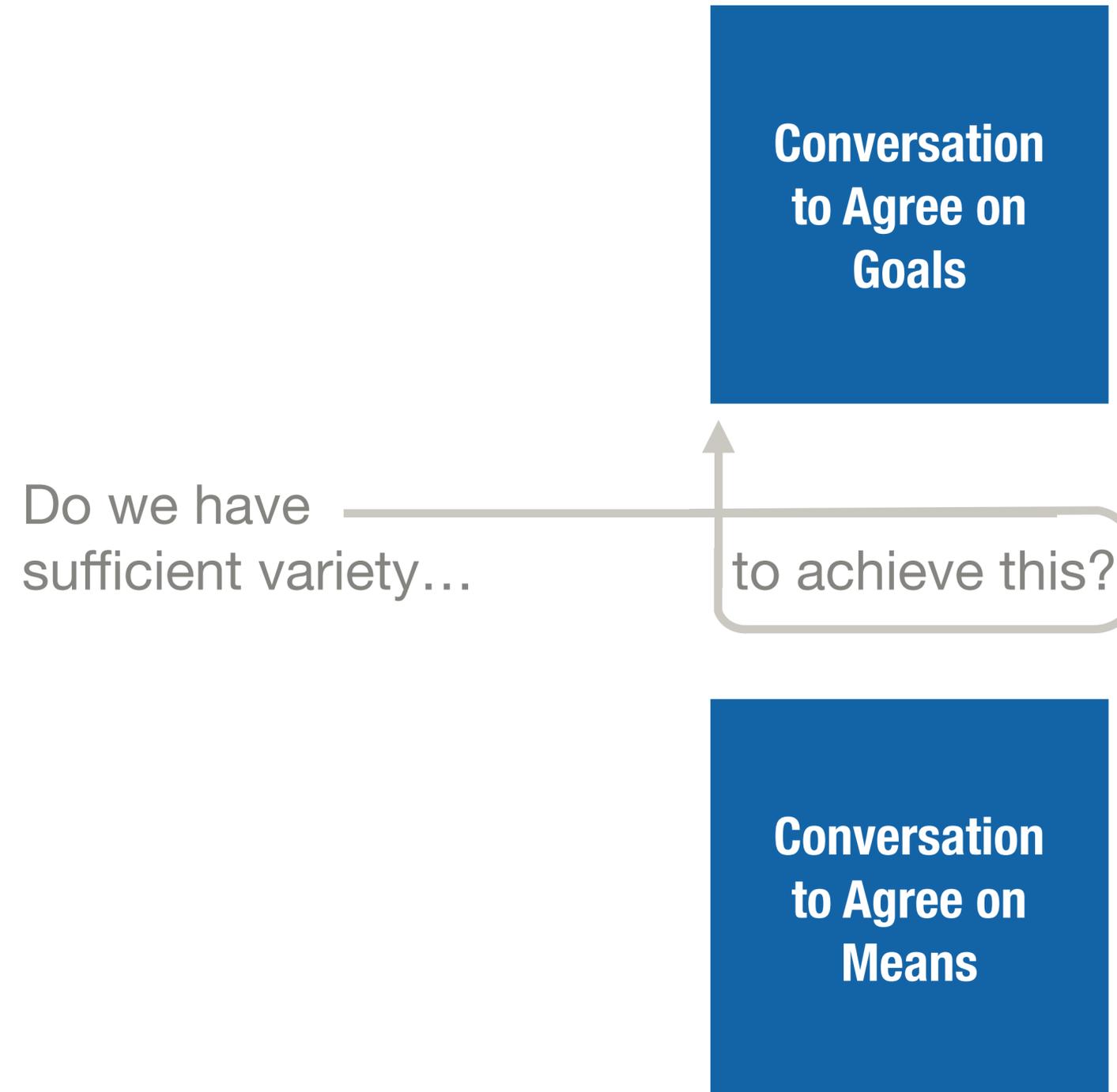


Design as Conversation

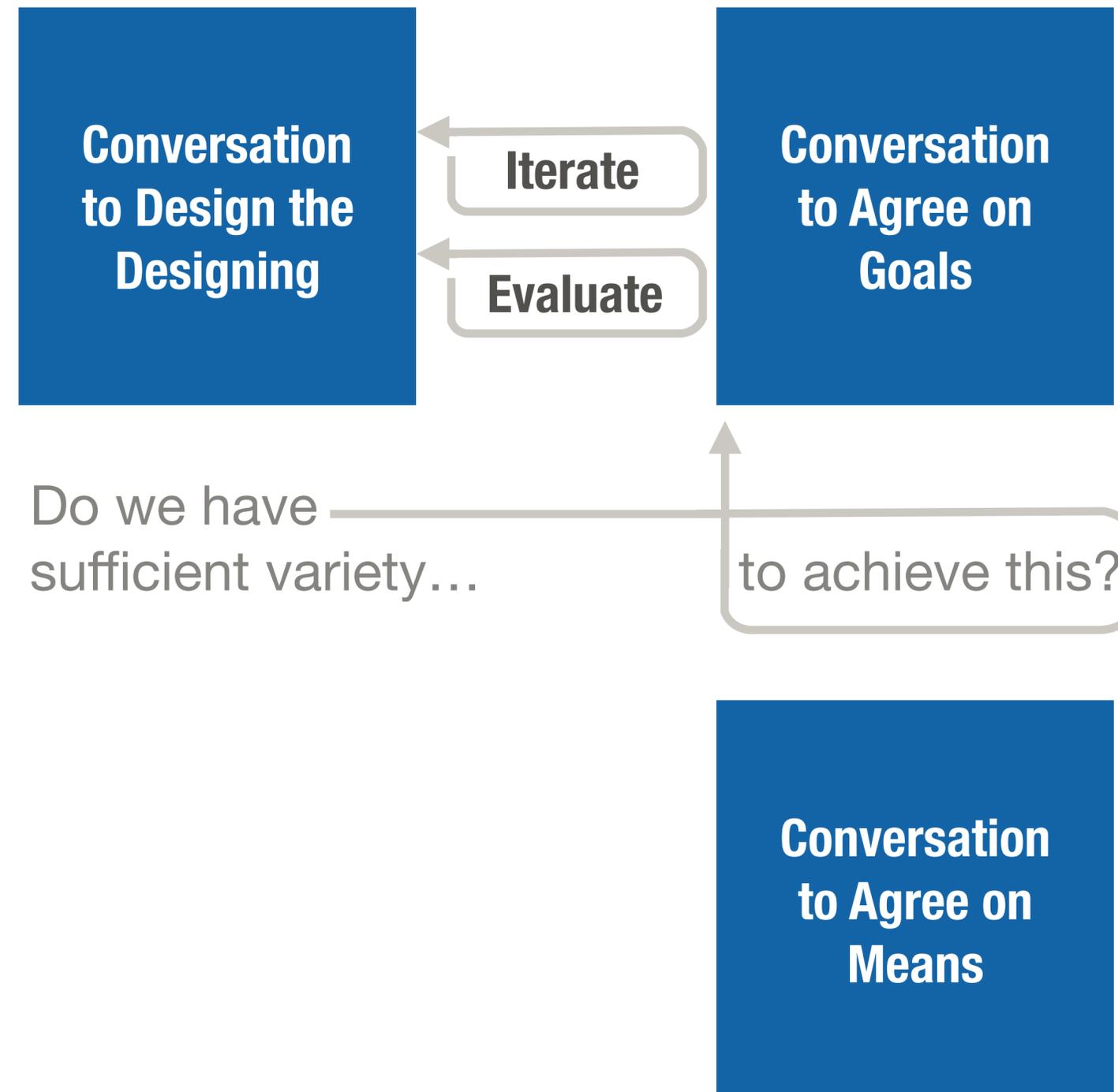
**Conversation
to Agree on
Goals**

**Conversation
to Agree on
Means**

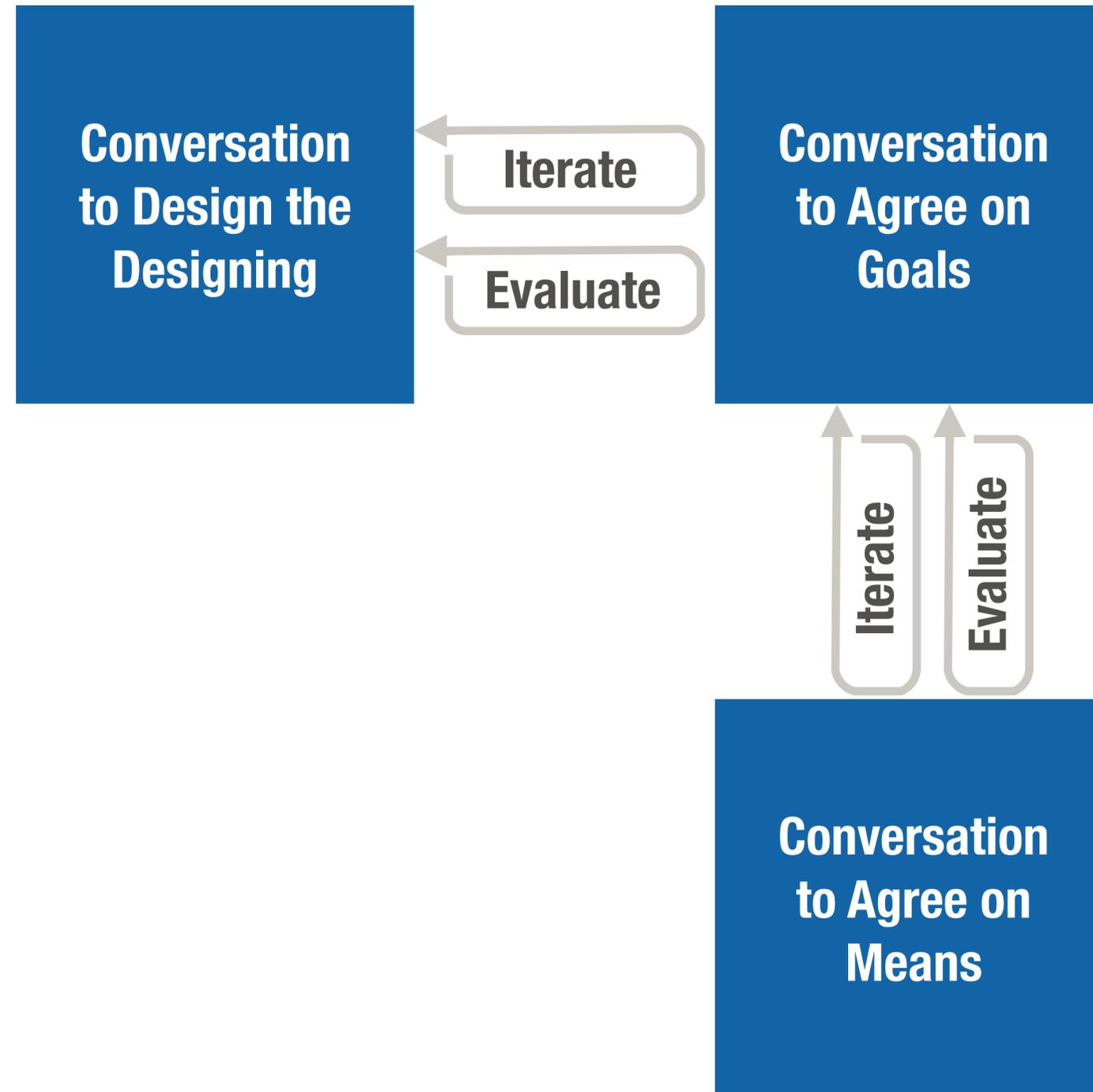
Design as Conversation



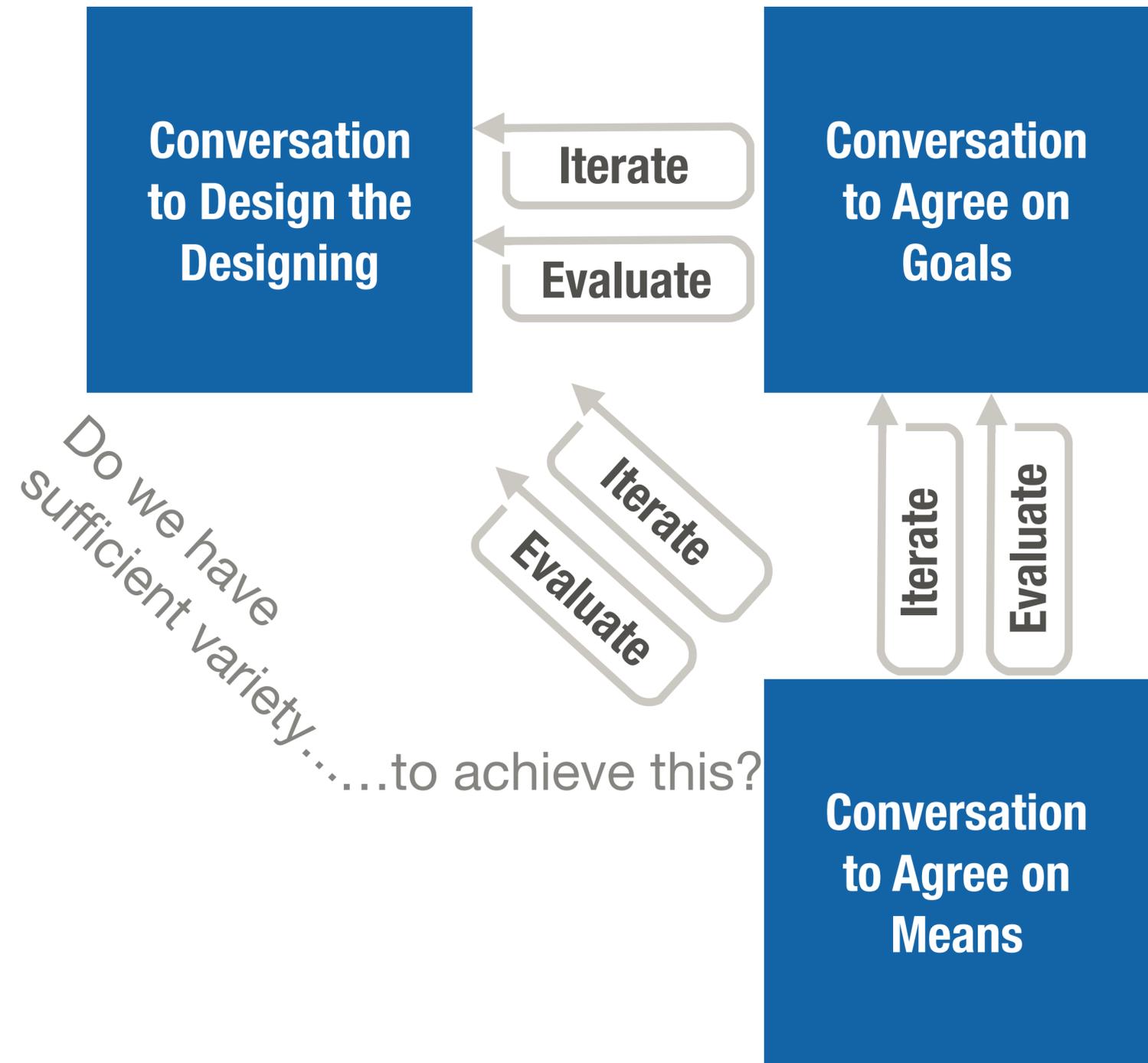
Design as Conversation



Design as Conversation



Design as Conversation



Designing Conversations...

CONVERSATION

e,e,e...

Designing Conversations for Variety

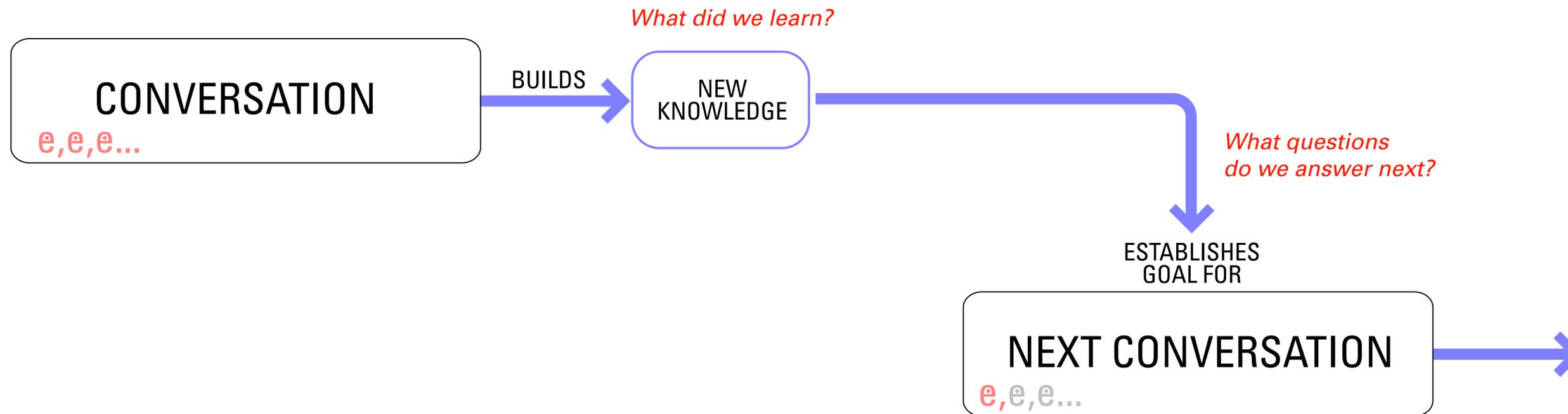
CONVERSATION

e,e,e...

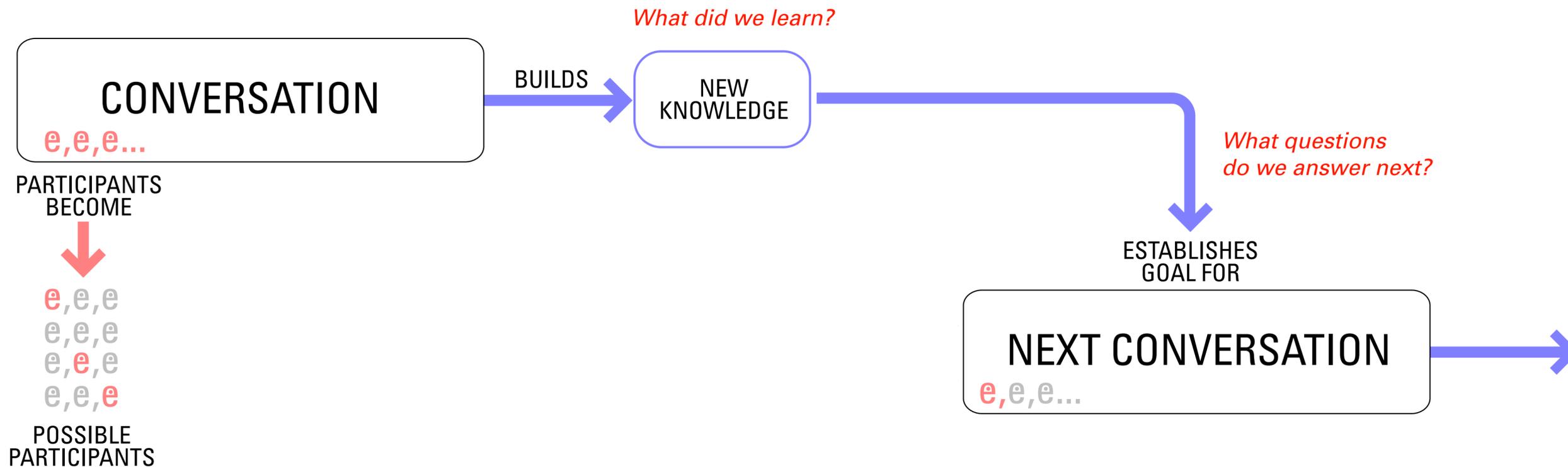
Each conversation builds new knowledge...



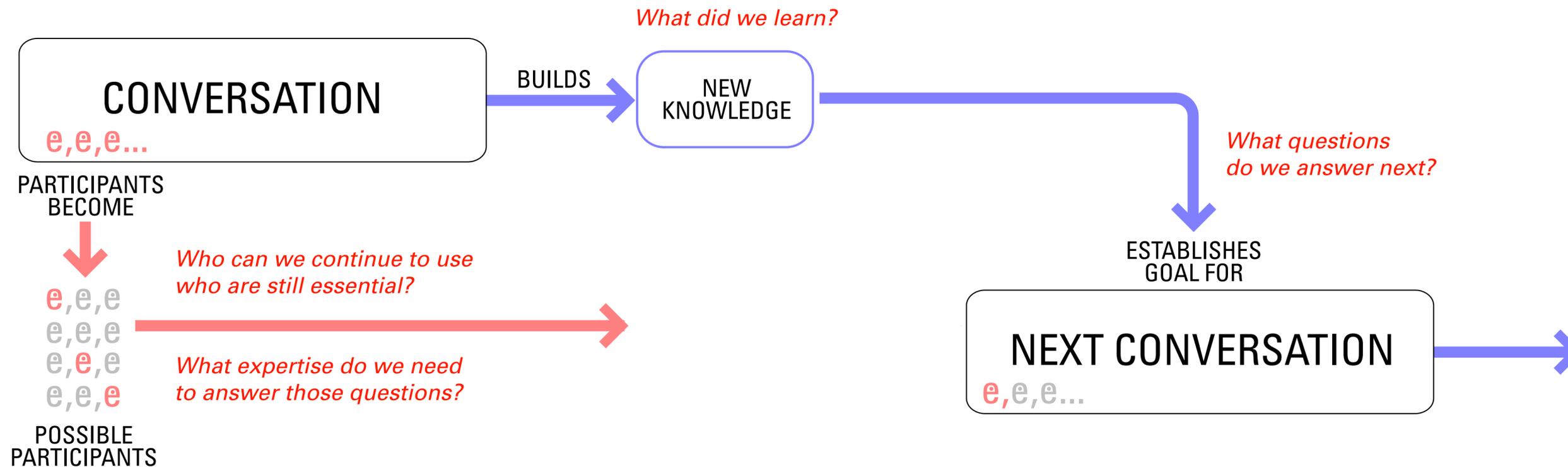
... and frames a goal for the next conversation.



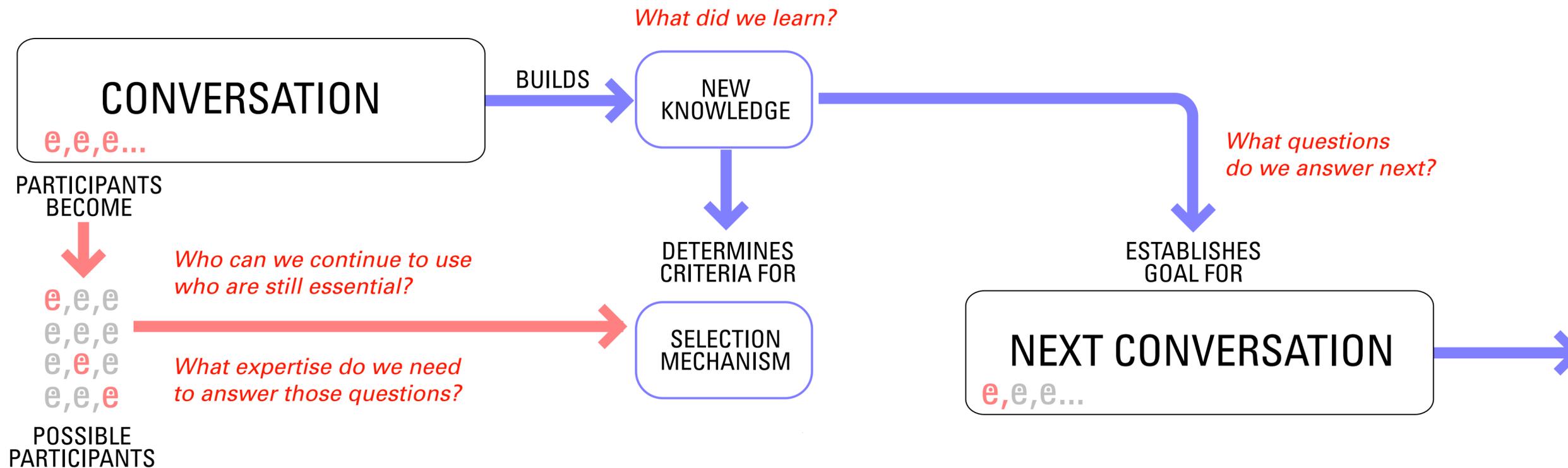
Participants in the current conversation...



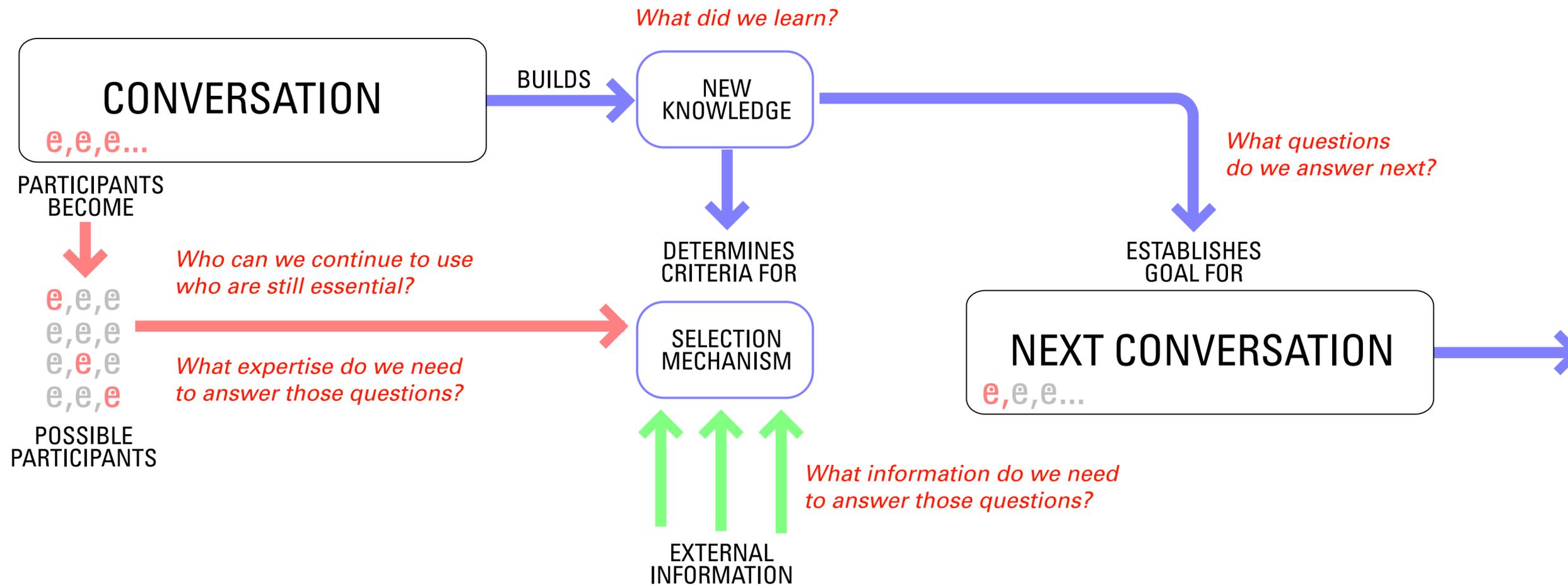
... may or may not suit the next one.



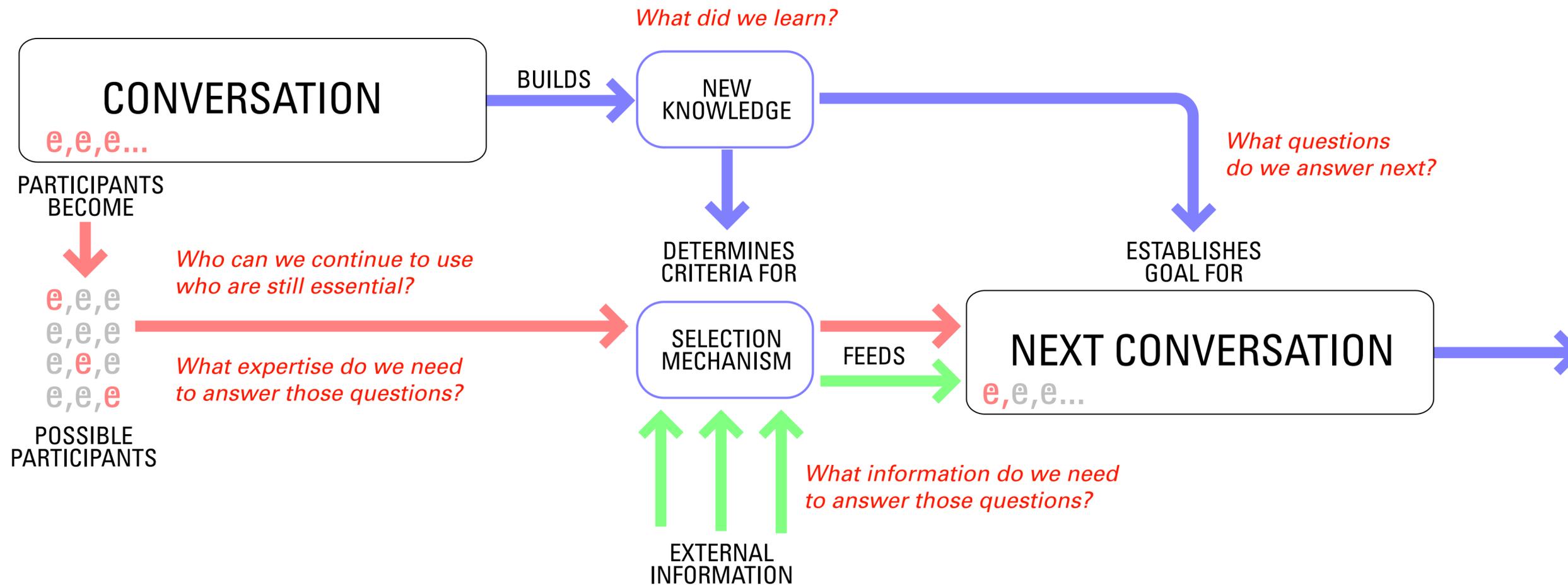
Participants may be identified and selected...



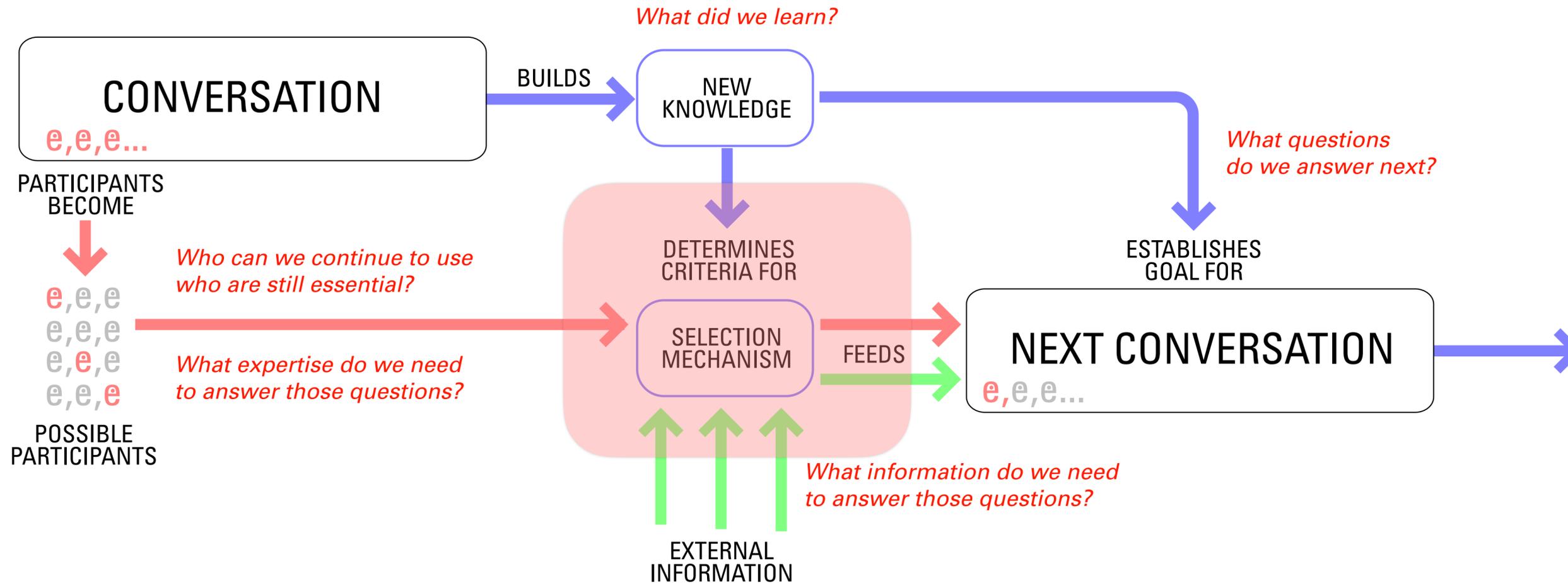
... along with new information...



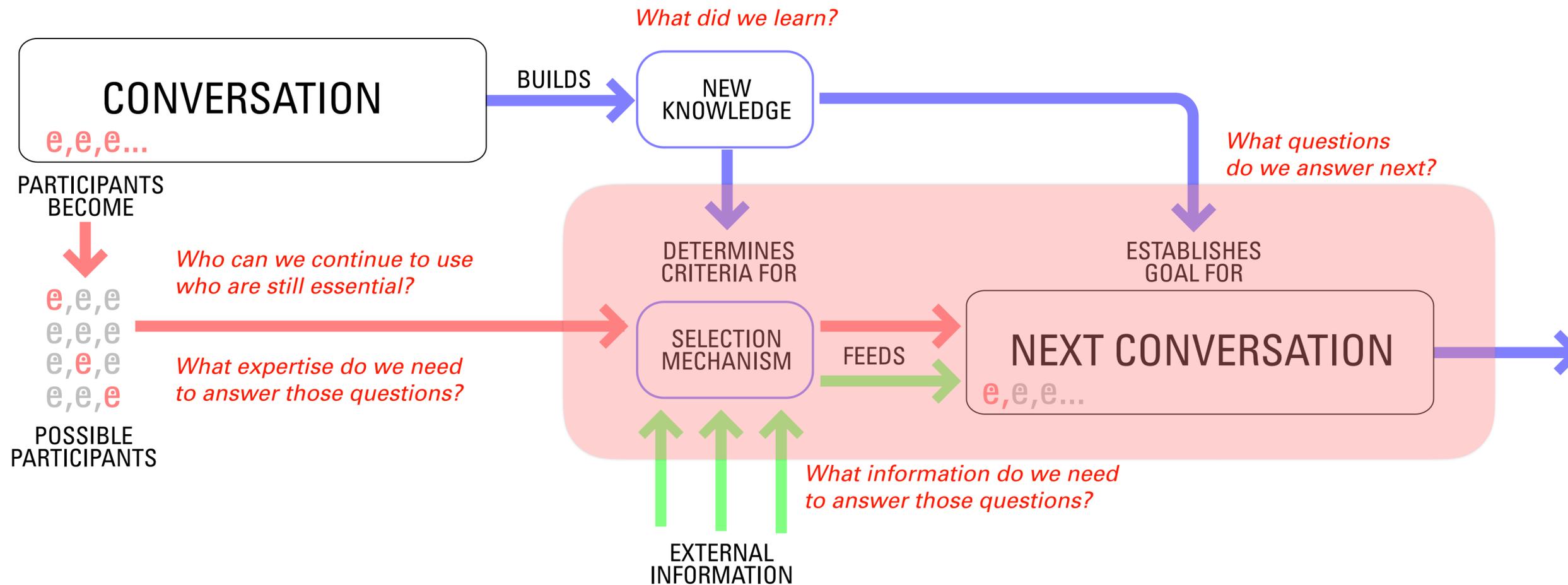
... to bring to the next conversation.



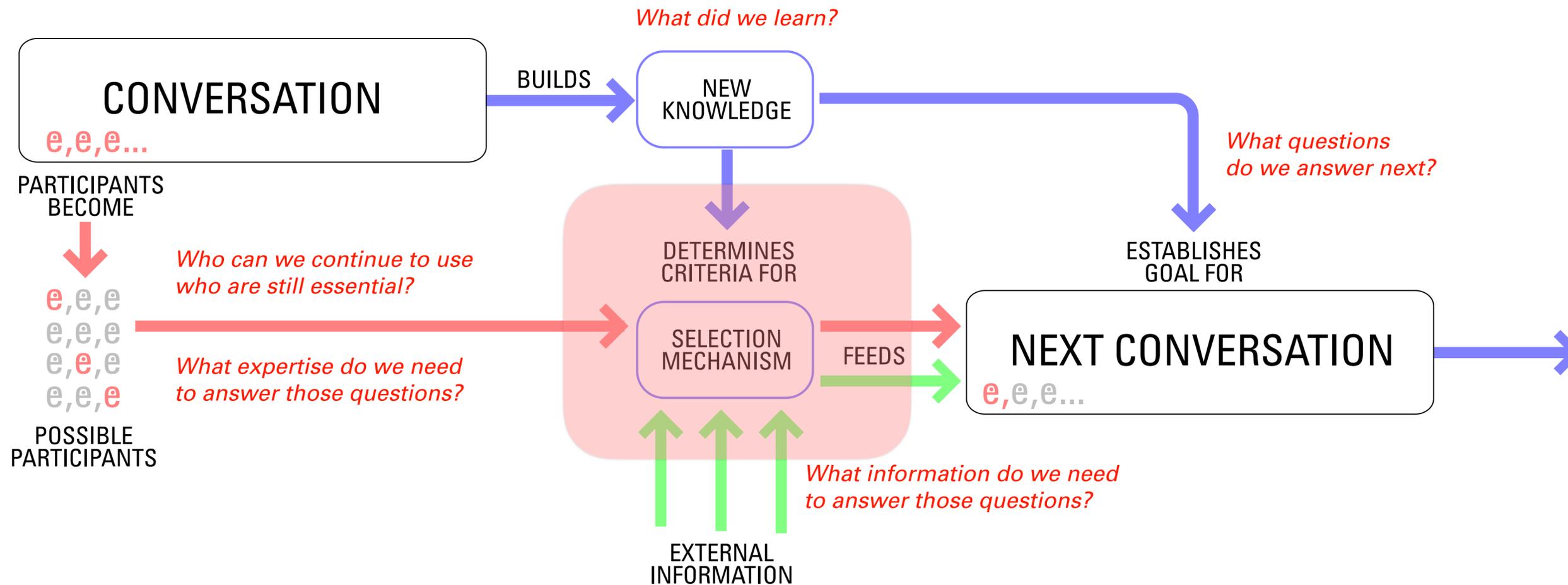
Designing conversations means...



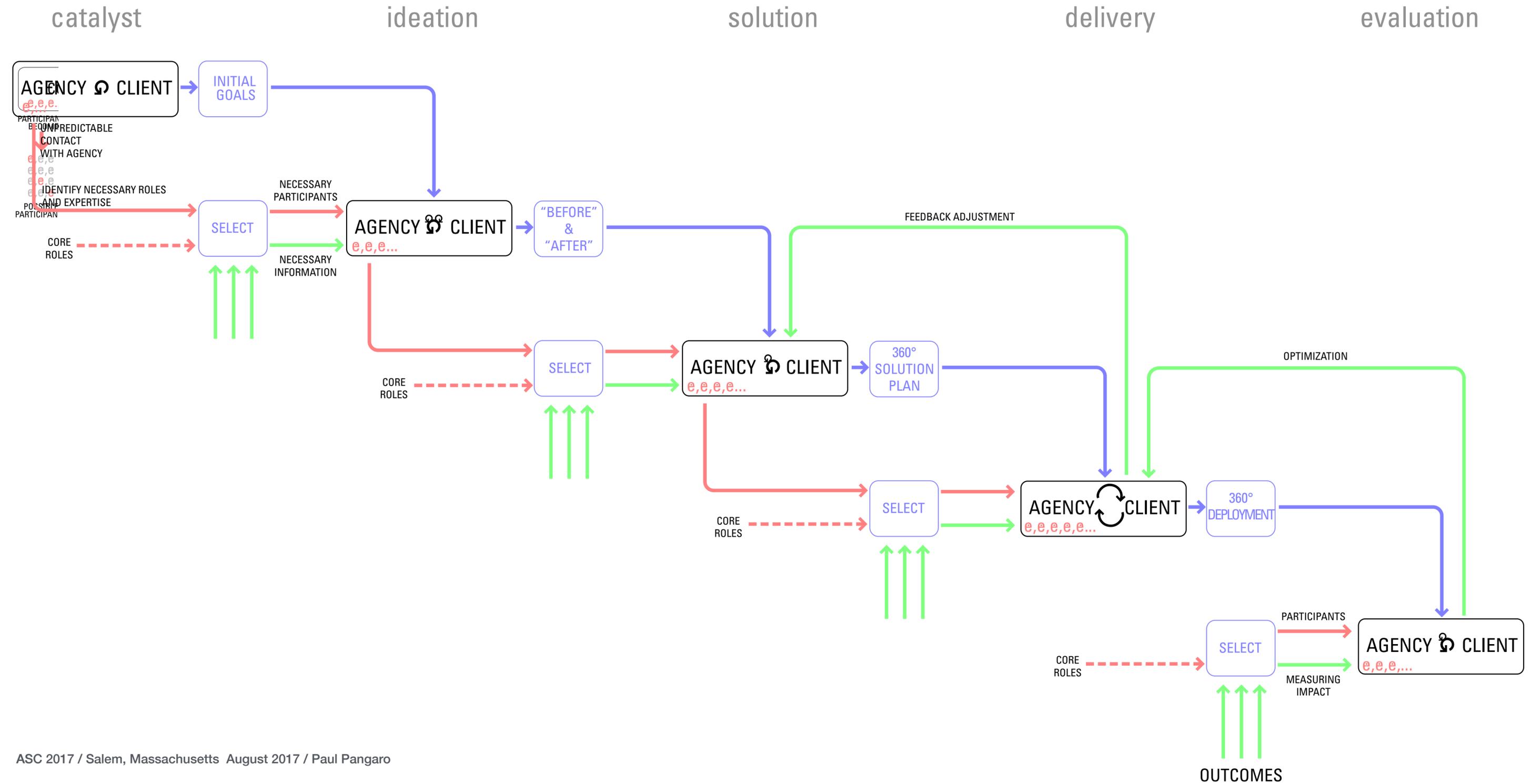
... selecting for requisite variety (with no guarantees).



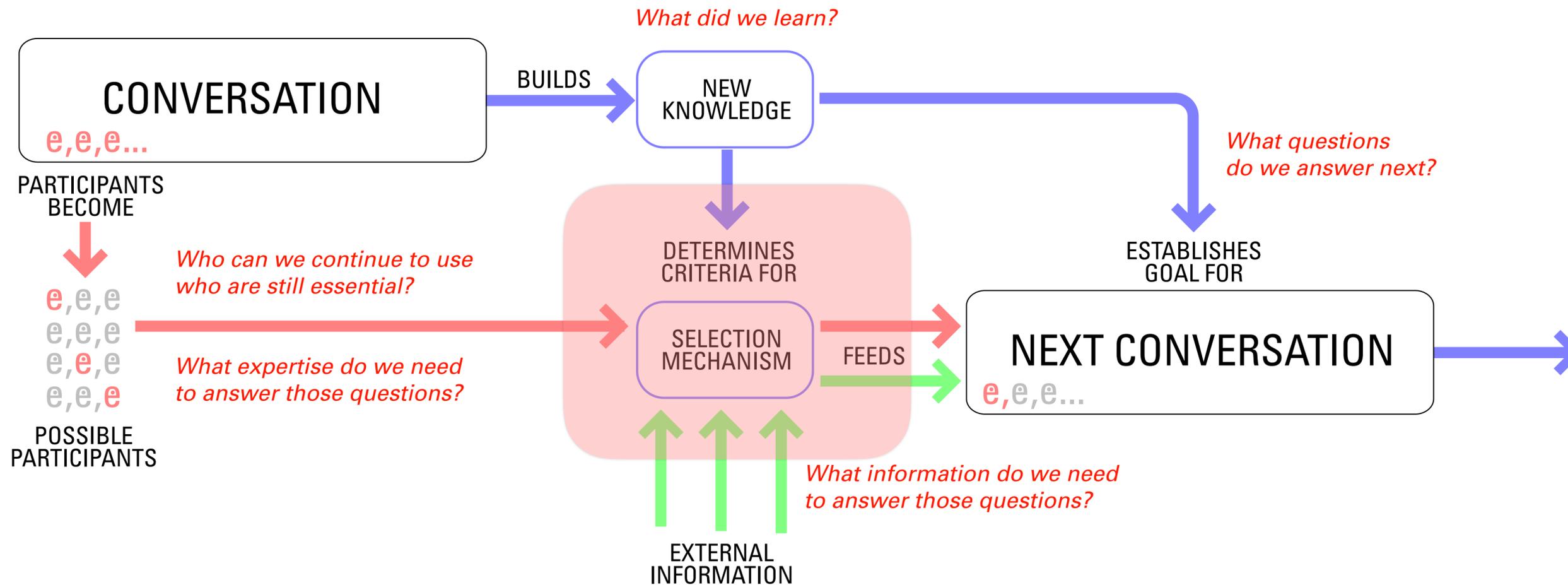
Focus on Designing Conversations for Variety



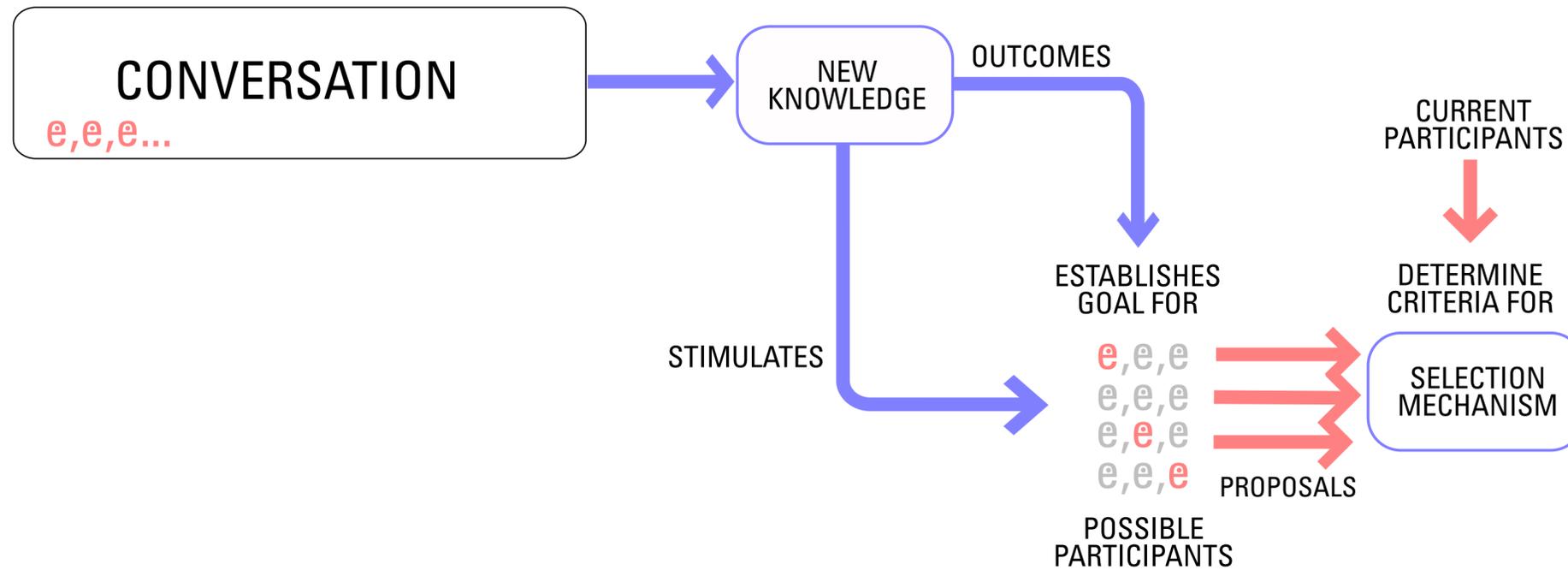
Designing the Cadence of Conversations



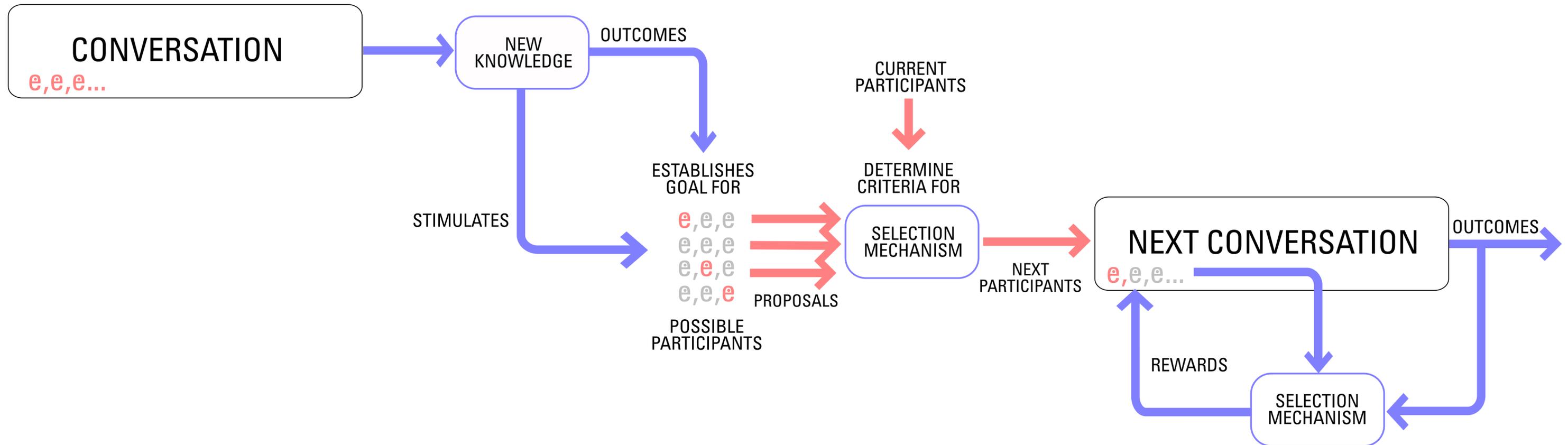
Focus on Designing Conversations for Variety



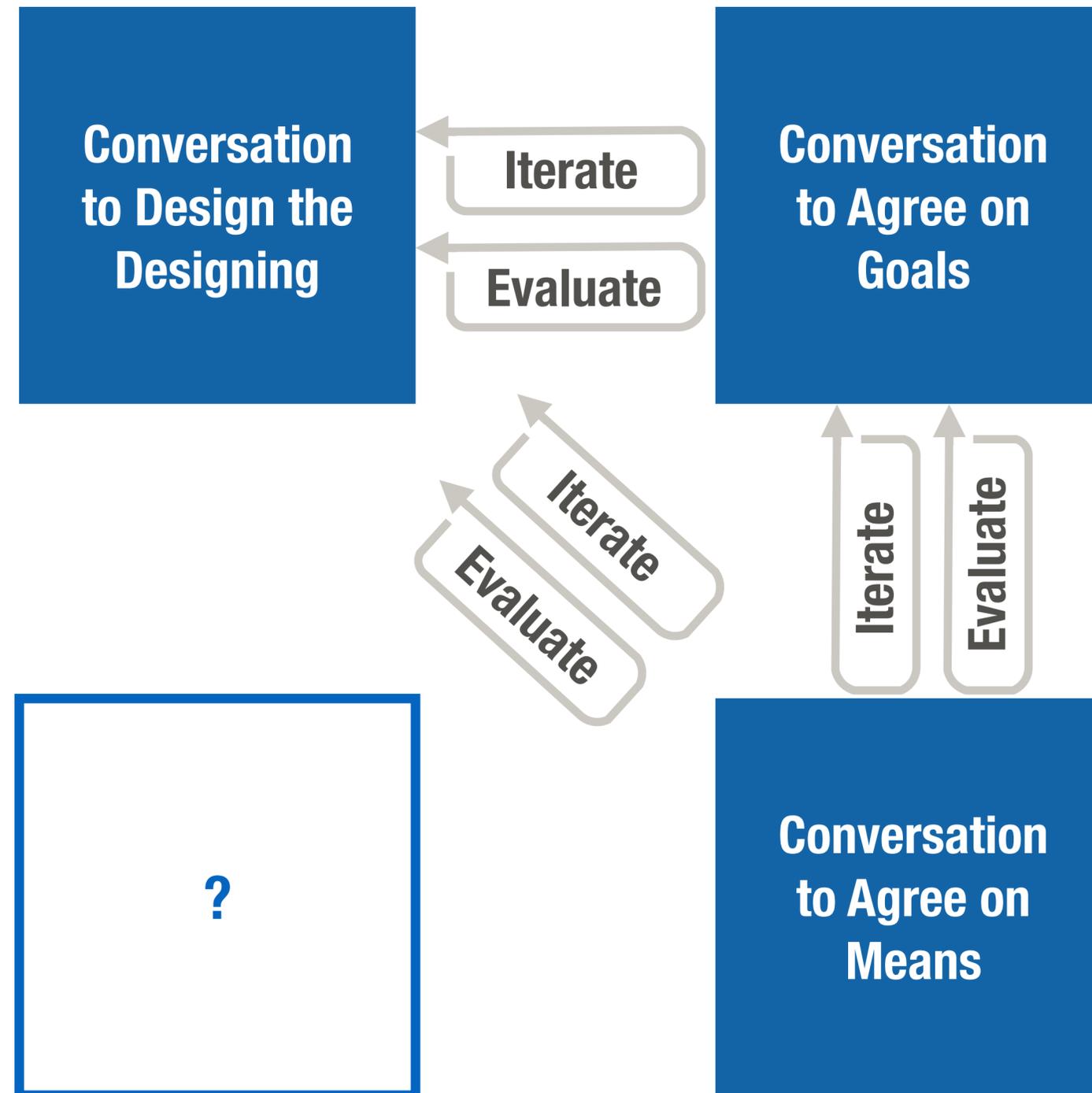
Designing for Reward of Variety



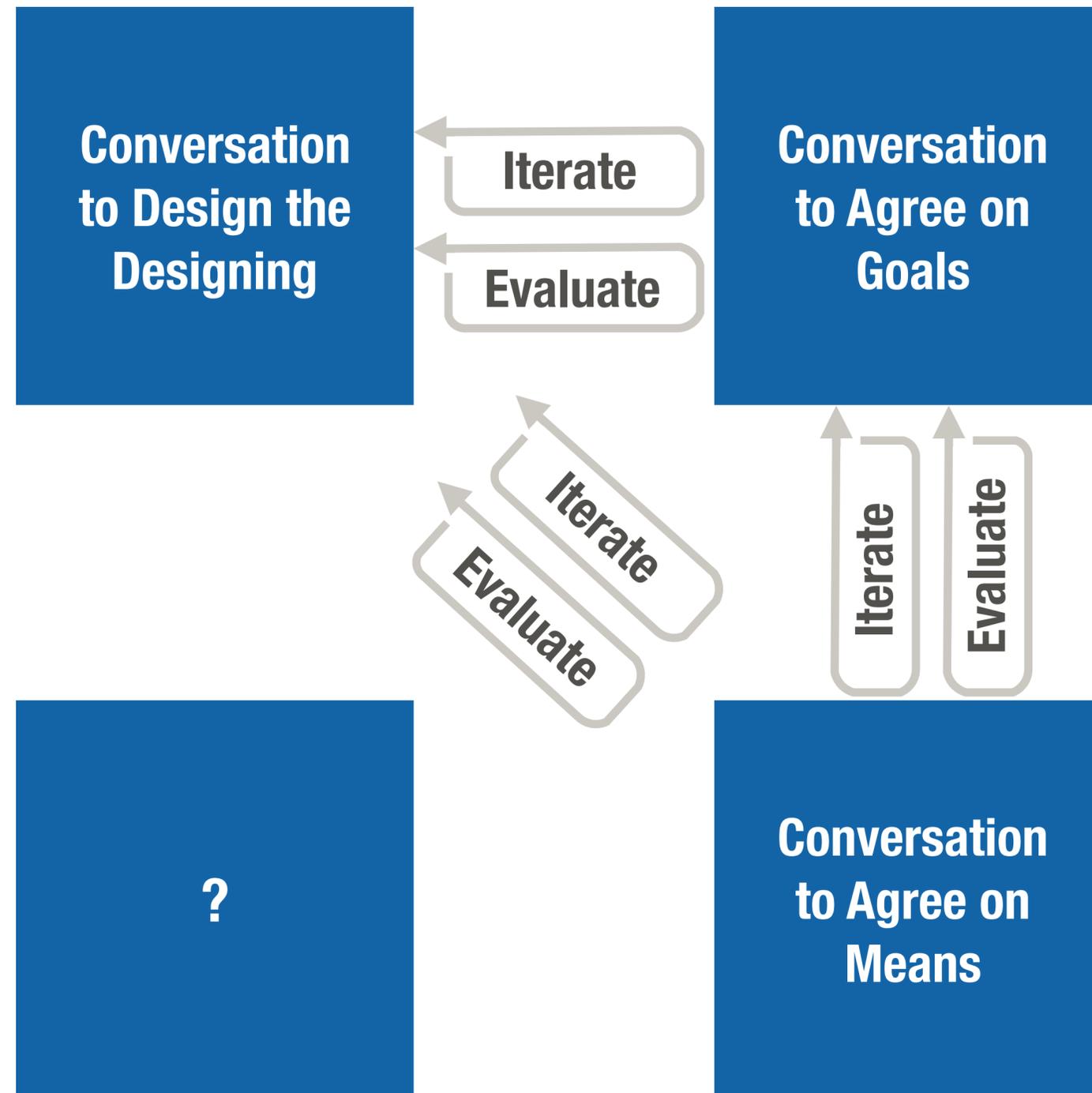
Designing for Reward of Variety



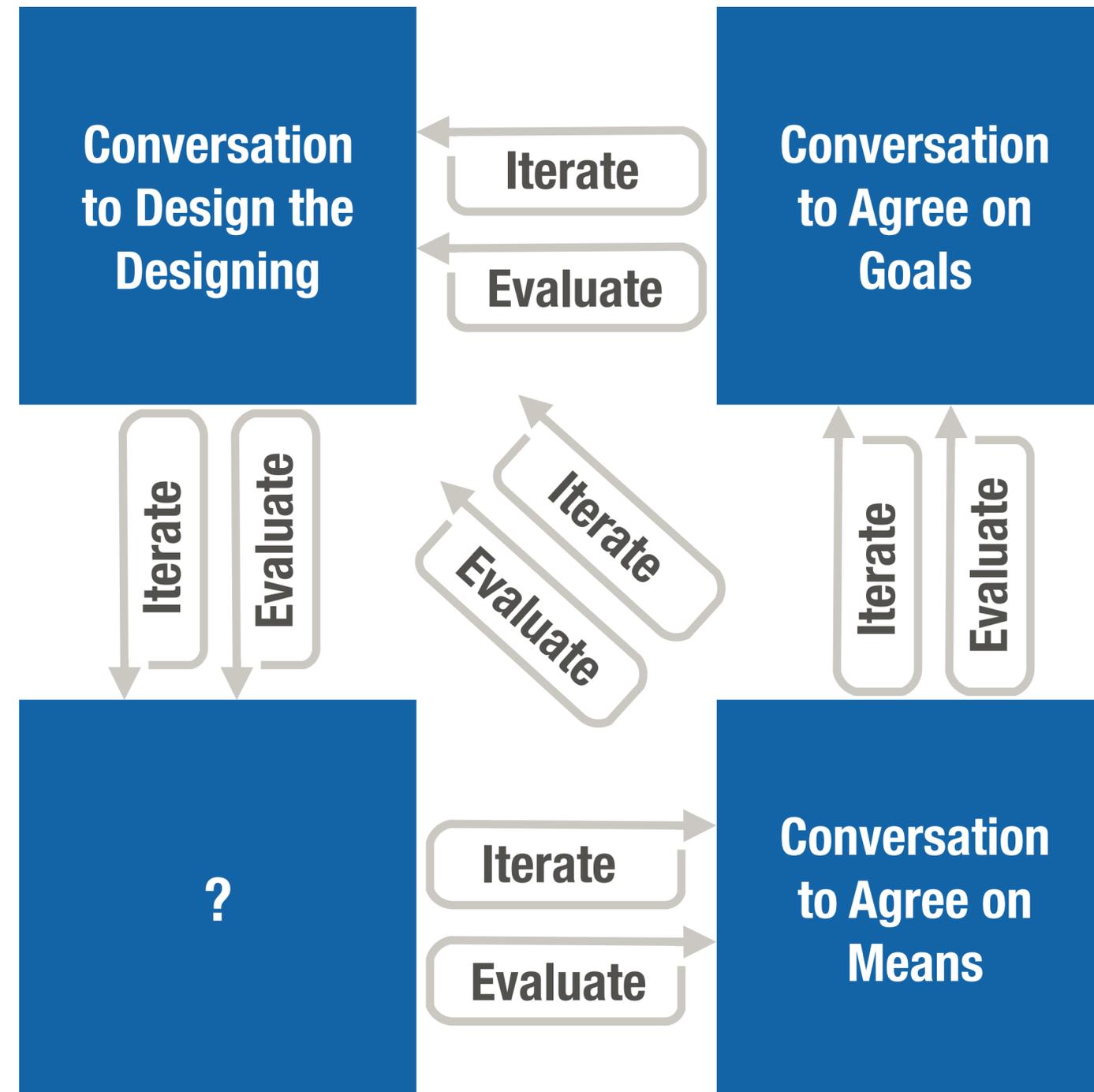
Design as Conversation



Design as Conversation



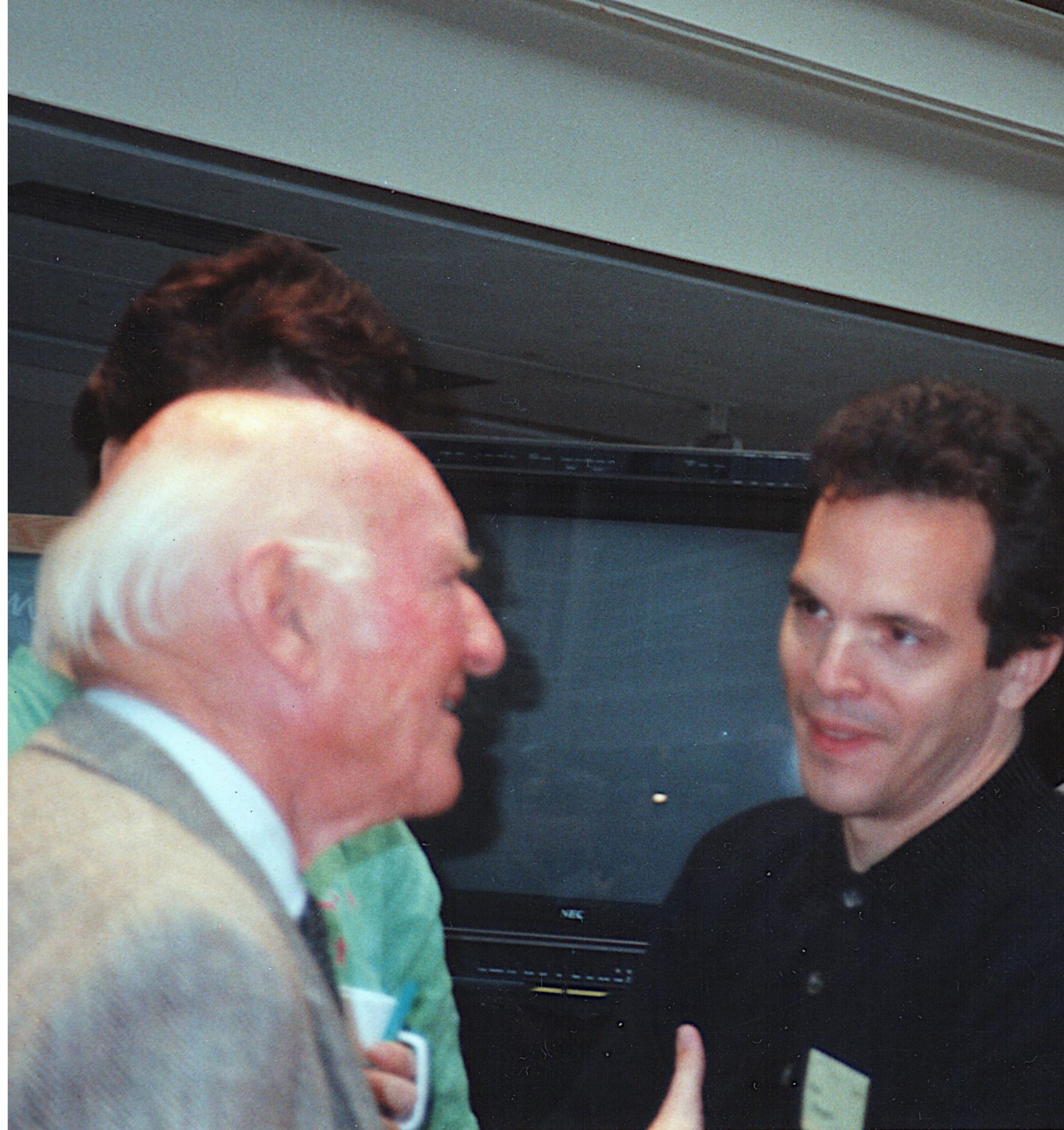
Design as Conversation



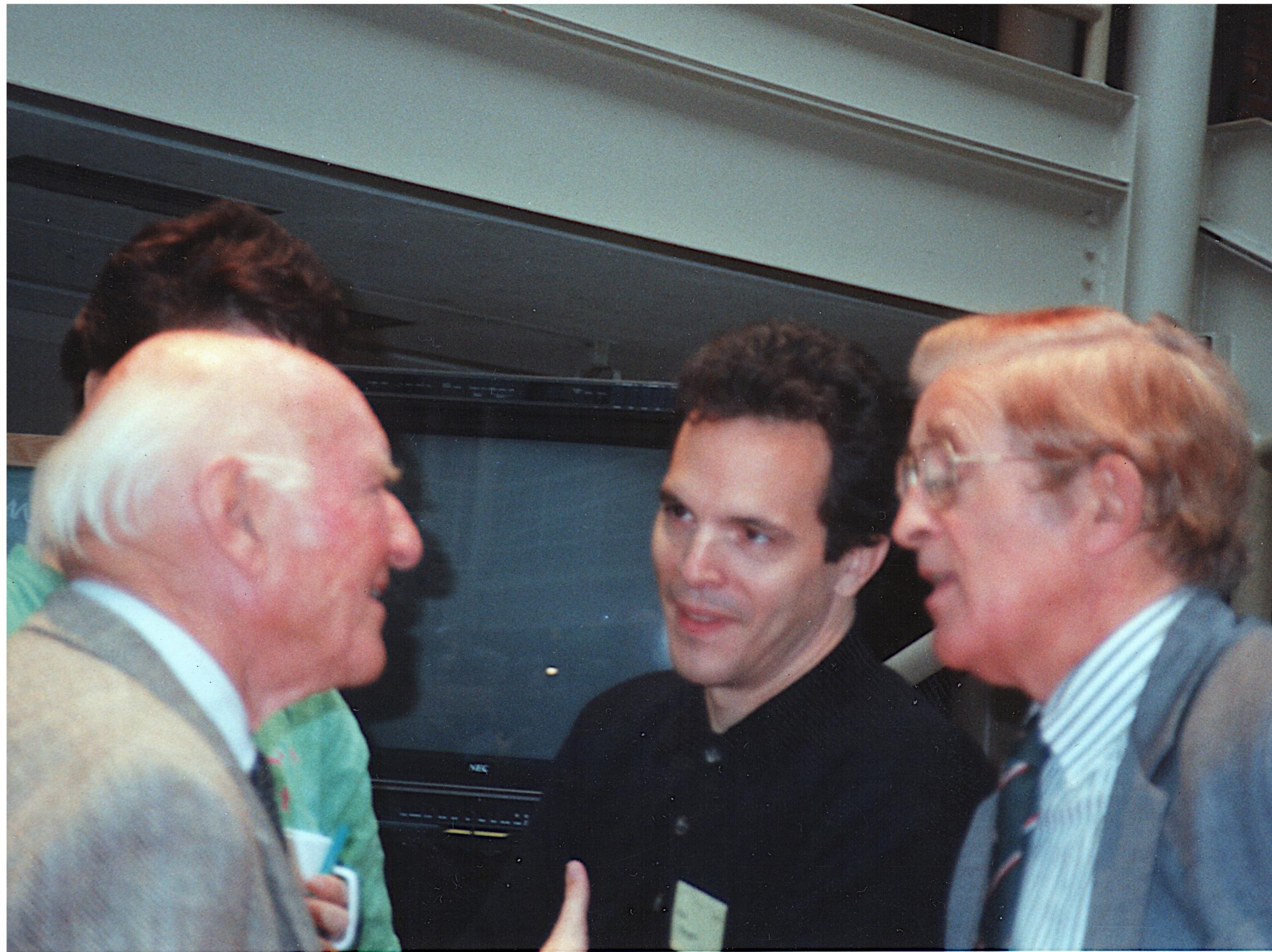
Heinz von Foerster Paul Pangaro

1993

ASC 2017 / Salem, Massachusetts August 2017 / Paul Pangaro



Heinz von Foerster
Paul Pangaro
Michael Geoghegan

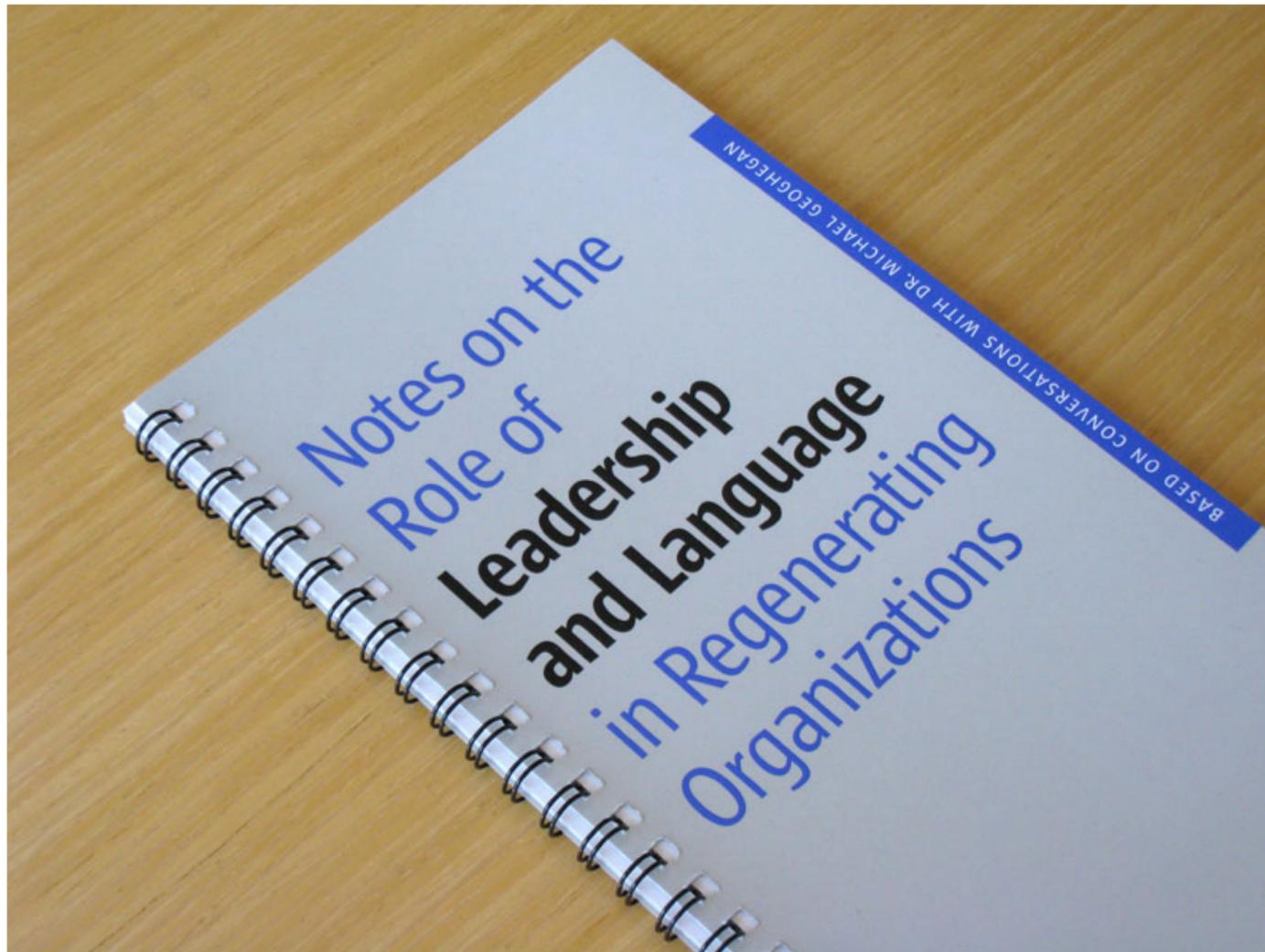


1993

Don Schön
Paul Pangaro
Michael Geoghegan
Gordon Pask
Frank Galuszka



1993



Dubberly, Esmonde, Geoghegan, Pangaro 2002

<http://pangaro.com/leadership-language-regenerating-organizations.html>

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.

Past language limits future vision.

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.

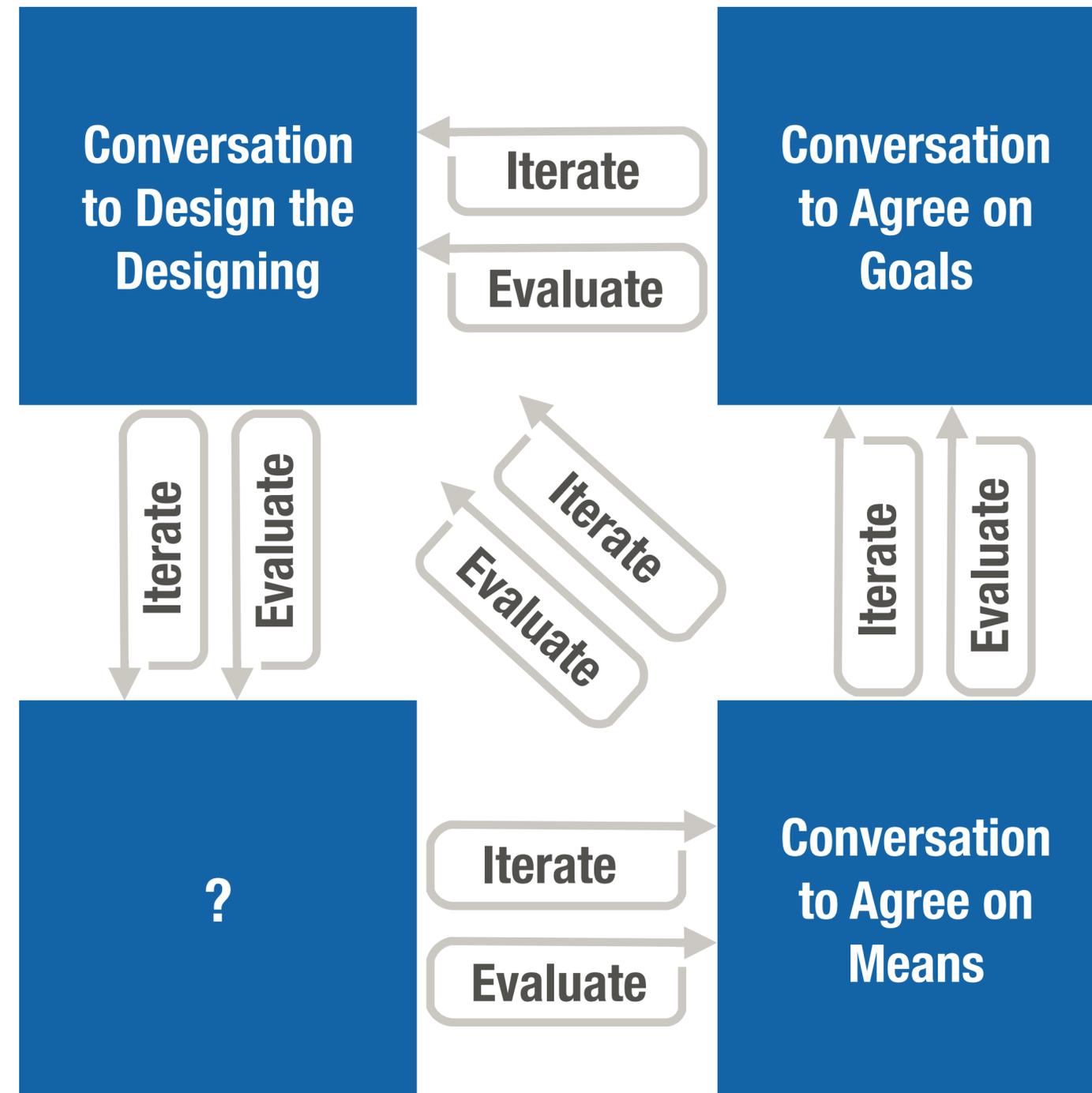
To regenerate,
an organization creates
a new **language**.

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

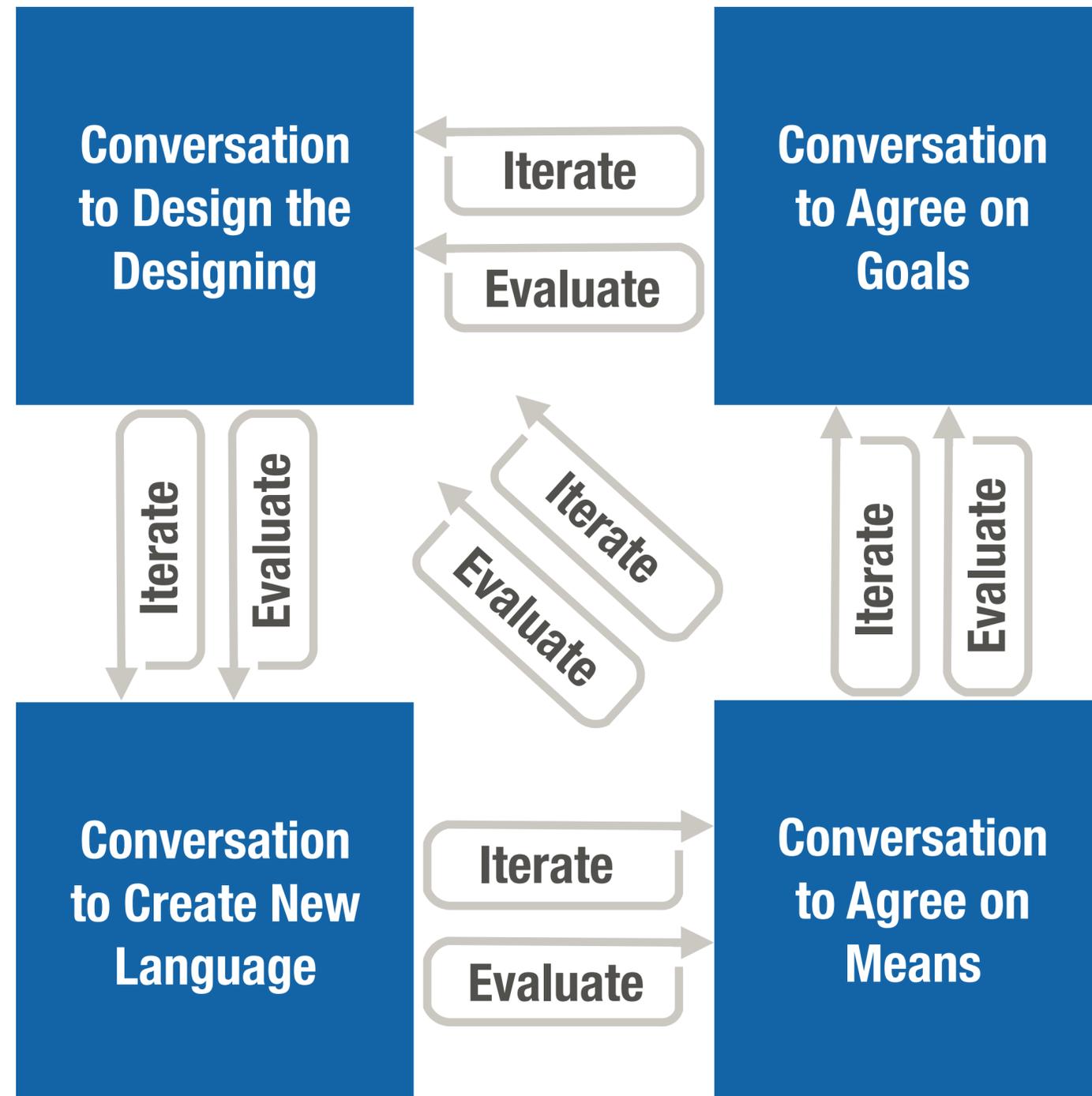
They do so by generating new language that appropriate groups in the organization come to understand and embrace.

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

Design as Conversation



Design as Conversation



Focusing Questions for an Organization

Exploit actionable information flows, not transformation of mass & energy—so we participate in the new economy, the move from “atoms to bits.”

Have economic potential—removes uncertainty in the market, creates order from disorder, lowers the human cost of achieving our goals—all are worth something.

Are consistent with the social system of the organization—connecting to who we are (our history) and what we can see ourselves engaging in.

Engage individuals who want to do it—otherwise resistance will be too great.

Reveal the necessary variety of expertise required for exploring the question—so that we can define it and make it available (achieve requisite variety).

Teach the organization as a whole—so that what is learned can be reproduced.

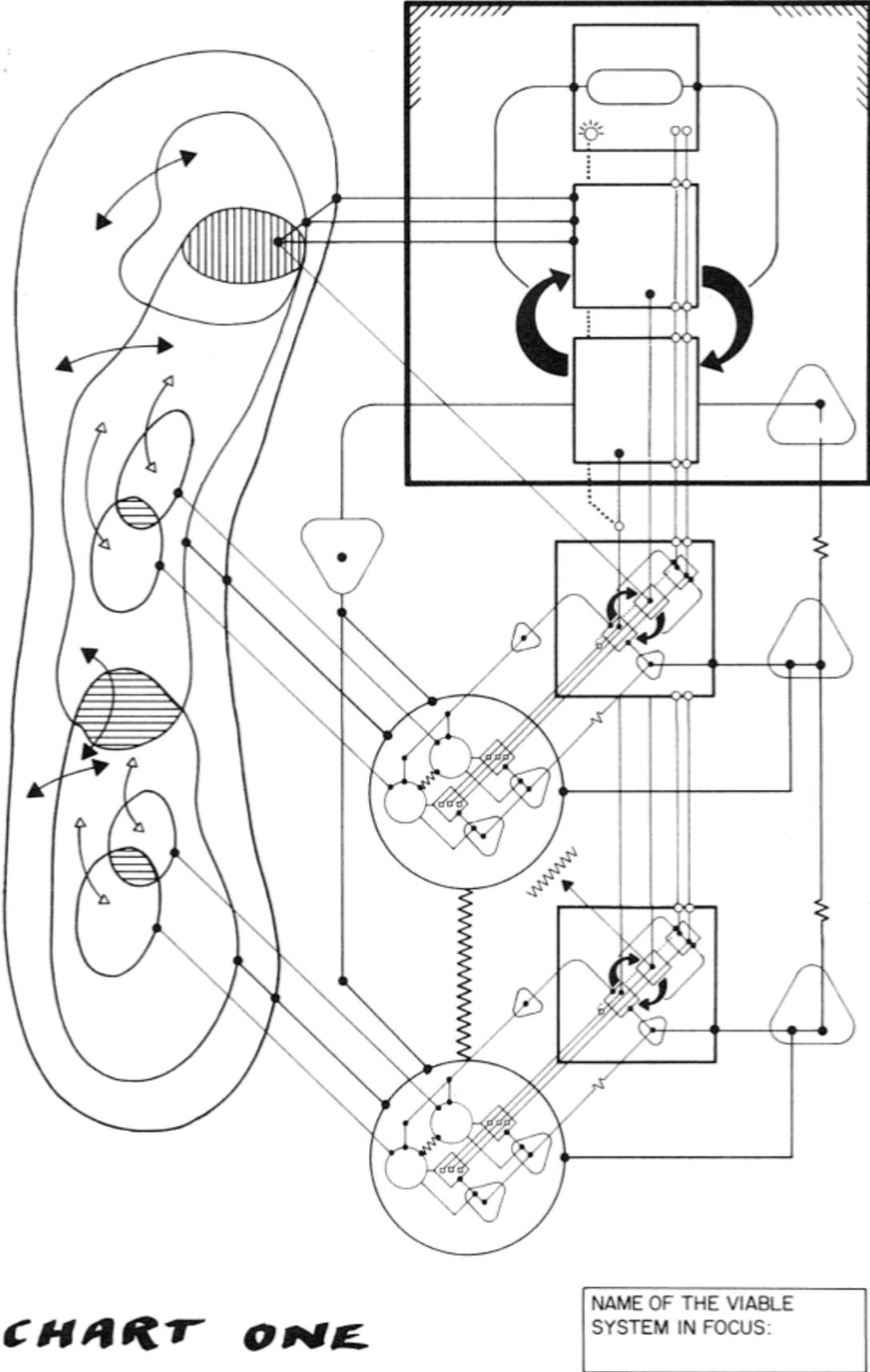
Paul Pangaro Stafford Beer



1984

Viability System Model

Diagnosing the System for Organizations
Stafford Beer 1985



Viability System Model

Diagnosing the System for Organizations
Stafford Beer 1985

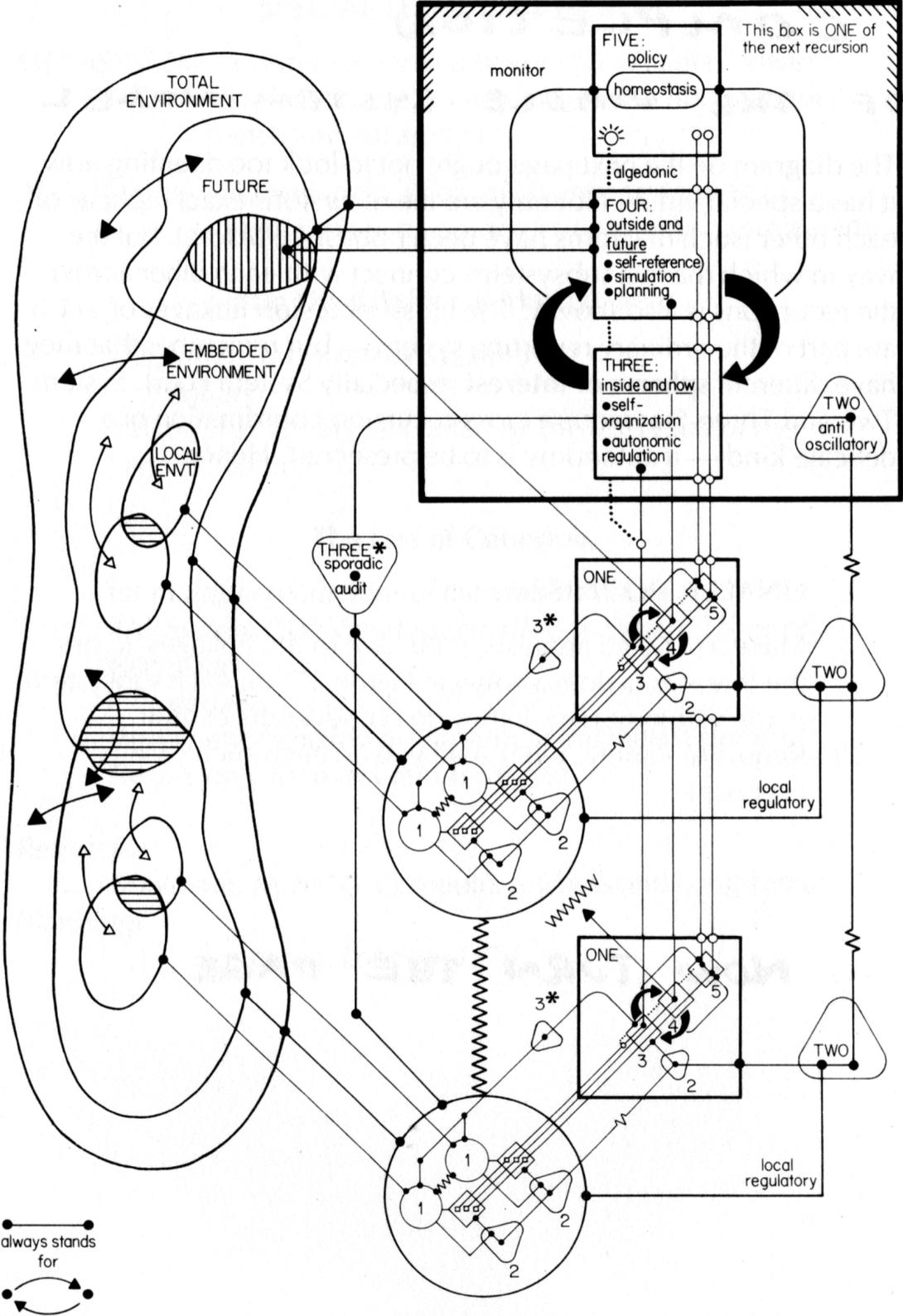
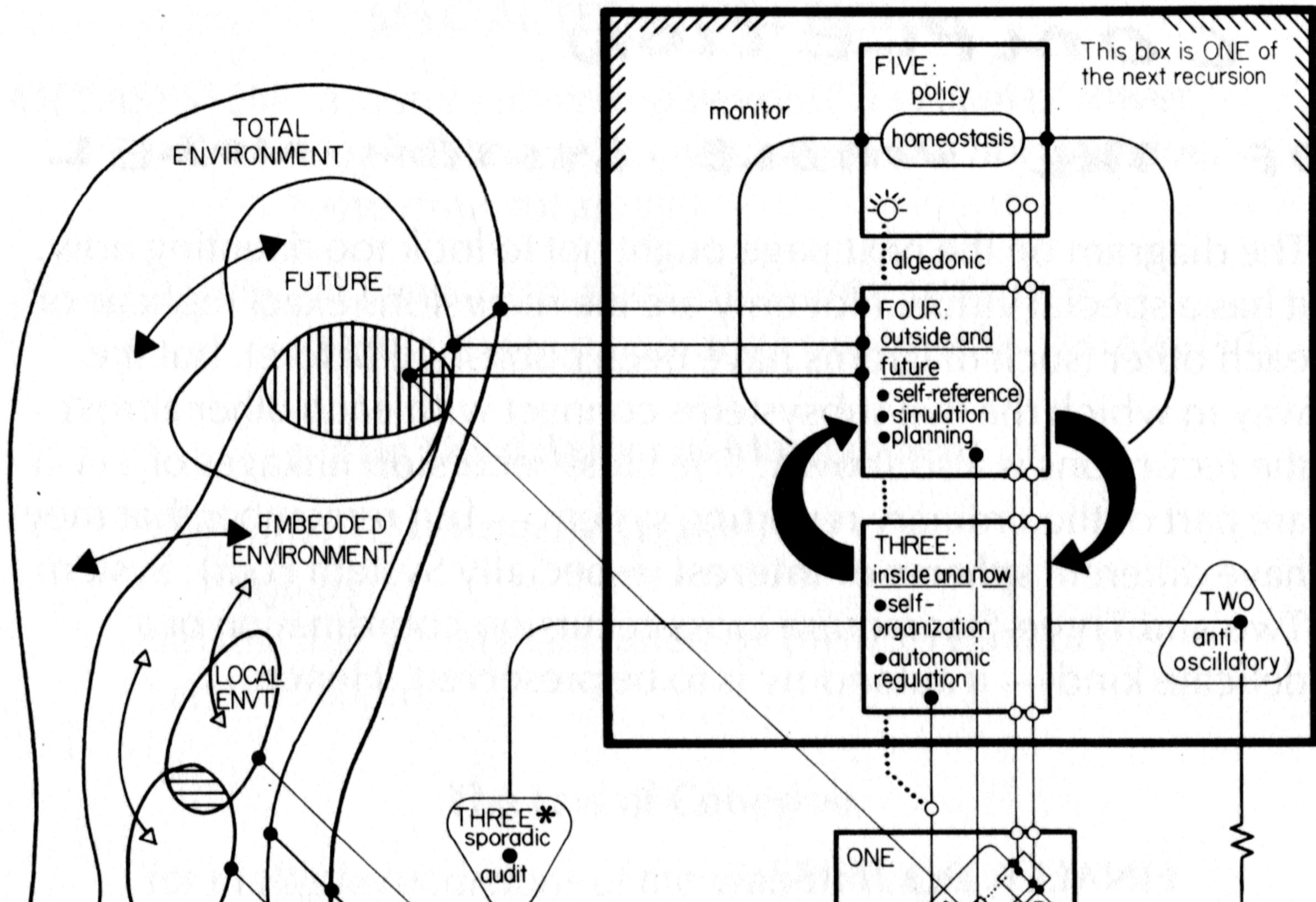
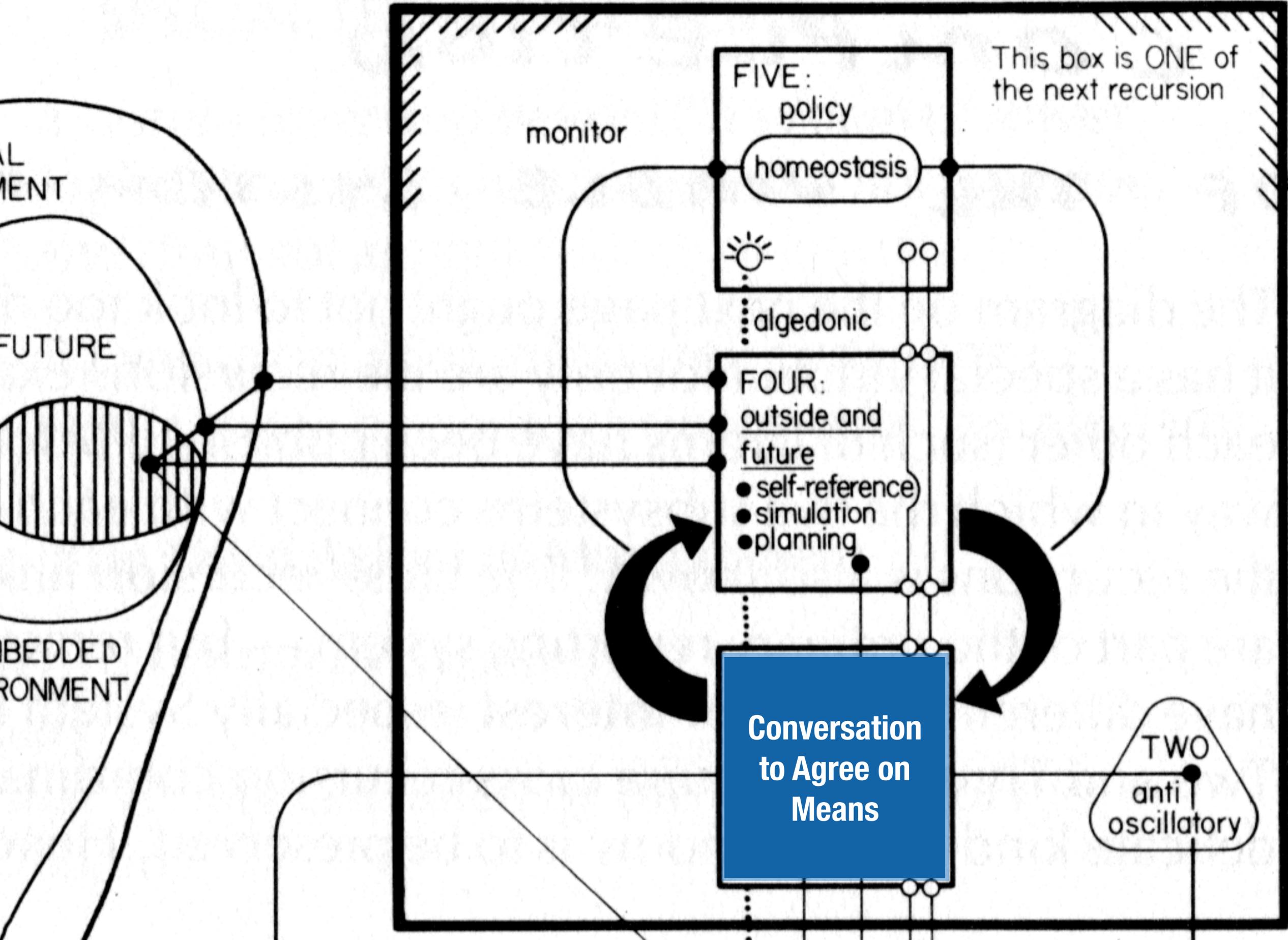


FIGURE 37 THE VIABLE SYSTEM - Stafford Beer

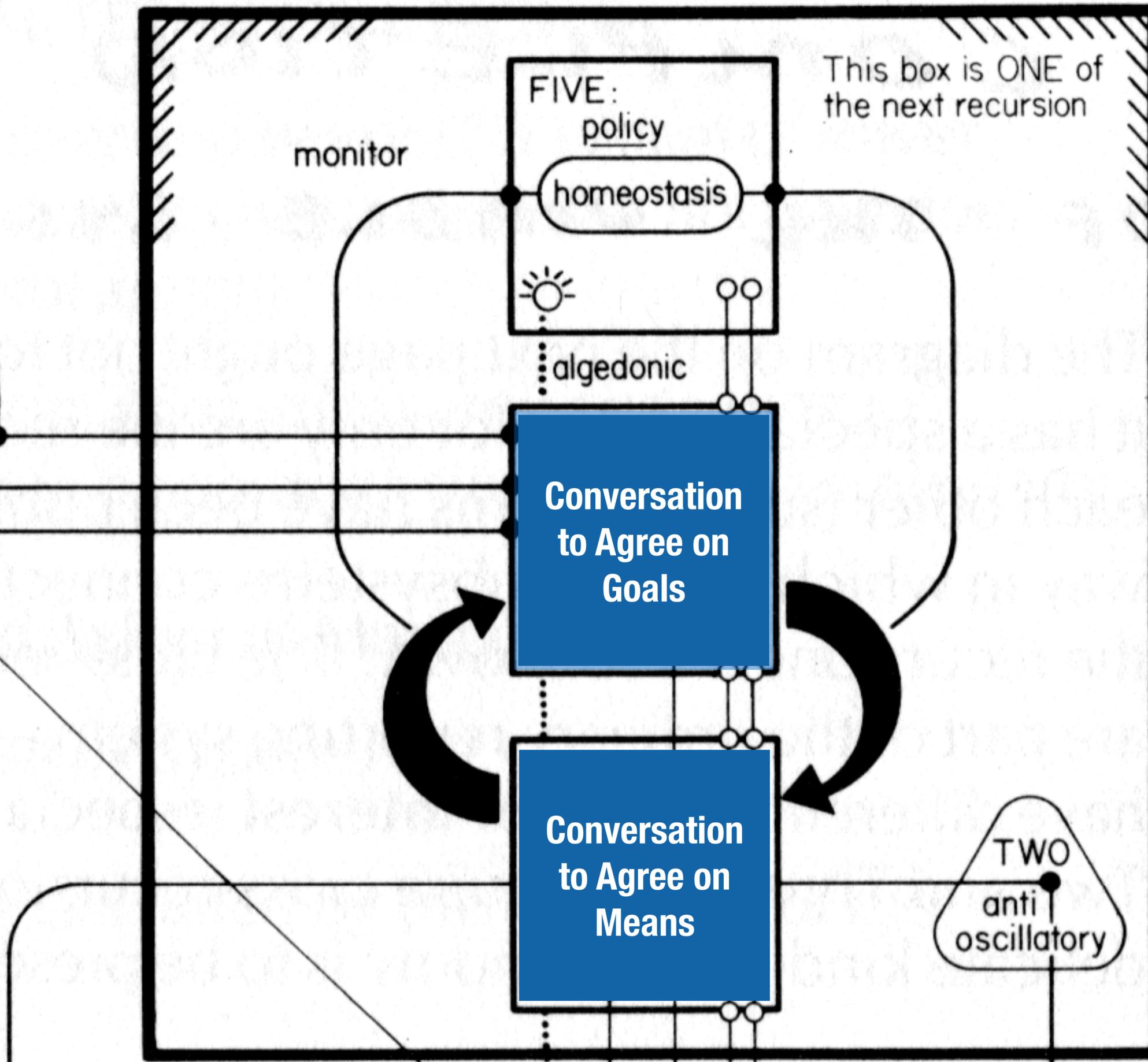


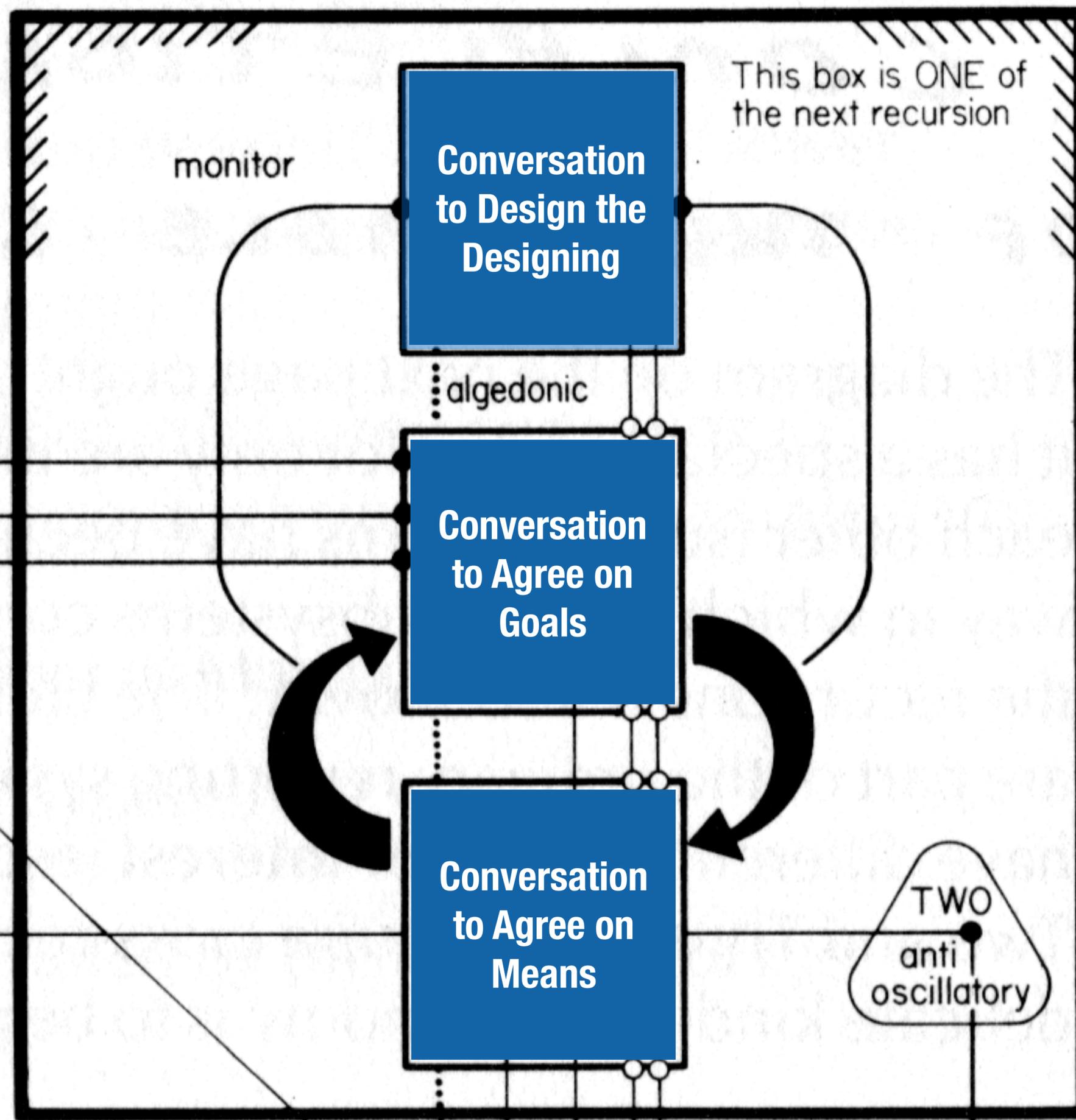
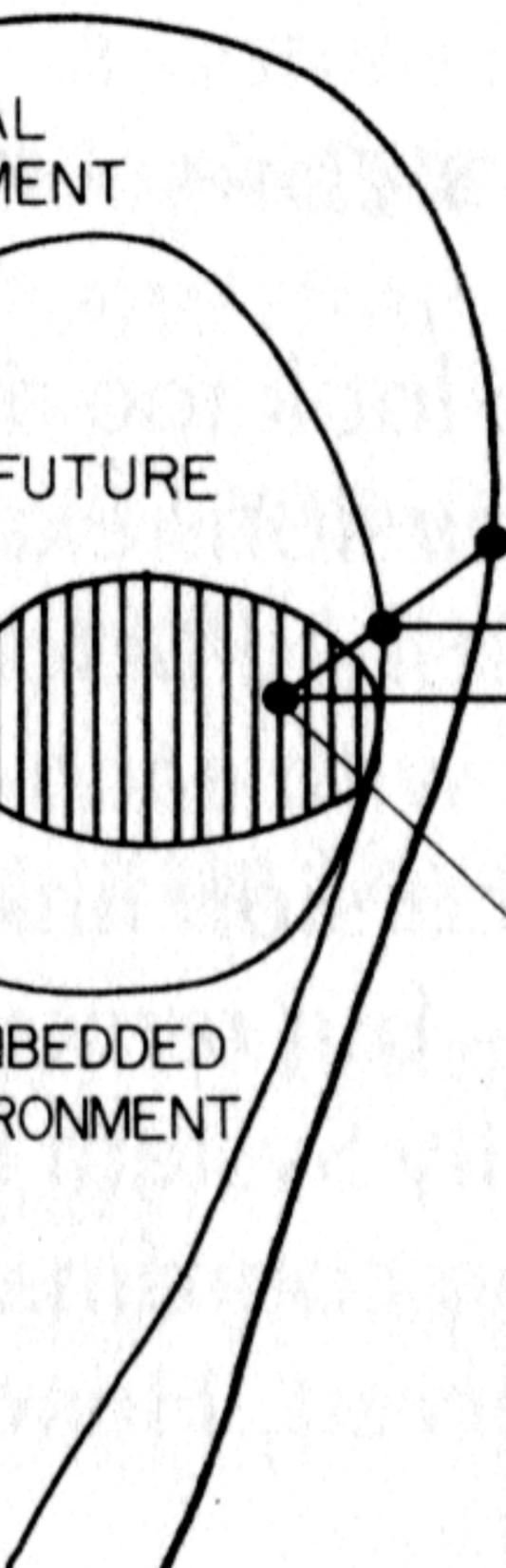


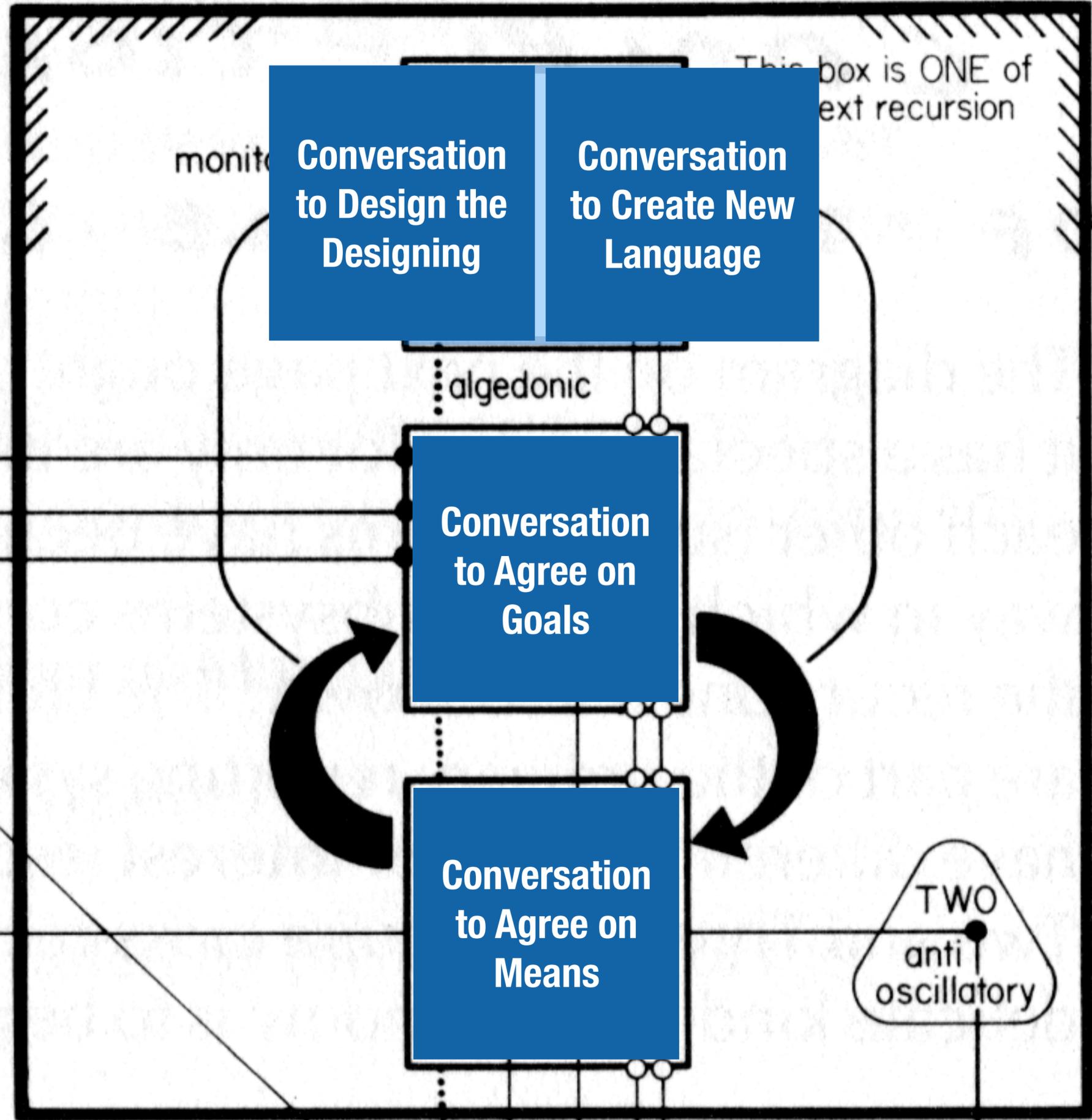
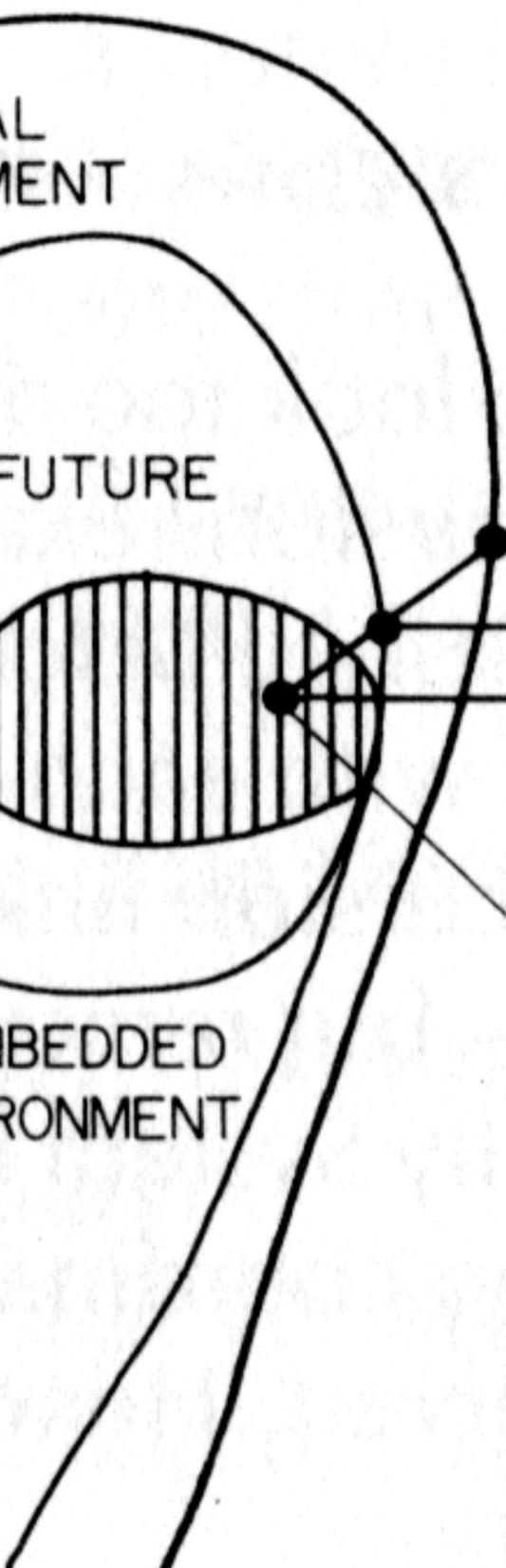
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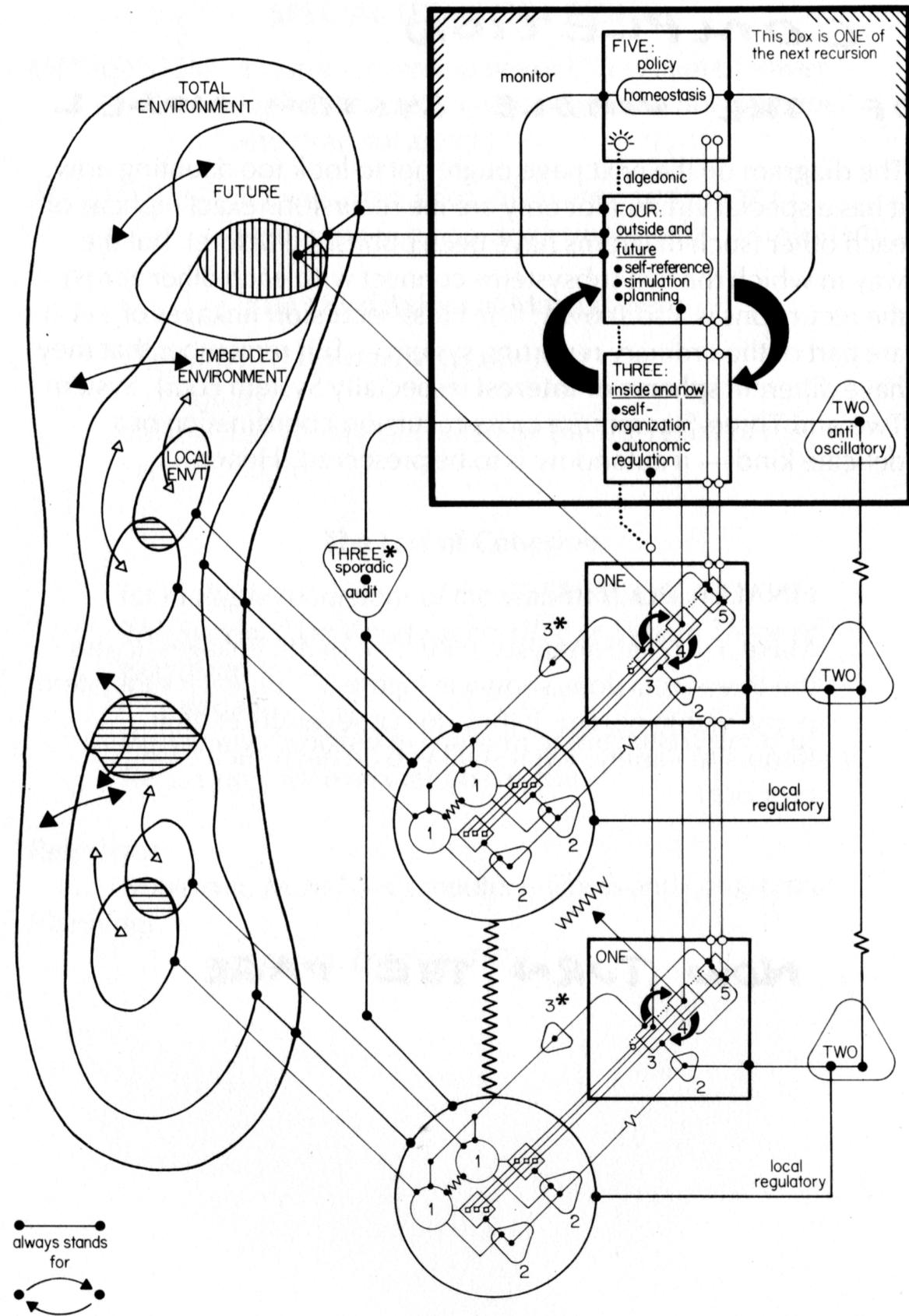


FIGURE 37

THE VIABLE SYSTEM
- Stafford Beer

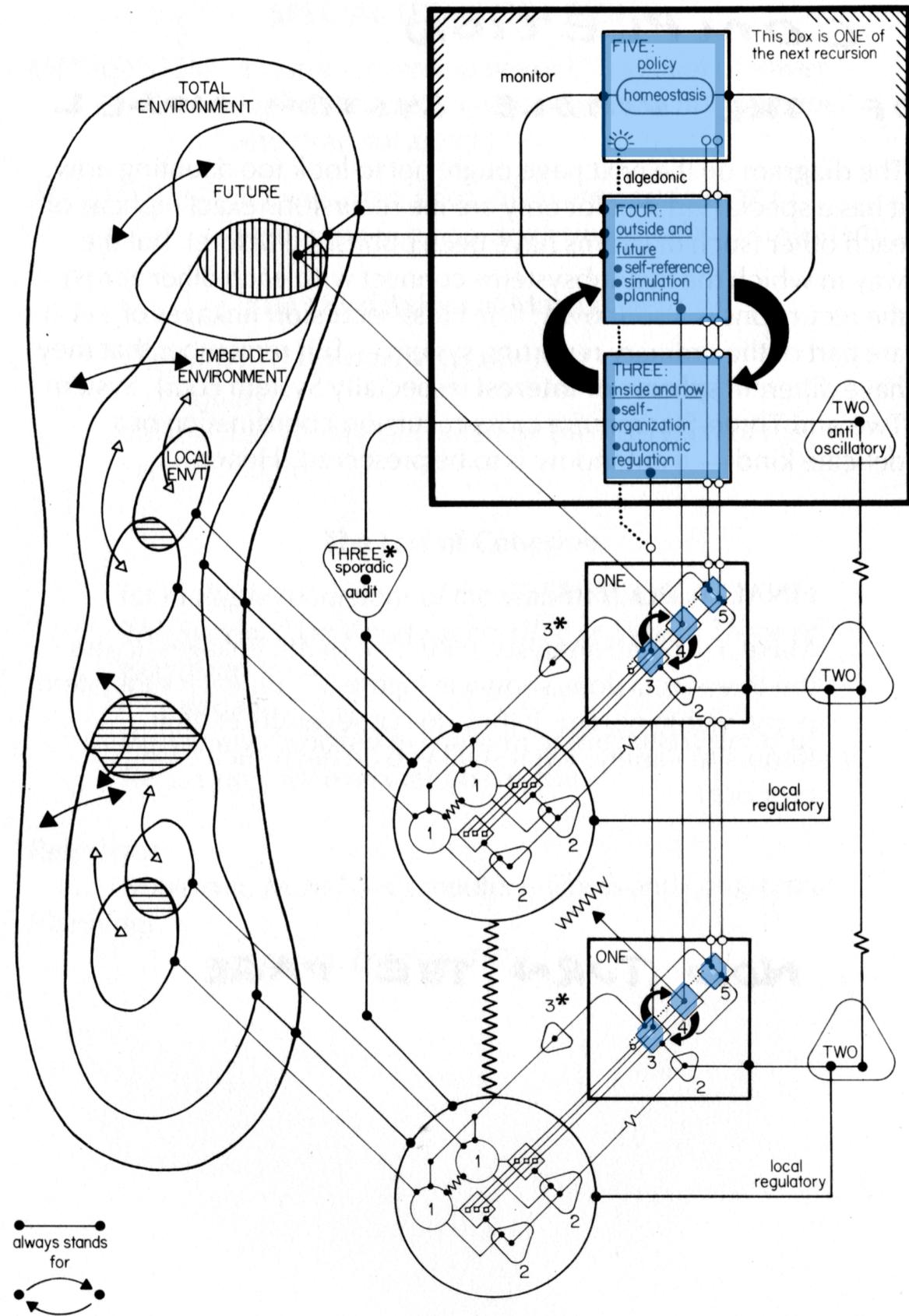


FIGURE 37

THE VIABLE SYSTEM
- Stafford Beer

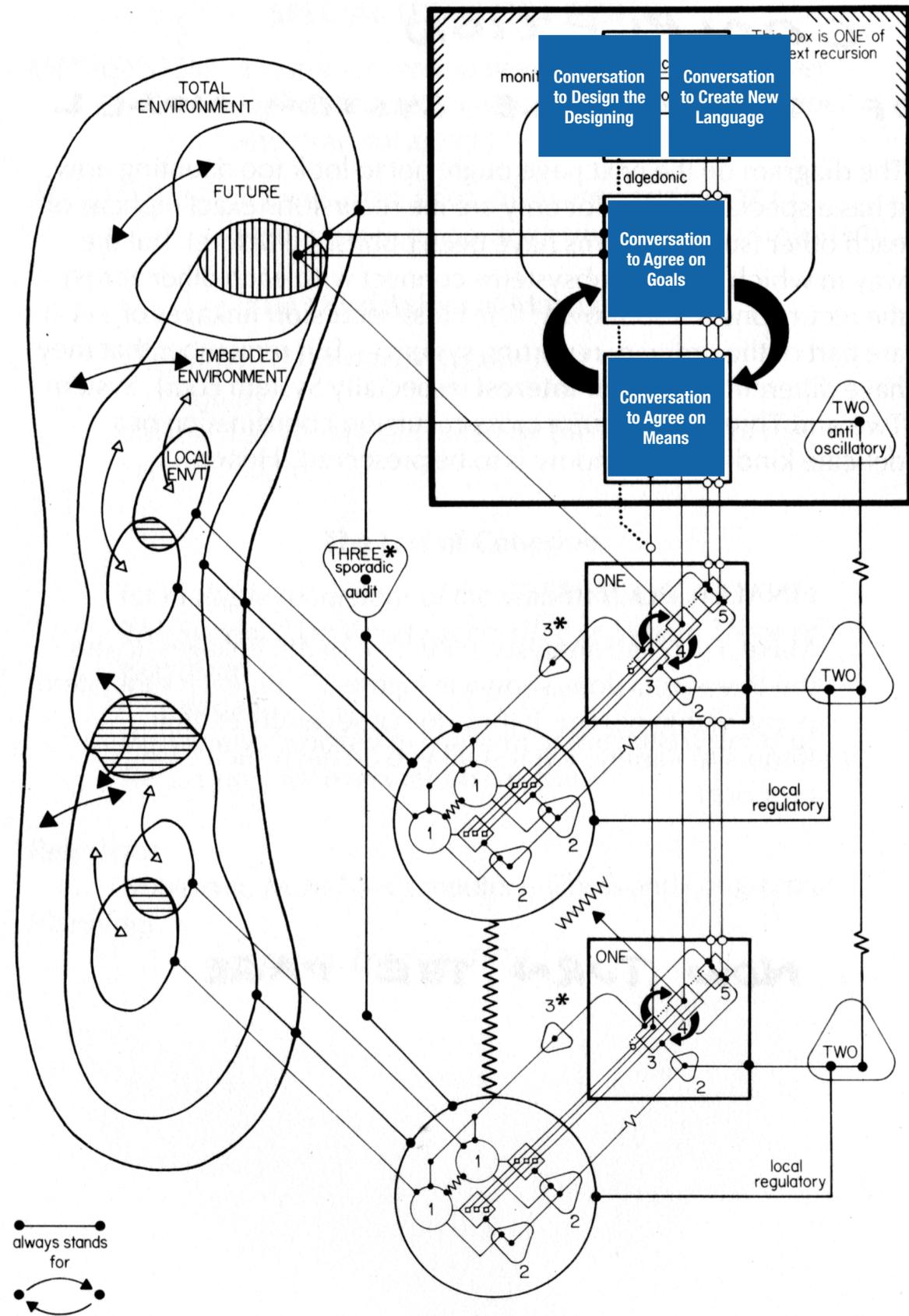
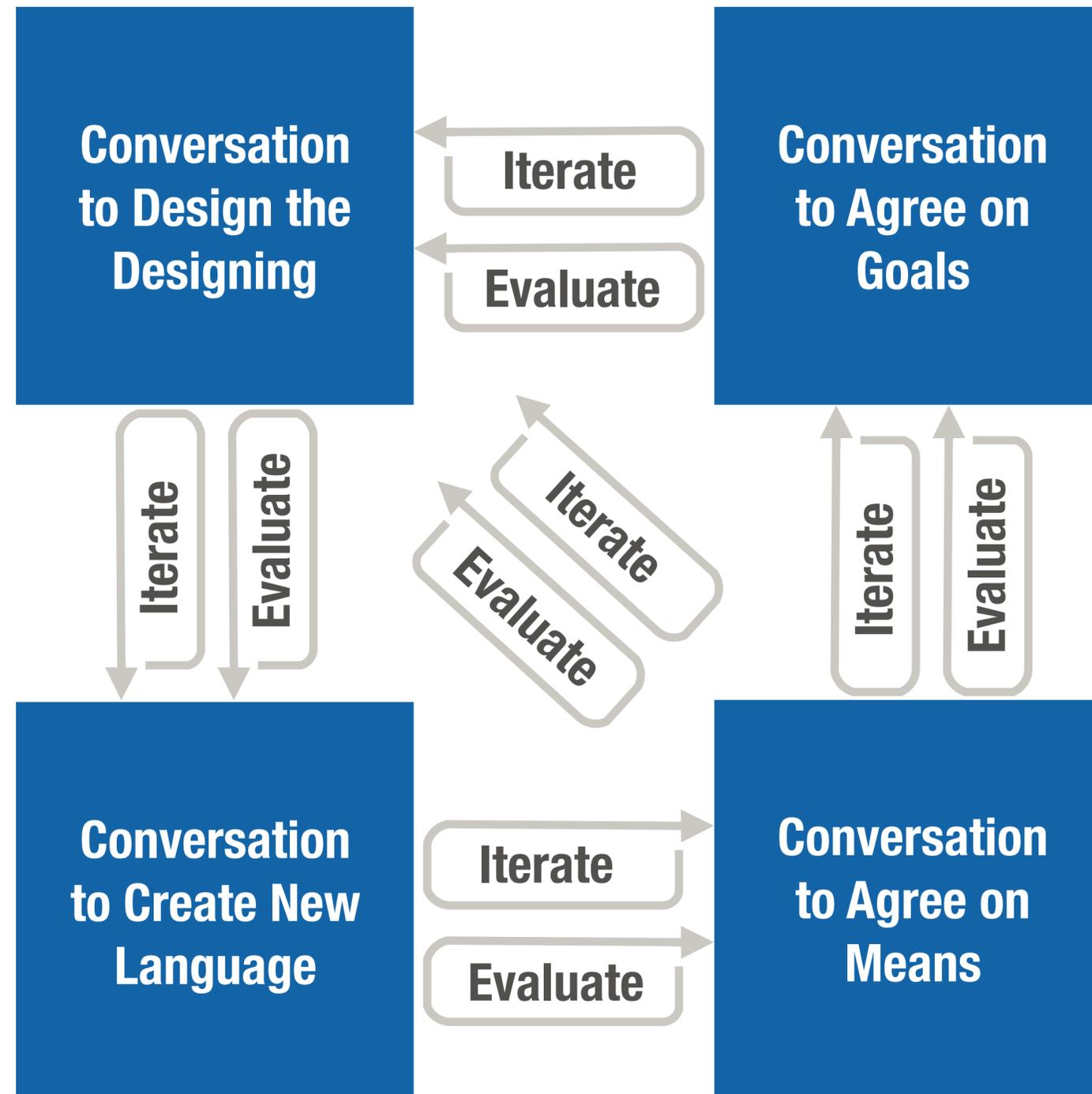


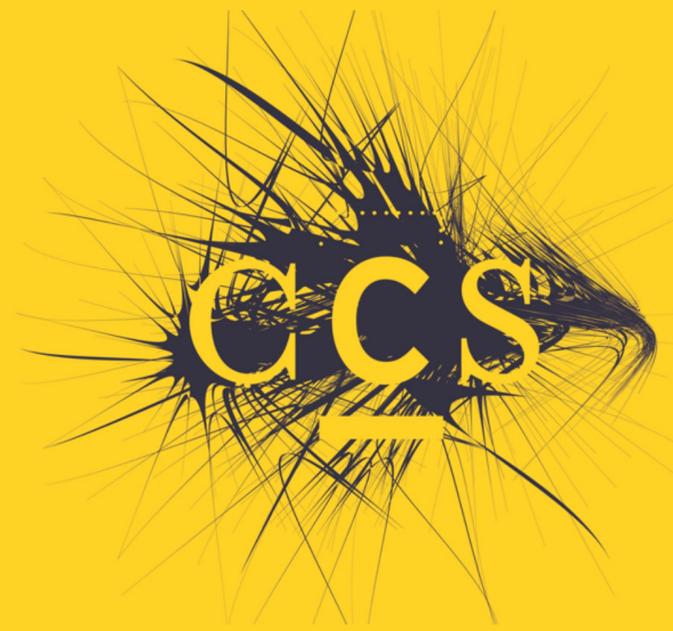
FIGURE 37

THE VIABLE SYSTEM
- Stafford Beer

Design as Conversation



Design of Conversations for Resilience



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

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

Action may either conserve or change a situation.

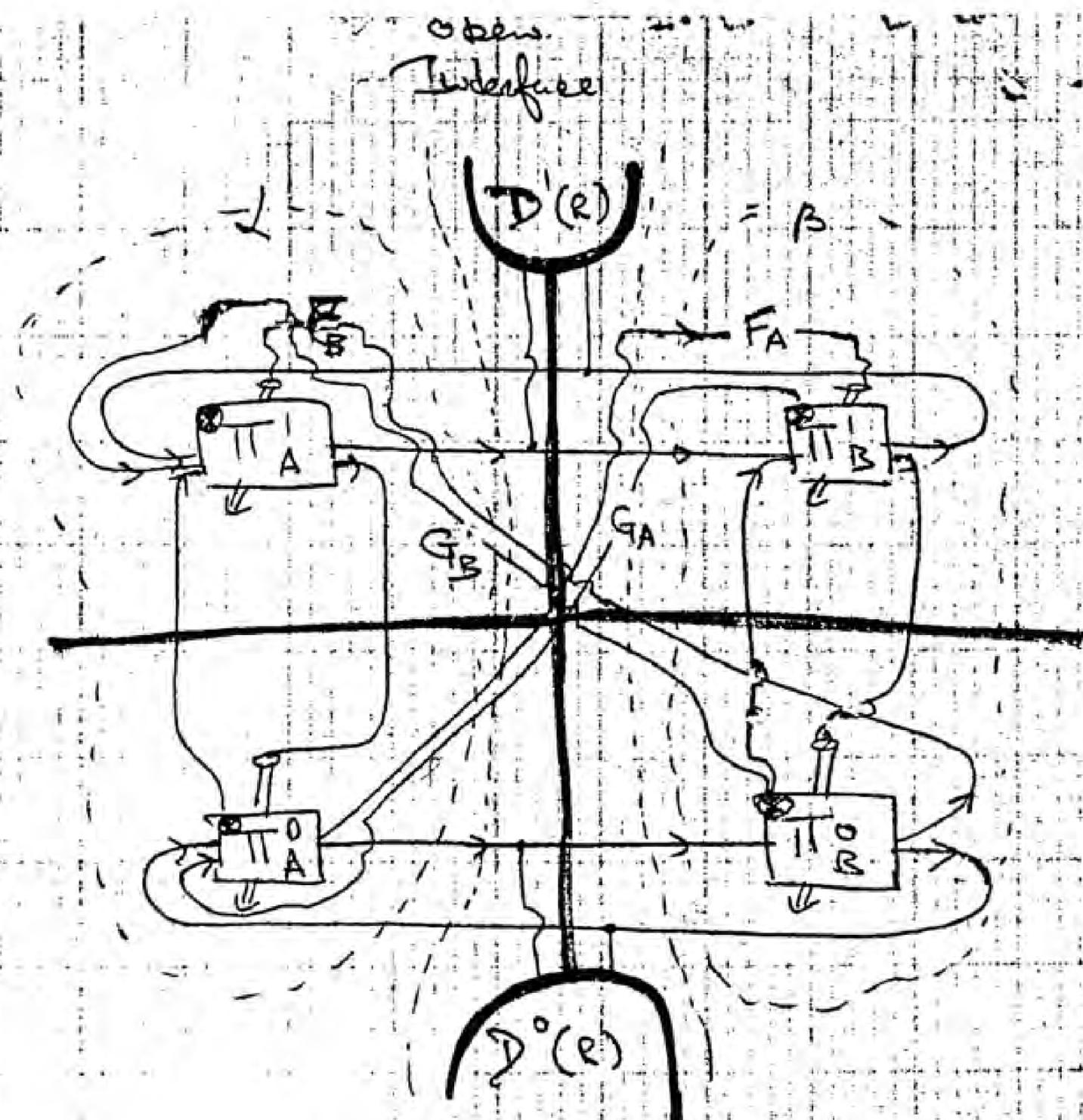
We construe design as a conversation for action — that is, as cybernetics.

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 2017, *Cybernetics and Design: Conversations for Action*

Conversation as Living Together in Languageing



10. The conditions to be satisfied as a prerequisite for creative and innovative activity, the former may be exhibited by either of F_A, G_A or F_B, G_B and the latter by $D'(R)$.

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.)

Design = Conversations for Action

(To agree on goals is ethical.)

(To agree on means is collaborative.)

(To create new language is innovative.)

(To design the designing is responsible.)

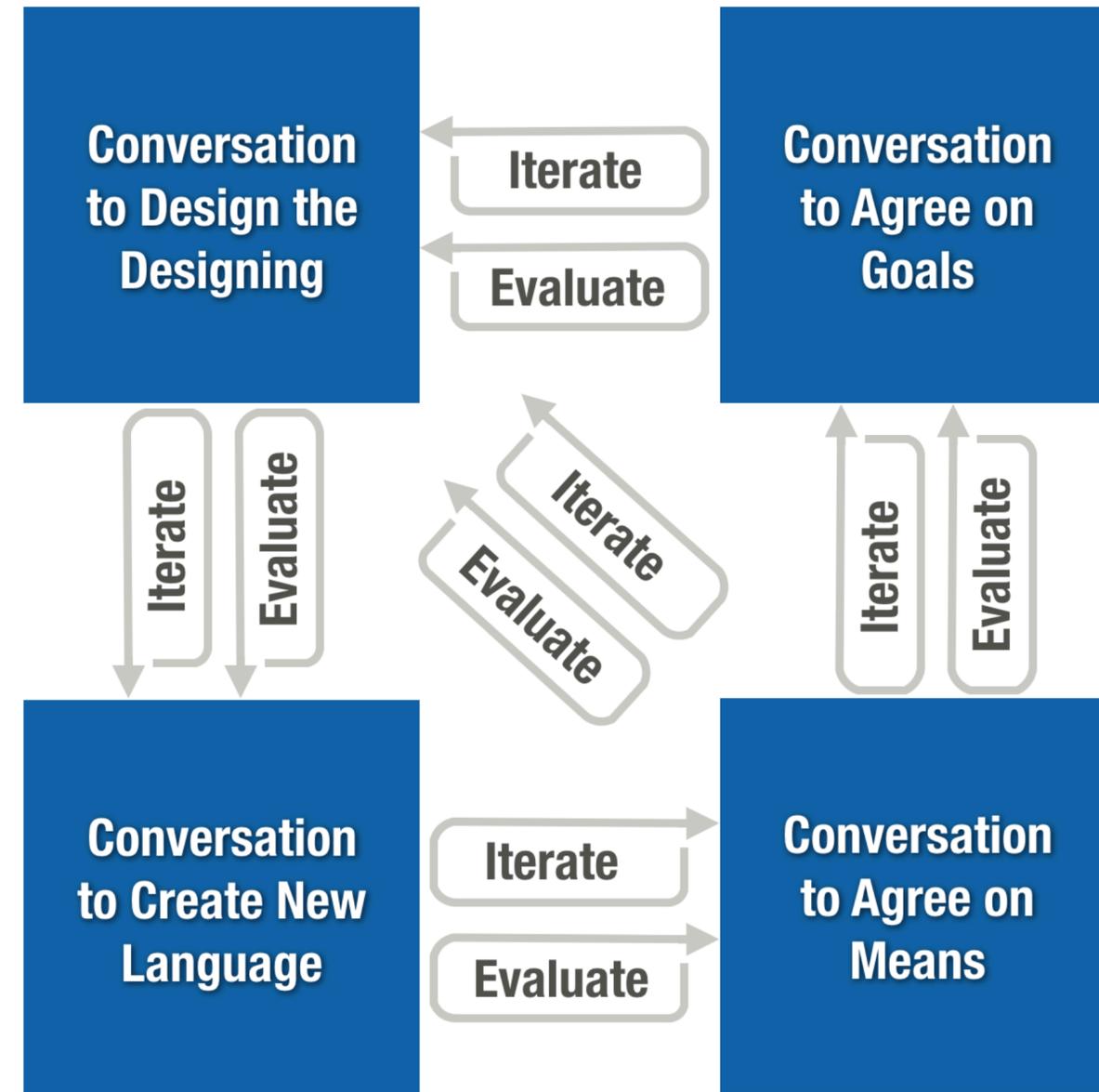
Design = Conversations for Action

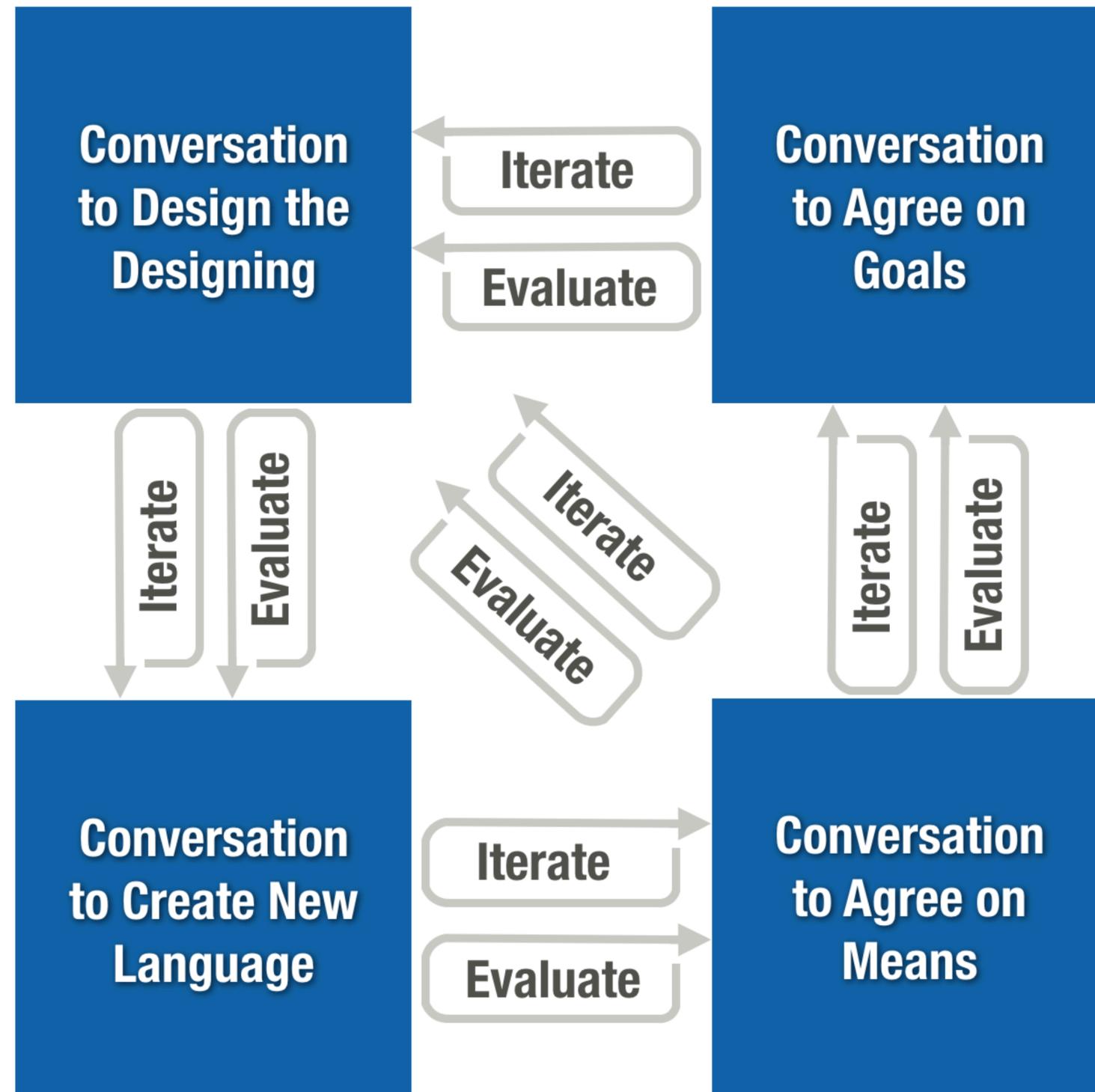
(To agree on goals is ethical.)

(To agree on means is collaborative.)

(To create new language is innovative.)

(To design the designing is responsible.)





Design of Conversations for Action

Challenges 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

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 2017, *Cybernetics and Design: Conversations for Action*

“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

**Mai von Foerster
Heinz von Foerster**



Thank you.

Design of Conversations for Resilience

Special Thanks to:

Michael Lissack

Hugh Dubberly

Ranulph Glanville

Jocelyn Chapman

Pooja Upadhyay

Lisa Fay

Jeff Glassman

Jude Lombardi

Larry Richards

Mark Sullivan

See pangaro.com/asc2017/ for slides and references

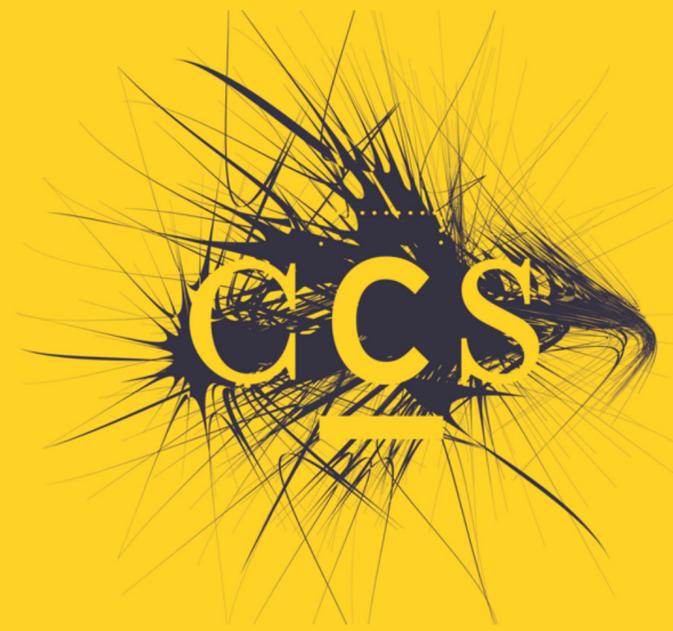
Paul Pangaro, Ph.D.

Chair and Associate Professor

MFA Interaction Design Program

College for Creative Studies, Detroit

paul@pangaro.com



Questions

Q1. In social systems, how is resilience best measured?

Q2. What is the *cost* of resilience?

Q3. What can be said about the *efficiency* of resilience based on variety?

Q4. ...

See pangaro.com/asc2017/ for slides and references
paul@pangaro.com

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