Leadership from a Systems Perspective

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MIT Sloan School
SIP Period
October 2009

Introductions

Name

Education

Work Background

Current Role / Where

Passion

Expectations

Leadership from a Systems Perspective

Leadership Problem Statement

Systems Models

Conversation Models

Co-evolution

What is Leadership?

Leadership

1900s = "Great Man"—born to lead

1930s = Seen as a group process

1940s–1950s = Comprises traits of individuals

1950s–1960s = Comprises behaviors of individuals

1970s = Contingent on situation

1980s = "Excellence"

What's missing?

What has changed for today's leaders

- globalization yet global unrest and economic instability
- fast-moving markets
- new knowledge in computation, biology, medicine, physics...
- the internet, "big data", sensor explosion...

What has not changed for today's leaders

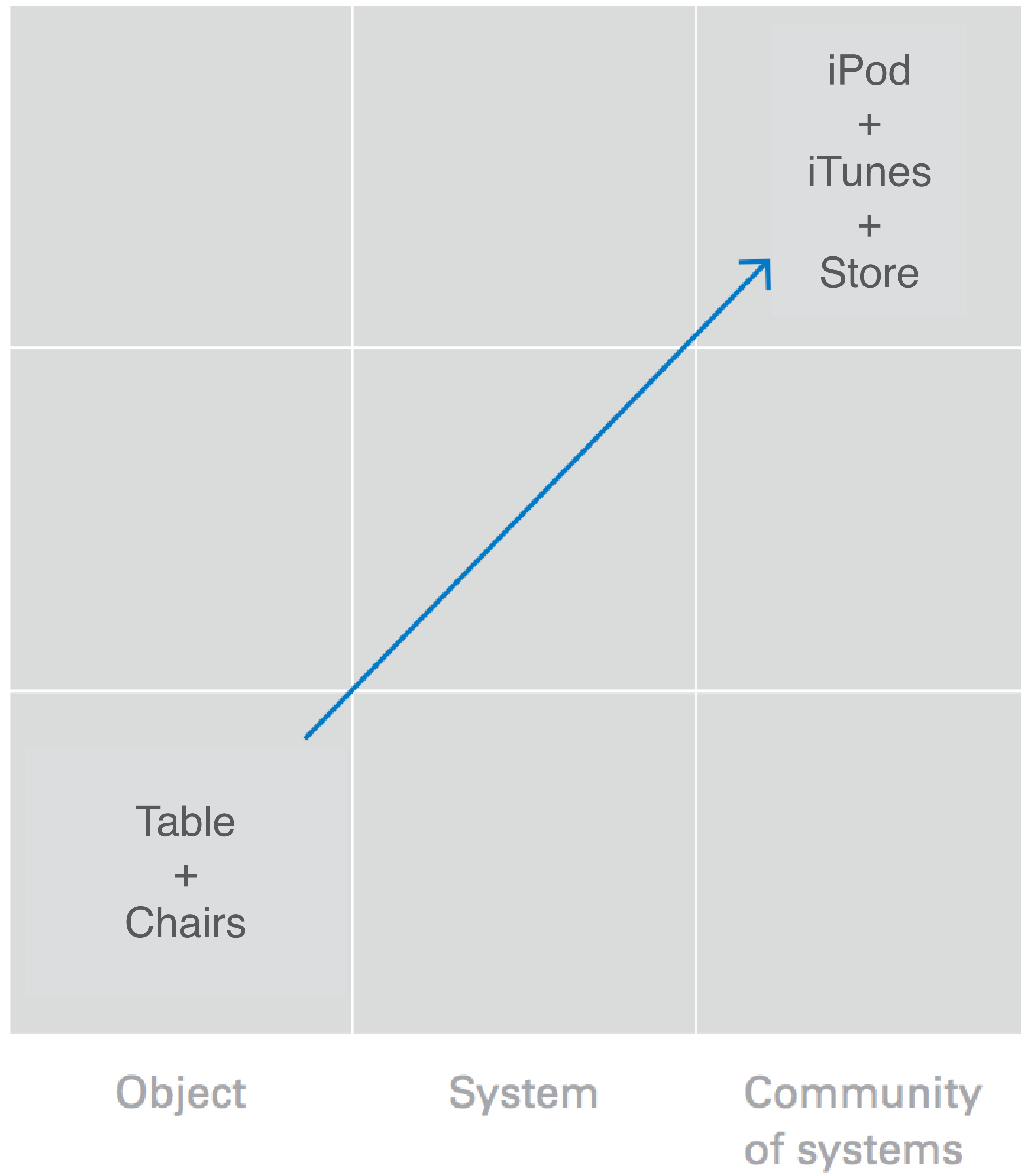
- systems are systems—some laws don't change
- organizations have fundamental need to create value
- need to formulate and agree on goals
  - to coordinate actions
  - to expand choices
  - to operate effectively

Business processes are changing

Why (Context/use)

What (Meaning/Structure)

How (Form/Grammar)



Hugh Dubberly

So, how do leaders

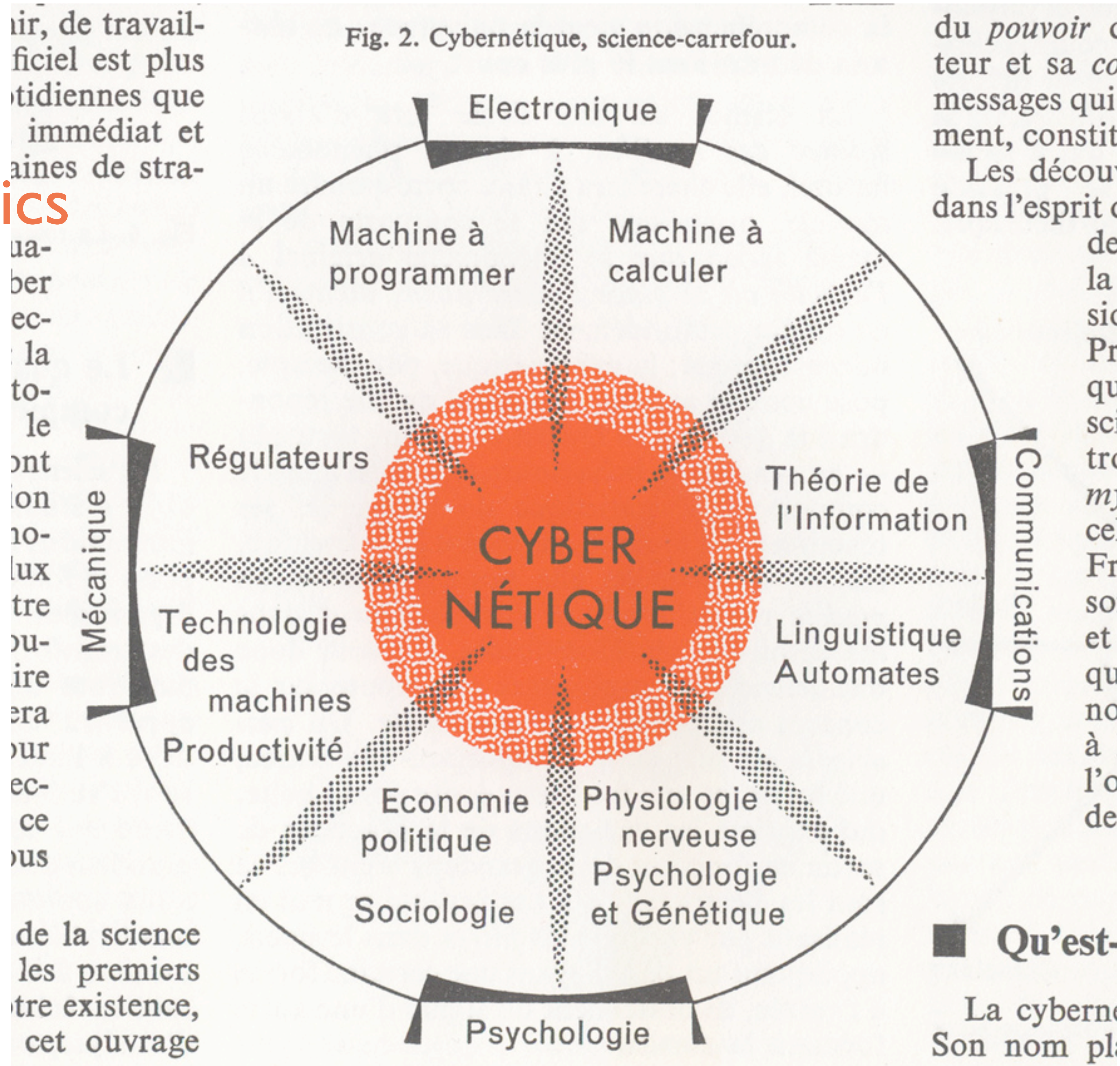
- understand...
- design for...
- innovate in...
- manage all this?

Leadership for Complex Systems?

- must acknowledge the new context of decision-making
- needs a comprehensive theory of complex systems
- must handle social as well as material factors
- requires an approach to "tame wicked problems".

Cybernetics

Cybernetics



Leadership from a Systems Perspective

Cybernetics explained

i. Model of Learning Systems

Exercise #1

Limits of Social Systems

ii. Requisite Variety

iii. Modeling Conversations

Exercise #2

Co-evolution

iv. Model of Innovation

Exercise #3

CYBERNETICS

What is cybernetics?

How does it characterize systems?

Why is cybernetics a "science of effective organizations"?

CYBERNETICS

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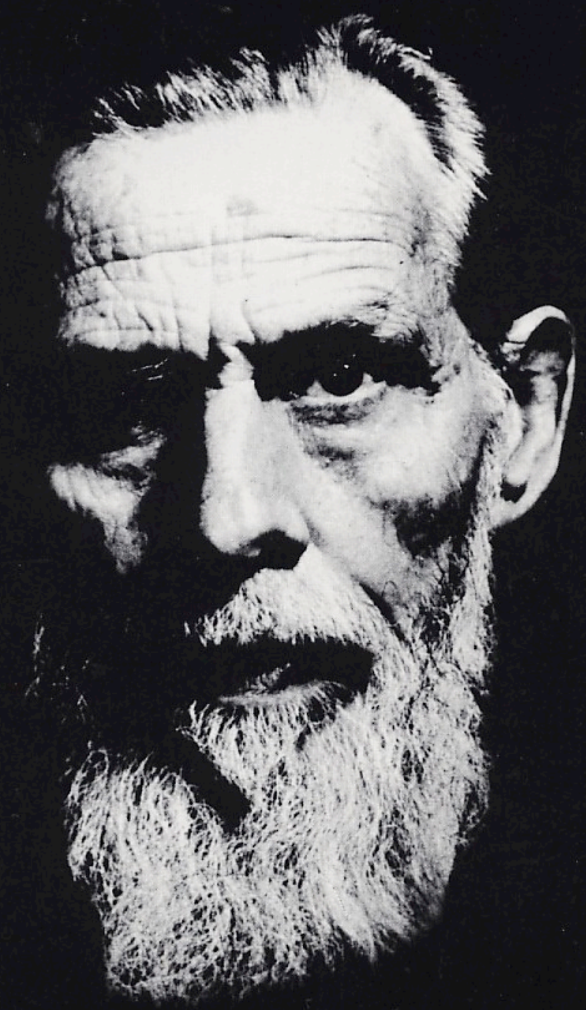
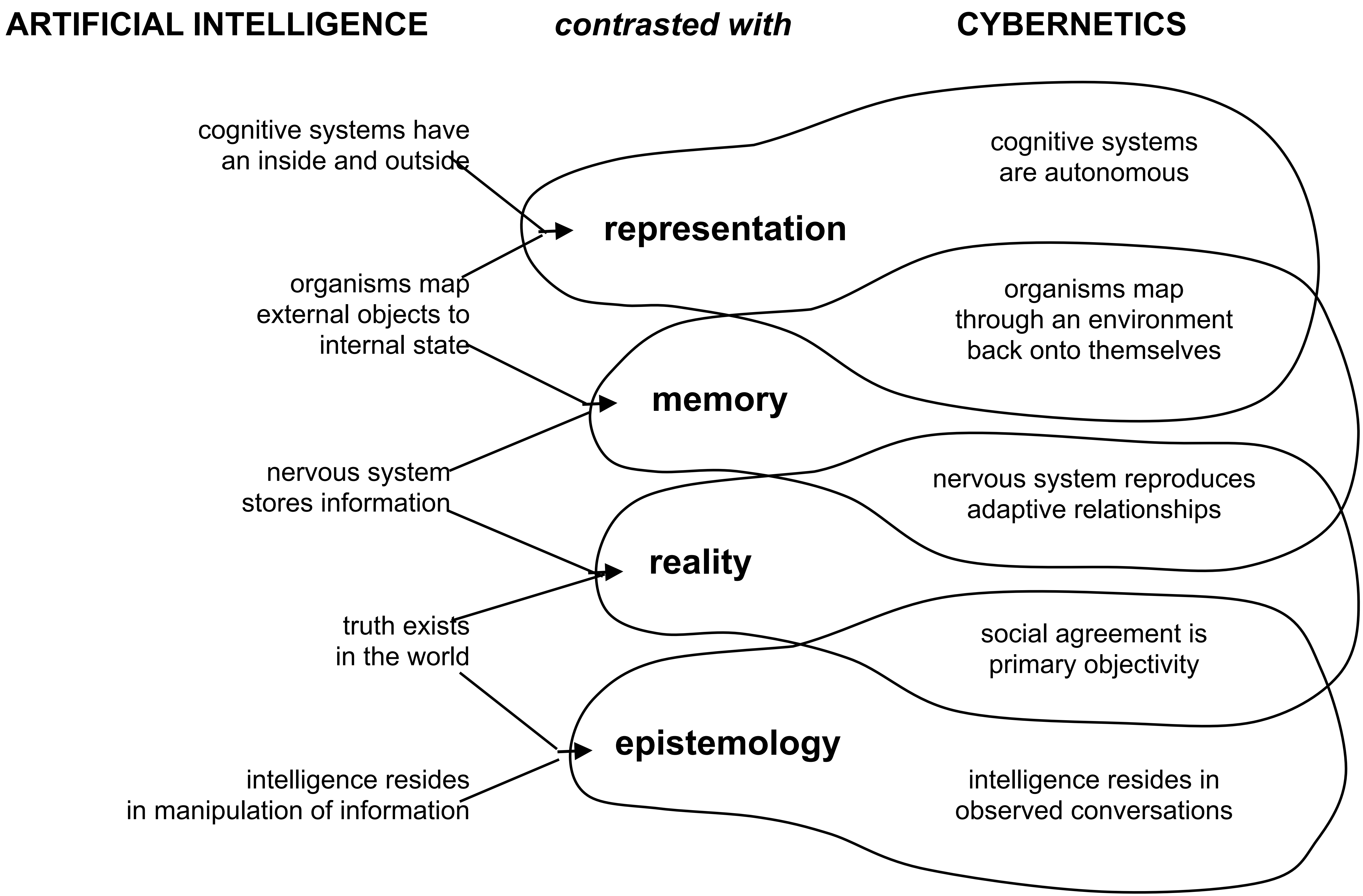


Warren S. McCulloch

EMBODIMENTS OF MIND

Introduction by Seymour Papert

New Foreword by Jerome Y. Lettvin


ARTIFICIAL INTELLIGENCE
contrasted with
CYBERNETICS
cognitive systems have
an inside and outside
representation
cognitive systems
are autonomous
organisms map
external objects to
internal state
memory
organisms map
through an environment
back onto themselves
nervous system
stores information
reality
nervous system reproduces
adaptive relationships
truth exists
in the world
epistemology
social agreement is
primary objectivity
intelligence resides
in manipulation of information
intelligence resides in
observed conversations

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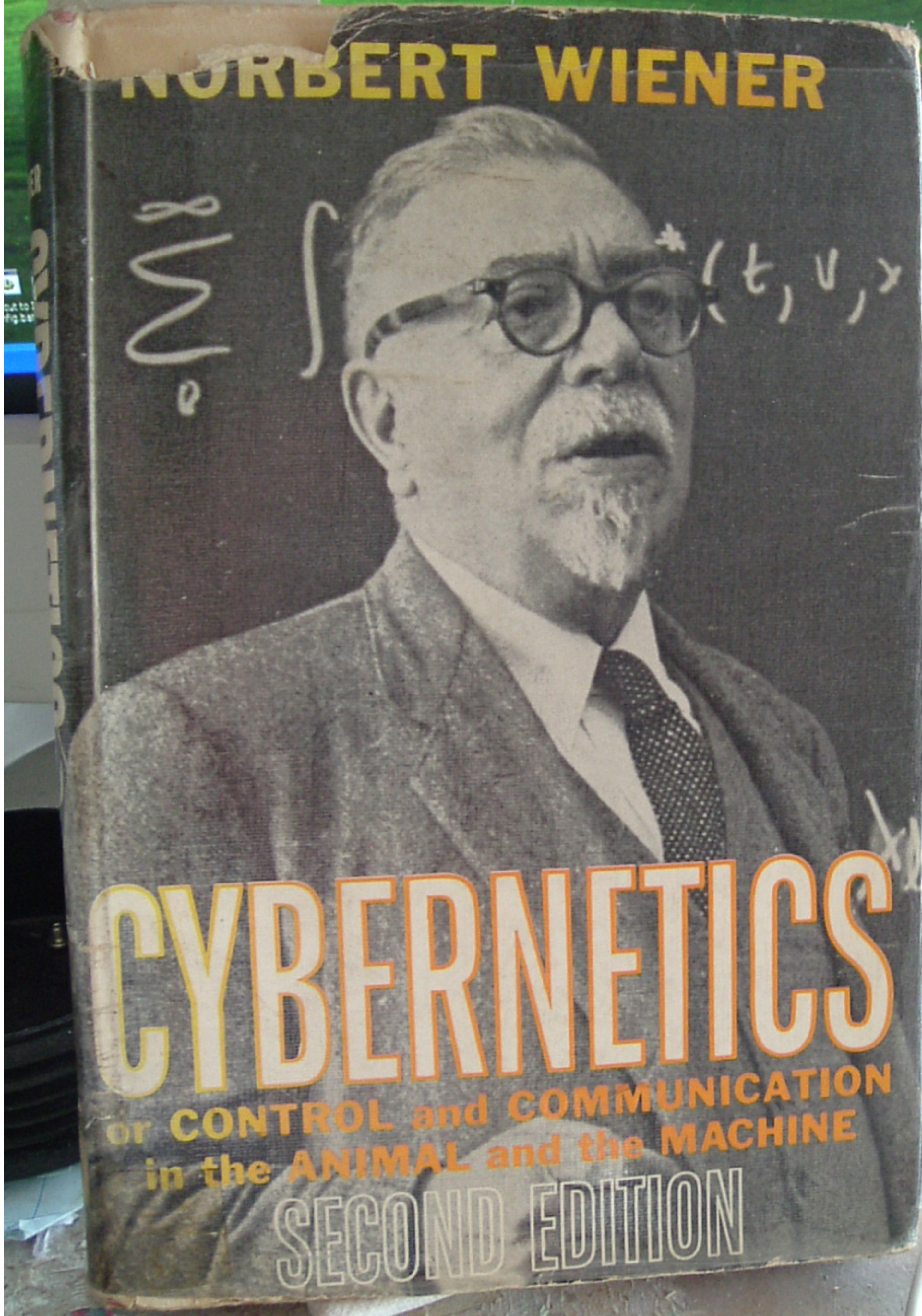
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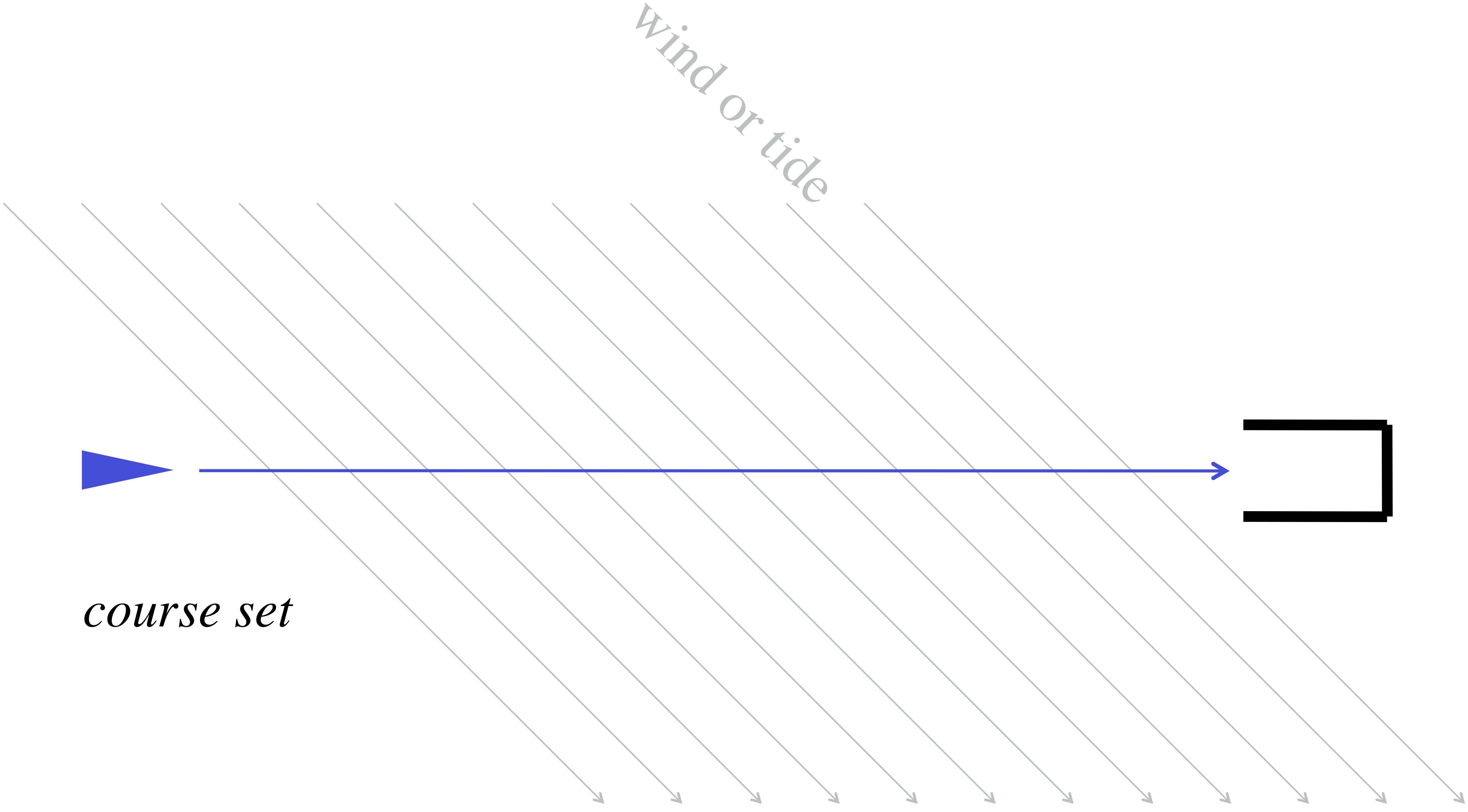
CYBERNETICS

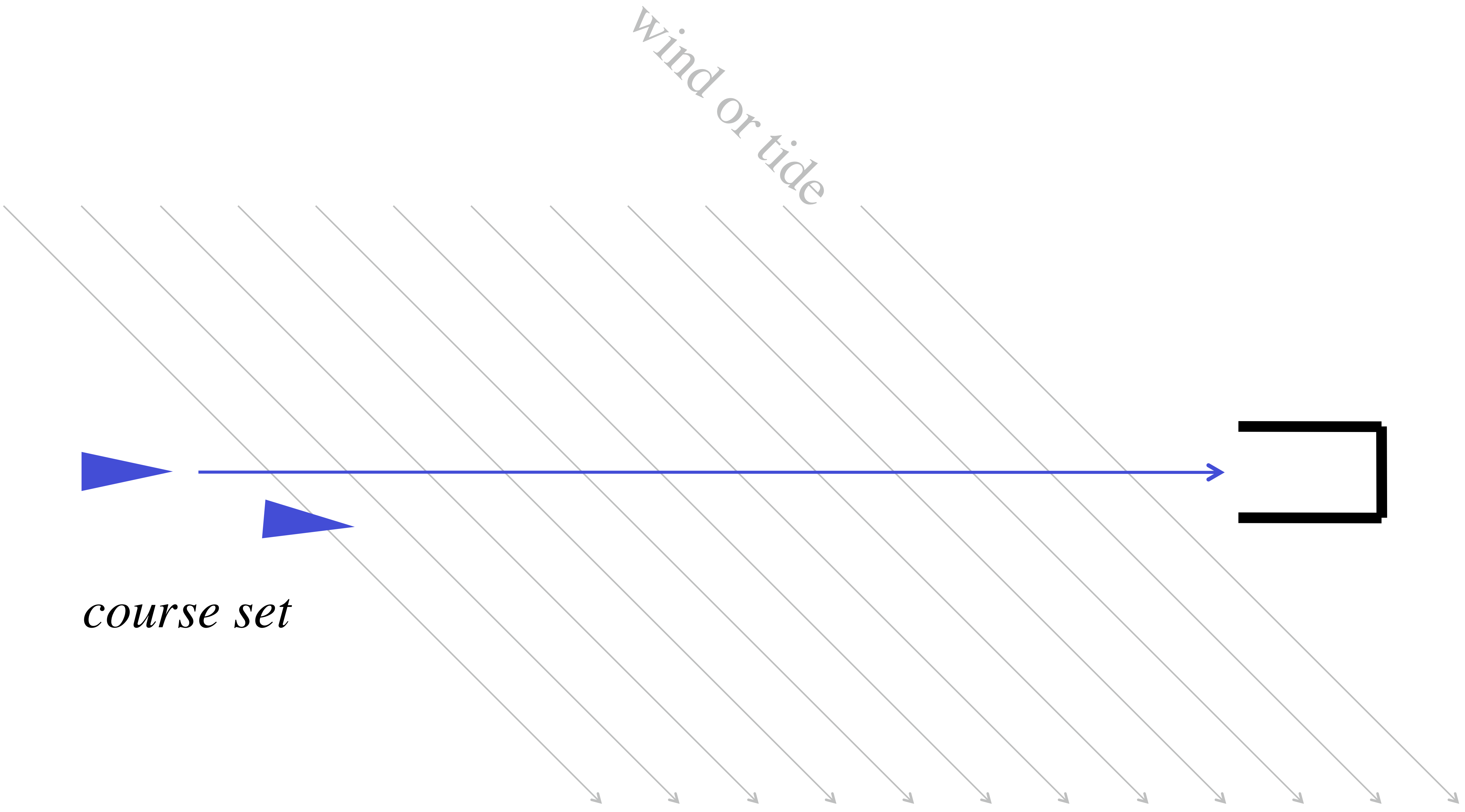
CYBERNETICS

from Greek ‘kybernetes’—the art of steering

the art of steering

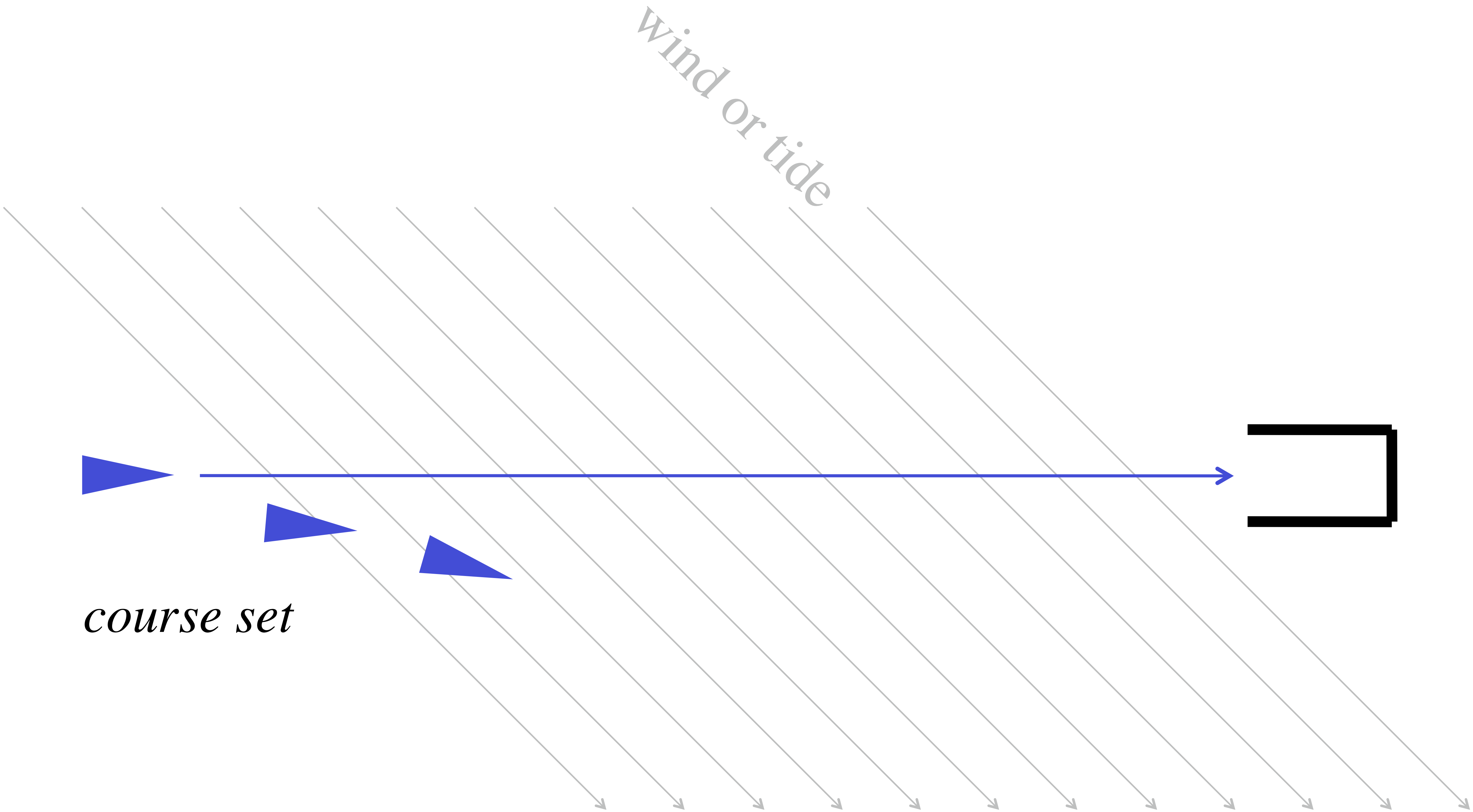


the art of steering



course set

the art of steering



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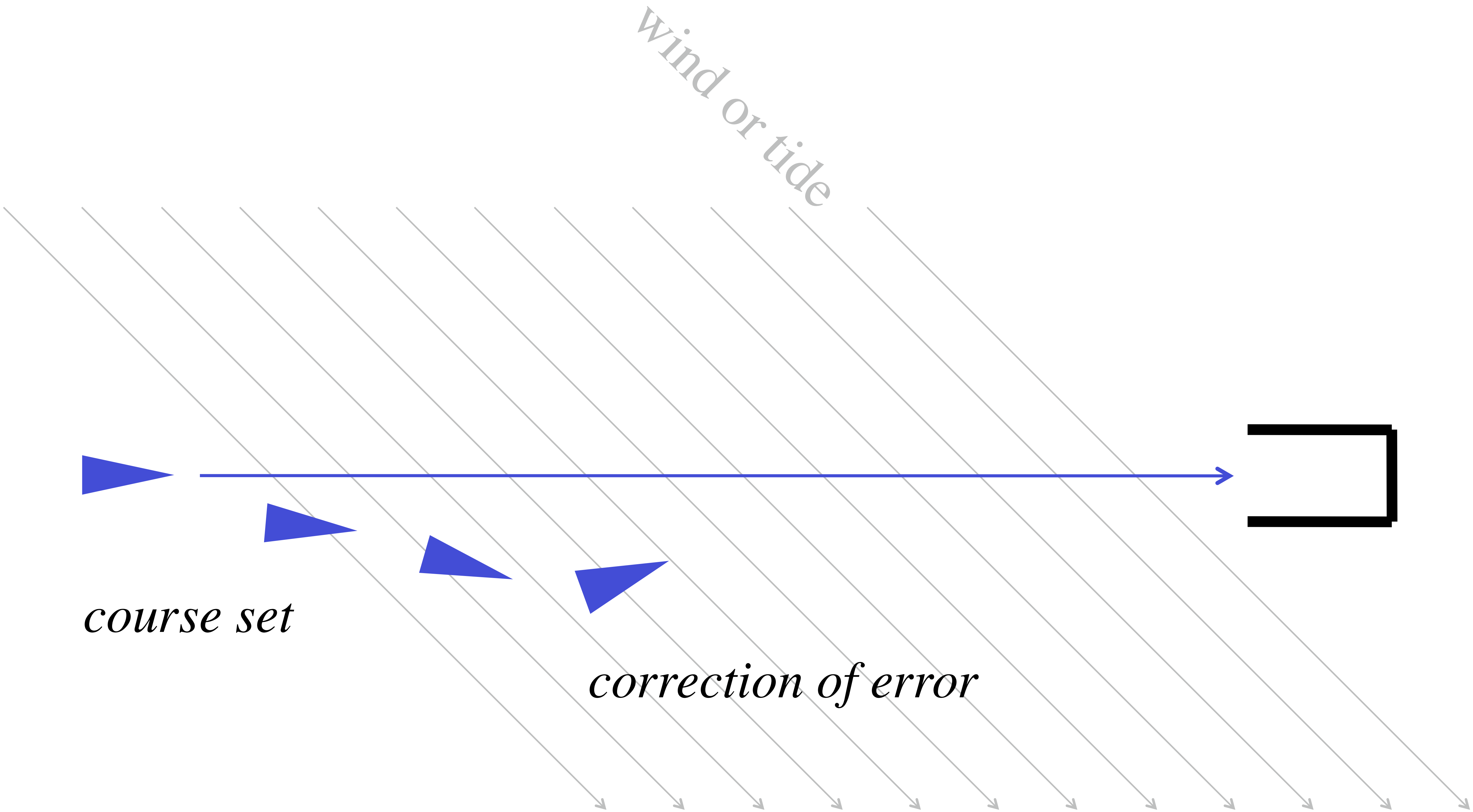

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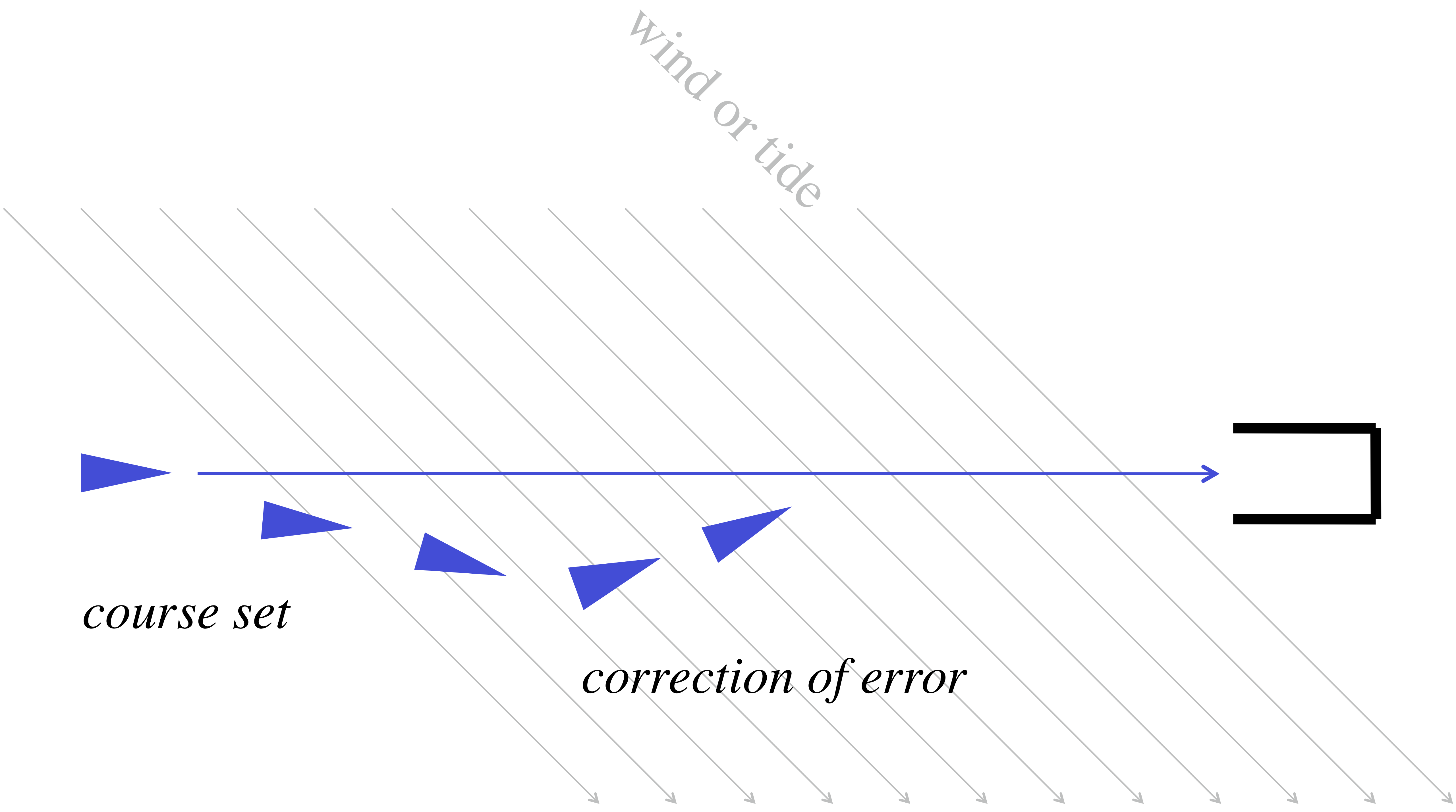

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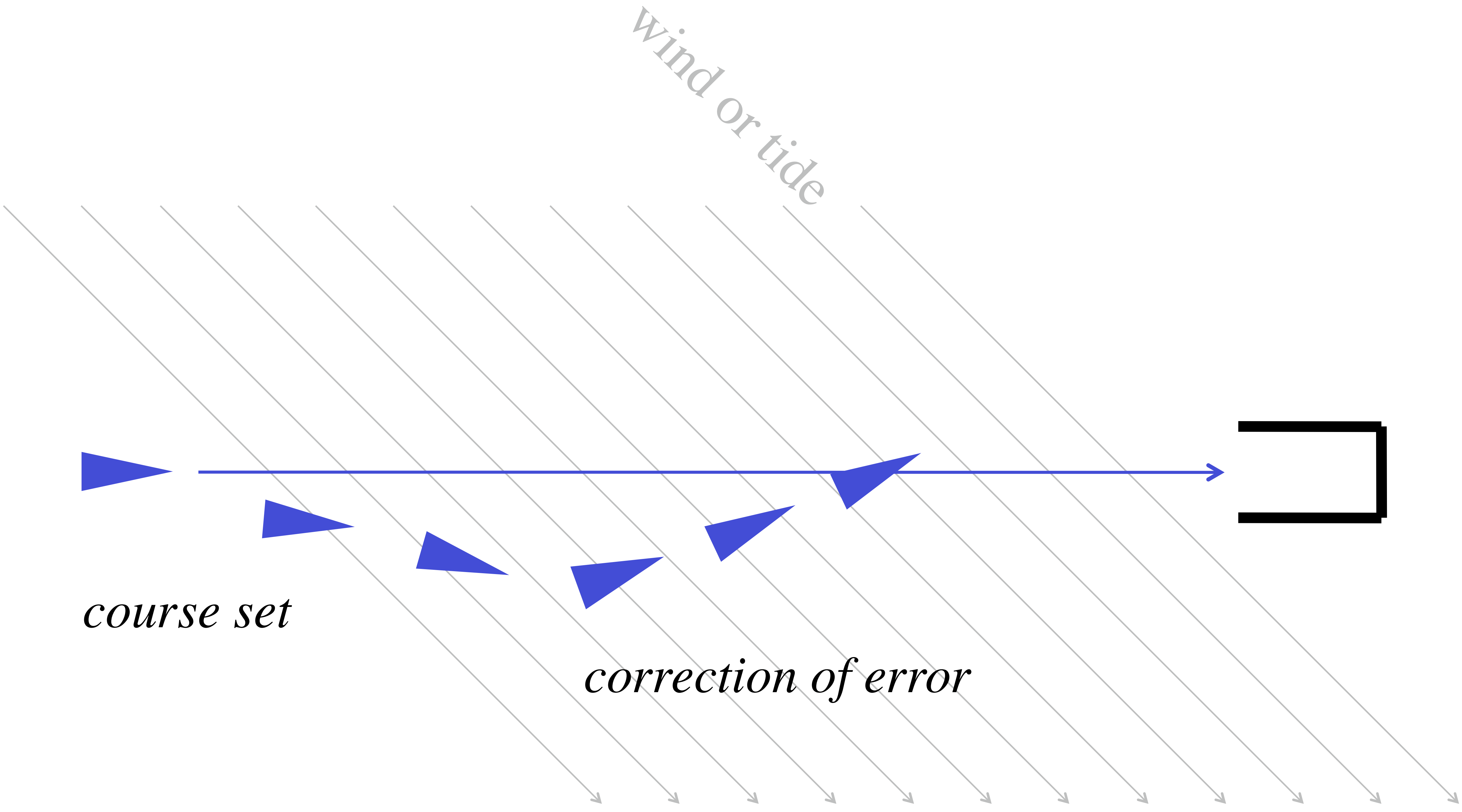

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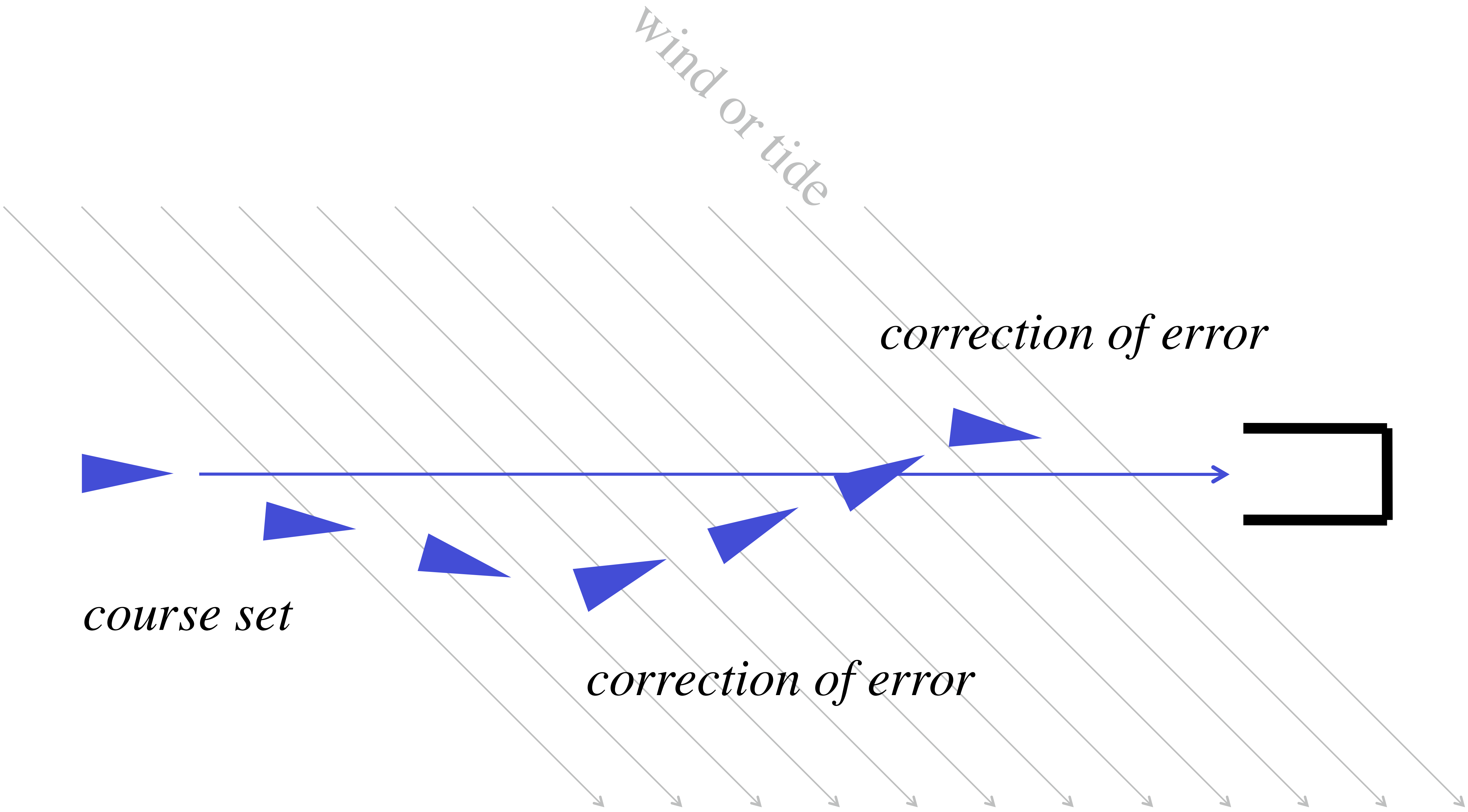

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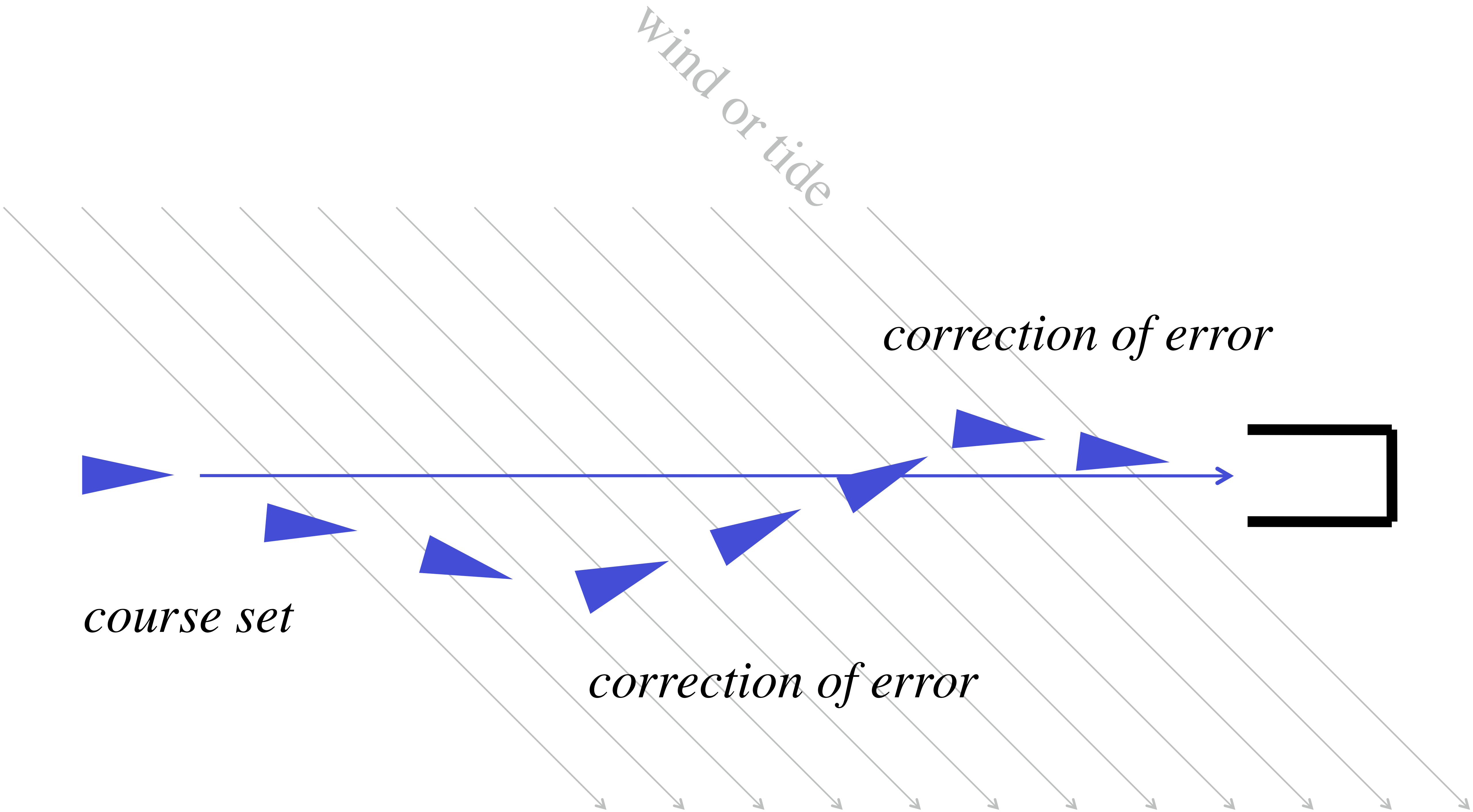

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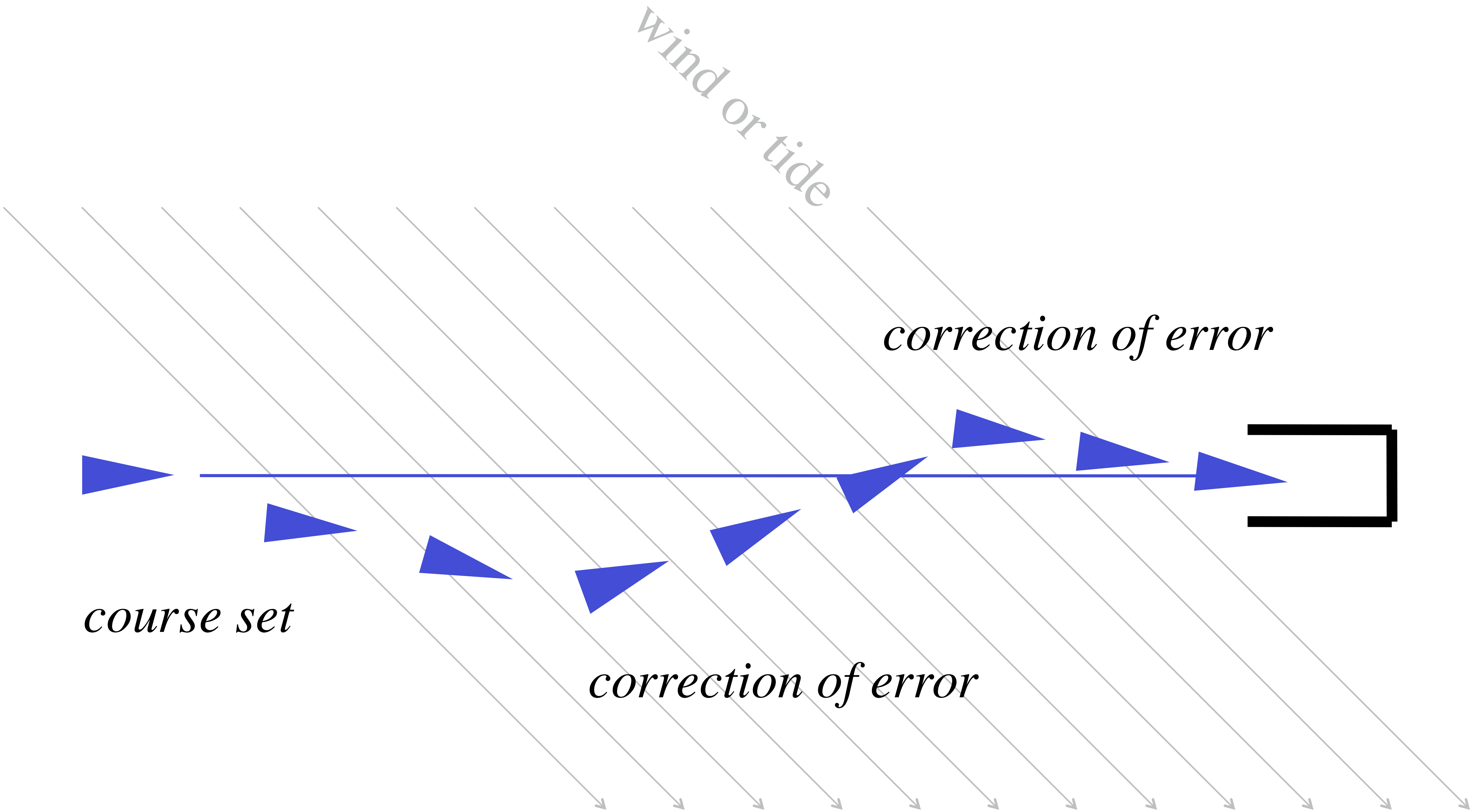

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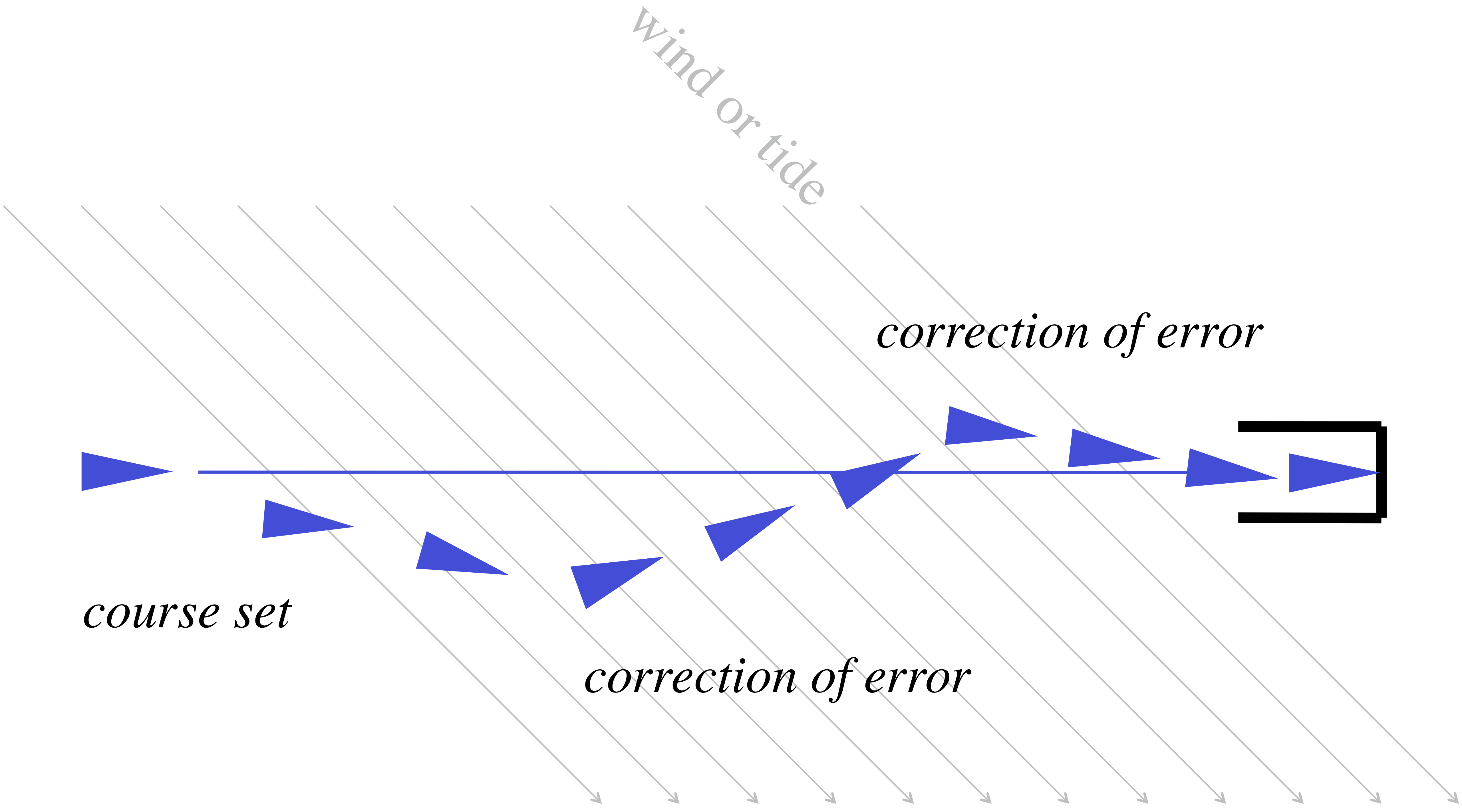


CYBERNETICS

system has goal

system aims toward goal

environment affects aim

information returns to system—‘feedback’

system measures difference between state and goal
—detects ‘error’

system acts to correct the error, to achieve its goal

CYBERNETICS

from Greek ‘kybernetes’—the art of steering

in Latin, the same term becomes ‘governing’

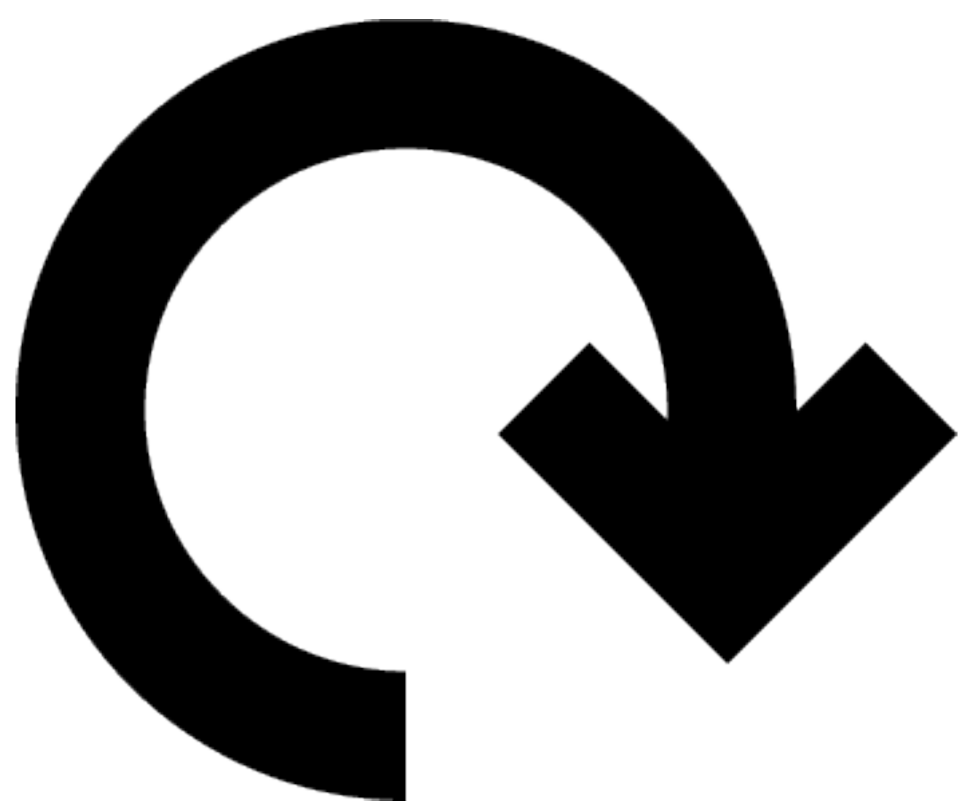
– regulation by law or person

– government *means* regulation

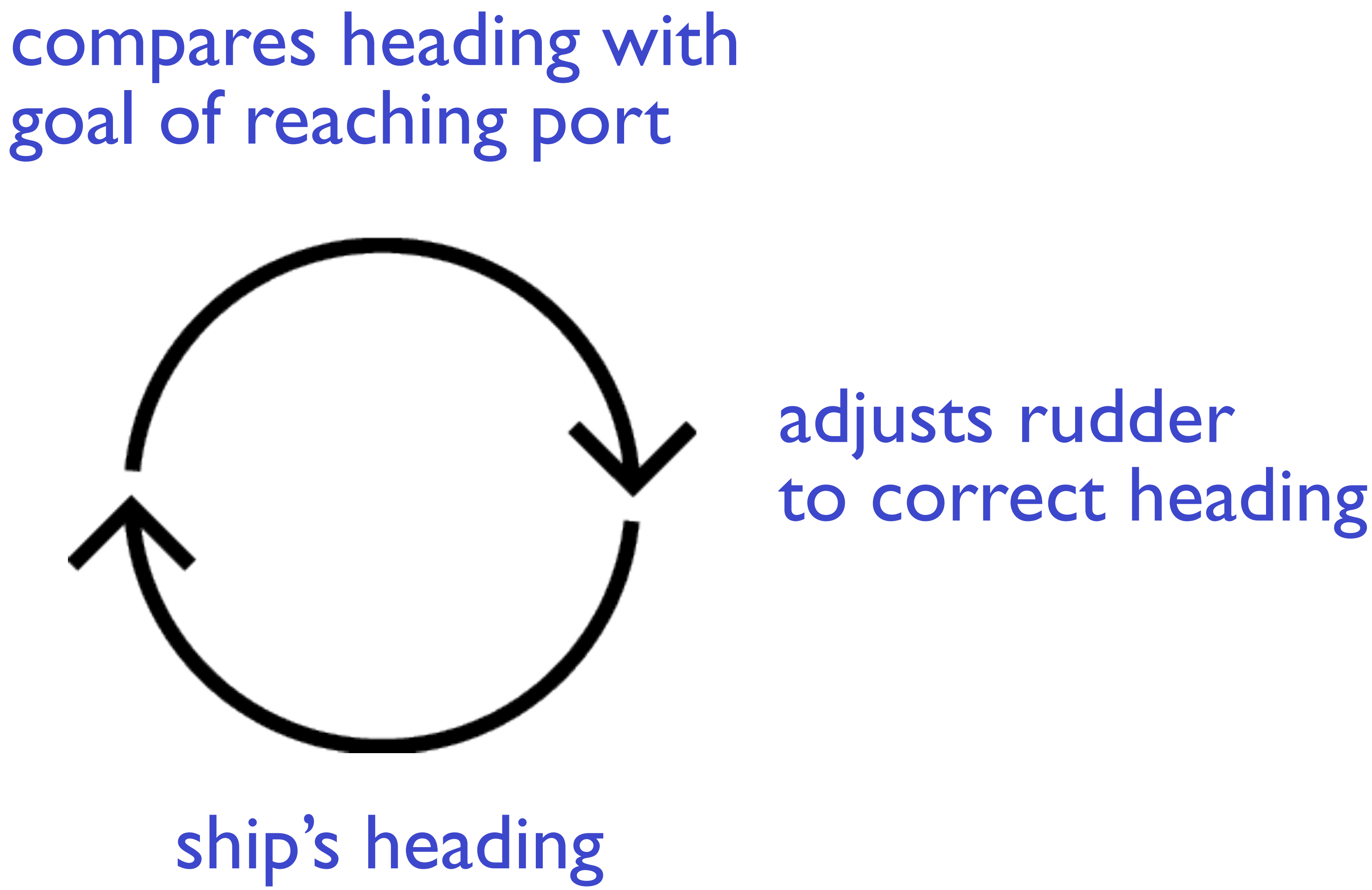
CYBERNETICS

"... introduces for the first time —
and not only by saying it, but methodologically —
the notion of circularity, circular-causal systems."

Heinz von Foerster



the art of regulation

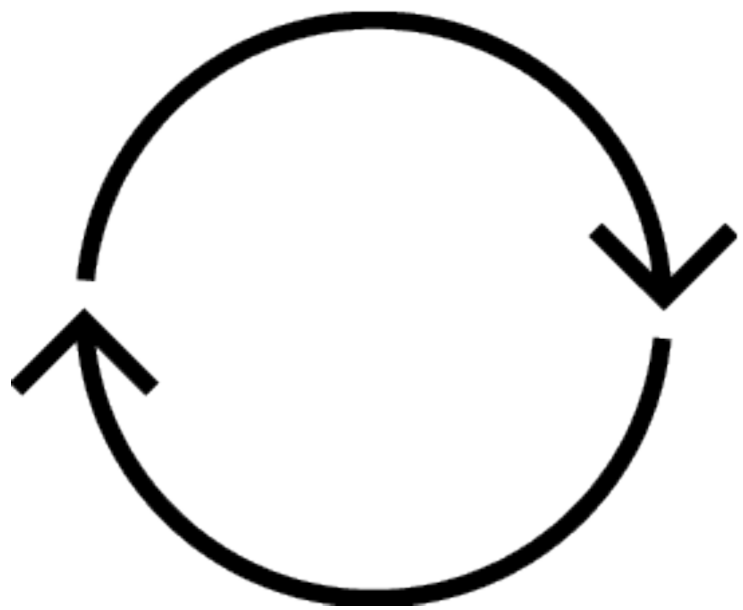


the art of regulation

detection of error

compares heading with
goal of reaching port

feedback

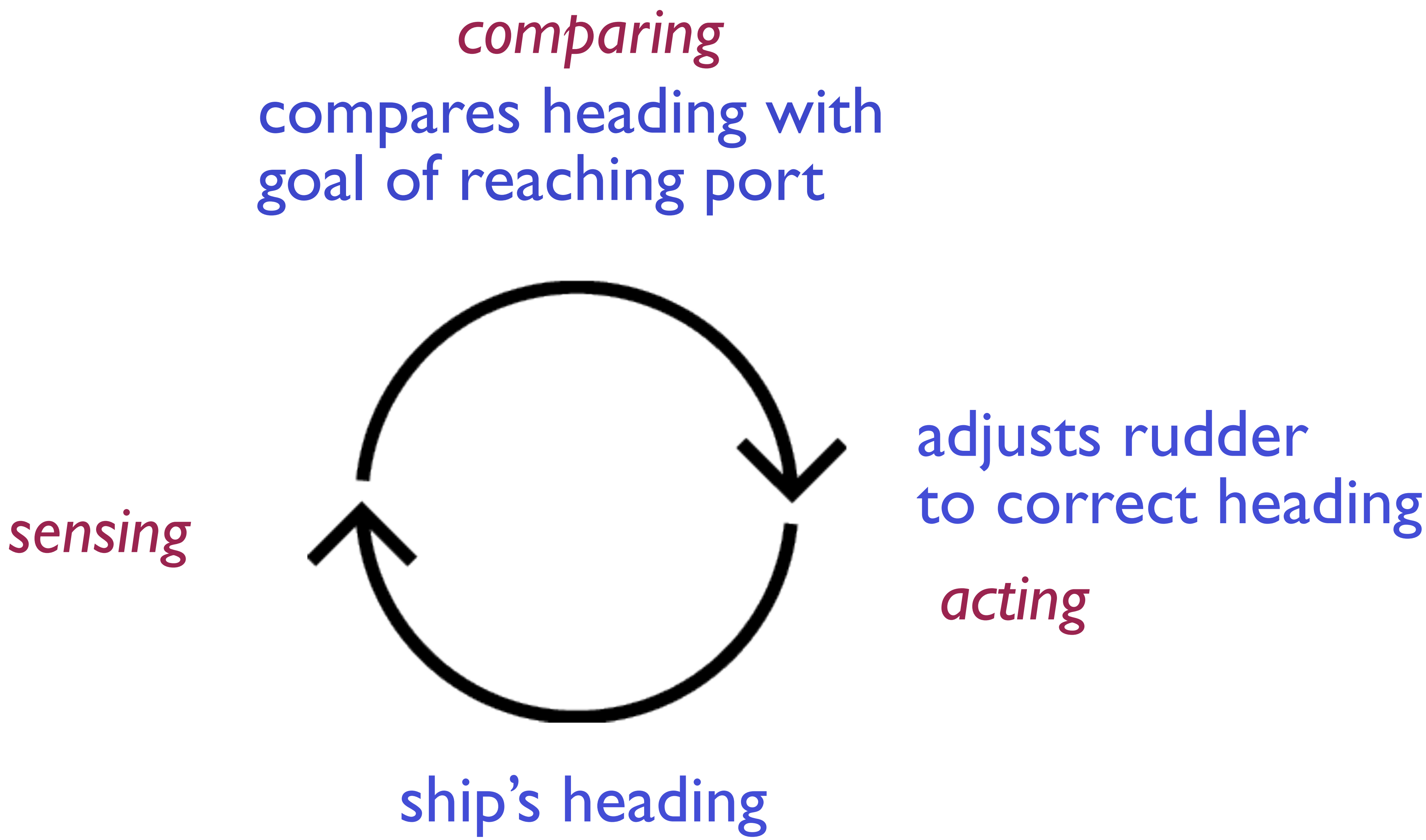


adjusts rudder
to correct heading

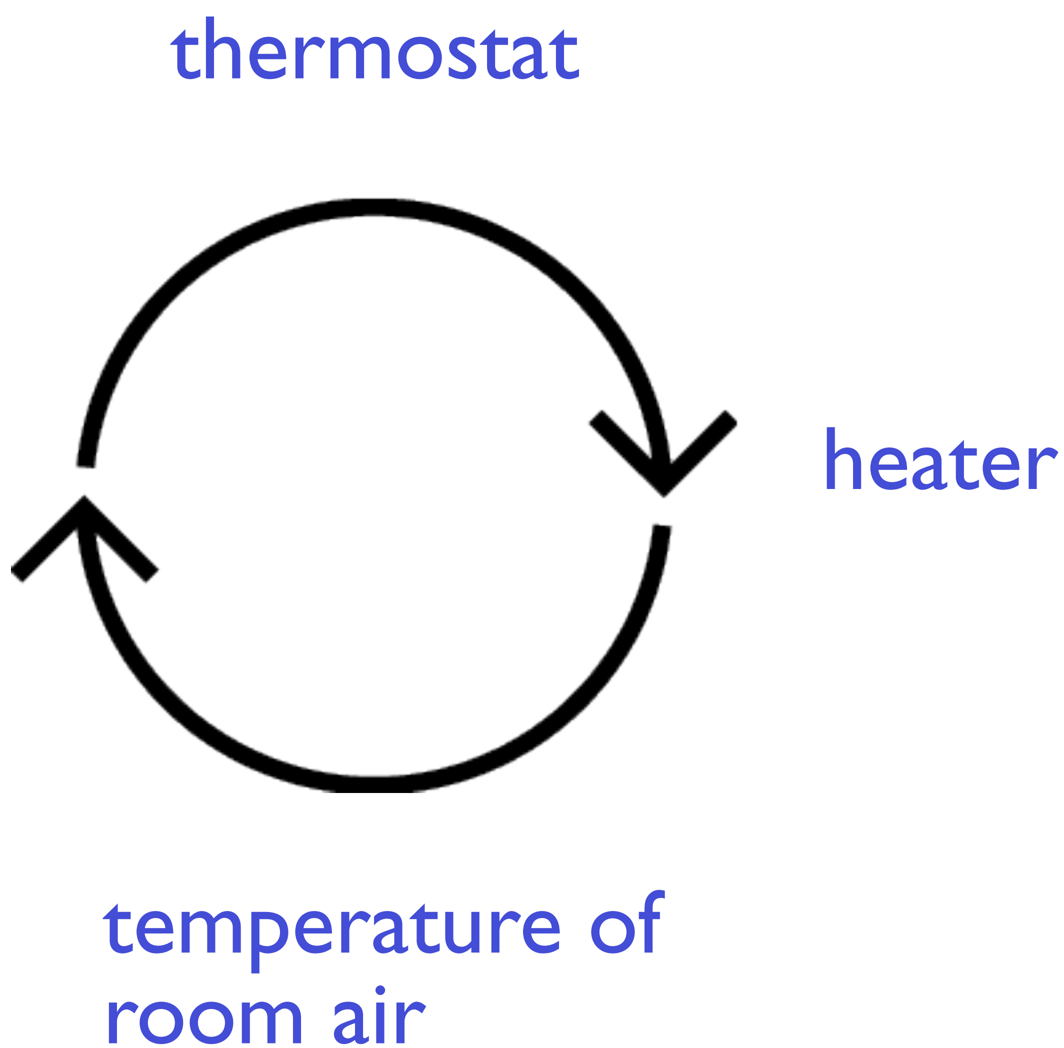
correction of error

ship’s heading

the art of regulation



automation of regulation



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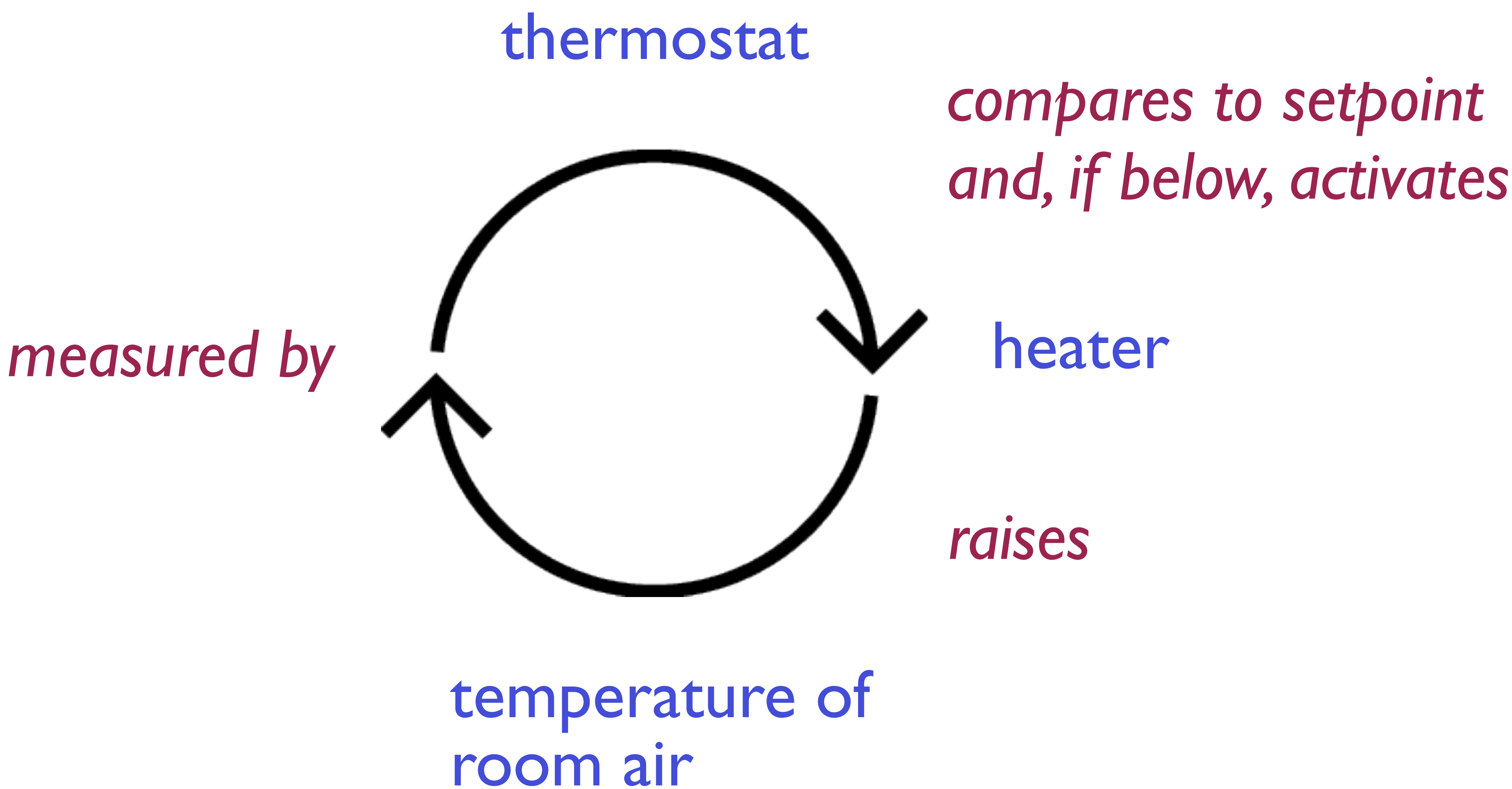
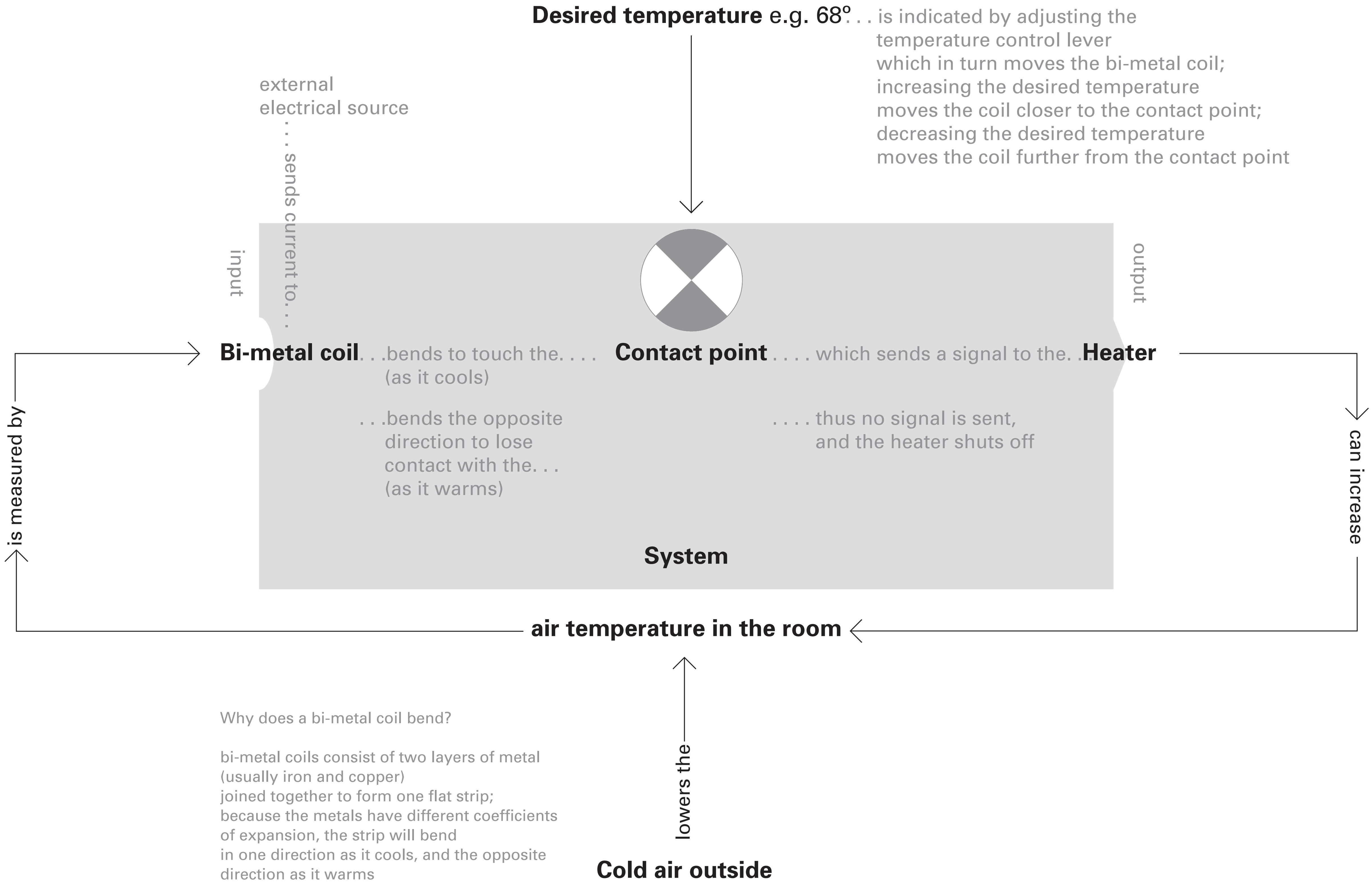


Feedback: Classic Example

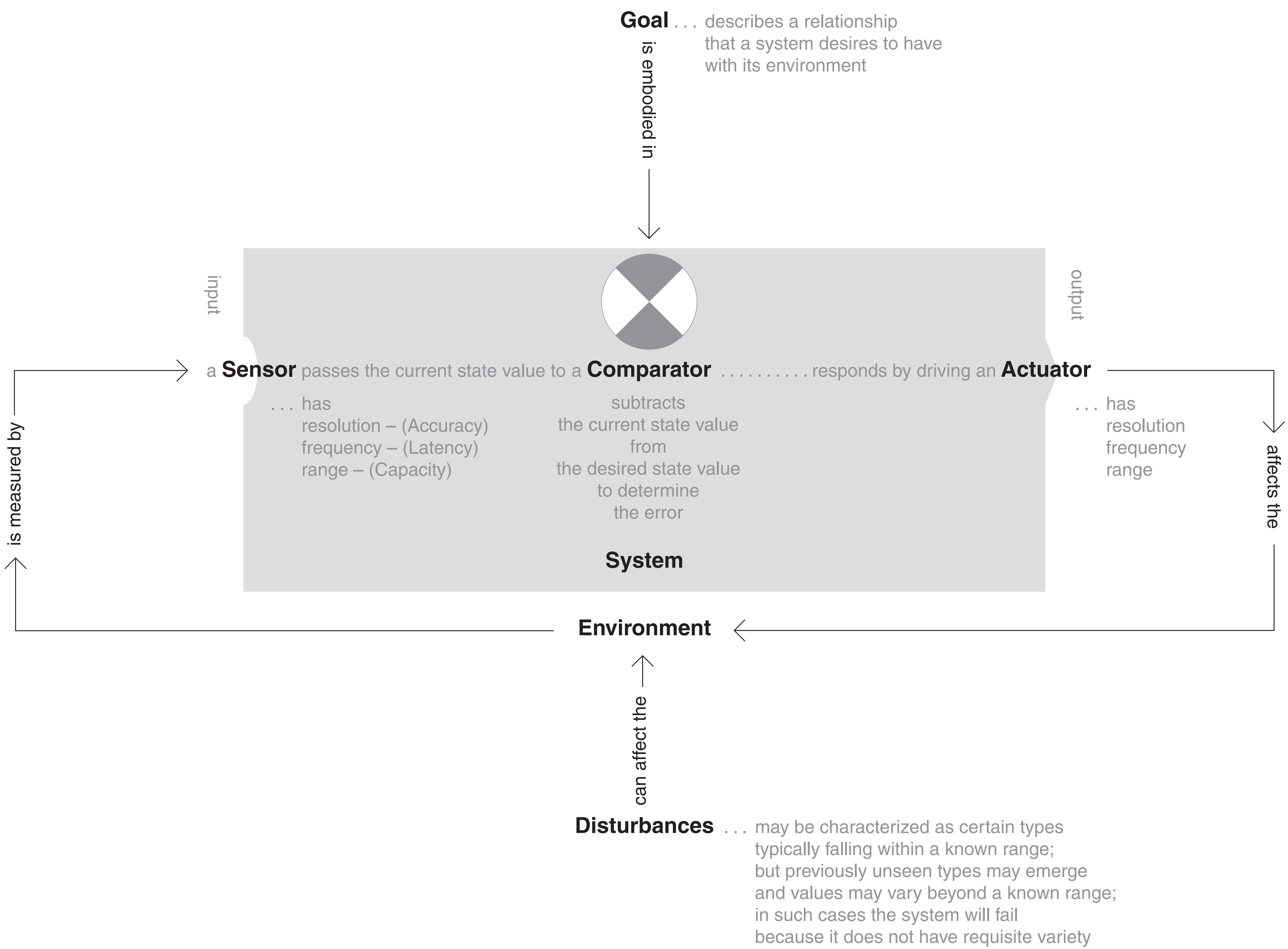
Thermostat regulating room temperature (via a heater)



Why does a bi-metal coil bend?

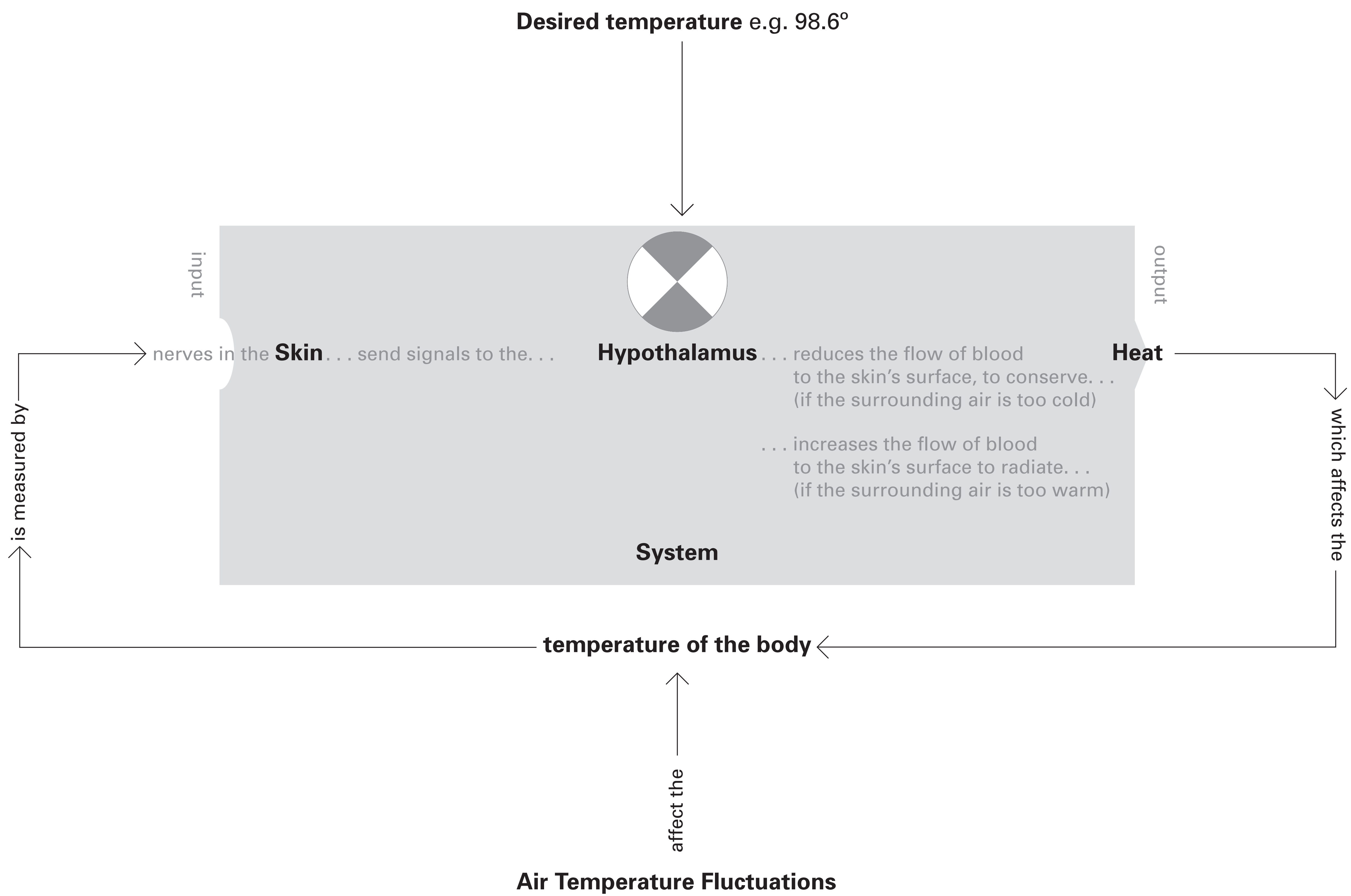
bi-metal coils consist of two layers of metal
(usually iron and copper)
joined together to form one flat strip;
because the metals have different coefficients
of expansion, the strip will bend
in one direction as it cools, and the opposite
direction as it warms

Feedback: Formal Mechanism

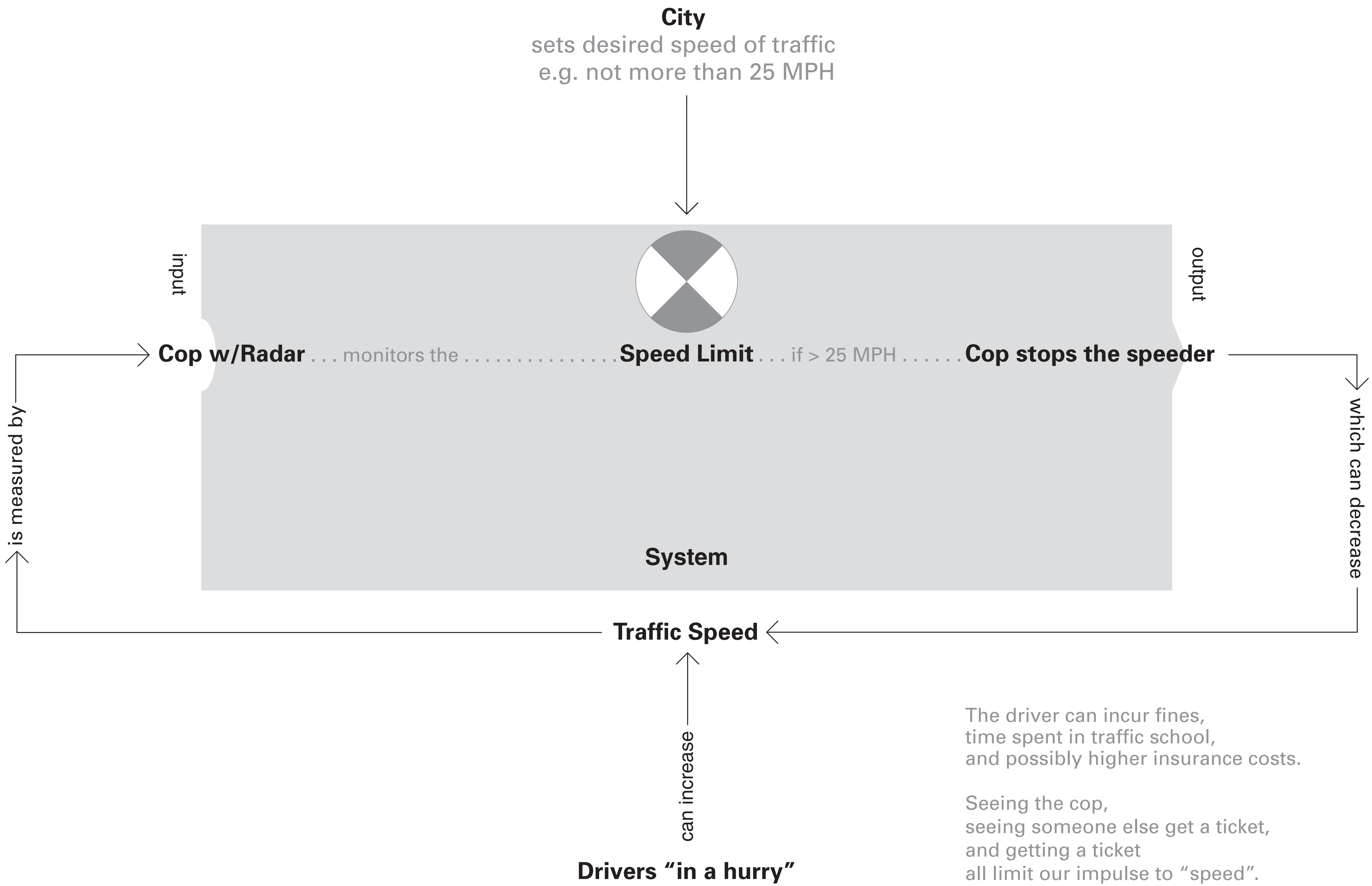


Feedback: Biological Example

Regulating temperature in the human body



Feedback: Social Example
Regulating traffic speed



The driver can incur fines,
time spent in traffic school,
and possibly higher insurance costs.

Seeing the cop,
seeing someone else get a ticket,
and getting a ticket
all limit our impulse to “speed”.

Examples of single-loop systems

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communication and control

in

animal and machine

intended

~~communication and control~~

in

intended

~~animal and machine~~

~~communication and control~~ → *intended* → communication and regulation

in → in

~~animal and machine~~ → *intended* → goal-directed systems,
whether organic or constructed

intended

~~communication and control~~ → communication and regulation

in *intended* in

~~animal and machine~~ → goal-directed systems,
whether organic or constructed

cybernetics

Historical views of cybernetics

Cybernetics saves the souls, bodies, and material possessions from the gravest dangers.

– Socrates according to Plato, c. 400 B.C.E.

The future science of government should be called “la cybernetique.”

– André-Marie Ampere, 1843

Until recently, there was no existing word for this complex of ideas, and... I felt constrained to invent one...

– Norbert Wiener, 1954

Many views of cybernetics

La Cybernetique est l’art d’assurer l’efficacite de l’action.

– Louis Couffignal

The science of effective organization.

– Stafford Beer

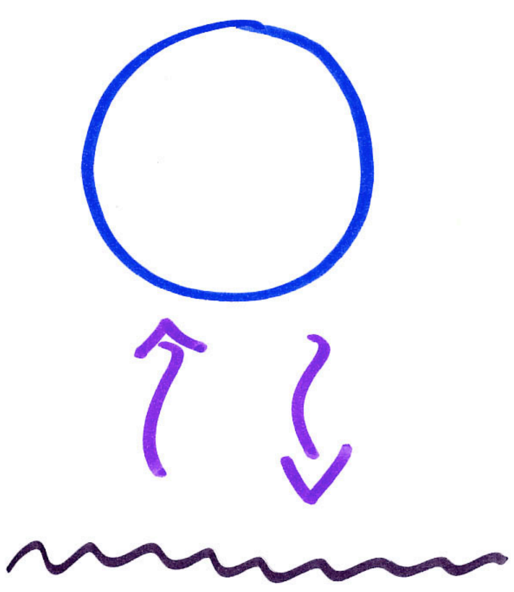
The science of observed systems.

– Heinz von Foerster

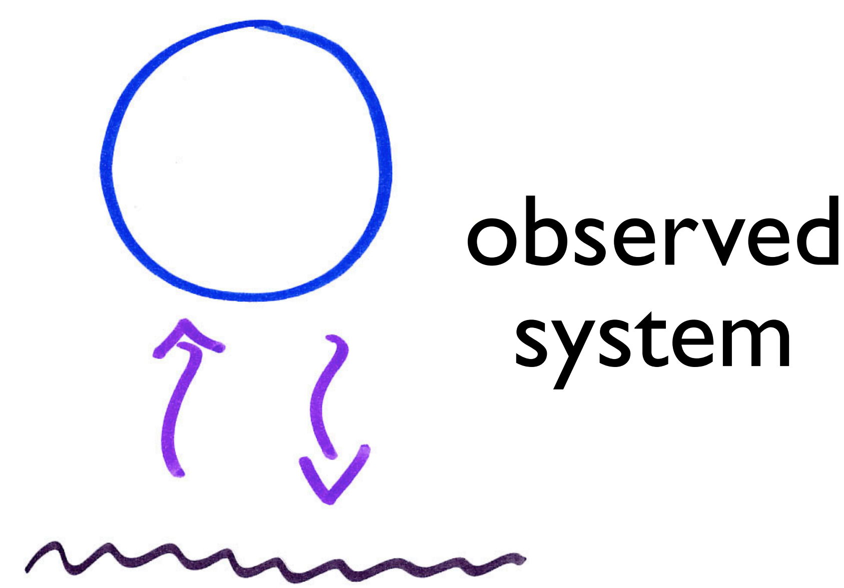
The study of the immaterial aspects of systems.

– W. Ross Ashby

But wait, there’s more…

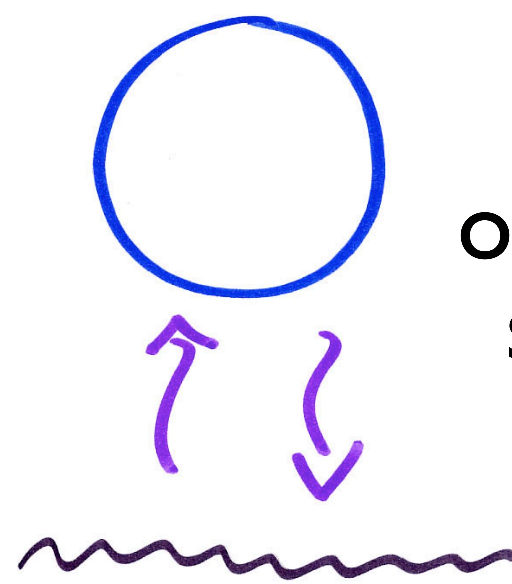


after Maturana



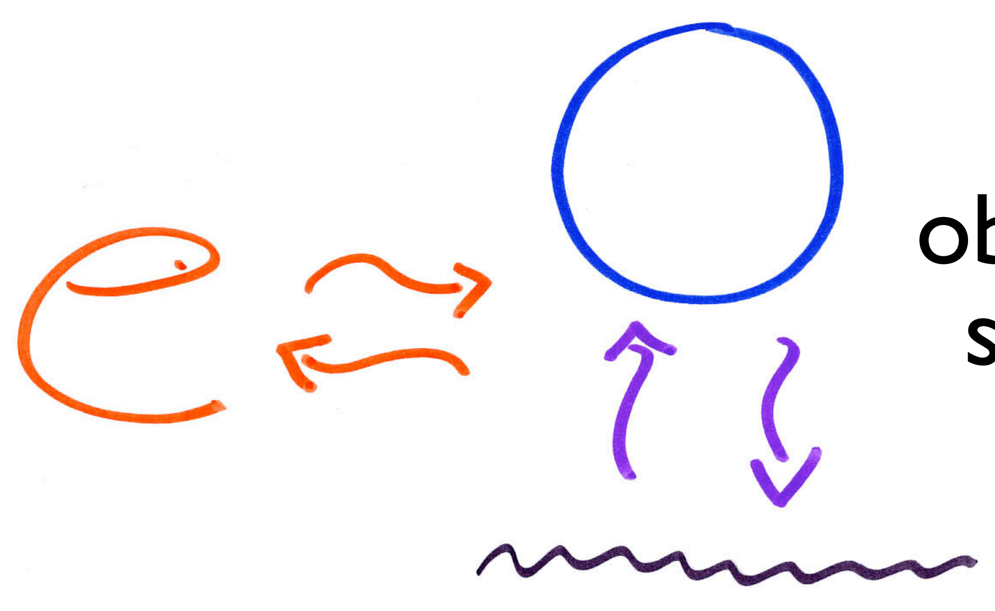
after Maturana

first-order cybernetics



observed
system

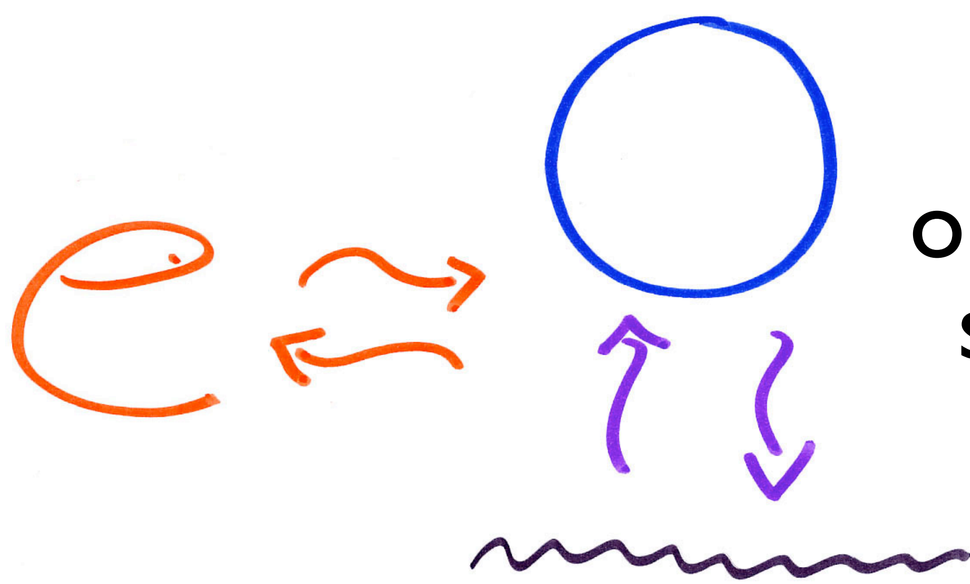
first-order cybernetics



observed system

first-order cybernetics

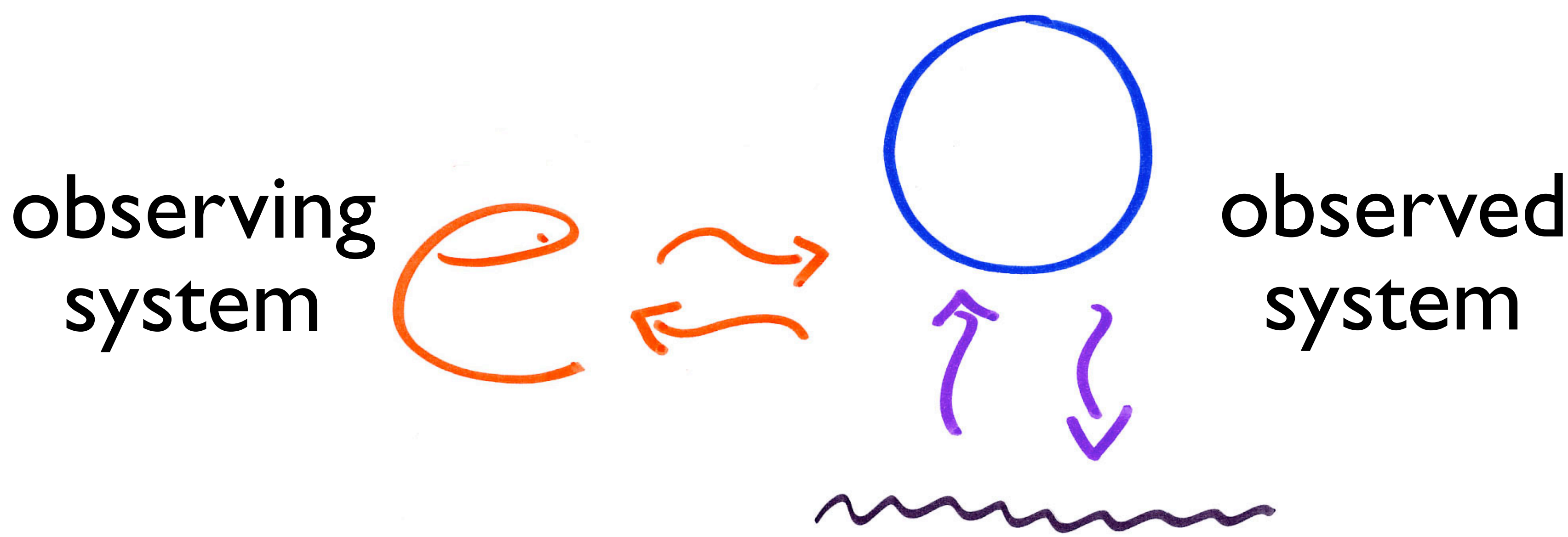
observing system



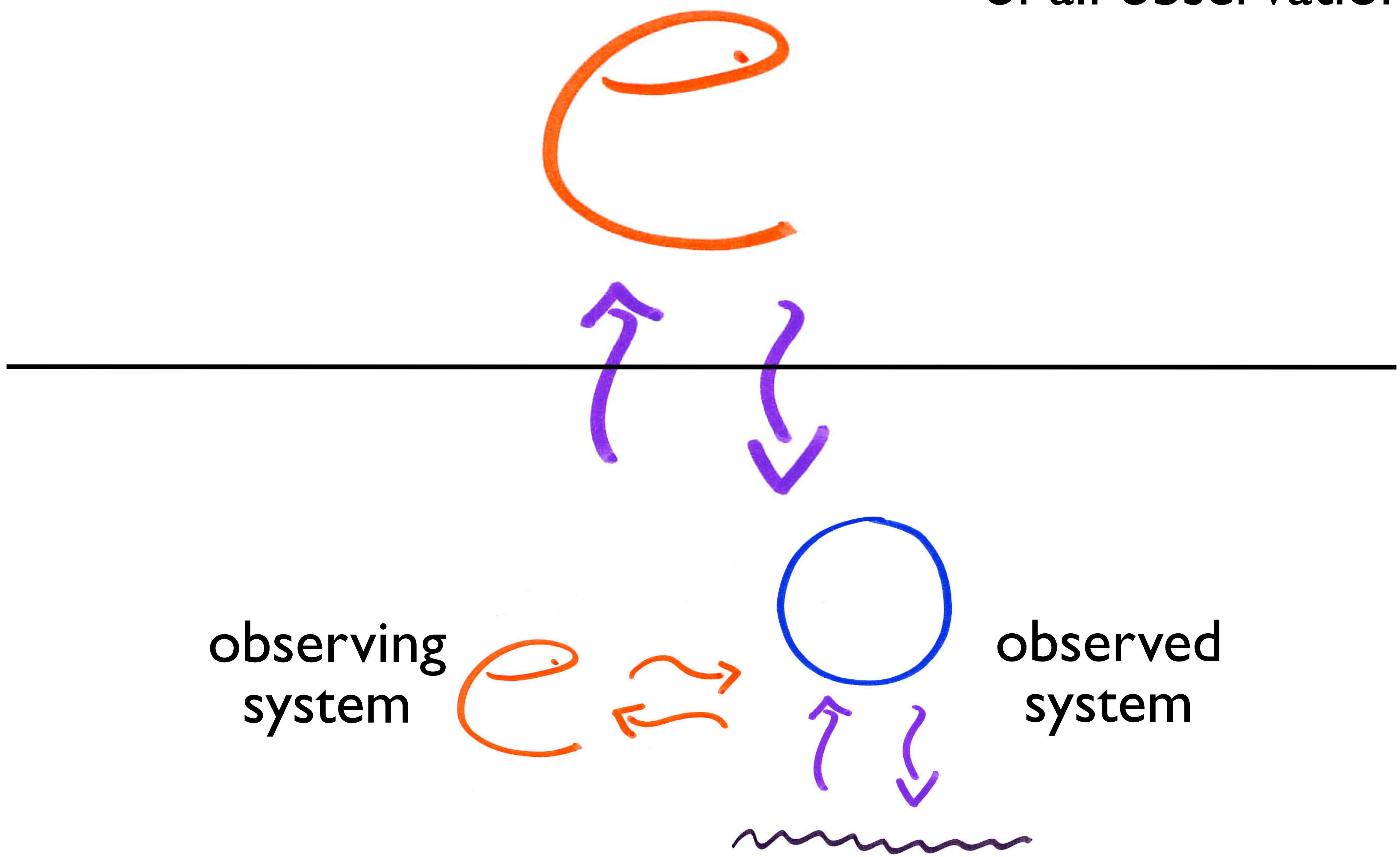
observed system

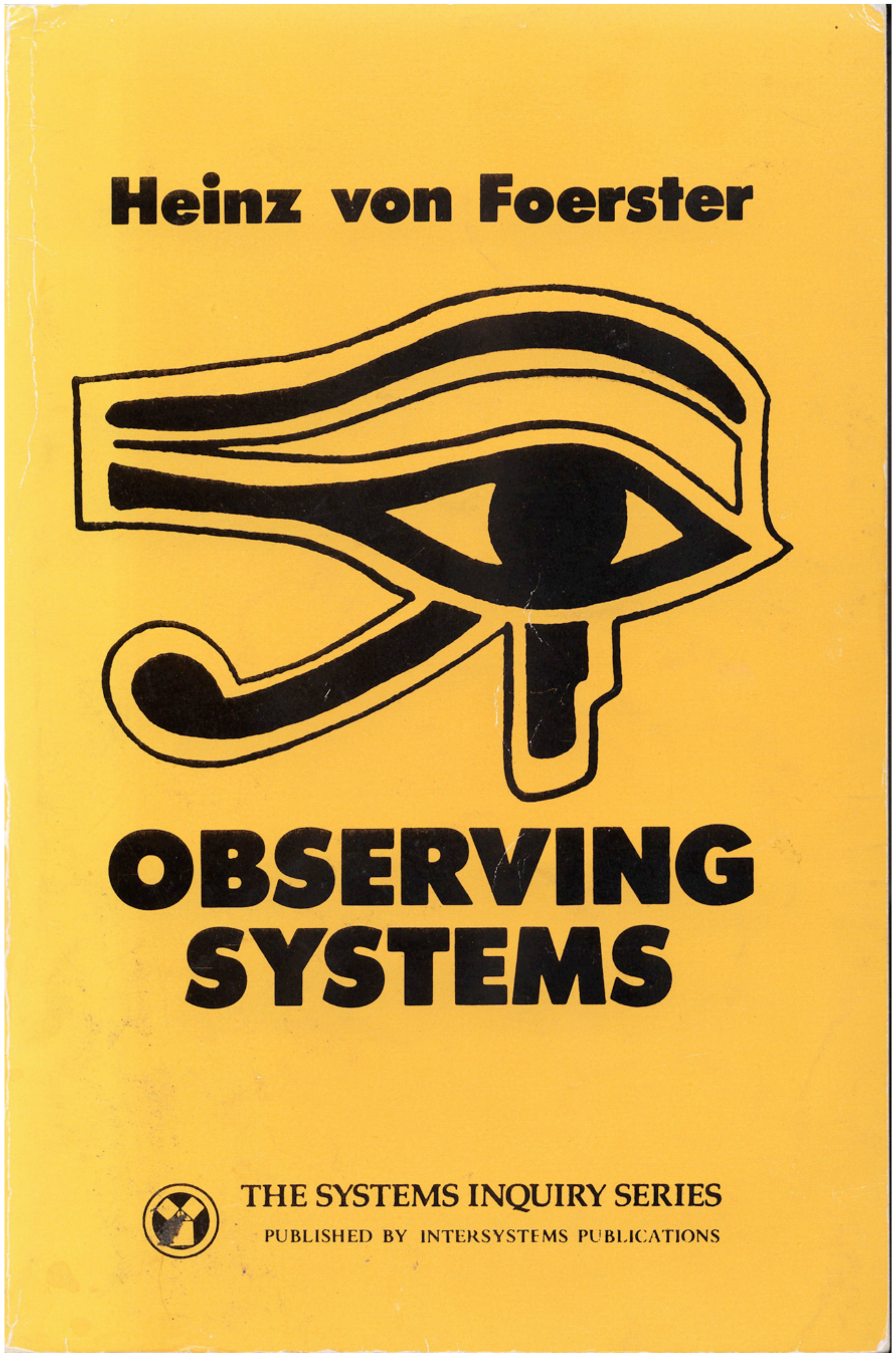
second-order cybernetics

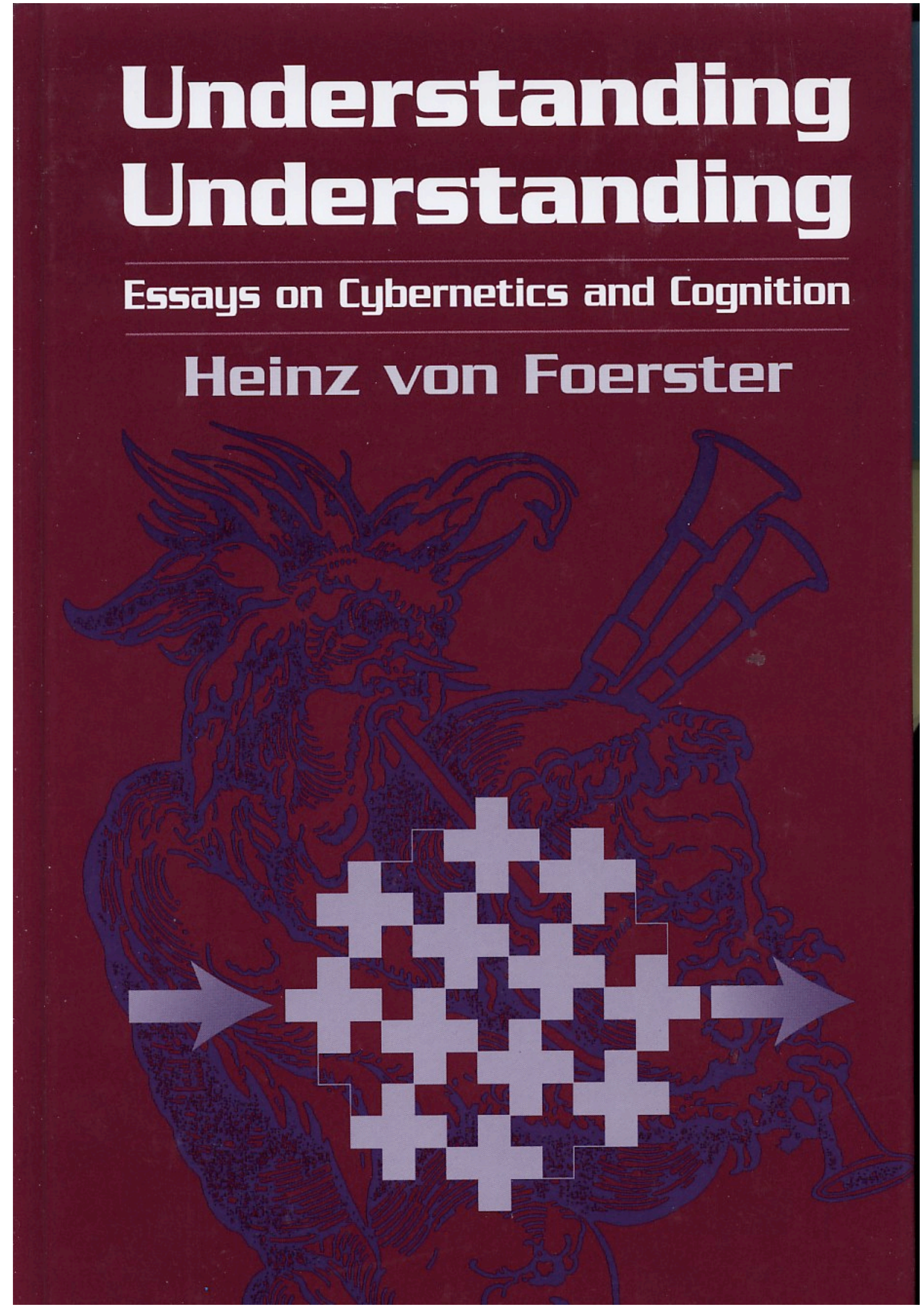
first-order cybernetics



recognizing
the subjectivity
of all observation




Heinz von Foerster
OBSERVING
SYSTEMS
THE SYSTEMS INQUIRY SERIES
PUBLISHED BY INTERSYSTEMS PUBLICATIONS


Understanding
Understanding
Essays on Cybernetics and Cognition
Heinz von Foerster

intended

~~communication and control~~ → communication and regulation

in in

intended

~~animal and machine~~ → goal-directed systems,
whether organic or constructed

cybernetics

communication and regulation

in

goal-directed systems,
whether organic or constructed

first-order cybernetics

becomes

~~communication and regulation~~

in

becomes

~~goal-directed systems,~~
whether organic or constructed

first-order cybernetics

becomes

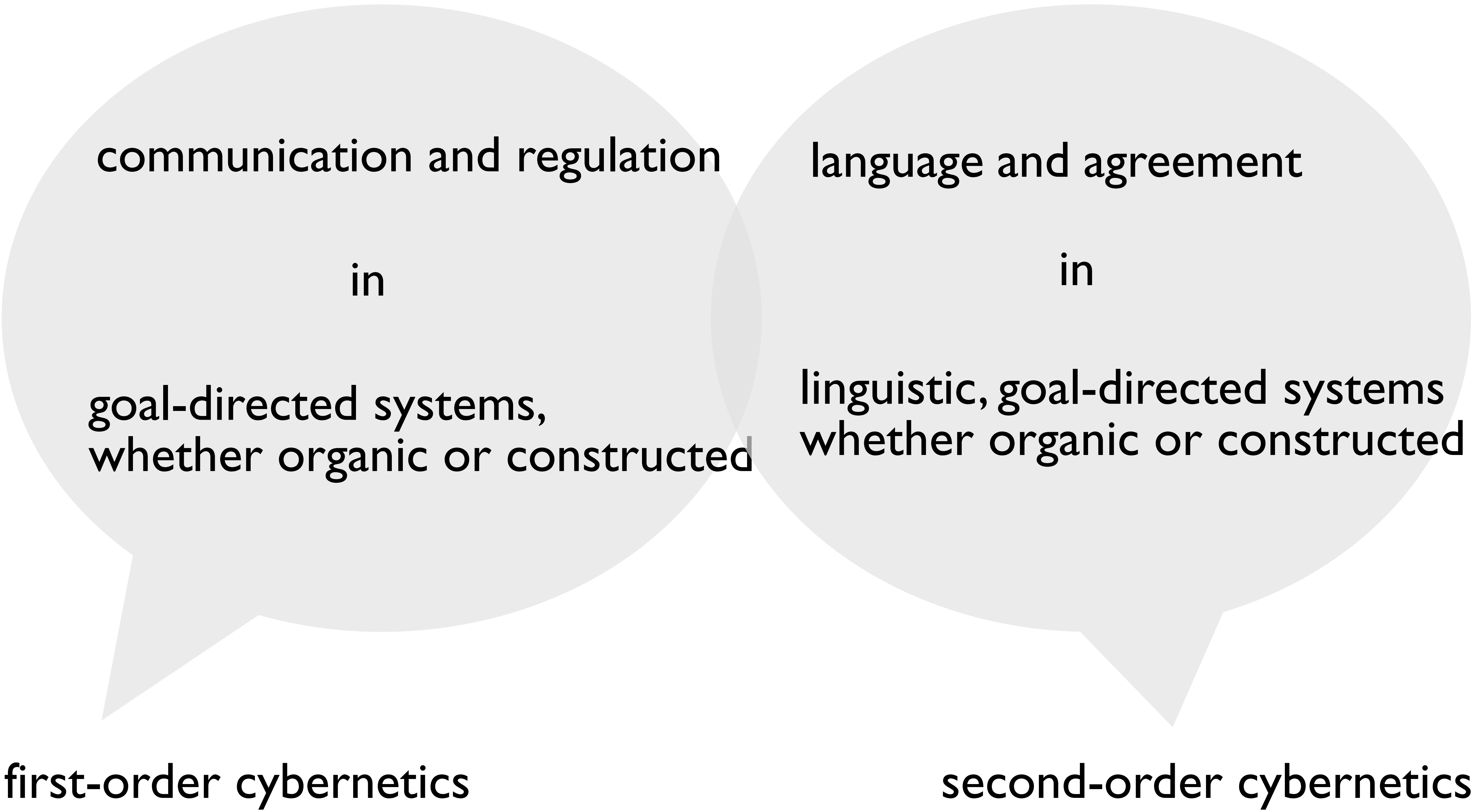
~~communication and regulation~~ → language and agreement

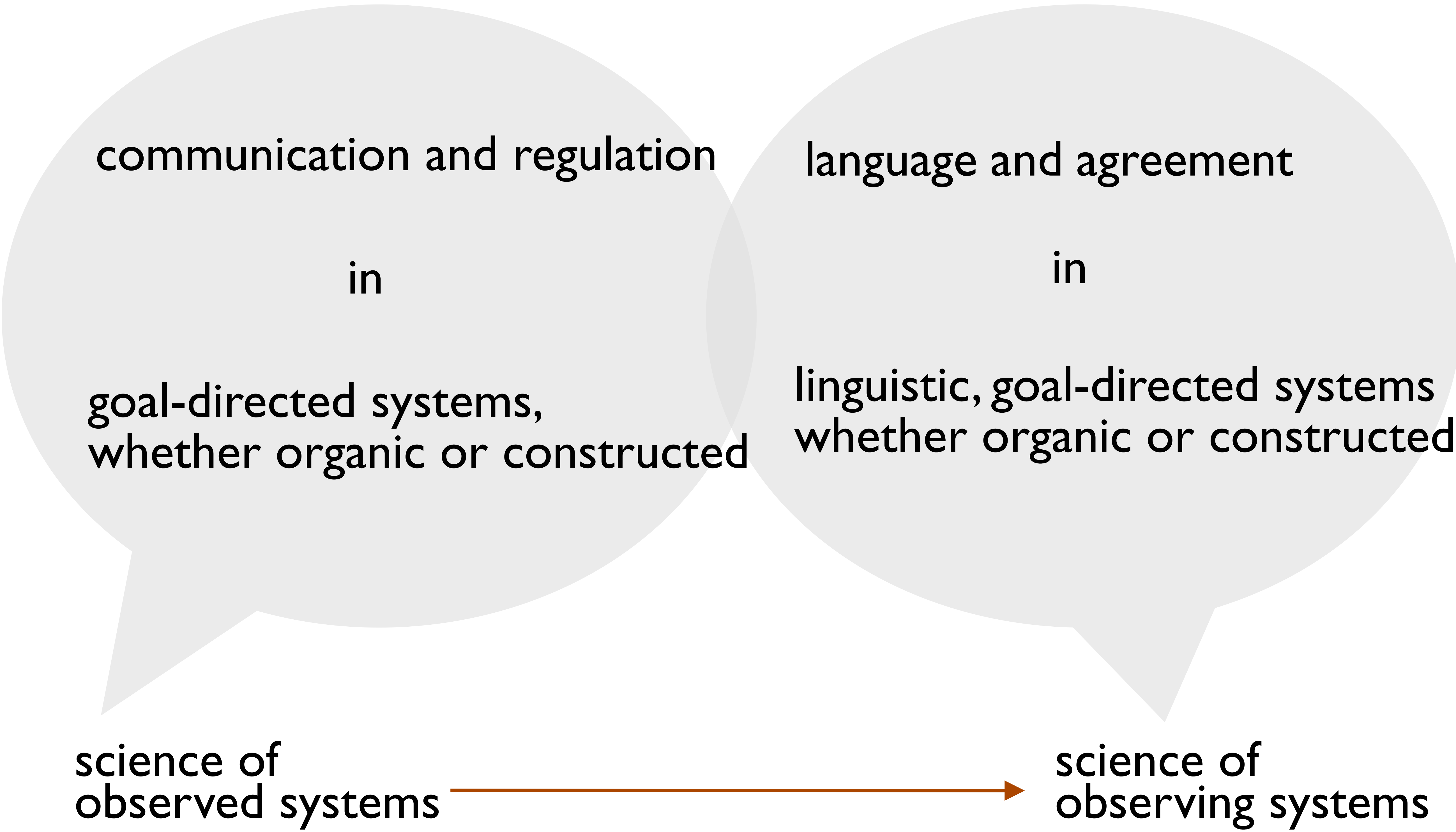
in   in

becomes

~~goal-directed systems,~~ → linguistic, goal-directed systems
whether organic or constructed   whether organic or constructed

first-order cybernetics


communication and regulation
in
goal-directed systems,
whether organic or constructed
language and agreement
in
linguistic, goal-directed systems
whether organic or constructed
first-order cybernetics
second-order cybernetics


communication and regulation
in
goal-directed systems,
whether organic or constructed
language and agreement
in
linguistic, goal-directed systems
whether organic or constructed
science of
observed systems
science of
observing systems

Second-order cybernetics

The science of observing systems.

– Heinz von Foerster

The art of defensible metaphors.

– Gordon Pask

The science and art of human understanding.

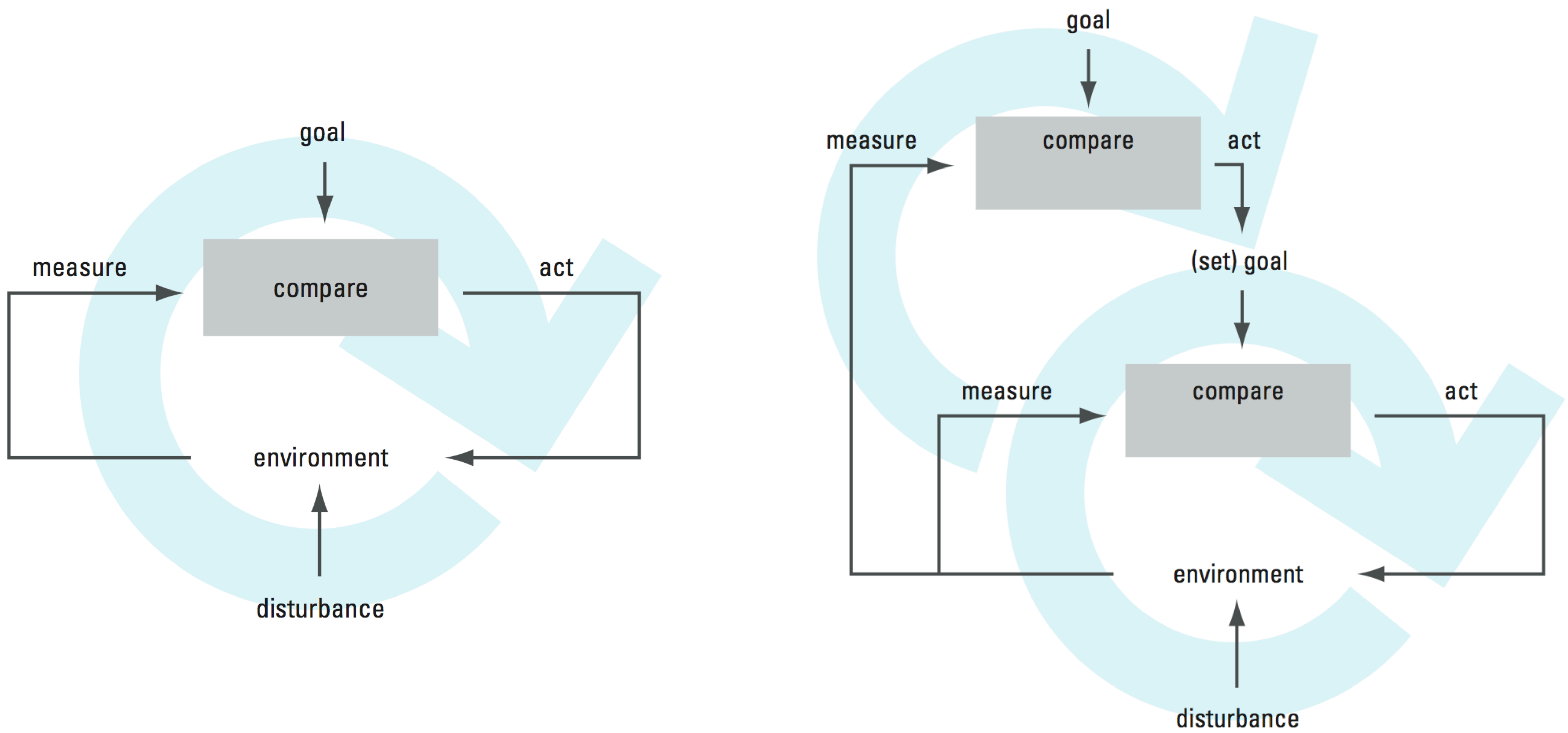
– Humberto Maturana

Cybernetics of Cybernetics.

– Margaret Mead

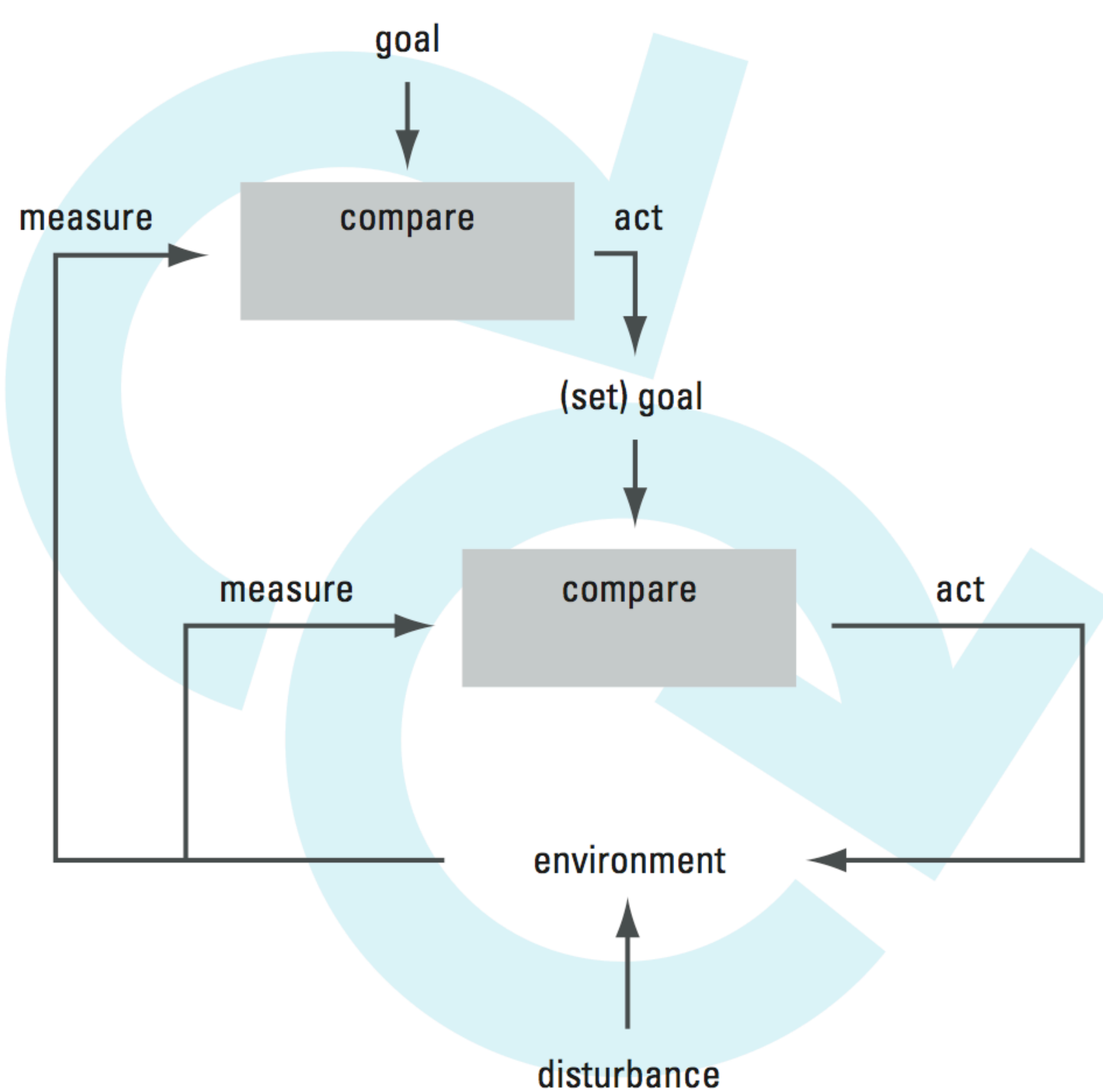
Second-order cybernetics

Cybernetics explains how the act of modeling is a subjective act.



Double-loop systems

Cybernetics explains how
circular-causal systems work—
even when they self-regulate and modify their goals.



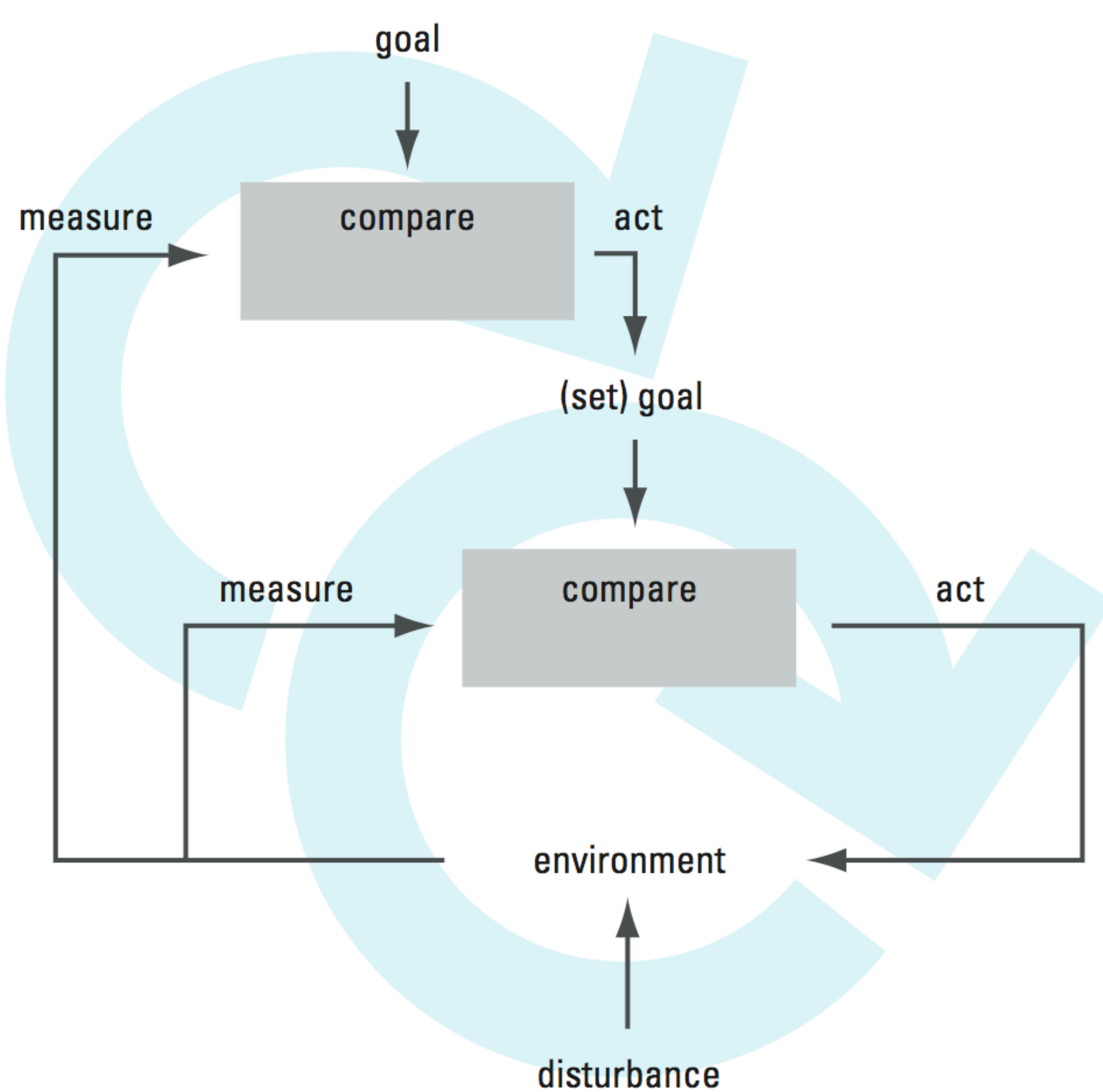
Contrasting terms

second-order cybernetics	double-loop systems
nested systems	nested systems
observing system observes observed system	outer loop controls inner loop
introduces subjectivity	changes its own internal goal
emphasizes a point-of-view	defines a structure
epistemological stance	epistemological stance*

* because all models are subjective

Double-loop systems

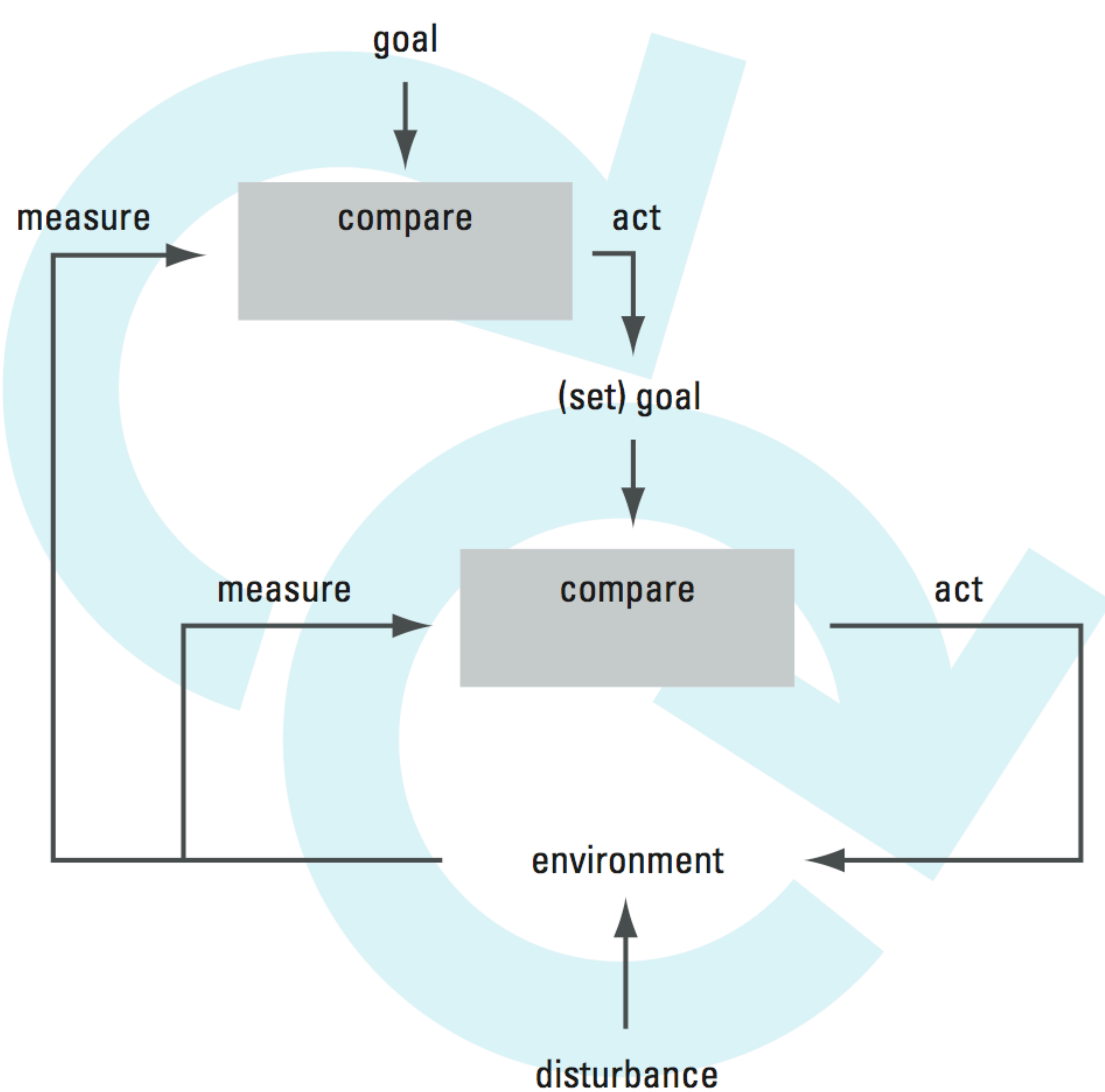
Cybernetics explains how
circular-causal systems work—
even when they self-regulate and modify their goals.



Because they can modify their internal goals, double-loop systems are also learning systems.

Learning systems

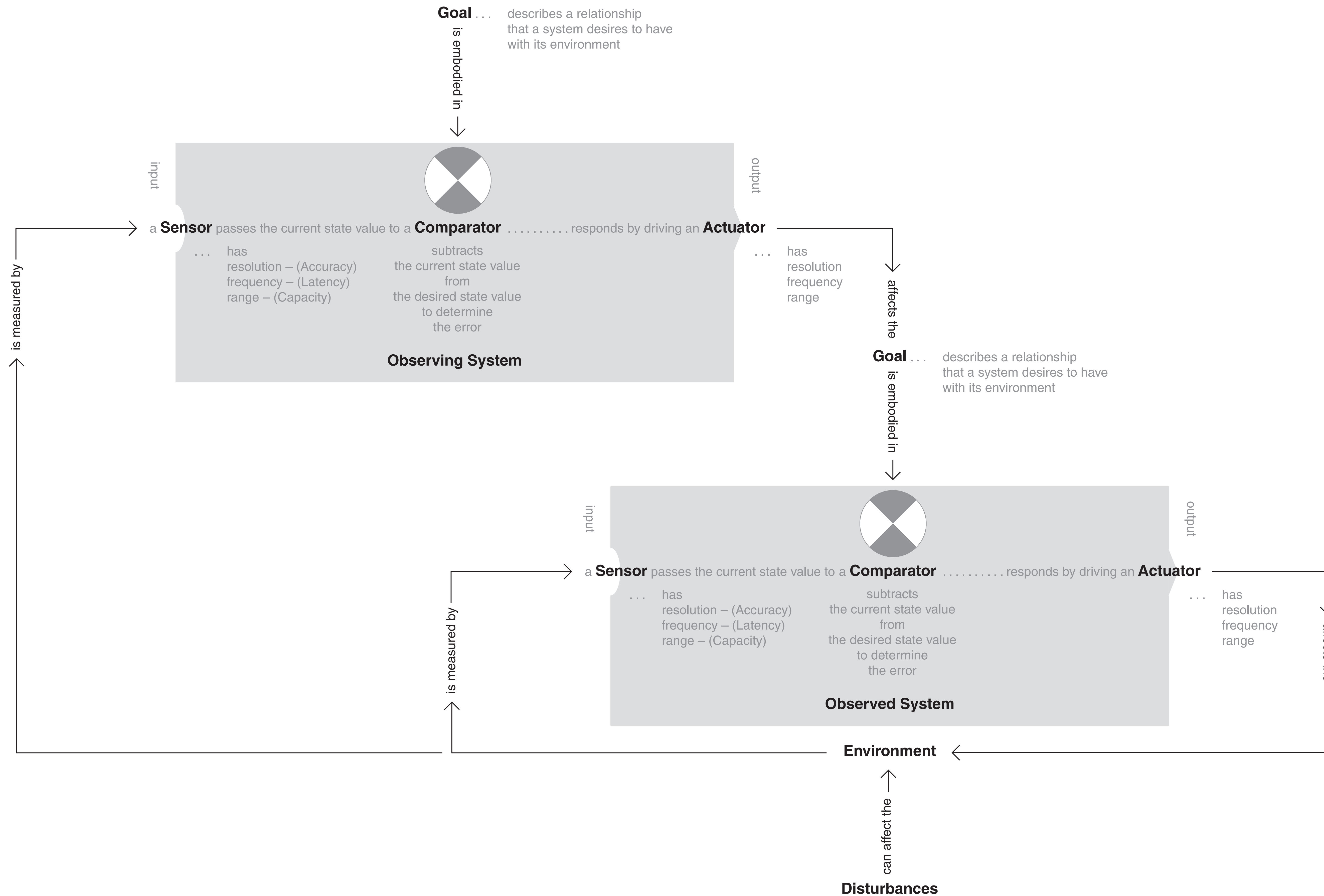
Cybernetics explains how
circular-causal systems work—
even when they self-regulate and modify their goals.



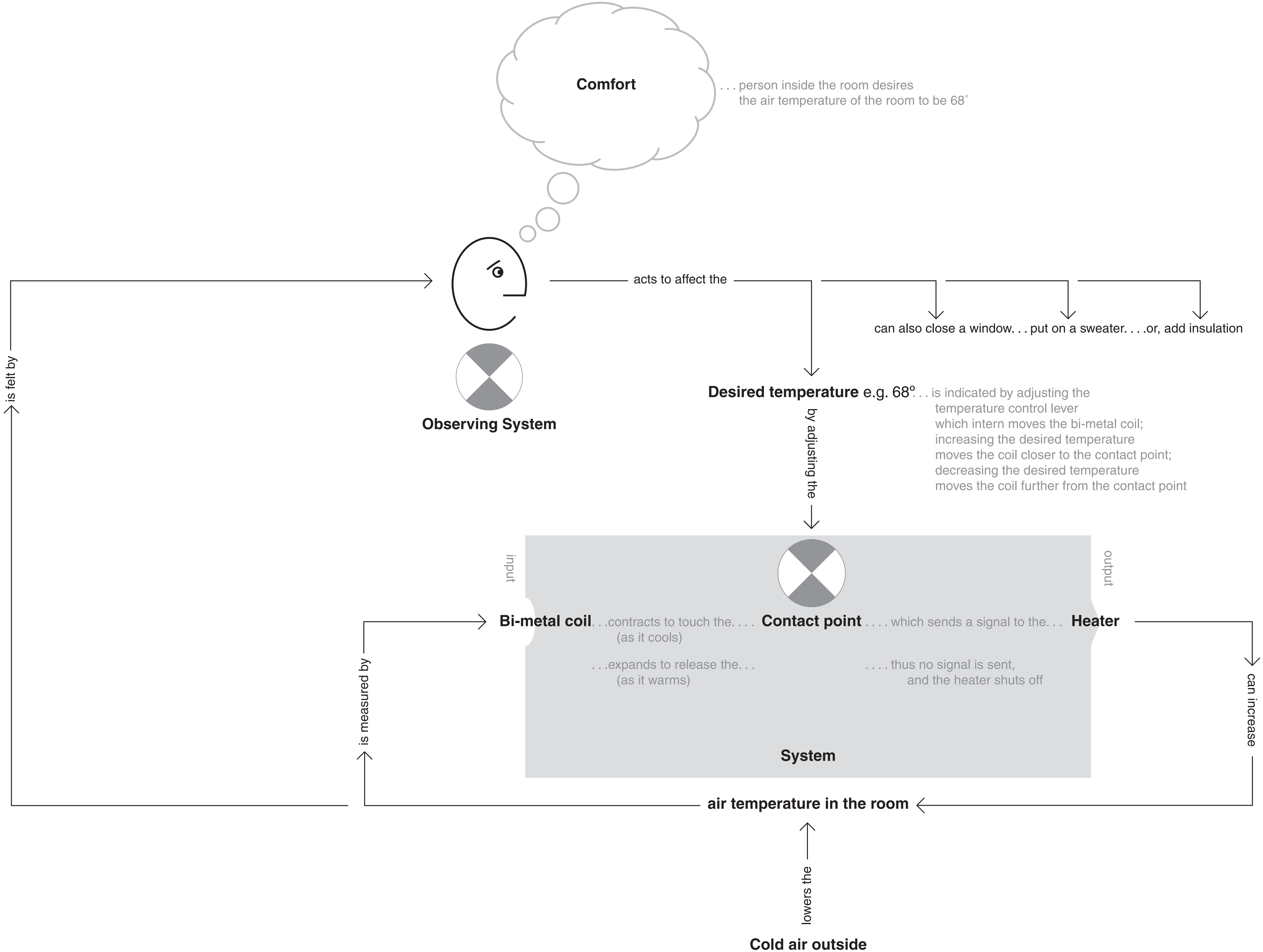
Organizations are structured in multiple, circular-causal loops.

These loops involve actions to achieve goals as well as modification of goals.

Cybernetic models are well suited to the process of understanding—and designing—organizations.



Goal . . .
describes a relationship
that a system desires to have
with its environment
is embodied in
input
output
a Sensor passes the current state value to a Comparator . . . . responds by driving an Actuator
. . . has
resolution – (Accuracy)
frequency – (Latency)
range – (Capacity)
subtracts
the current state value
from
the desired state value
to determine
the error
. . . has
resolution
frequency
range
Observing System
affects the
Goal . . .
describes a relationship
that a system desires to have
with its environment
is embodied in
input
output
a Sensor passes the current state value to a Comparator . . . . responds by driving an Actuator
. . . has
resolution – (Accuracy)
frequency – (Latency)
range – (Capacity)
subtracts
the current state value
from
the desired state value
to determine
the error
. . . has
resolution
frequency
range
Observed System
affects the
is measured by
is measured by
Environment
can affect the
Disturbances



Comfort
. . . person inside the room desires
the air temperature of the room to be 68˚
acts to affect the
can also close a window. . . put on a sweater. . . .or, add insulation
Observing System
Desired temperature e.g. 68º. . . is indicated by adjusting the
temperature control lever
which intern moves the bi-metal coil;
increasing the desired temperature
moves the coil closer to the contact point;
decreasing the desired temperature
moves the coil further from the contact point
by adjusting the
is felt by
input
output
Bi-metal coil. . .contracts to touch the. . . .
(as it cools)
Contact point . . . . which sends a signal to the. . .
Heater
. . .expands to release the. . .
(as it warms)
. . . . thus no signal is sent,
and the heater shuts off
System
is measured by
can increase
air temperature in the room
lowers the
Cold air outside

Decreasing the wolf population seemed to increase erosion (and created a more desert-like environment).

Conversely, restoring wolves seemed to reduce erosion (and restored much of the environment’s diversity).

Increasing Erosion

As the number of wolves drops,
the level of elk grazing around streams
(and the nearby willows) rises
(an unexpected outcome).

As more elk graze near the streams,
they destroy more and more willows—
eventually (over many years)
destroying nearly all of the willow.

As the willow population declines,
the beaver population declines.

As the beaver population declines,
the number of damns decrease.

As the number of the dams decrease,
the number of the ponds decrease.

As the number of the ponds decrease,
the speed and extent of erosion increase.

Decreasing Erosion

As the number of wolves increases
(after reintroduction),
the level of elk grazing around streams
(and the nearby willows) drops—
presumably because the elk "sense"
the increased danger in these areas
where wolves can more easily trap them.

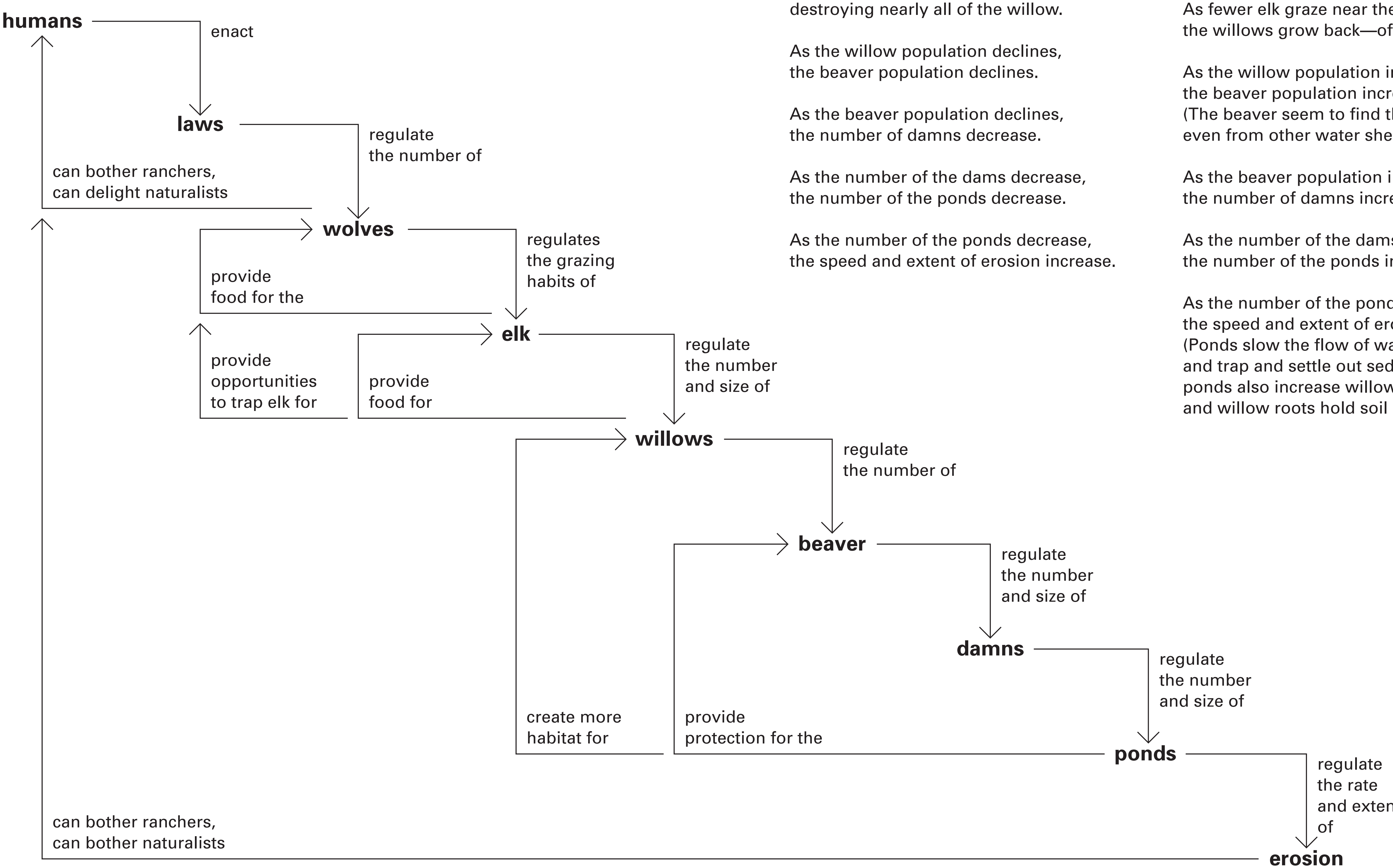
As fewer elk graze near the streams,
the willows grow back—often quite rapidly.

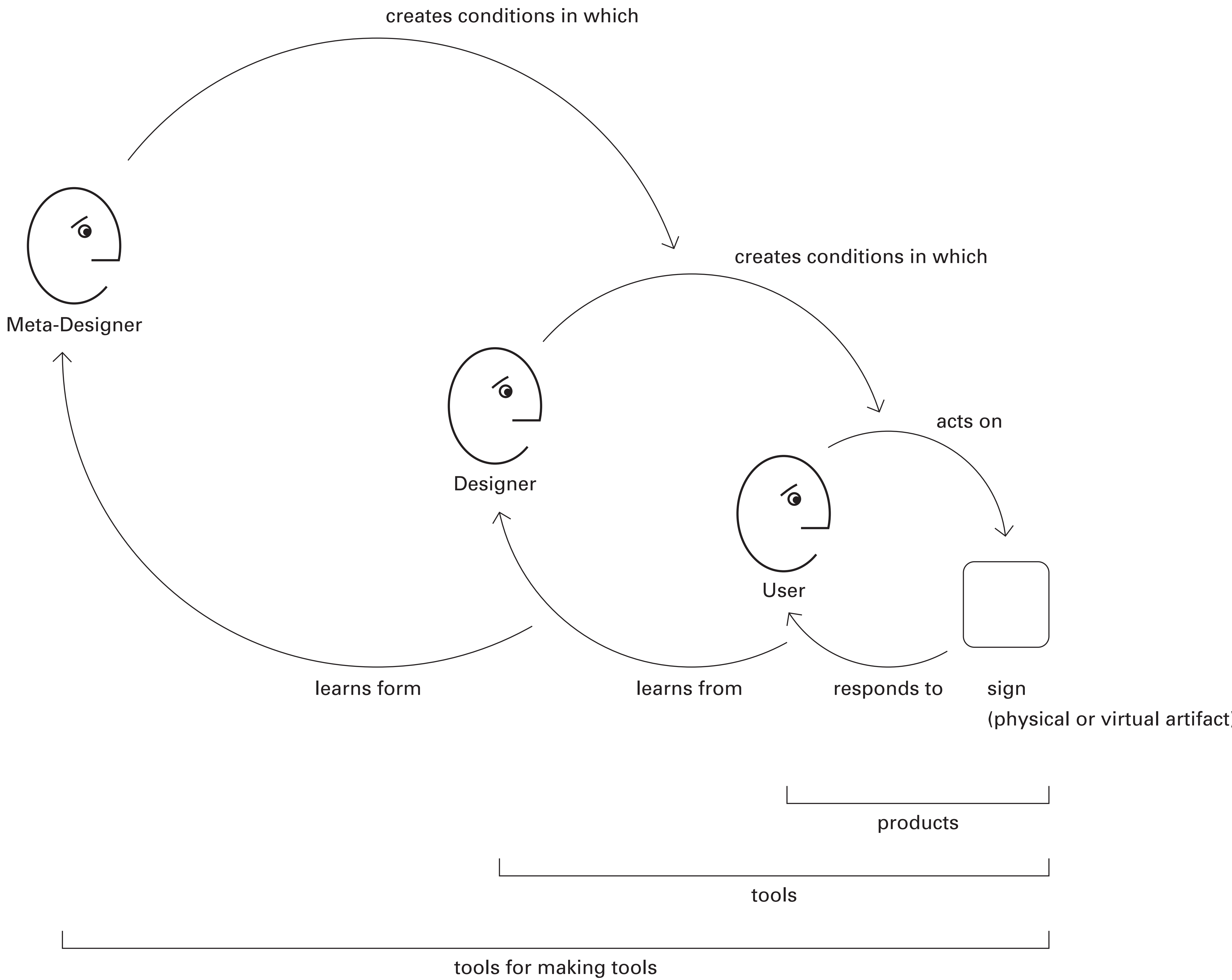
As the willow population increases,
the beaver population increases.
(The beaver seem to find their way back
even from other water sheds.)

As the beaver population increases,
the number of damns increase.

As the number of the dams increase,
the number of the ponds increase.

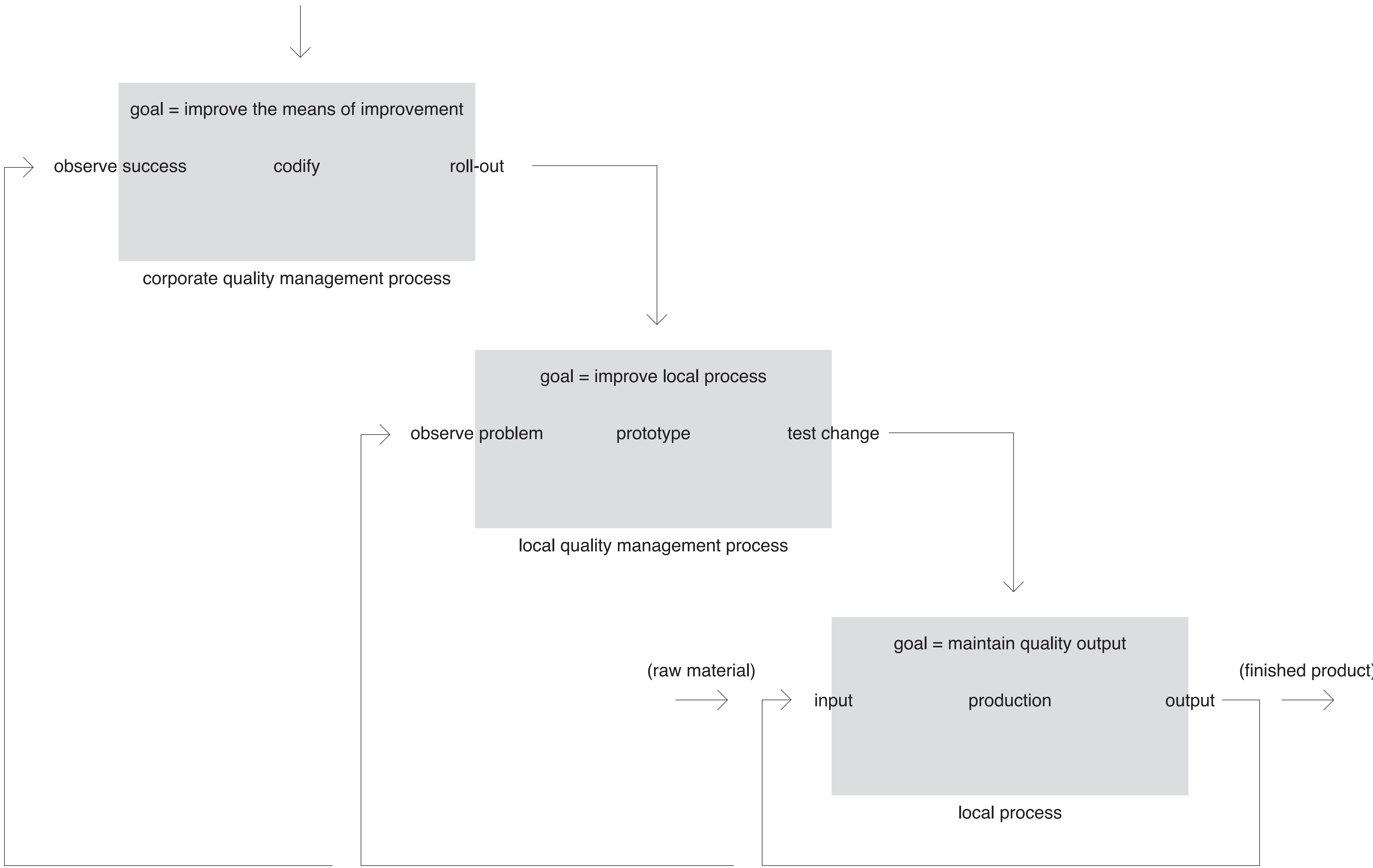
As the number of the ponds increase,
the speed and extent of erosion decrease.
(Ponds slow the flow of water
and trap and settle out sediment;
ponds also increase willow habitat;
and willow roots hold soil in place.)




creates conditions in which
Meta-Designer
creates conditions in which
Designer
acts on
User
learns form
learns from
responds to
sign
(physical or virtual artifact)
products
tools
tools for making tools

after Douglas Englebart

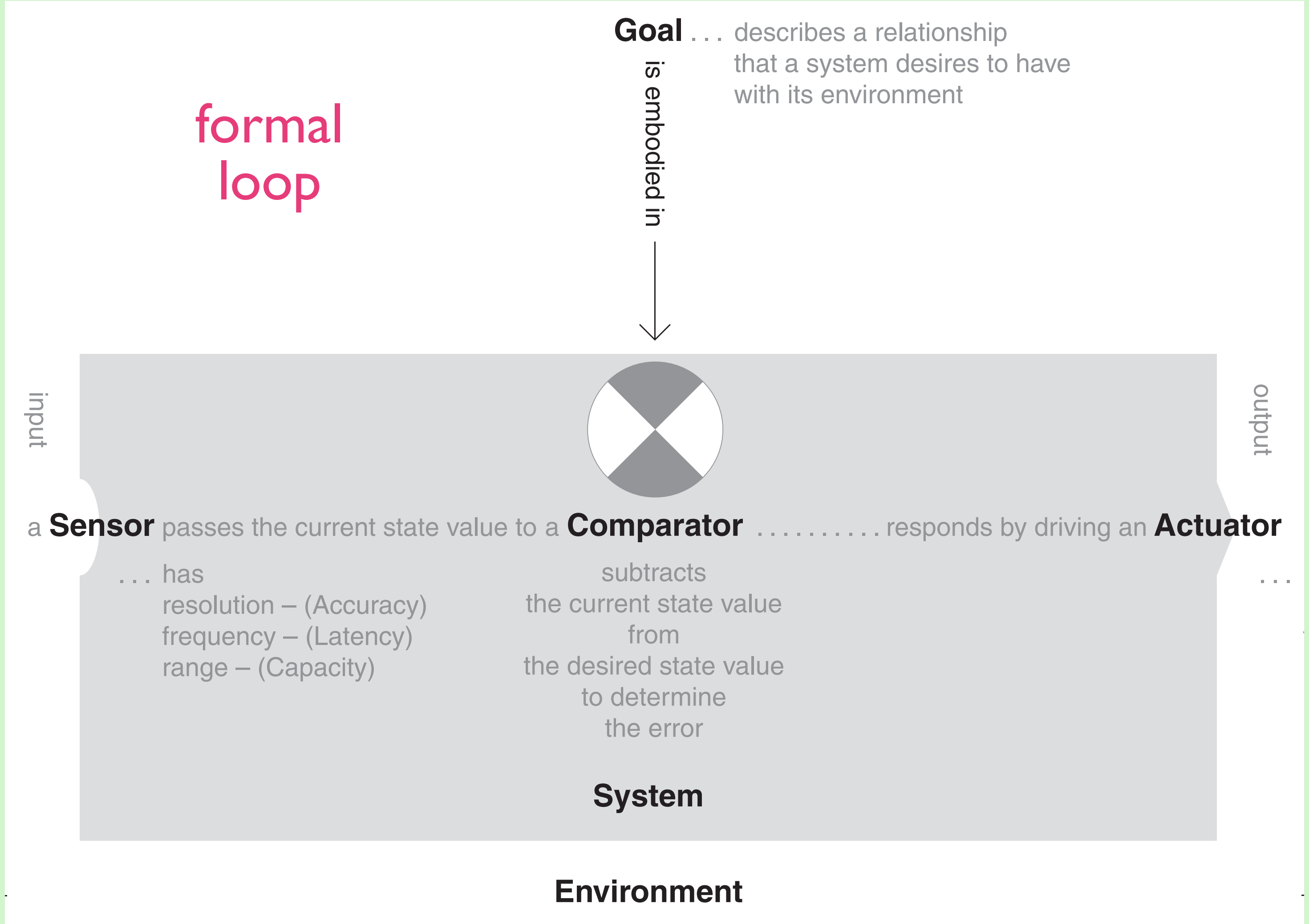
Organizational 'boot-strapping' process
relies on nested feedback loops.

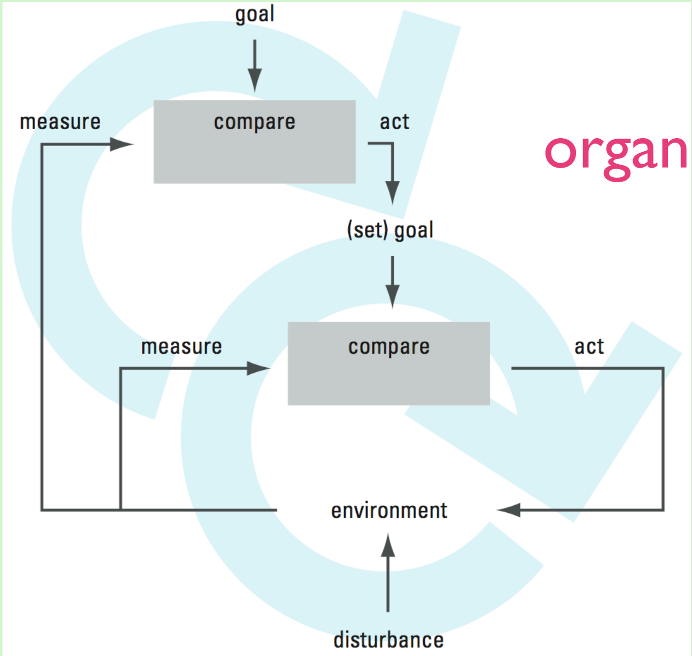


Examples of learning systems

Exercise #1
Model a Learning System

- List a few examples the group finds interesting
- Agree on one (think about why you are agreeing)
- Model the system using a visual language and these terms





system	goal	sensor
environment	feedback	comparator
disturbance	error	actuator

Exercise #1
Review of models

Does the model "fit" the situation?

Is there a simpler way to explain the situation?

Is the model internally consistent?

Does the model allow for useful prediction?

Does the model express the system's limitations?

See "Models of Models" by Hugh Dubberly.

Leadership from a Systems Perspective

Cybernetics explained

i. Model of Learning Systems

Exercise #1

Limits of Social Systems

ii. Requisite Variety

iii. Modeling Conversations

Exercise #2

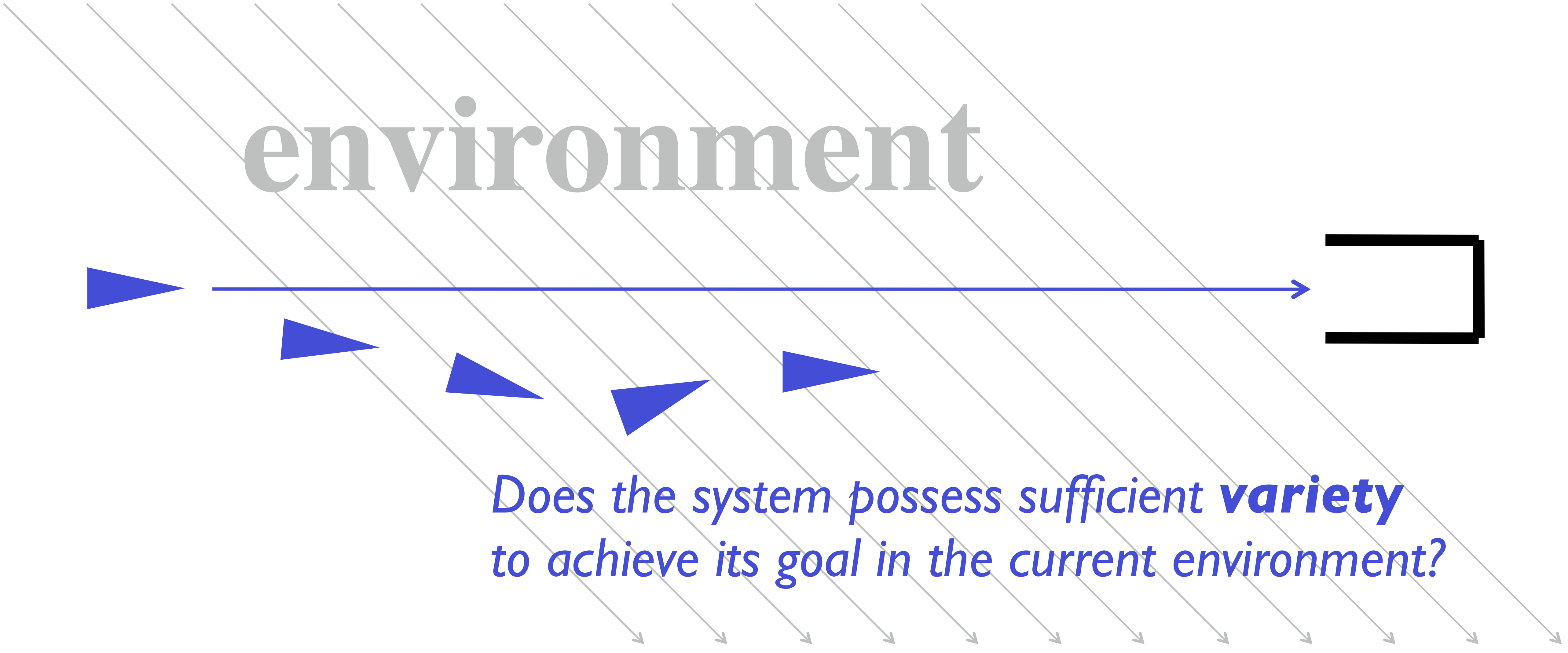
Co-evolution

iv. Model of Innovation

Exercise #3

Limits of Social Systems

Cybernetics has a rigorous definition
of the limitations of a system
to achieve its goal.

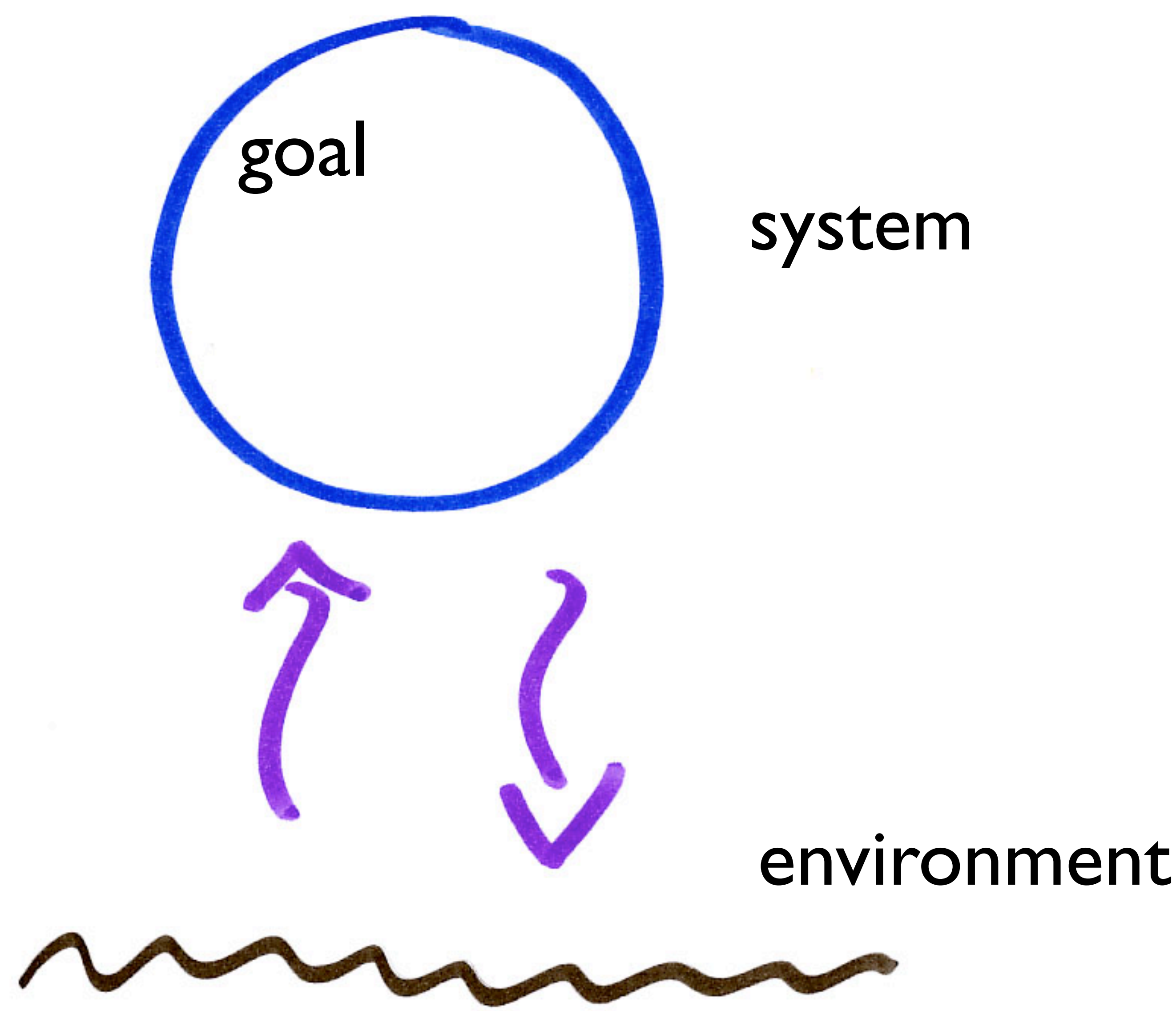


Does the system possess sufficient ***variety***
to achieve its goal in the current environment?

limits of a system

yes or no:

does the system possess sufficient variety to regulate its essential variables and maintain its goal?

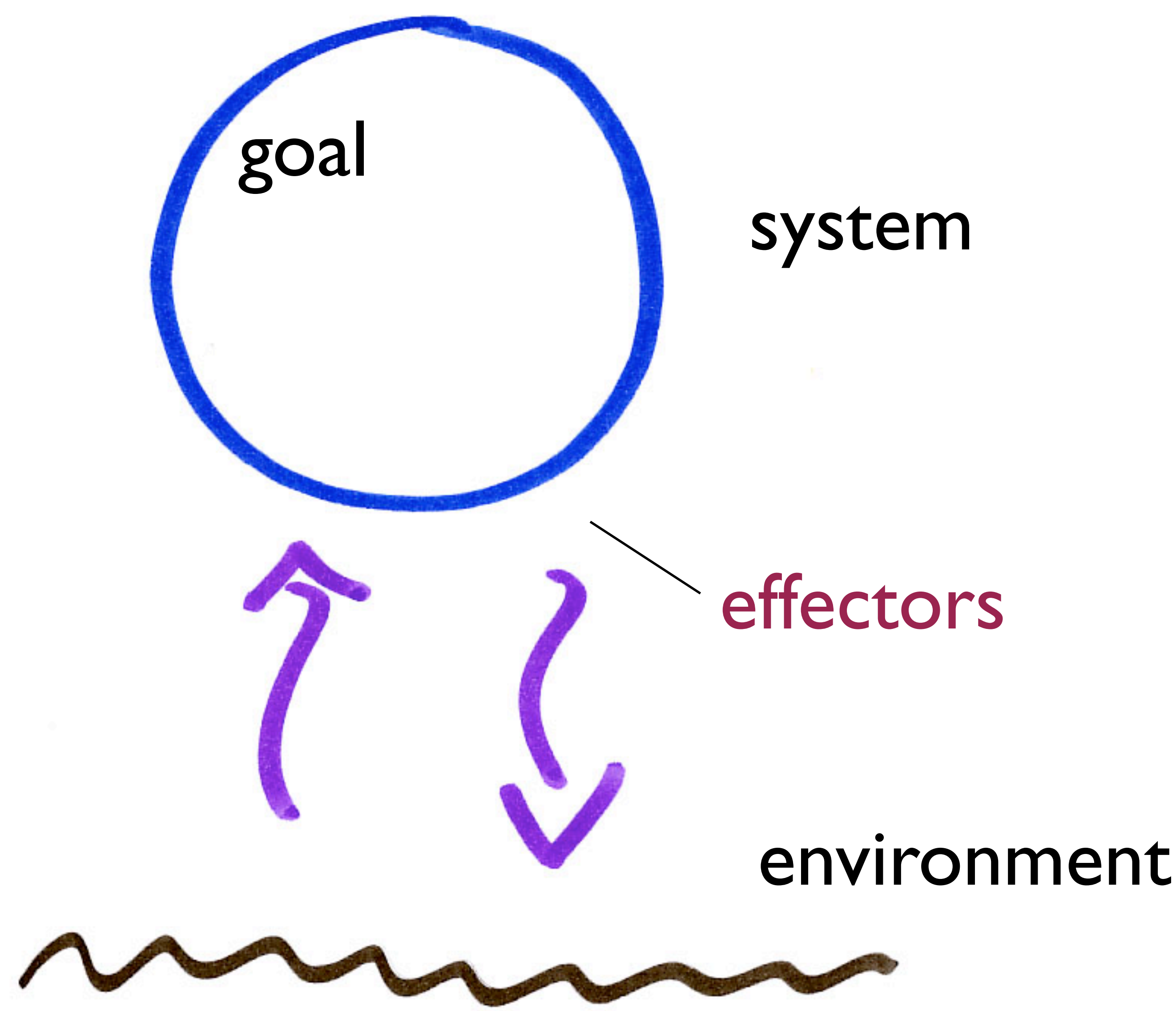


limits of a system—effectors

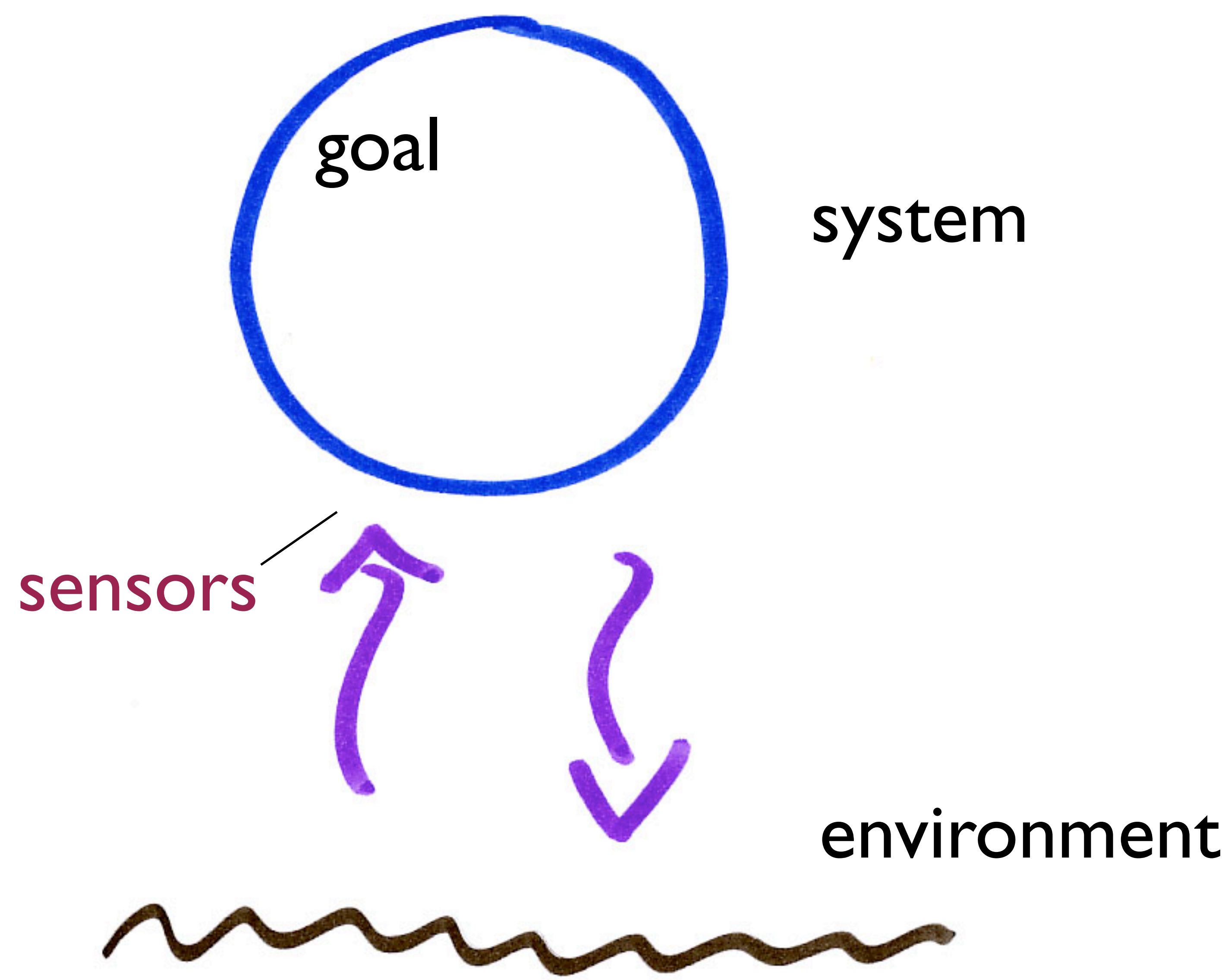
sufficient variety...

what are the parameters in the environment that the system can effect?

within what range of those parameters can the system maintain control?



limits of a system—sensors



sufficient variety...

is there sensing of the environment such that deviations from goal can be detected?

do the sensors have sufficient resolution & speed so that the system can respond in time?

Design for a Brain

W. ROSS ASHBY

Science Paperbacks

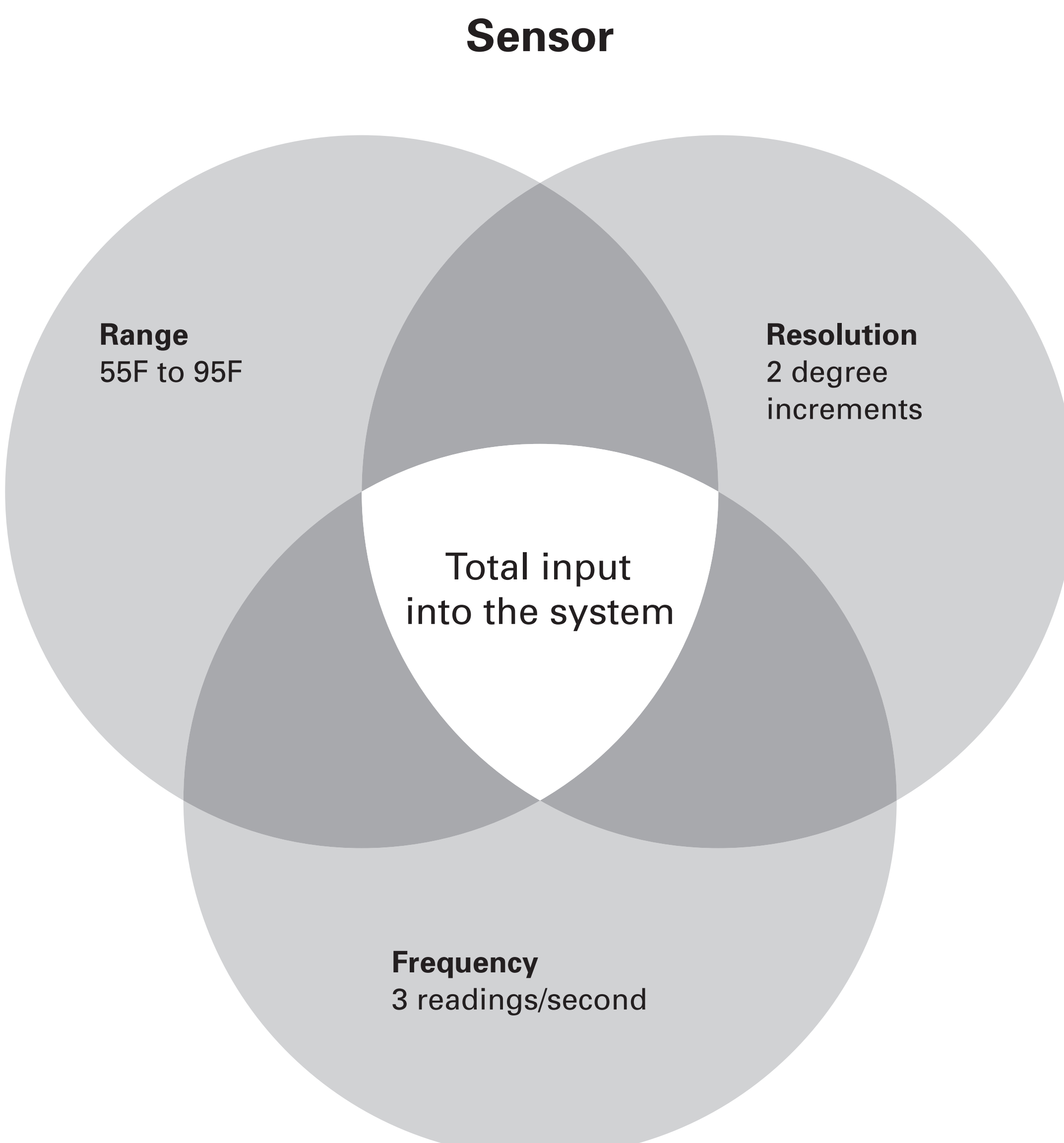
ii. Requisite Variety

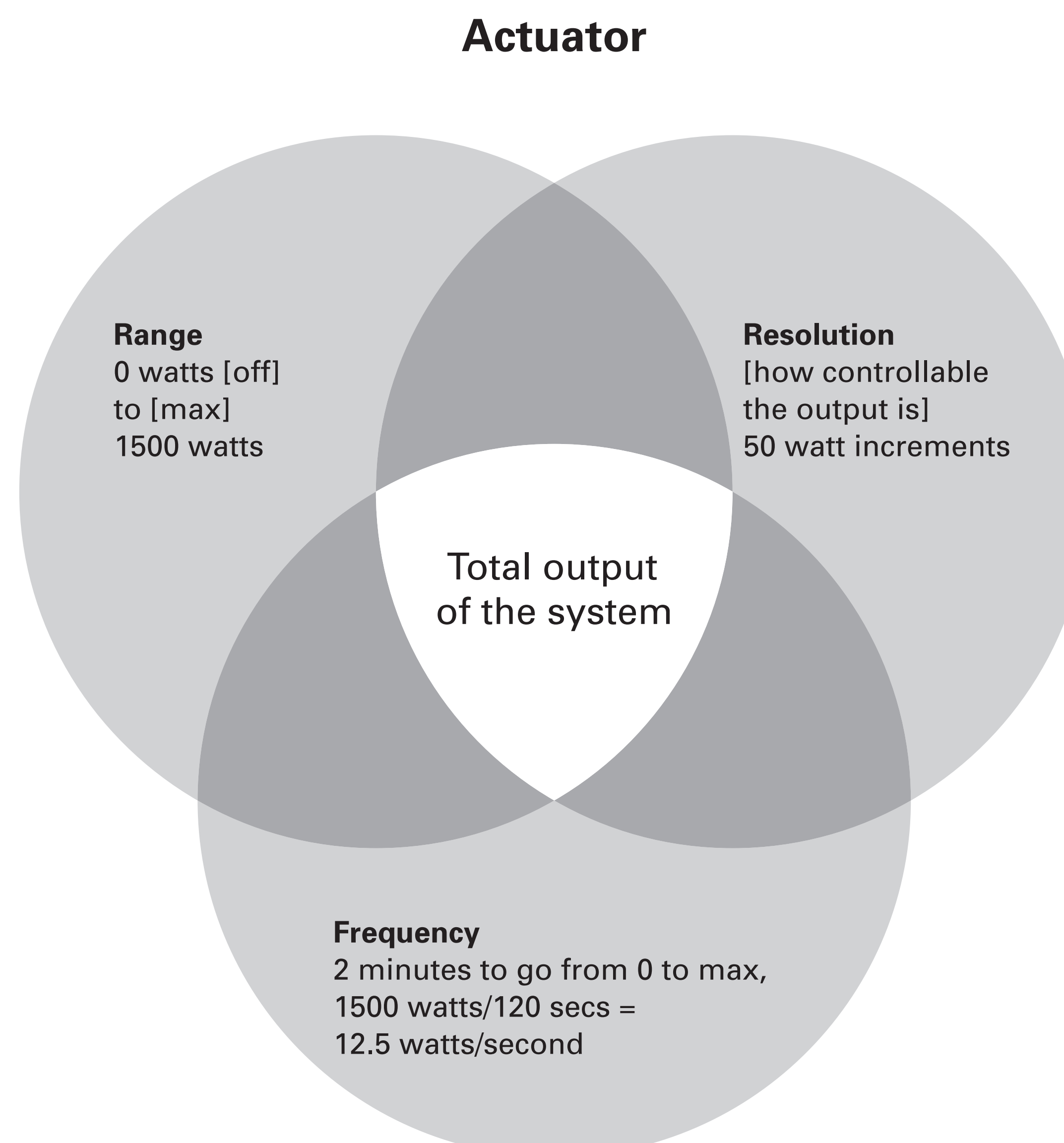
Cybernetics has a rigorous definition
of the limitations of a system
to achieve its goal.

Ashby's Law of Requisite Variety

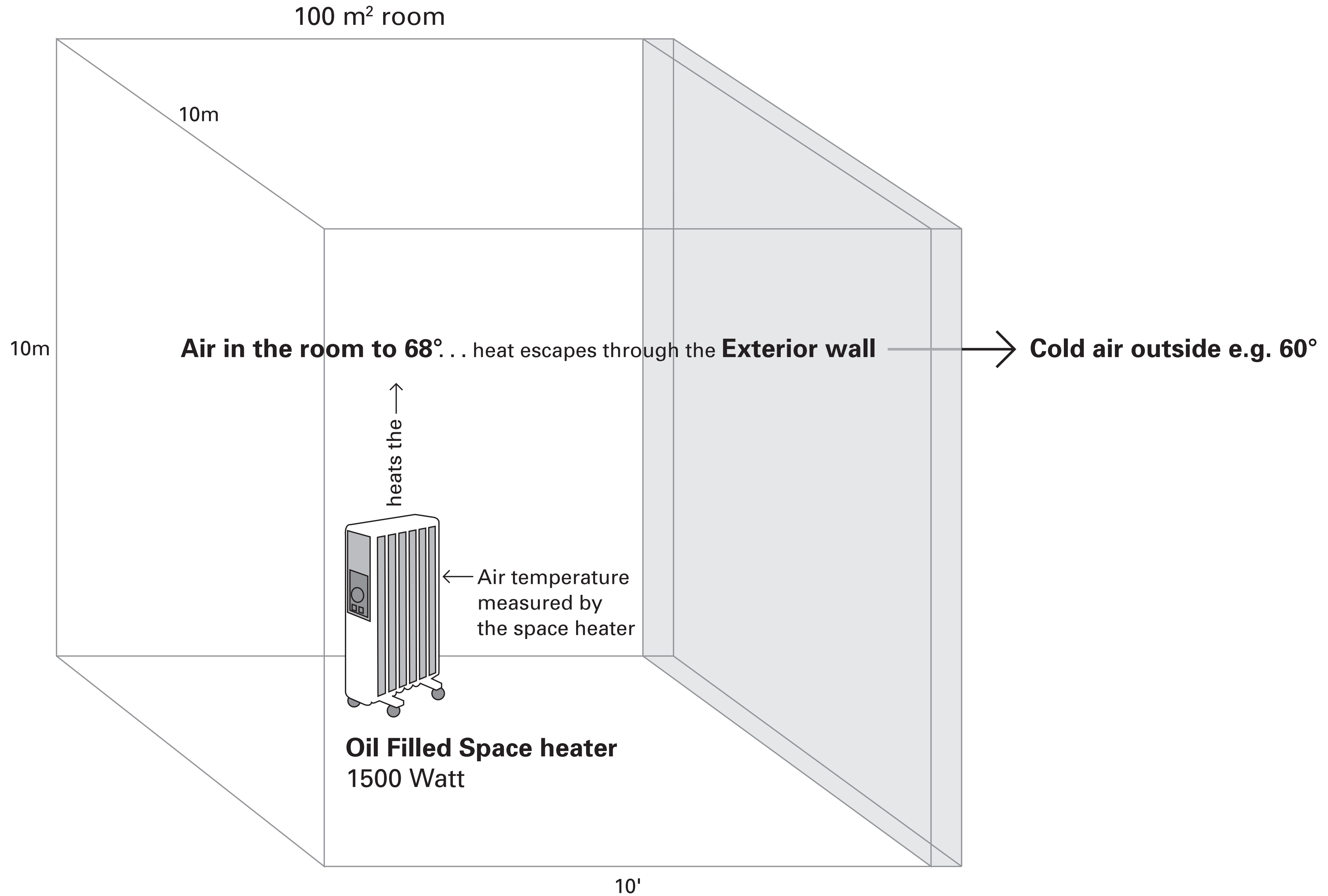
The variety (complexity) of a system
must be equal to (or greater than)
the variety of its environment
for the system to reliably achieve its goals.

Example: Space Heater

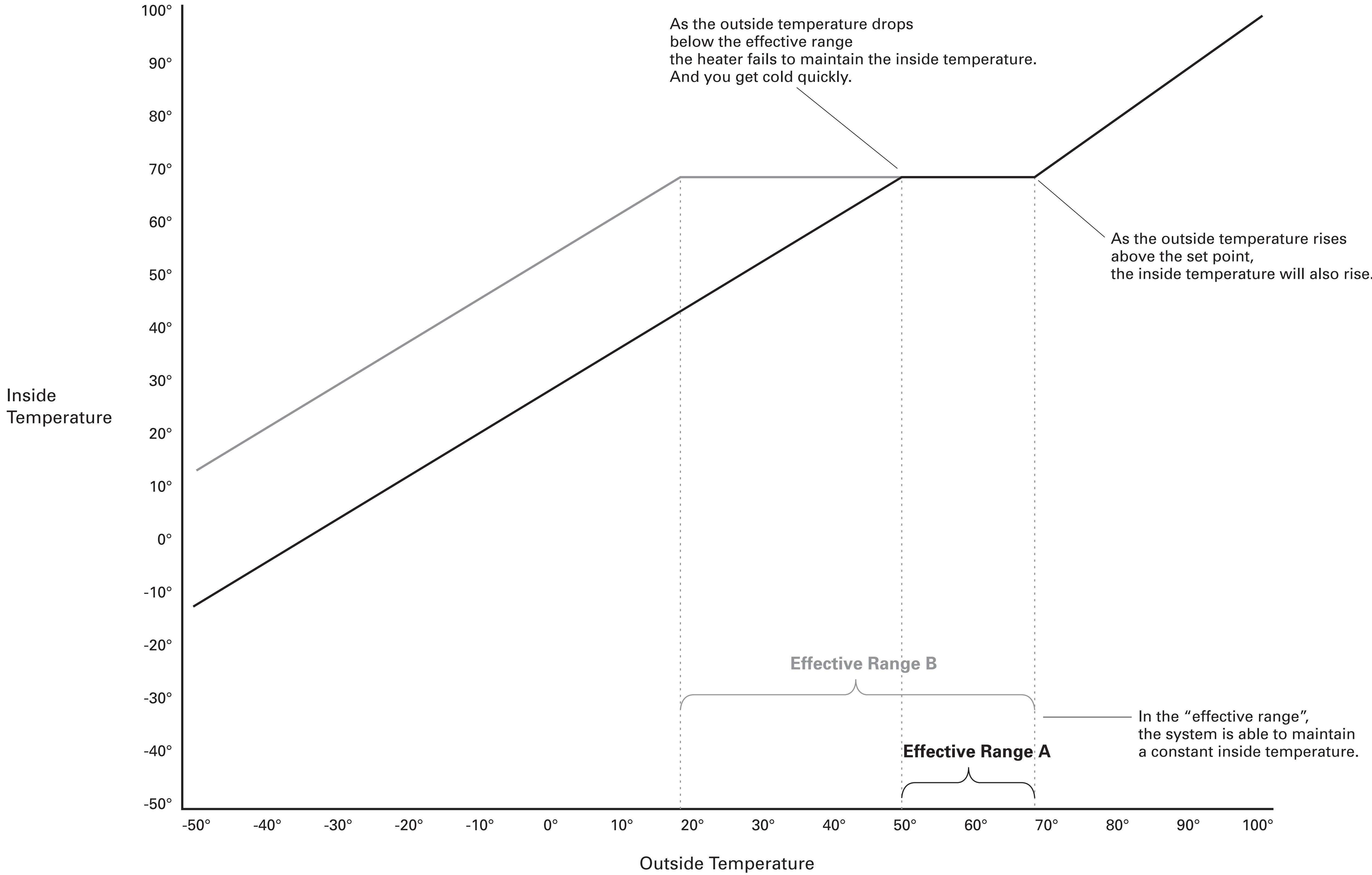




Determining the effective range of a space heater
(How much variety does it have?)

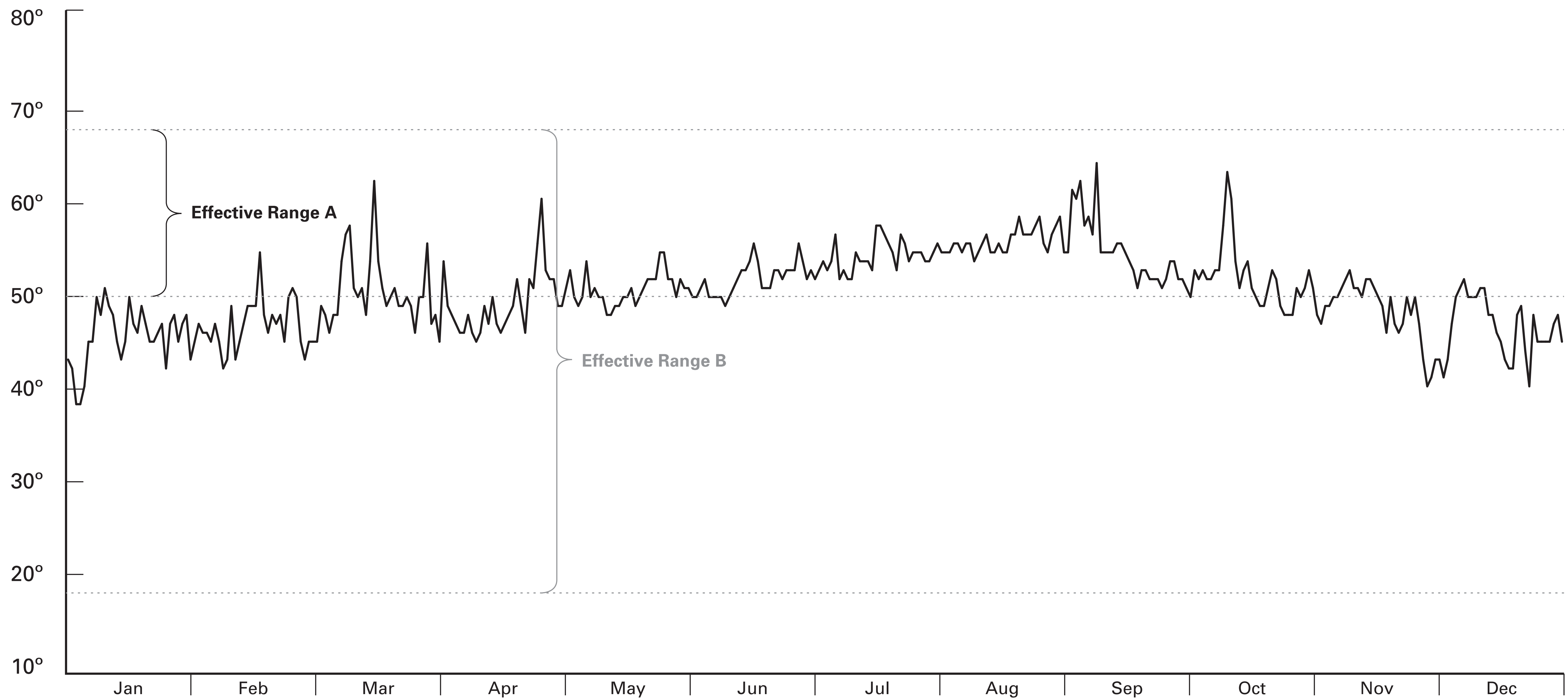


Graphing the effective range of a space heater



These figures are only intended as a theoretical example.

Where does the space heater fail?

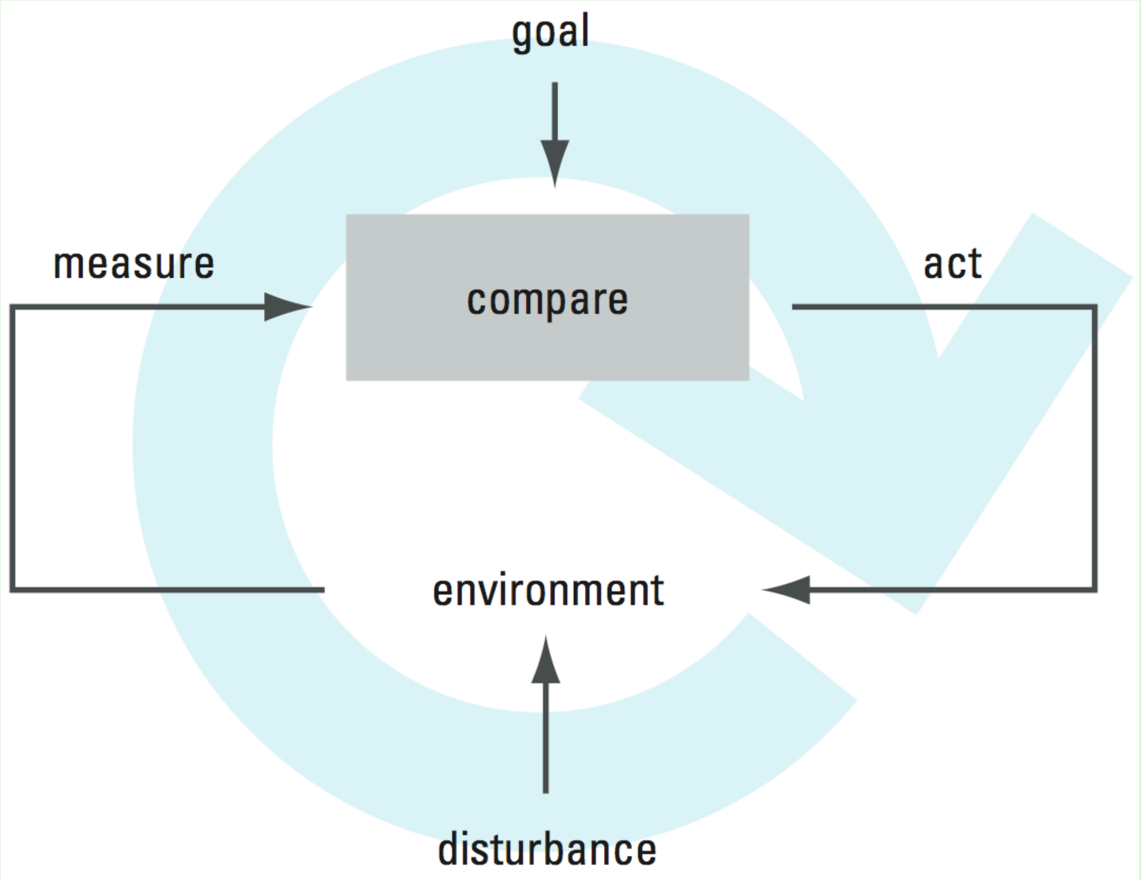


Daily Low Temperature
San Francisco, California 2004

ii. Requisite Variety

In a social system, such as a business, what are the...
- sensors?
- comparators?
- actuators?

How are goals...
- expressed?
- communicated?
- agreed upon?



Notes on the Role of **Leadership and Language** in Regenerating Organizations

An organization is its **language.**

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

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.

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.

Like all of us,
they cannot recognize their own limitations.
Constrained by the previously successful language,
we do not know that we do not know.
Consequently, we think we know—
and thus cannot learn.

Developed as a tool to increase efficiencies,
the organization's language, paradoxically,
becomes a trap.

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.

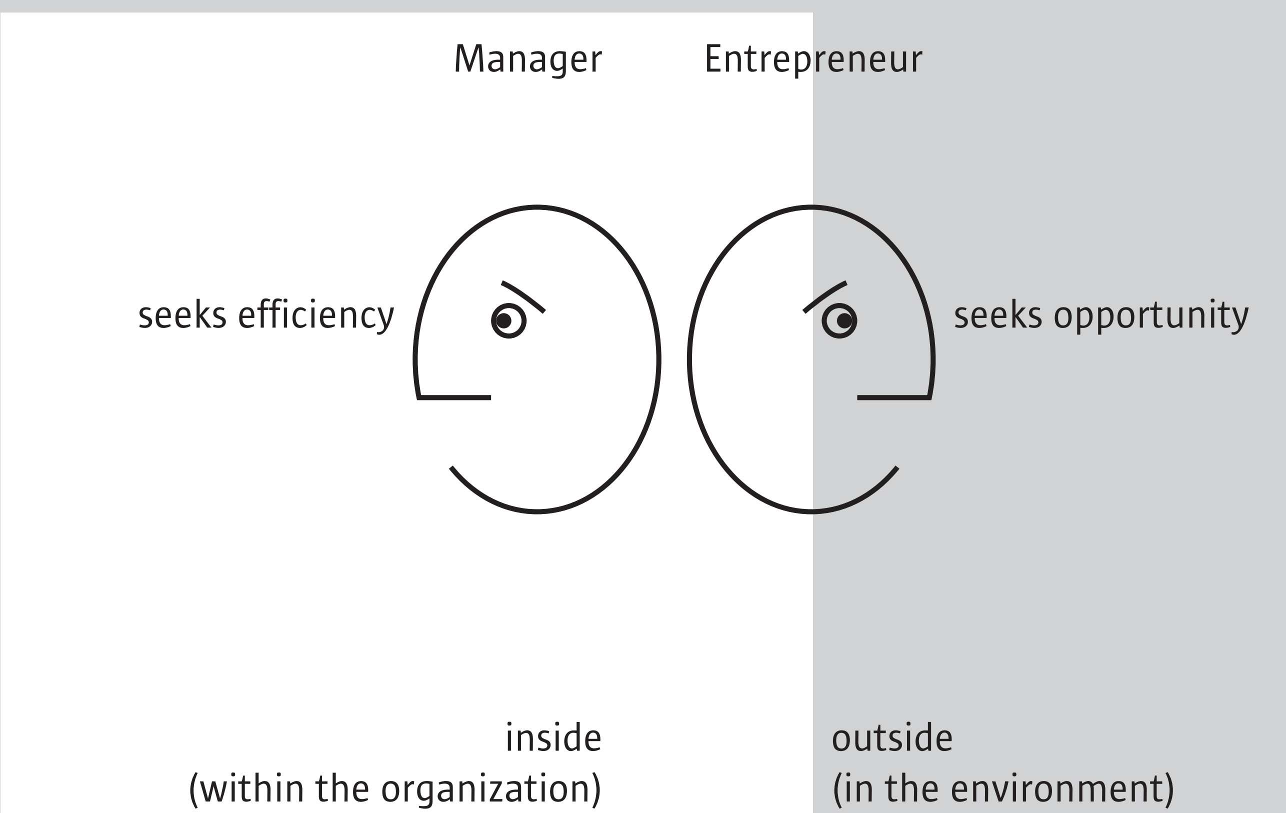
They do so by generating new language that appropriate groups in the organization come to understand and embrace.

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

Manager and Entrepreneur.

The Manager is responsible for improving the organization's present-day performance.

The Entrepreneur does not concern herself with present-day business.



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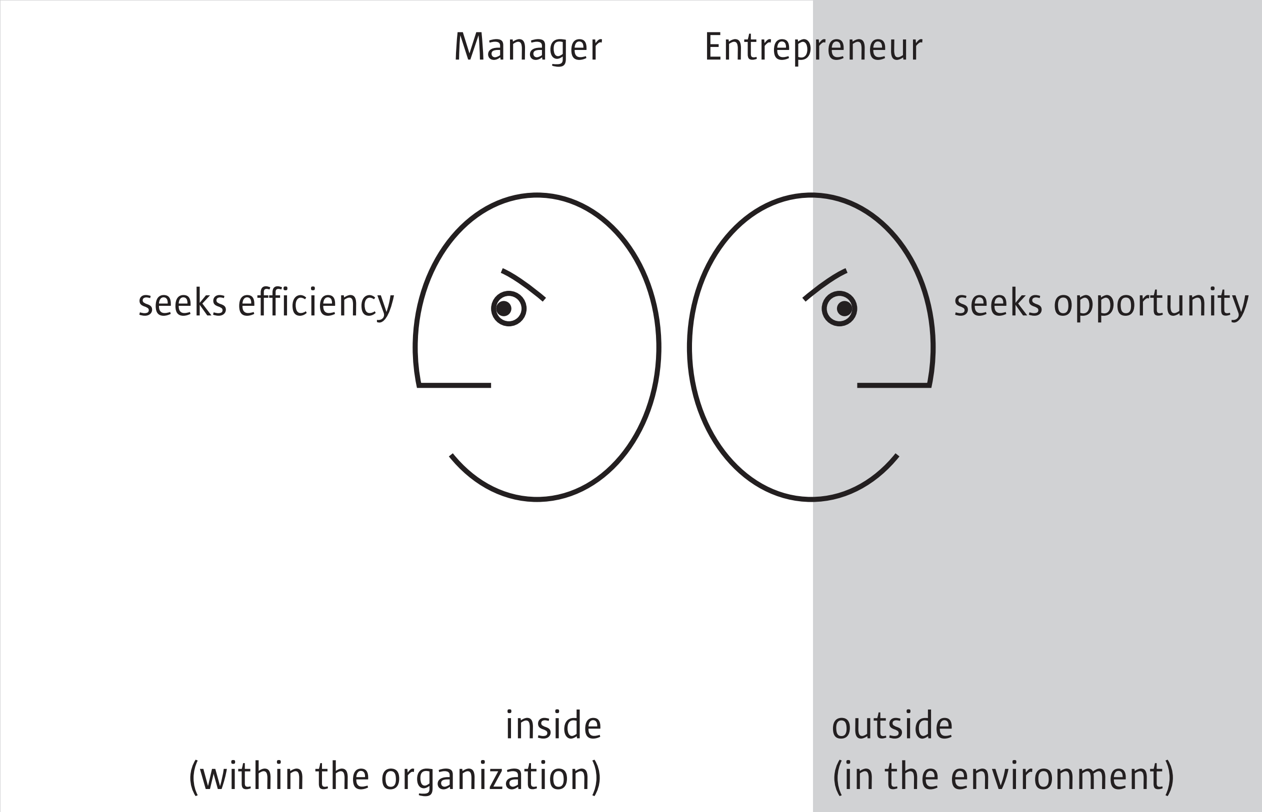


Managers' reaction to Entrepreneurs' language:

"Don't distract me with future problems."

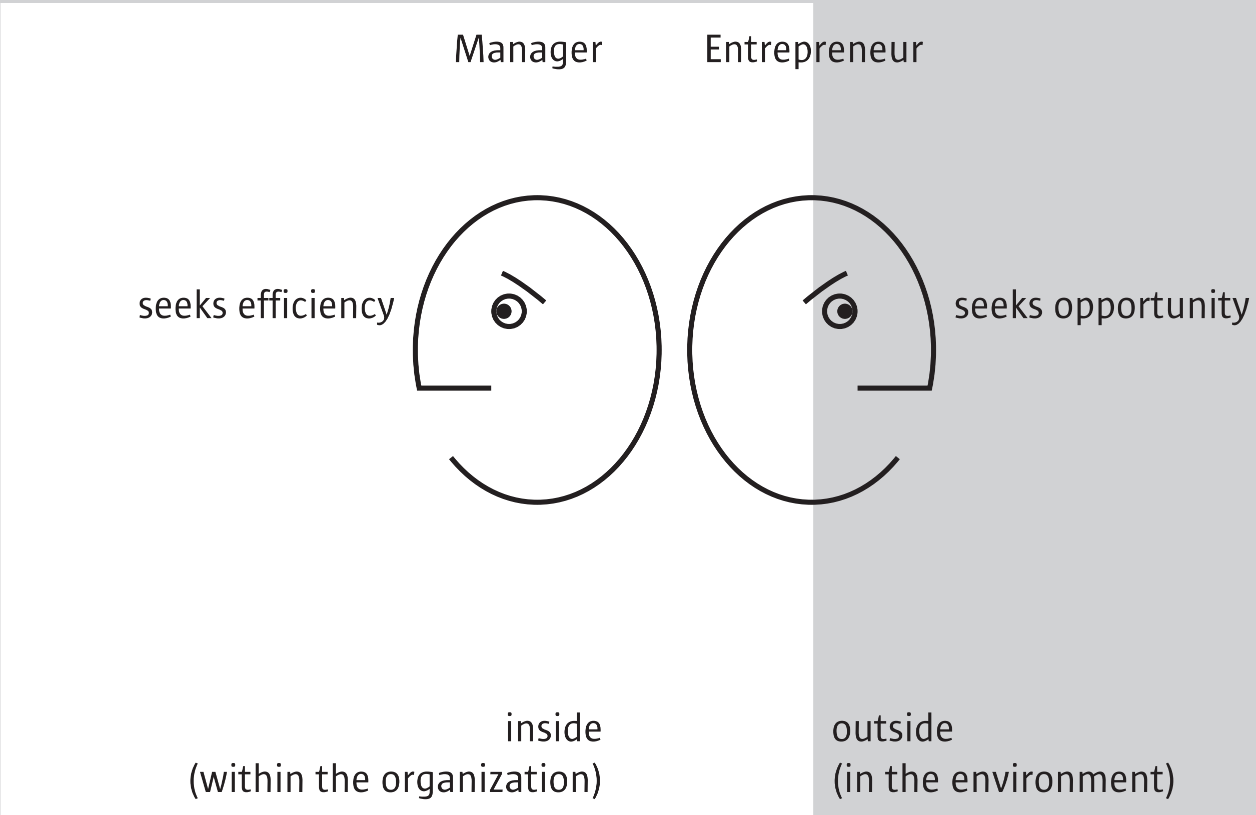
"That's a waste of time."

"Stop taking resources away from what's important."

Manager and Entrepreneur.

The Manager is responsible for improving the organization's present-day performance.

The Entrepreneur does not concern herself with present-day business.



Entrepreneurs' reaction to Managers' language:

"You are stuck in the past."

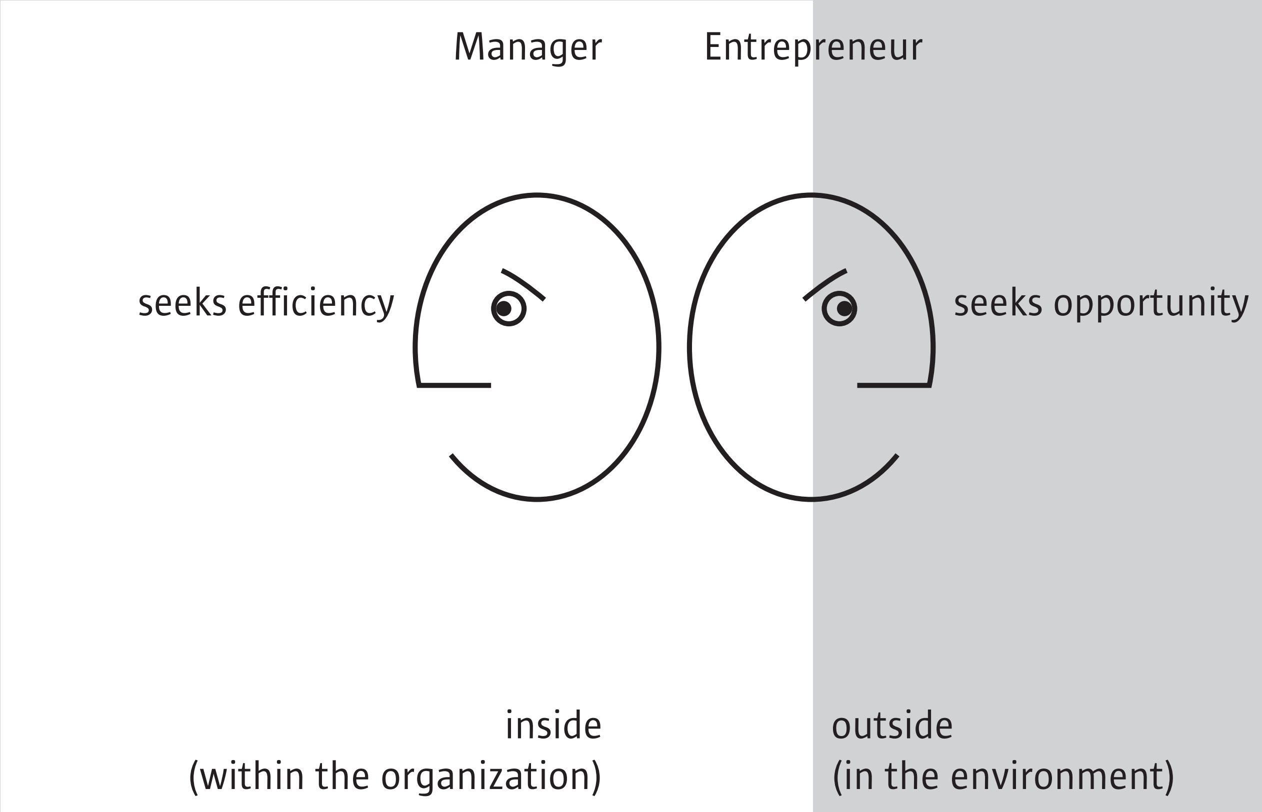
"What you want to do is no longer relevant."

"Stop taking resources away from what's important."

Manager and Entrepreneur.

The Manager is responsible for improving
the organization's present-day performance.

The Entrepreneur does not concern herself
with present-day business.



But...

Managers and Entrepreneurs
are both necessary for the
long-term viability of an organization.

Managers' language improves quality,
brings about efficiencies, and
focuses on today.

Entrepreneurs' language increases variety,
fosters insight, and focuses on tomorrow.

Leadership from a Systems Perspective

http://pangaro.com/mitsloan2009/

Paul Pangaro, Ph.D.
CyberneticLifestyles.com
New York City

MIT Sloan School
SIP Period
October 2009

Leadership from a Systems Perspective

Cybernetics explained

i. Model of Learning Systems

Exercise #1

Limits of Social Systems

ii. Requisite Variety

iii. Modeling Conversations

Exercise #2

Co-evolution

iv. Model of Innovation

Exercise #3

ii. Requisite Variety

Cybernetics has a rigorous definition
of the limitations of a system
to achieve its goal....

which can be applied to social systems
– variety is defined as capacity for conversation
– local truth controls the "essential variables"
that determine the viability system.

ii. Requisite Variety

In the social system of an organization,
- sensors are based in language
- comparators are implemented via conversation
- actuators are bounded by agreements.

Transactions are preceded by agreements.

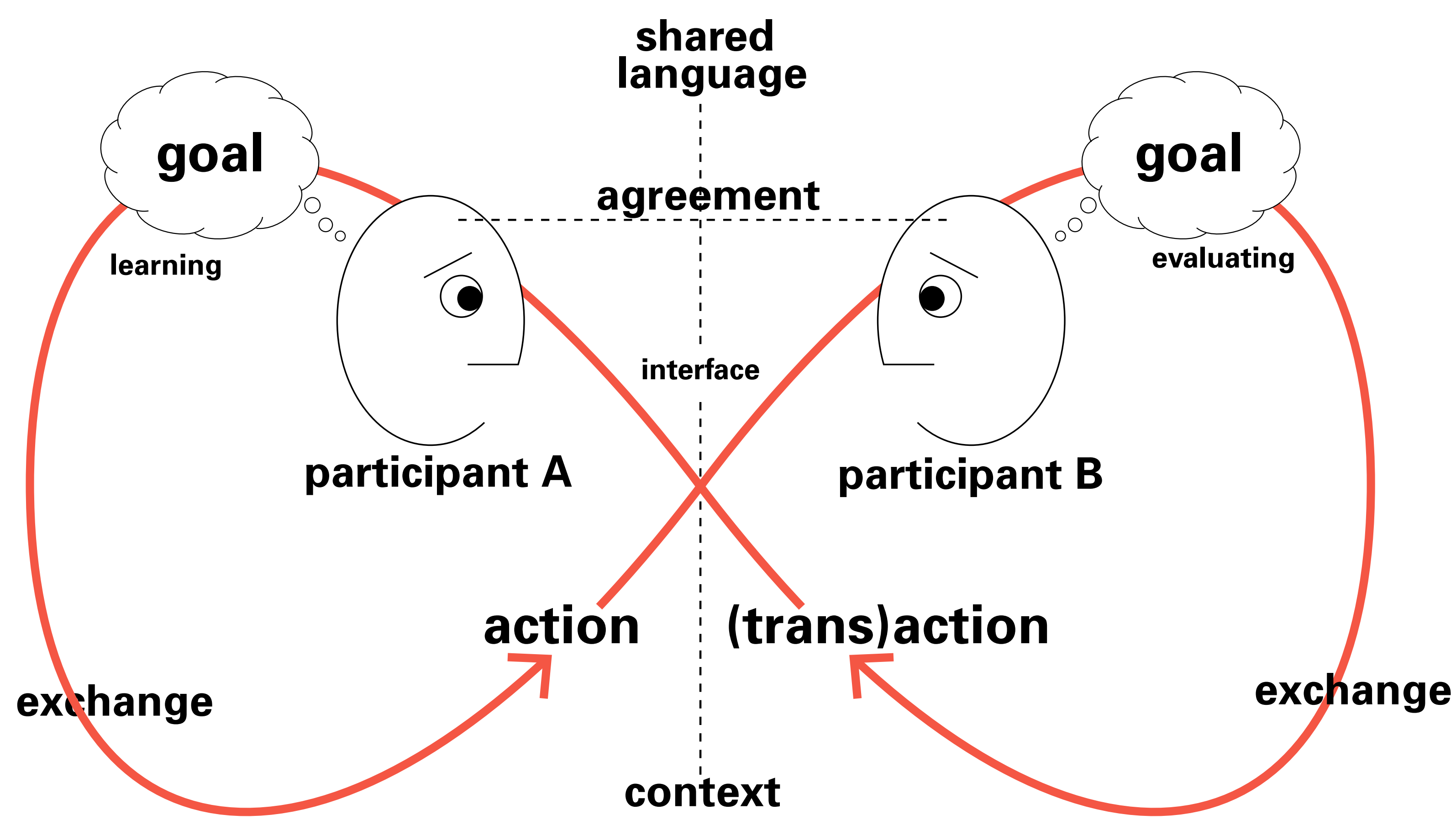
Agreements must be preceded by conversation.

Conversation must be preceded by language.

iii. Modeling Conversations

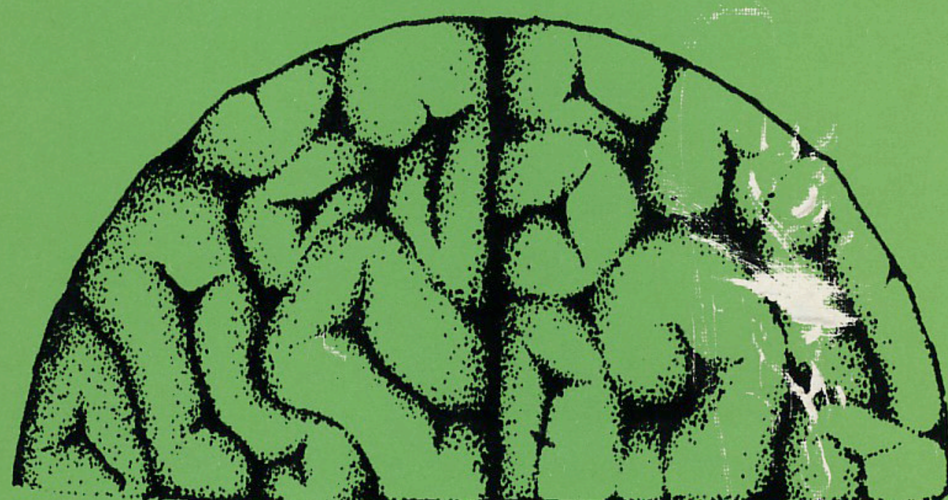
iii. Modeling Conversations

Cybernetics has a rigorous definition of conversation.



GORDON PASK

CONVERSATION, COGNITION AND LEARNING

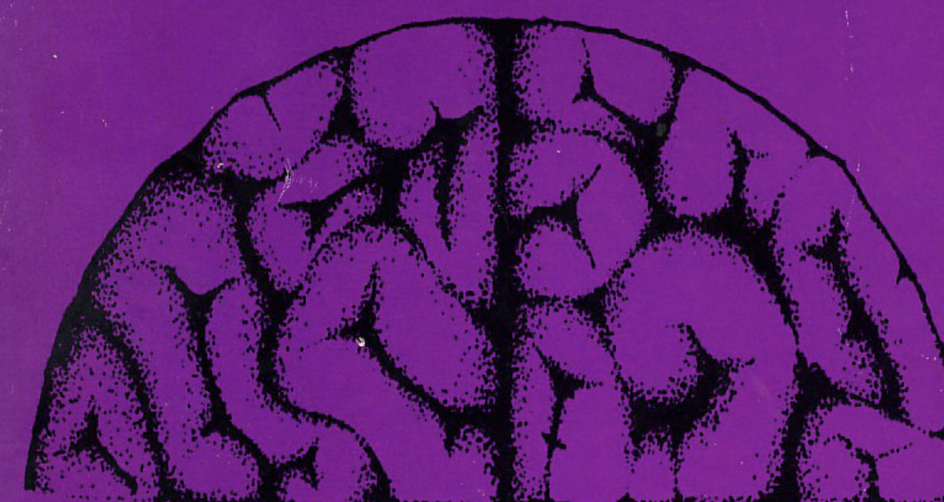


A CYBERNETIC THEORY AND METHODOLOGY

ELSEVIER

GORDON PASK

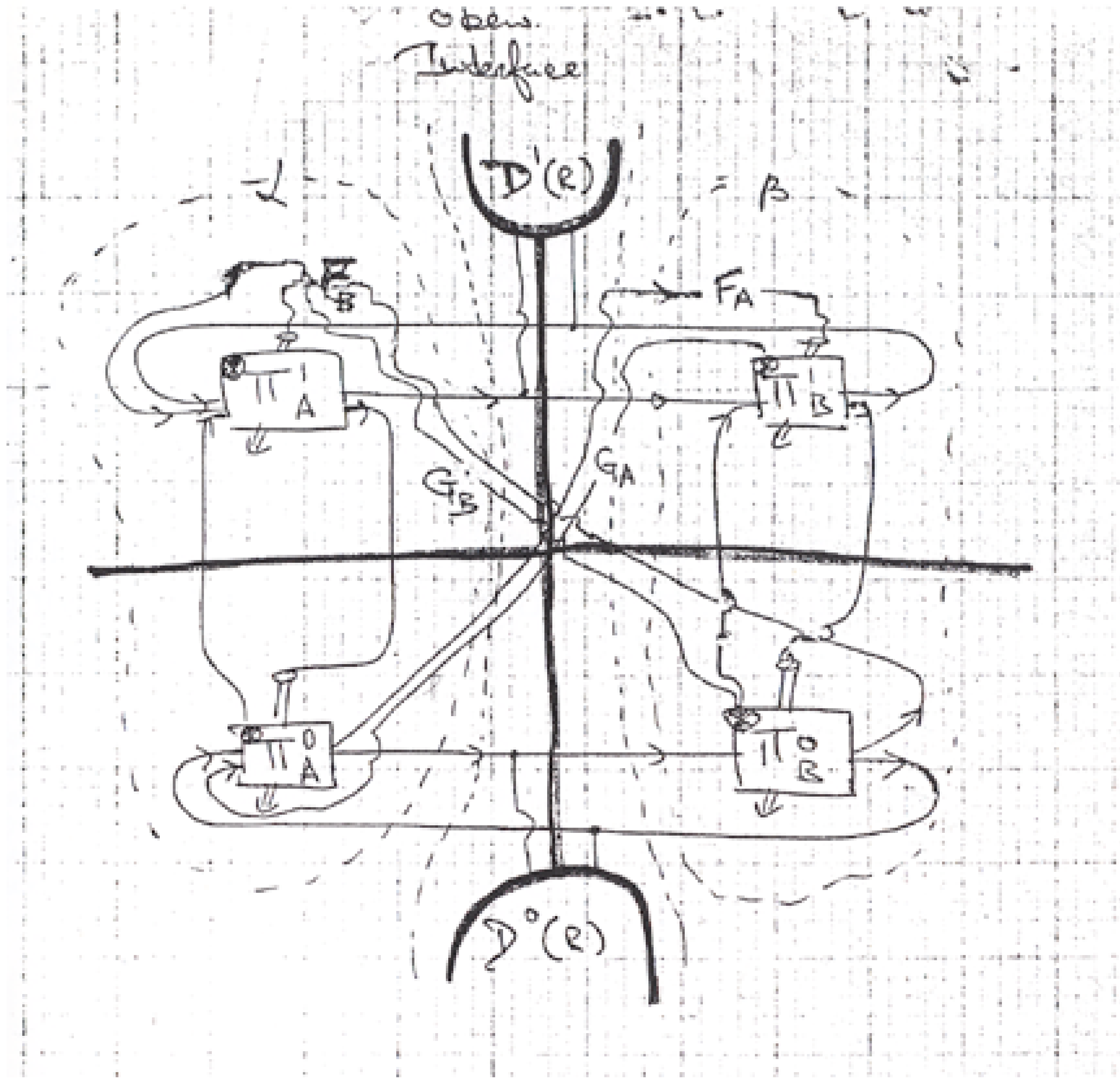
CONVERSATION THEORY

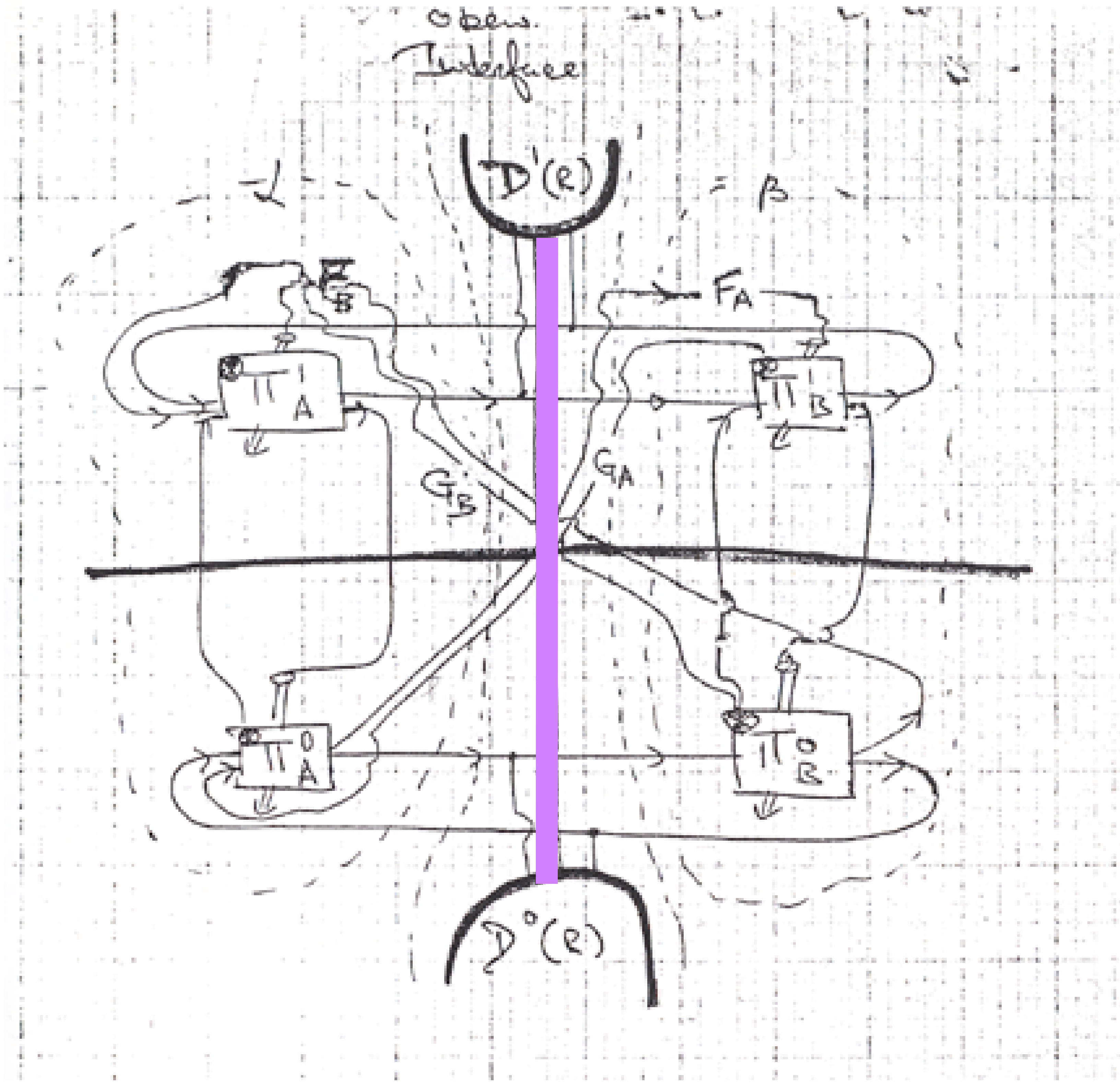


APPLICATIONS IN EDUCATION AND EPISTEMOLOGY

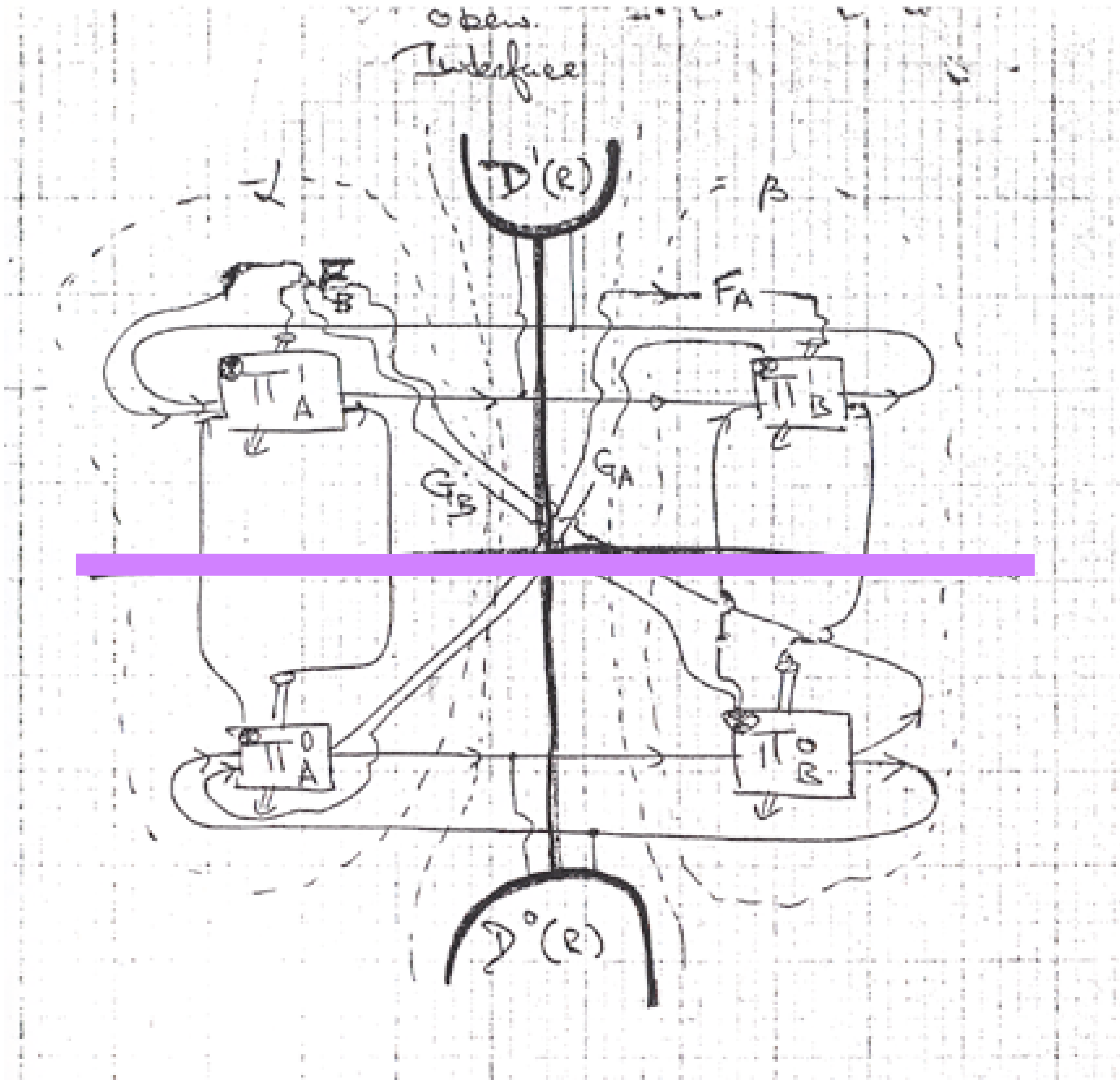
ELSEVIER

Pask's own rendering—in *Soft Architecture Machines*

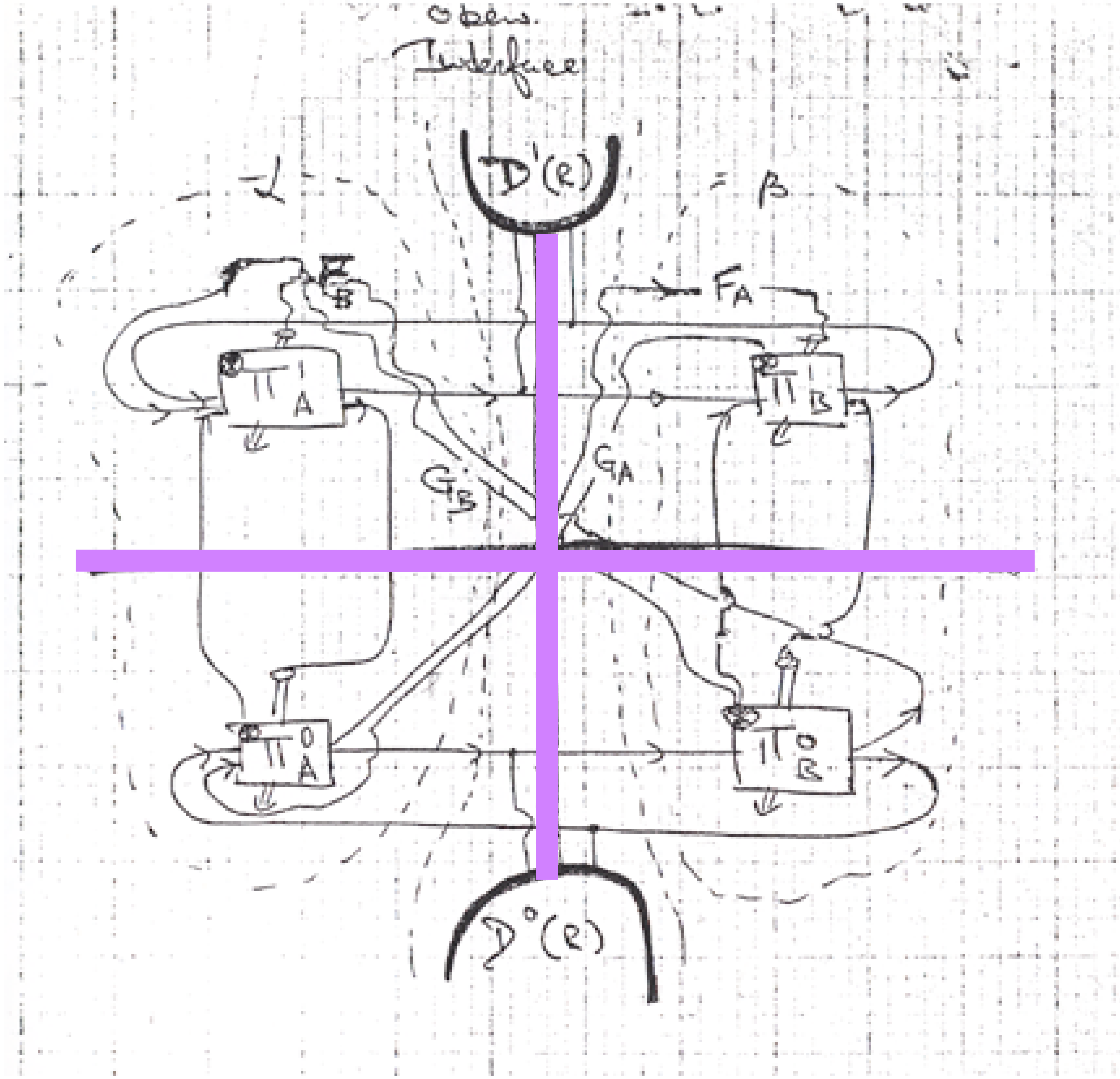




Interface
D'(R)
β
F_A
G_A
G_B
D°(R)

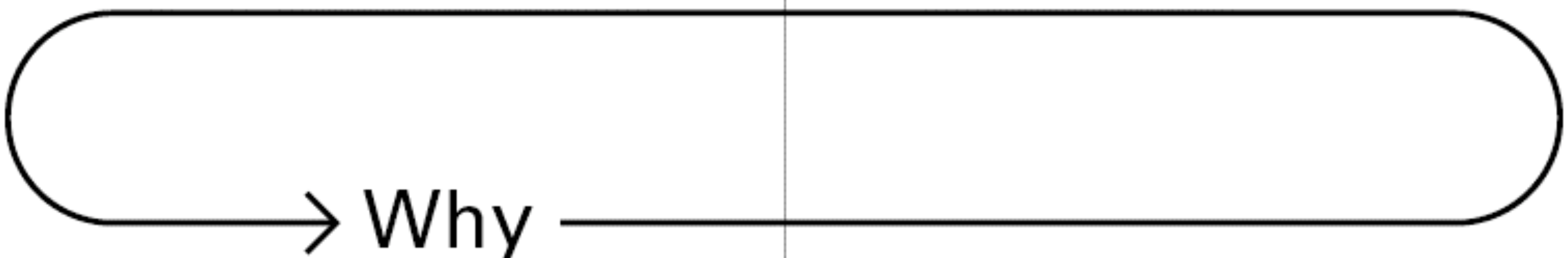


Interface
$D^1(R)$
F_A
G_B
G_A
Π^1_A
Π^1_B
Π^0_A
Π^0_B
$D^0(R)$


Interface
$D^1(R)$
α
β
F_B
F_A
Π^1_A
Π^1_B
G_B
G_A
Π^0_A
Π^0_B
$D^0(R)$

Participant A | Participant B

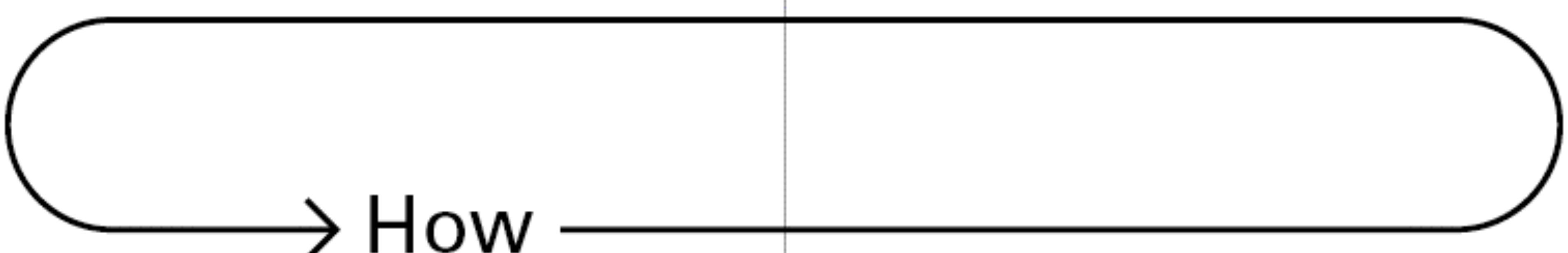
Description (L^1)



The goal of the concept, the role each topic plays.

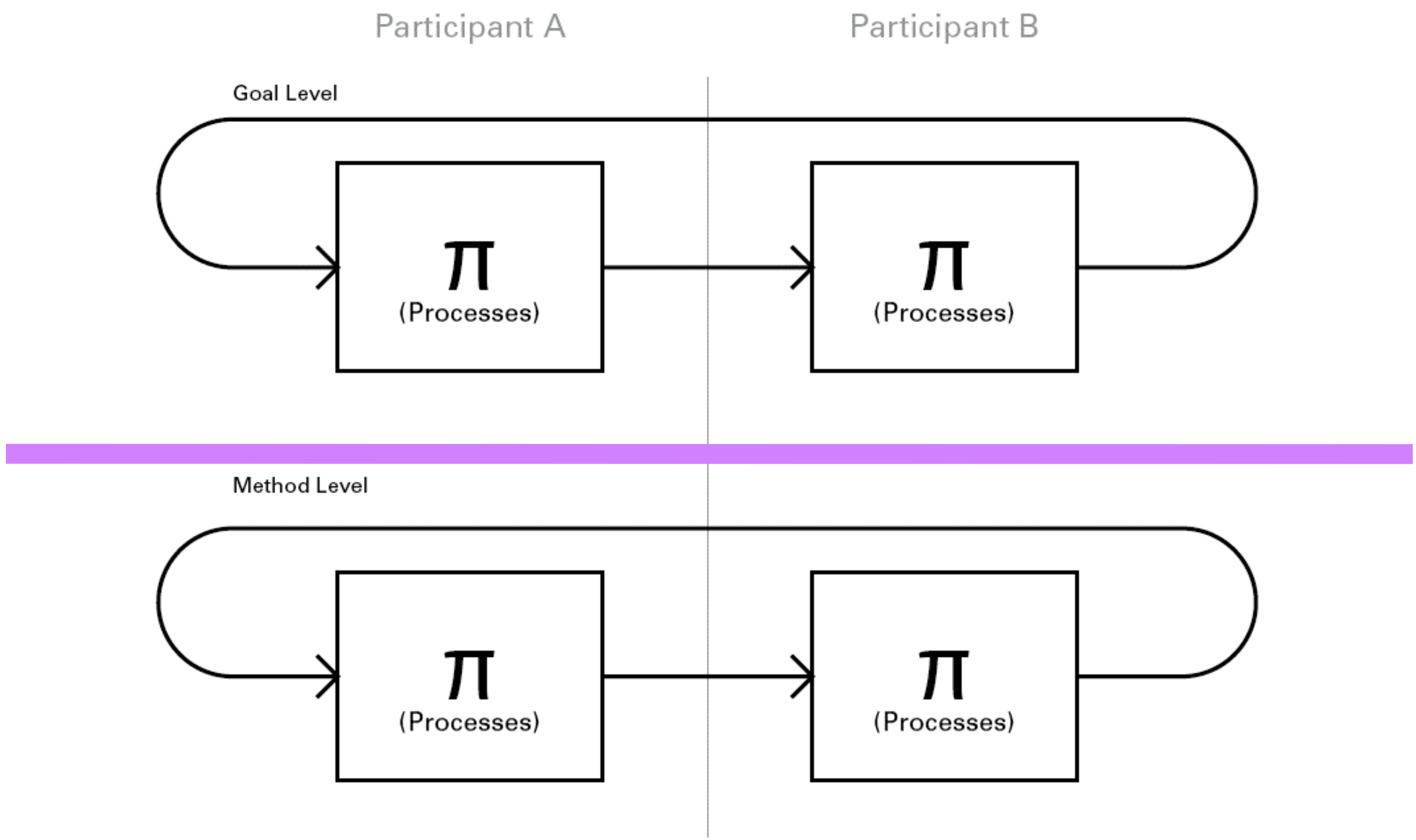
Example: My goal is to show you how to use a compass to make a circle on a table.

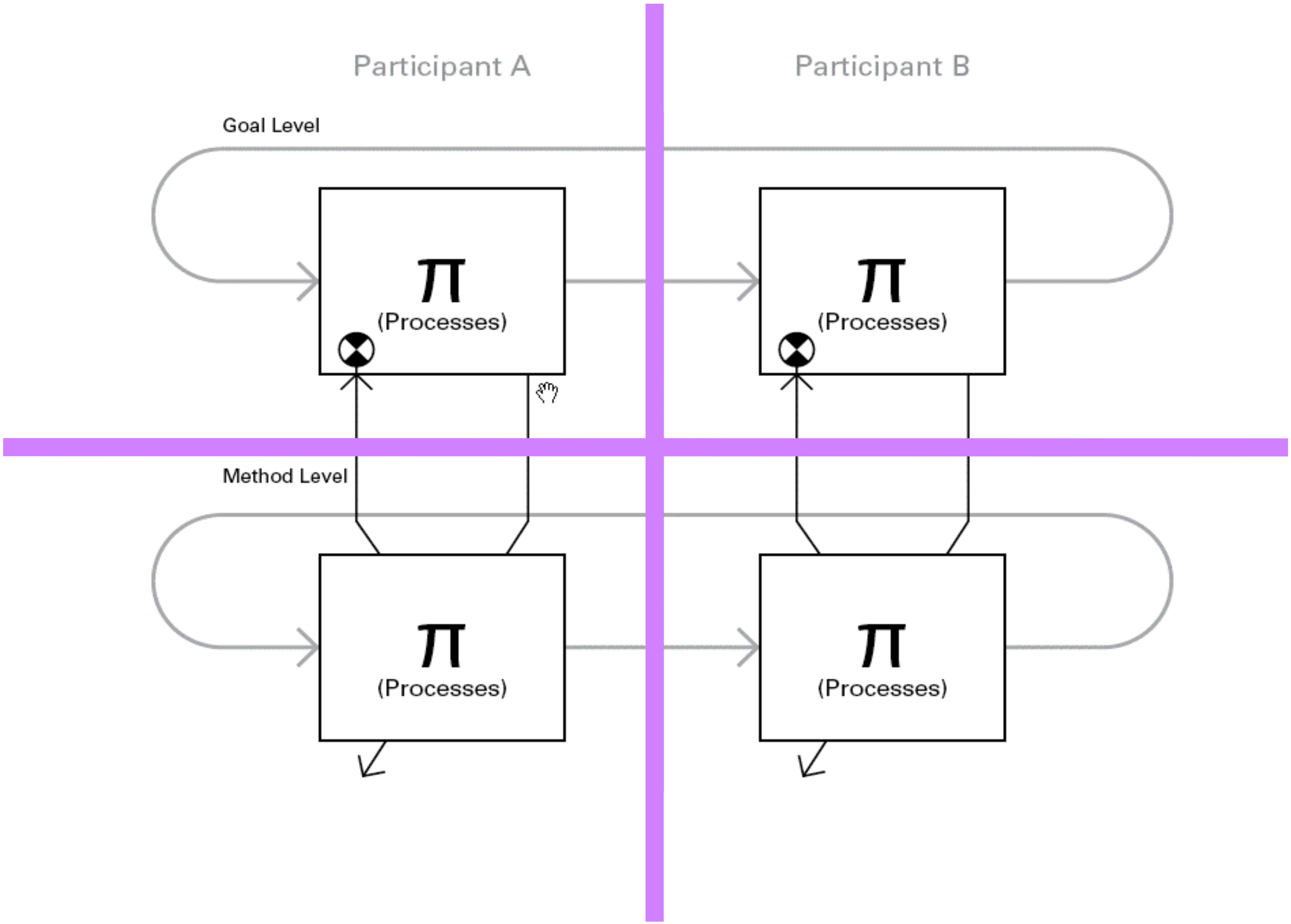
Prescription (L^0)

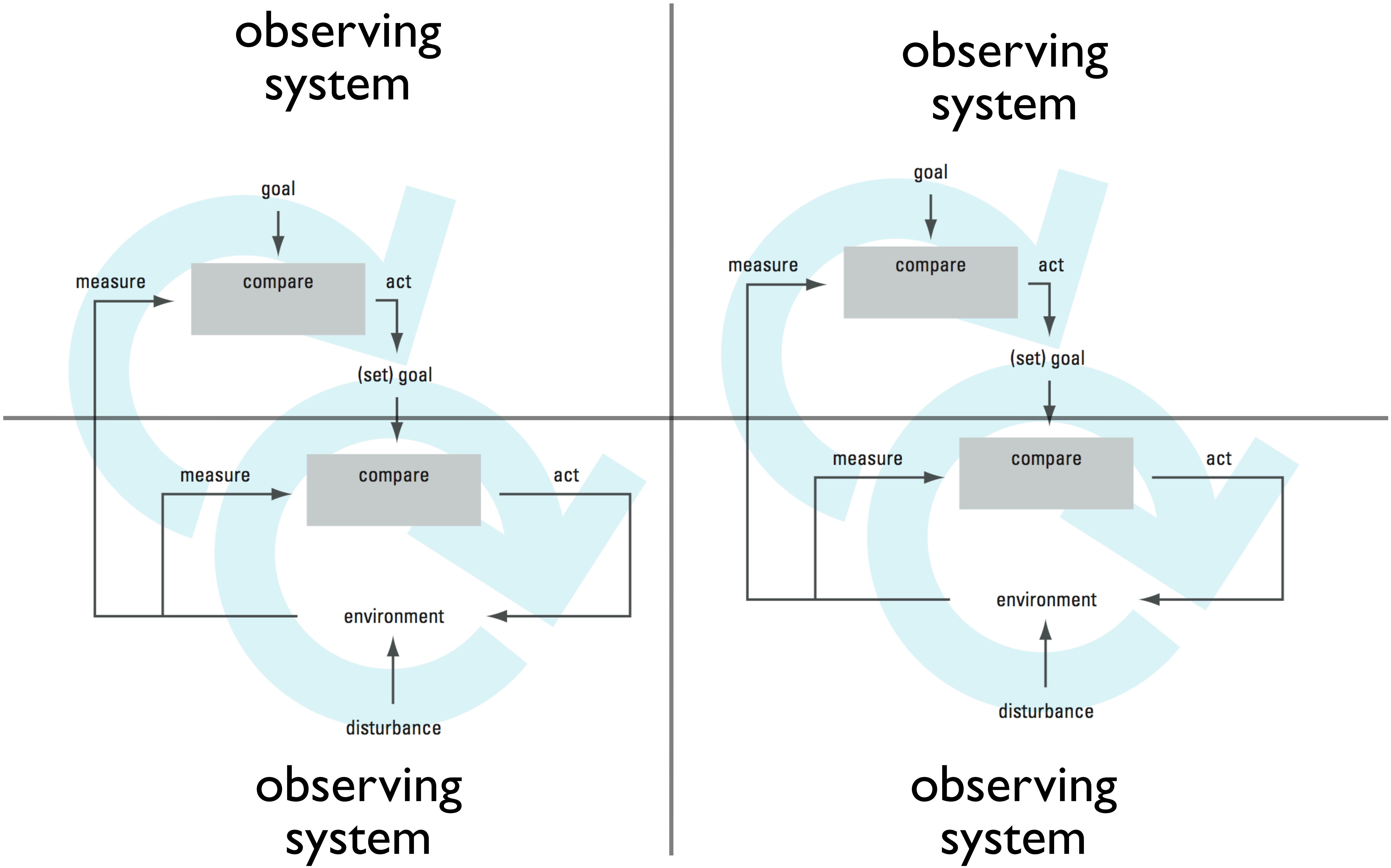


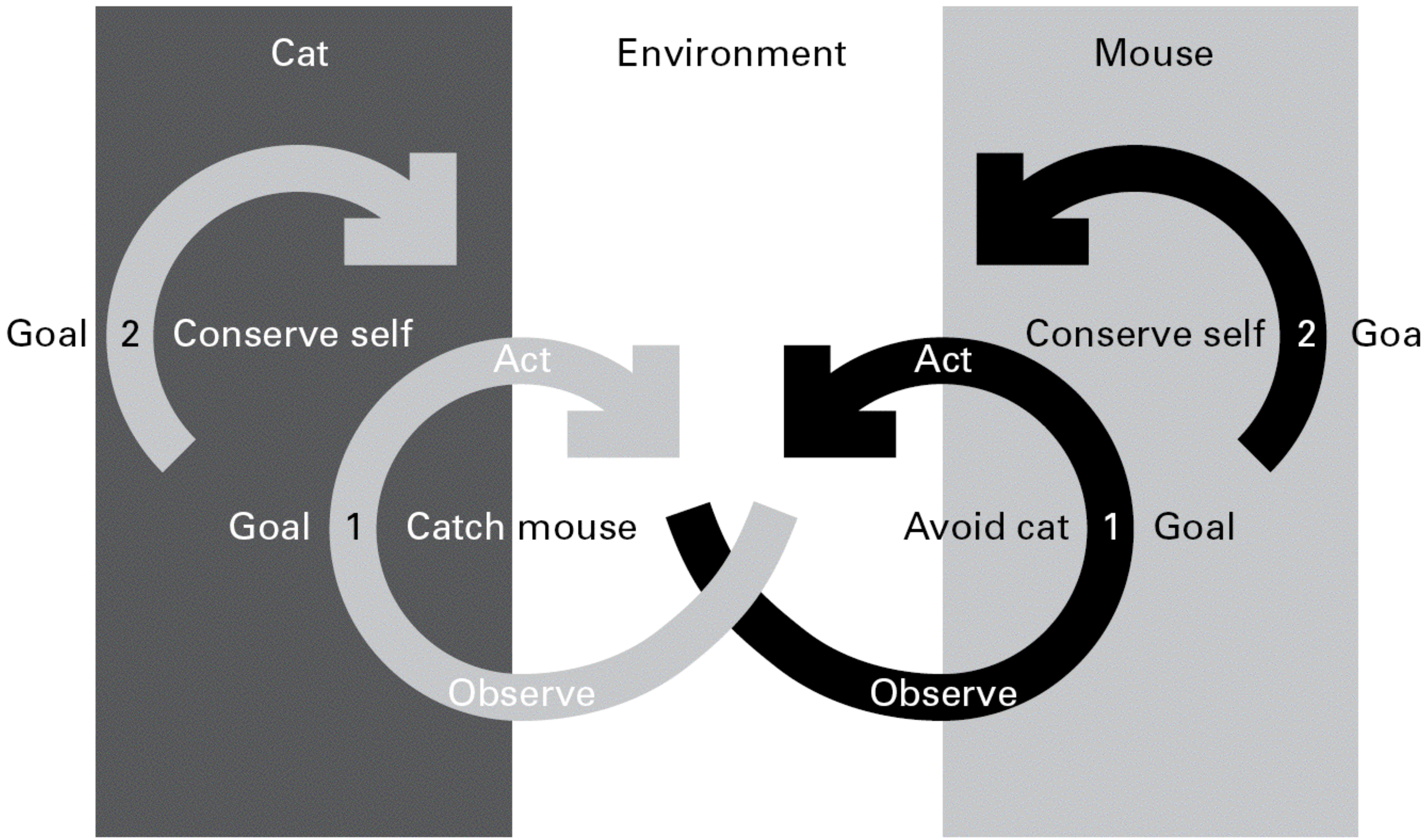
The relationships among topics; instructions on combining topics to fulfill the goal.

Example: Stick the compass point into the table; swing the other arm around the compass point so that it forms a circle.


Participant A
Participant B
Goal Level
π
(Processes)
π
(Processes)
Method Level
π
(Processes)
π
(Processes)

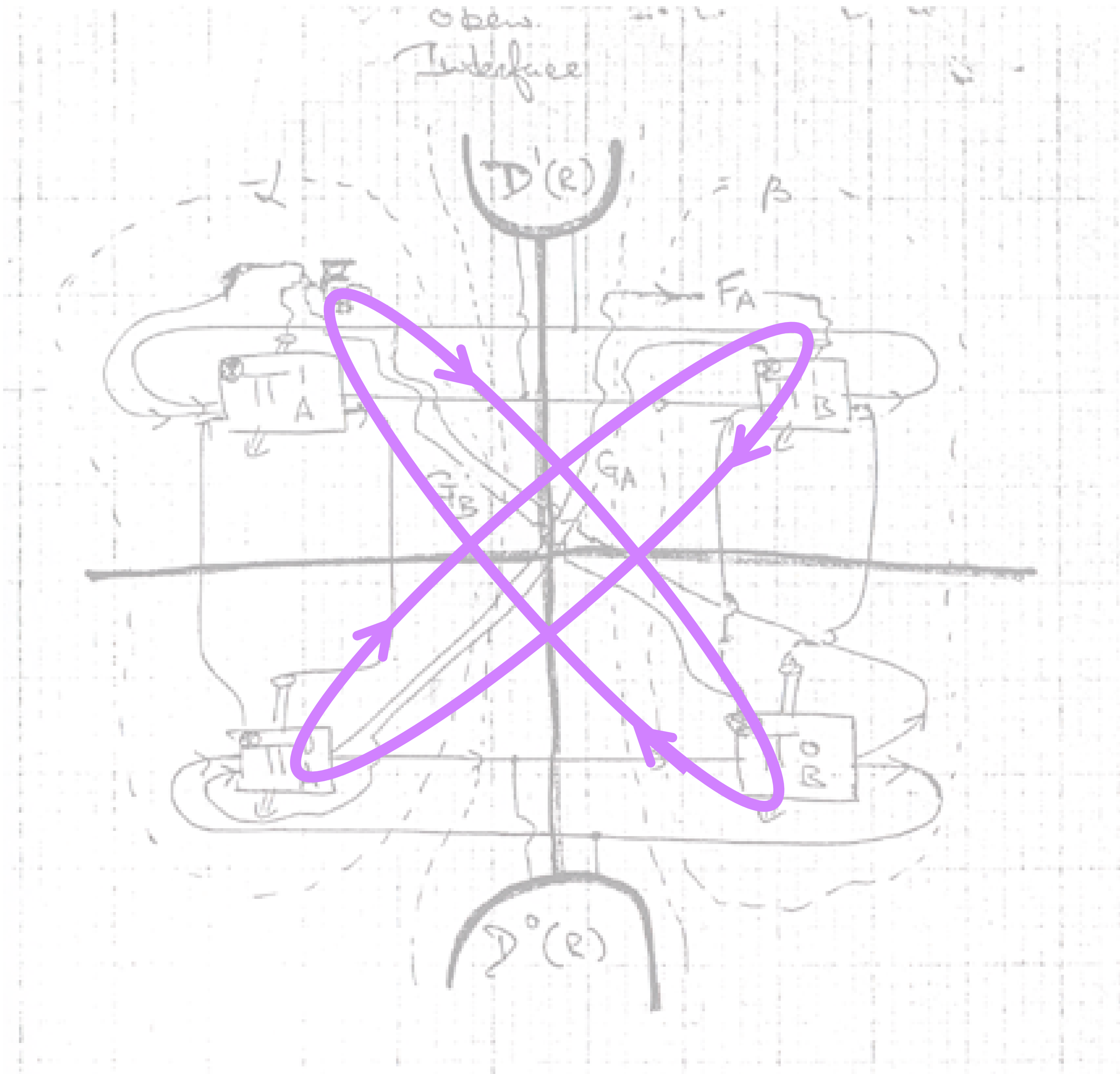

Participant A
Participant B
Goal Level
π
(Processes)
π
(Processes)
Method Level
π
(Processes)
π
(Processes)

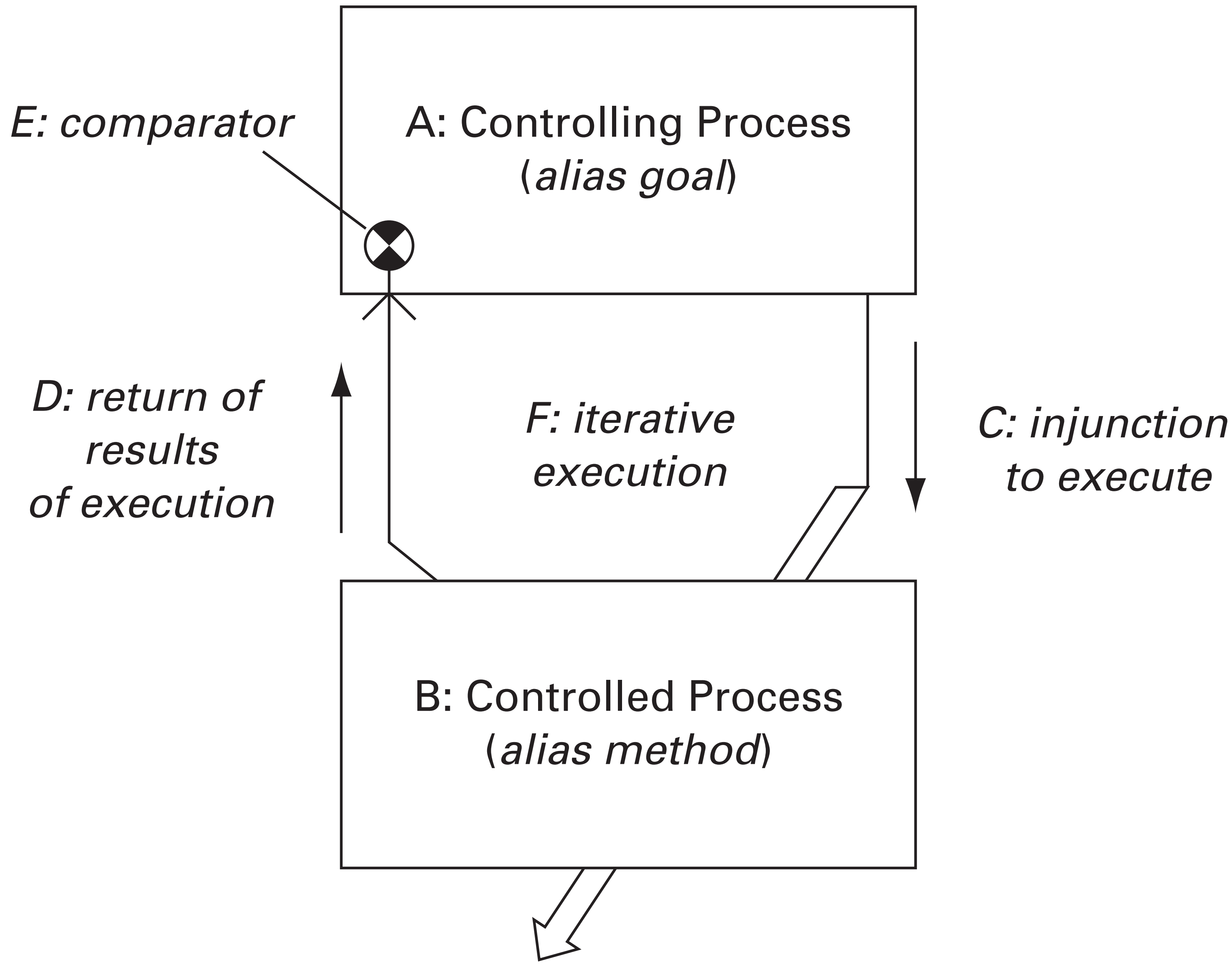

observing
system
observing
system
goal
measure
compare
act
(set) goal
measure
compare
act
environment
disturbance
goal
measure
compare
act
(set) goal
measure
compare
act
environment
disturbance
observing
system
observing
system



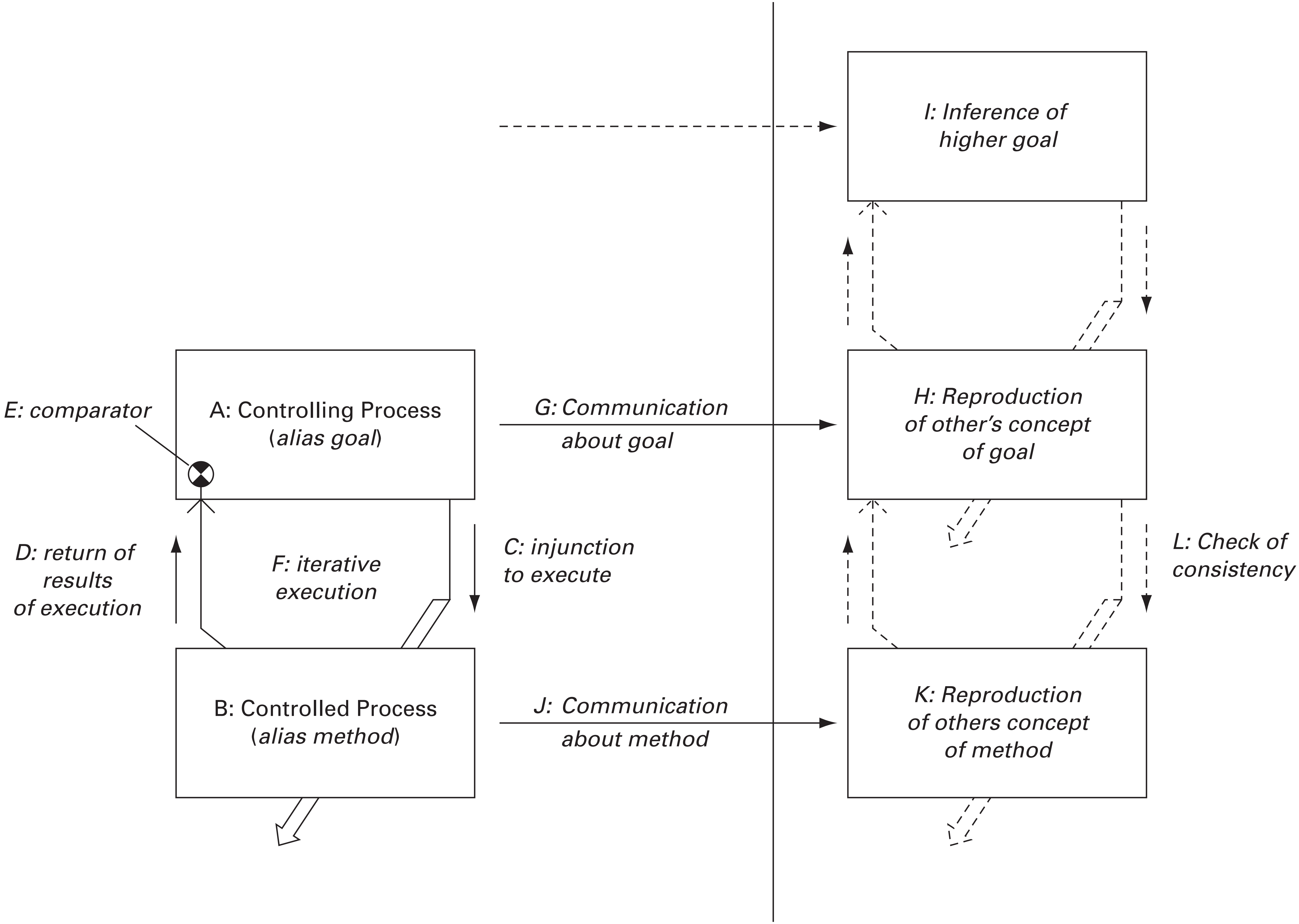
Cat
Environment
Mouse
Goal
2
Conserve self
Conserve self
2
Goal
Act
Act
Goal
1
Catch mouse
Avoid cat
1
Goal
Observe
Observe

dance—contention—shared outcomes





Closure occurs when comparator confirms
execution of controlled processes is coherent with controlling processes
(as when a goal is achieved by executing a successful method)


I: Inference of higher goal
E: comparator
A: Controlling Process (alias goal)
G: Communication about goal
H: Reproduction of other's concept of goal
D: return of results of execution
F: iterative execution
C: injunction to execute
L: Check of consistency
B: Controlled Process (alias method)
J: Communication about method
K: Reproduction of others concept of method

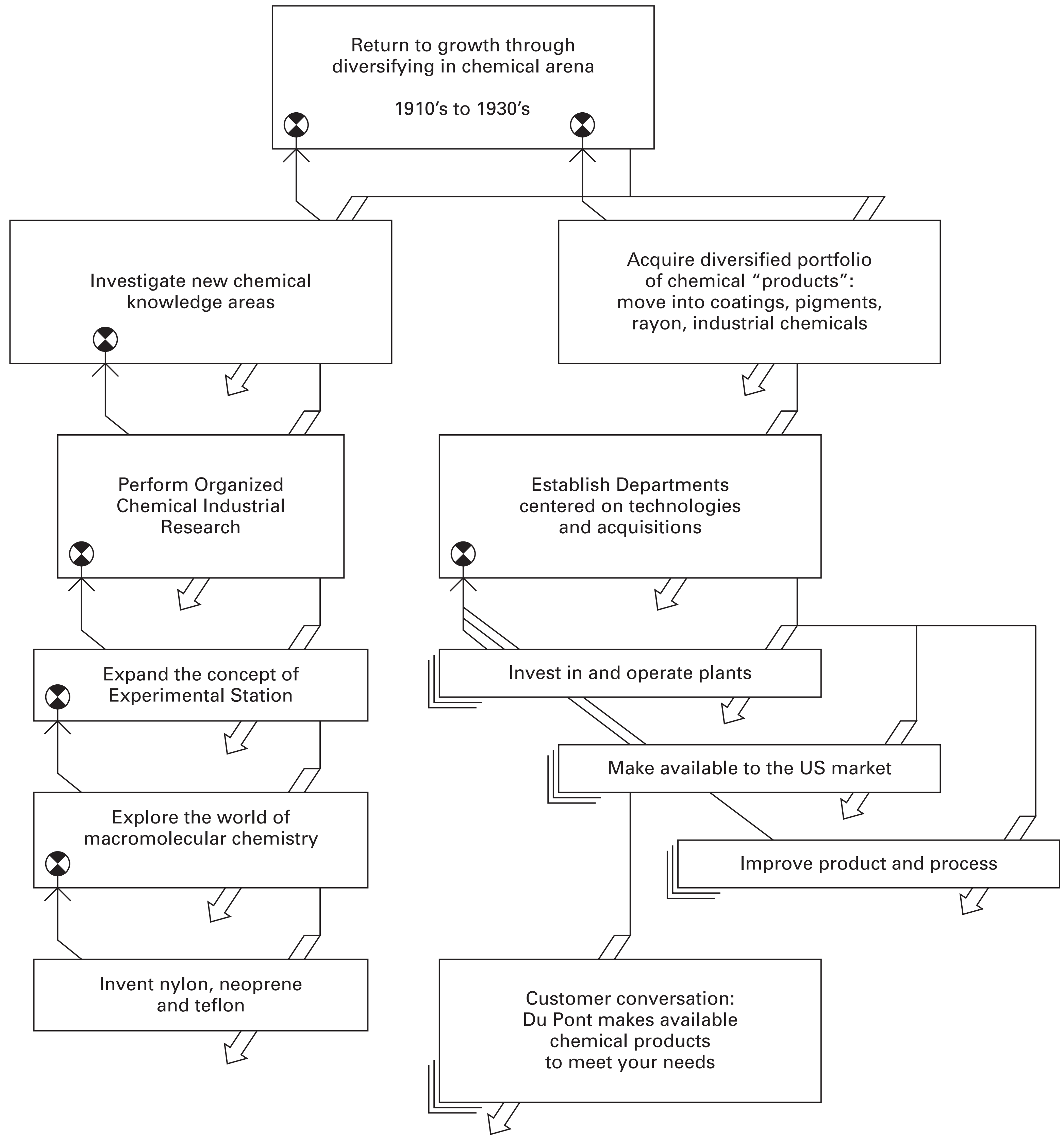
iii. Modeling Conversations

Cybernetics has a rigorous definition of conversation, making it practical to "design for conversation".

a. organizational structures (goal view)

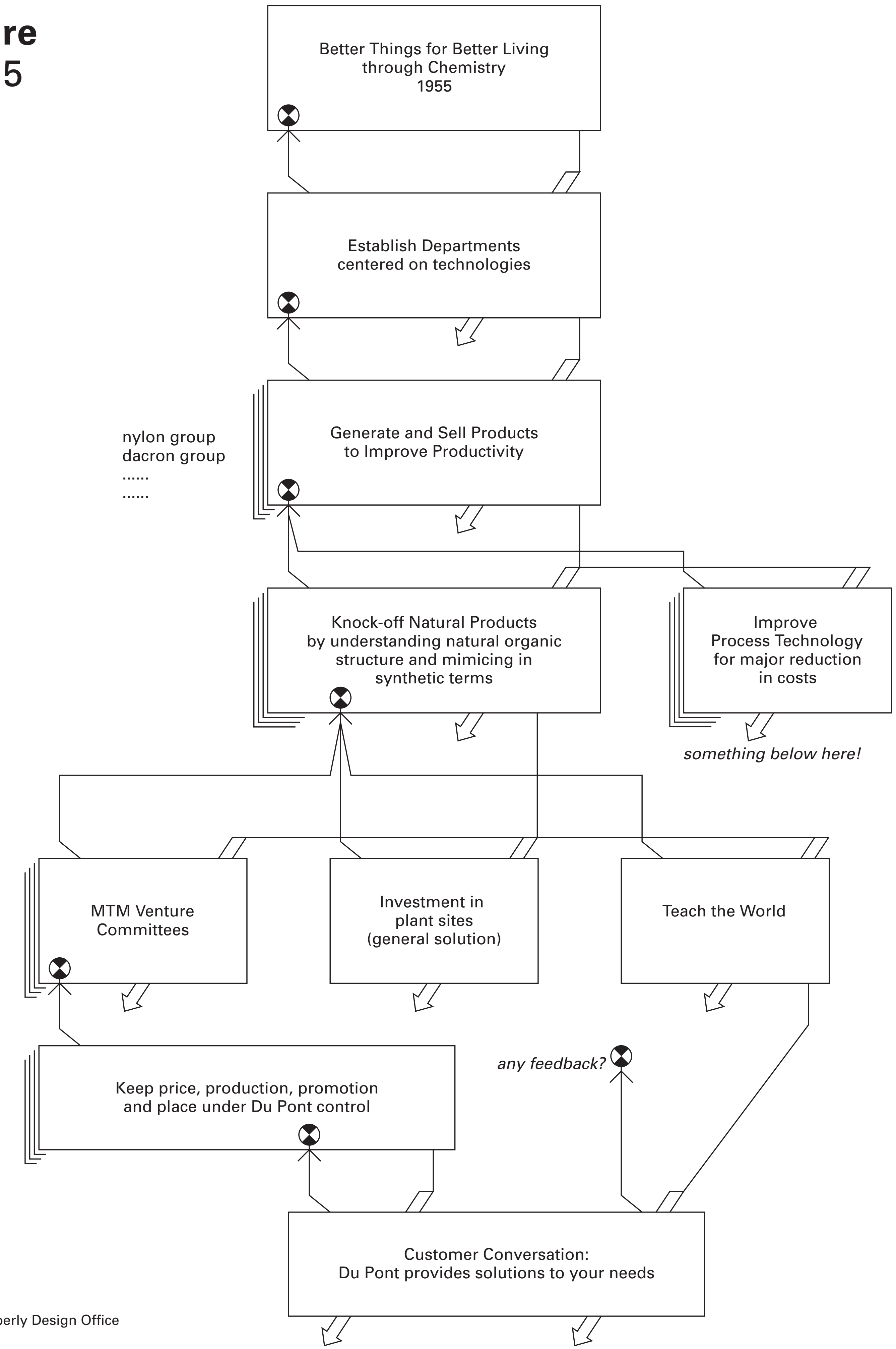
Du Pont Goal Structure
Snapshot 1910 to 1940

Laid the foundation for a new business—
"invention" phase.



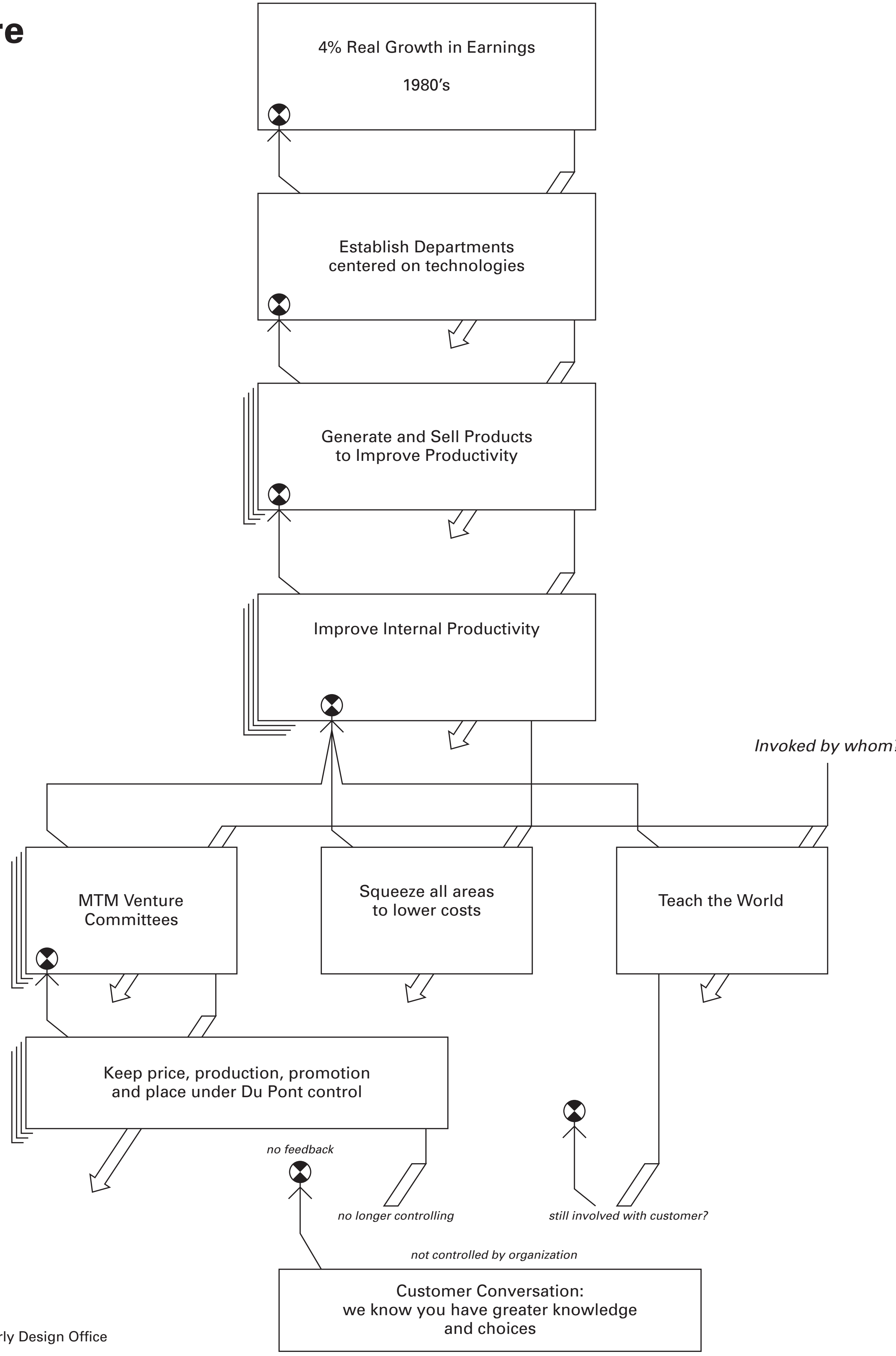
Du Pont Goal Structure
Snapshot 1940 to 1975

Built on the foundation—
“discovery” phase.



Du Pont Goal Structure
Snapshot of 1980's

Milked the existing structure—
"efficiency" phase.



iii. Modeling Conversations

Cybernetics has a rigorous definition of conversation, making it practical to "design for conversation".

a. organizational interfaces

b. user interfaces / conversing with myself

iii. Modeling Conversations

Cybernetics has a rigorous definition of conversation, making it practical to "design for conversation".

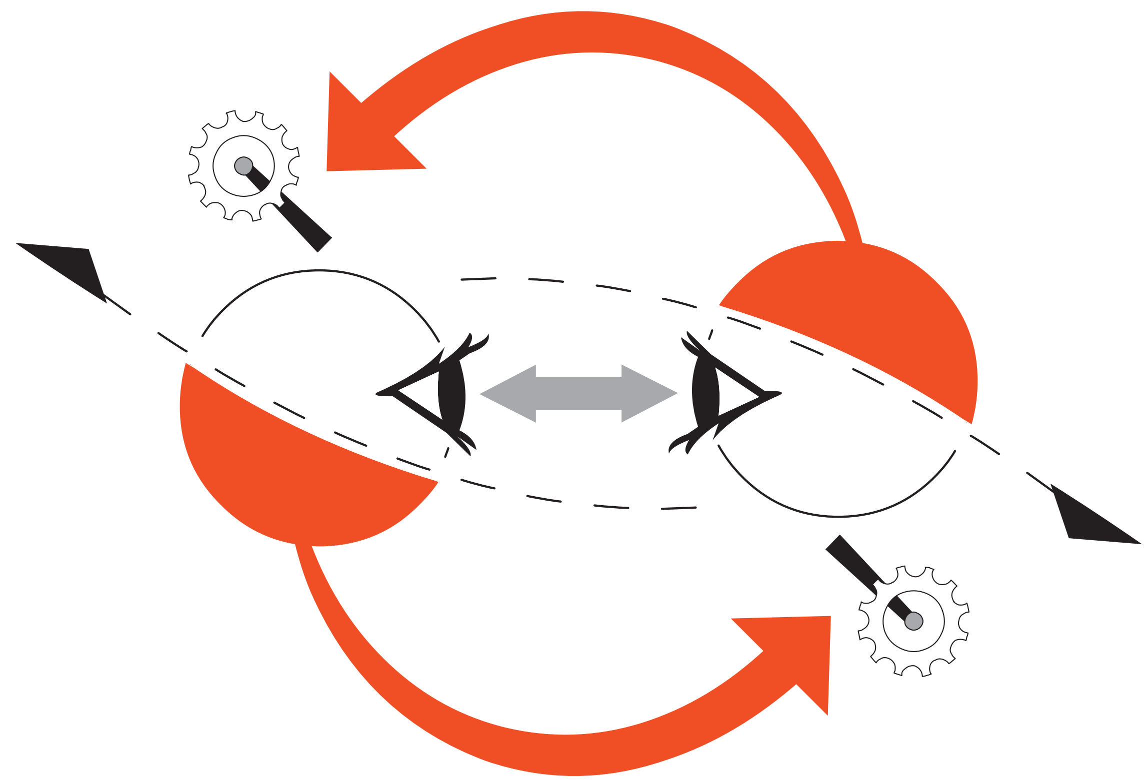
But what is the structure of conversations?

What makes for successful conversation?

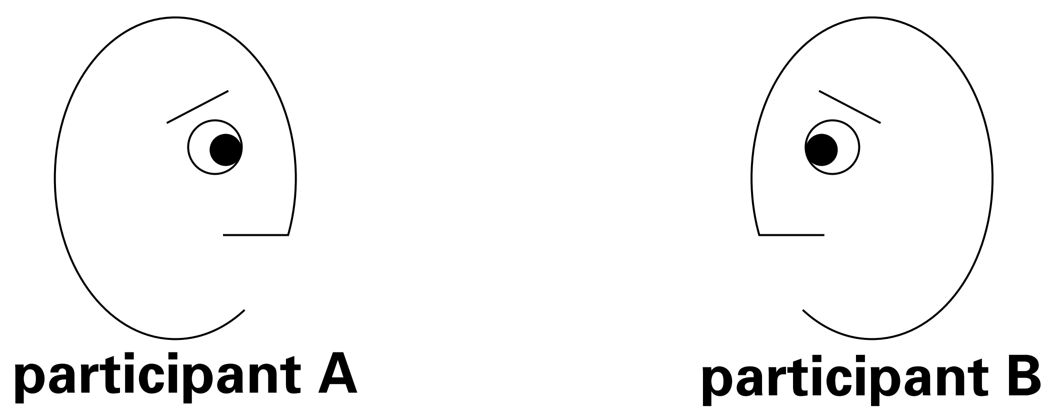
How do we design for conversation?

By applying cybernetics of conversation, by understanding...

- what are the goals?
- how do we measure if we're on course?
- what controls do we have?

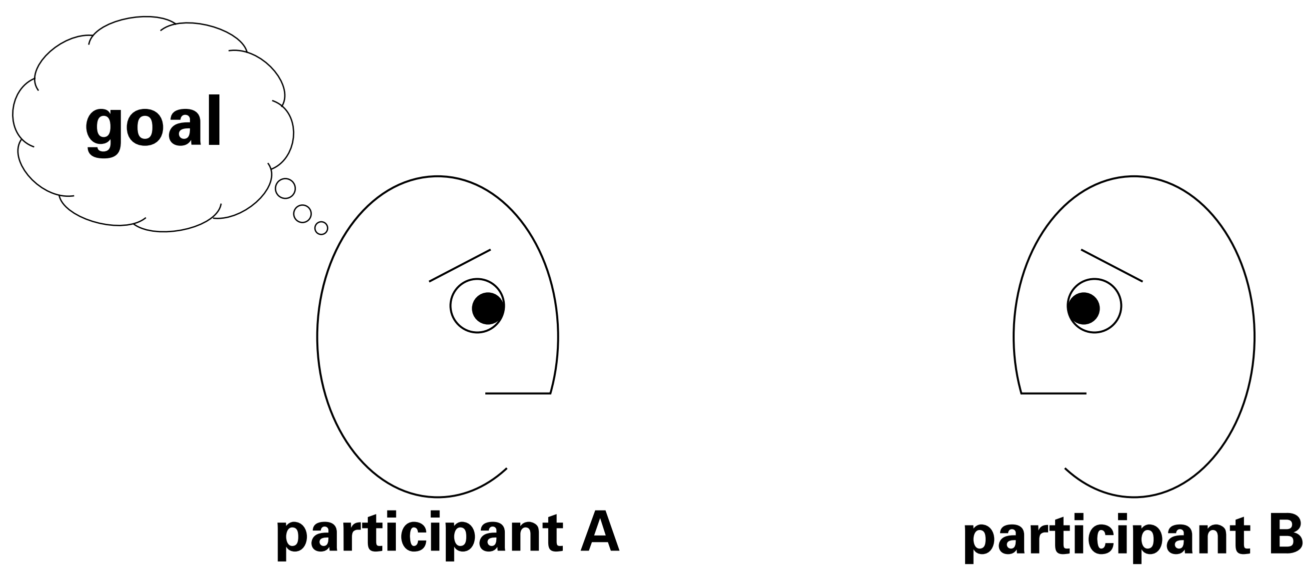


what is conversation?

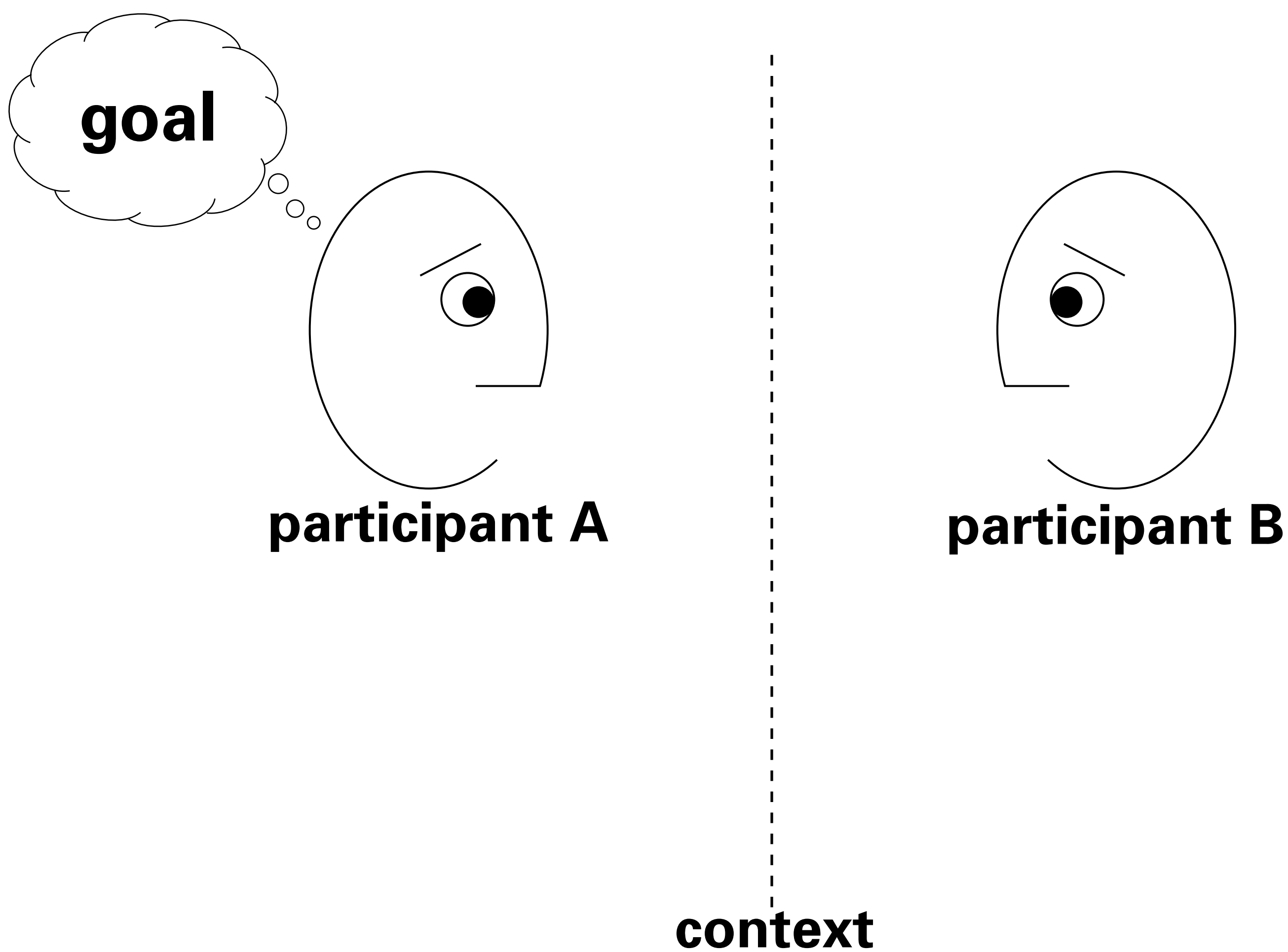


after Dubberly Design Office 2008

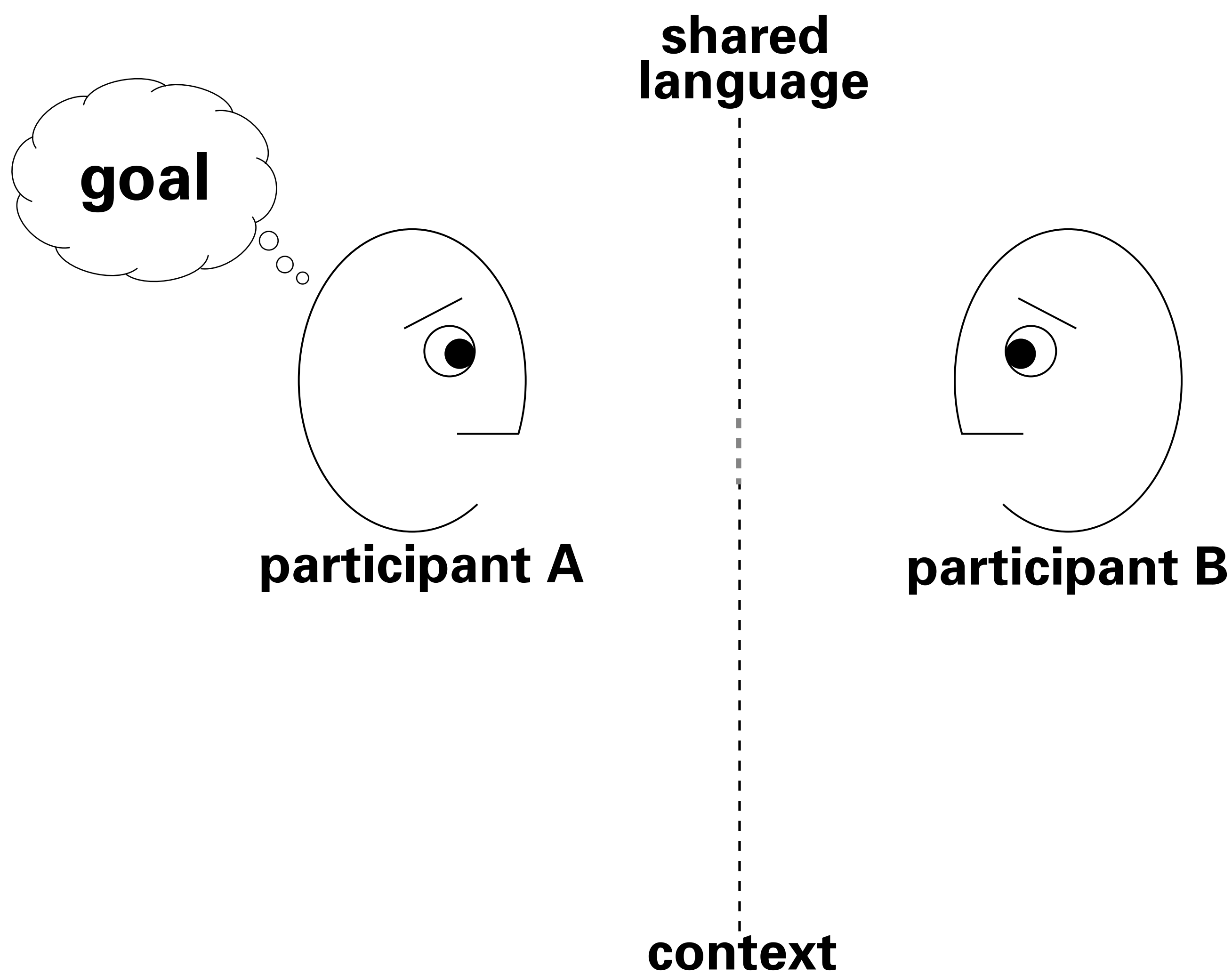
a participant has a goal



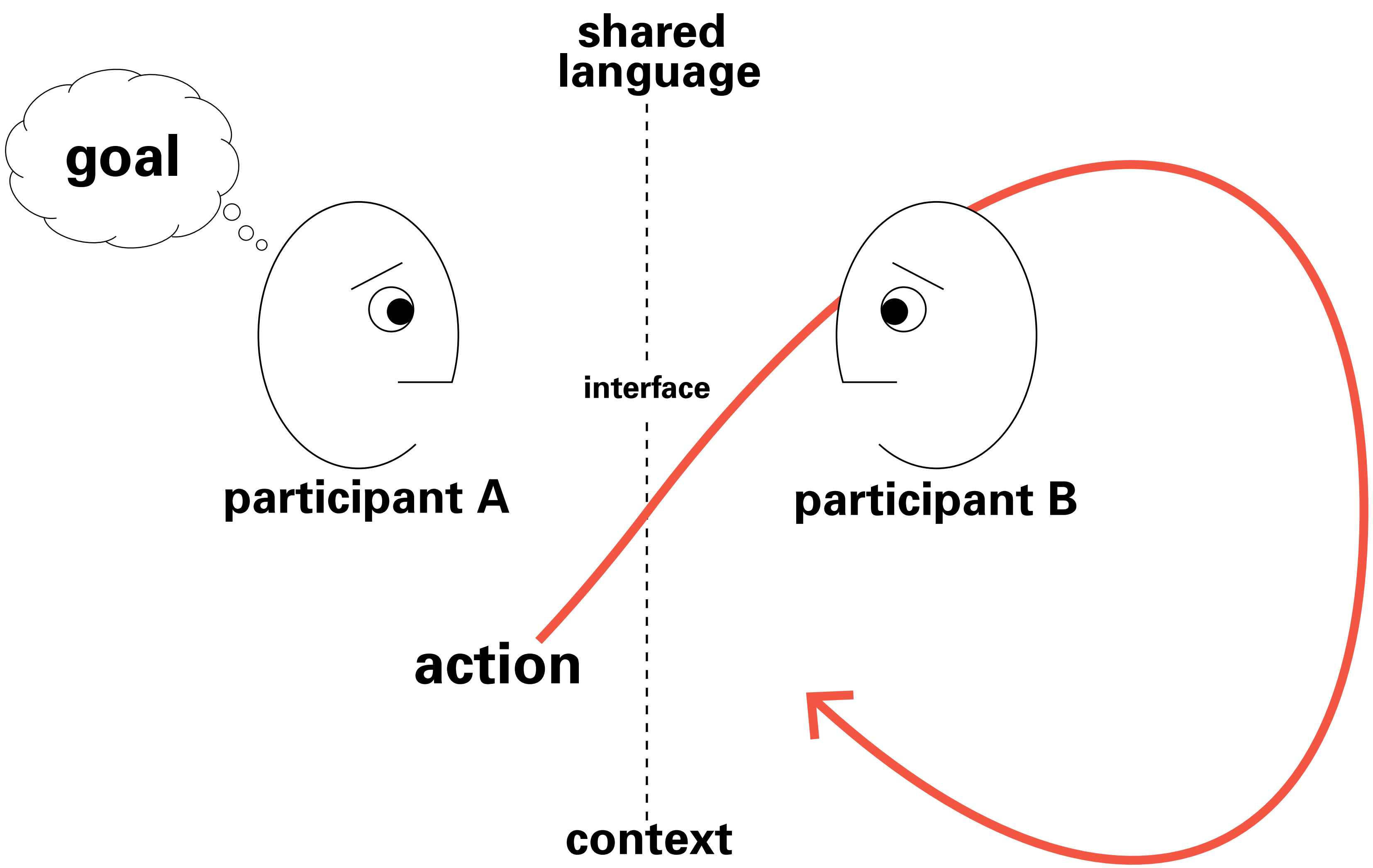
chooses a context



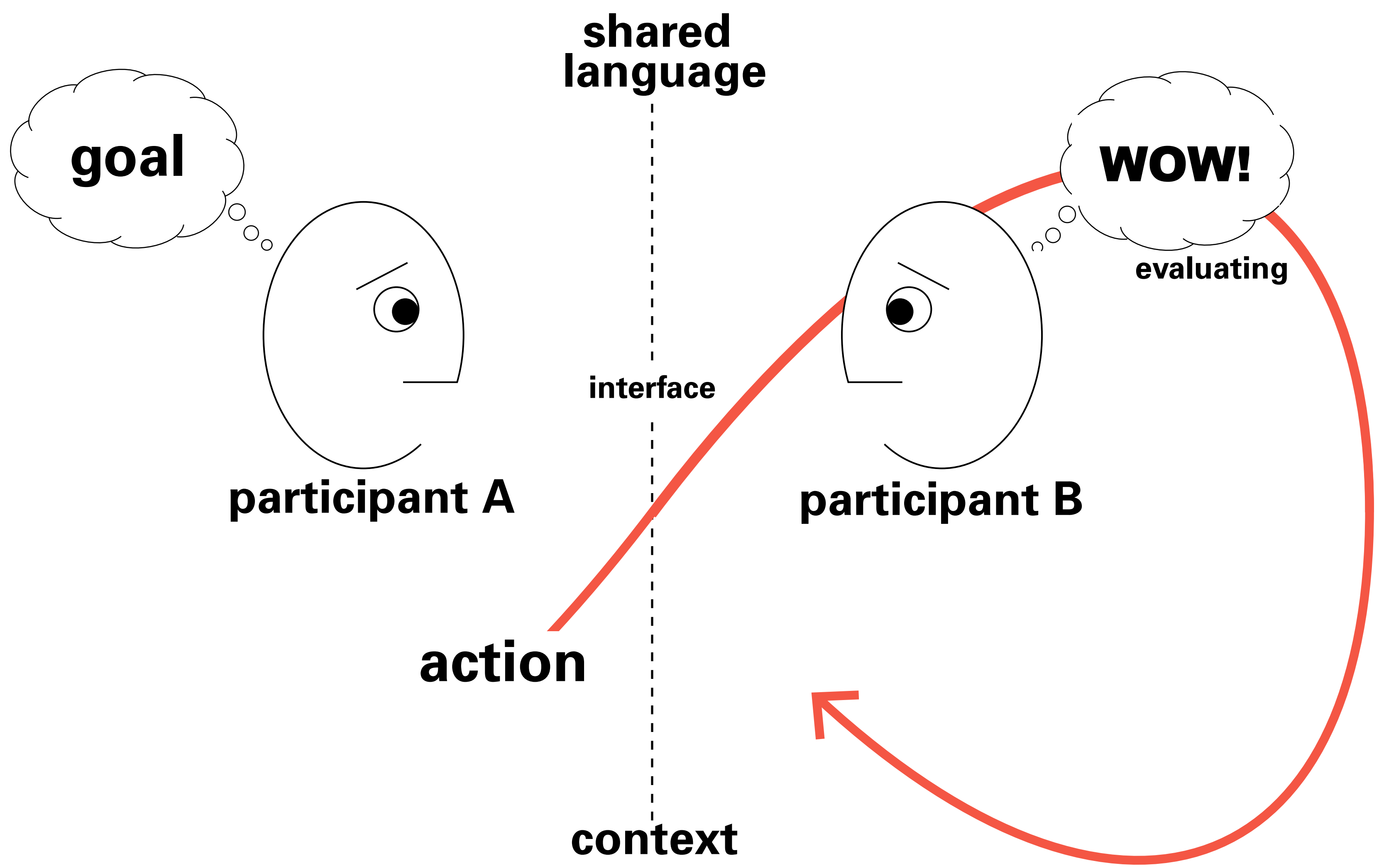
chooses a language



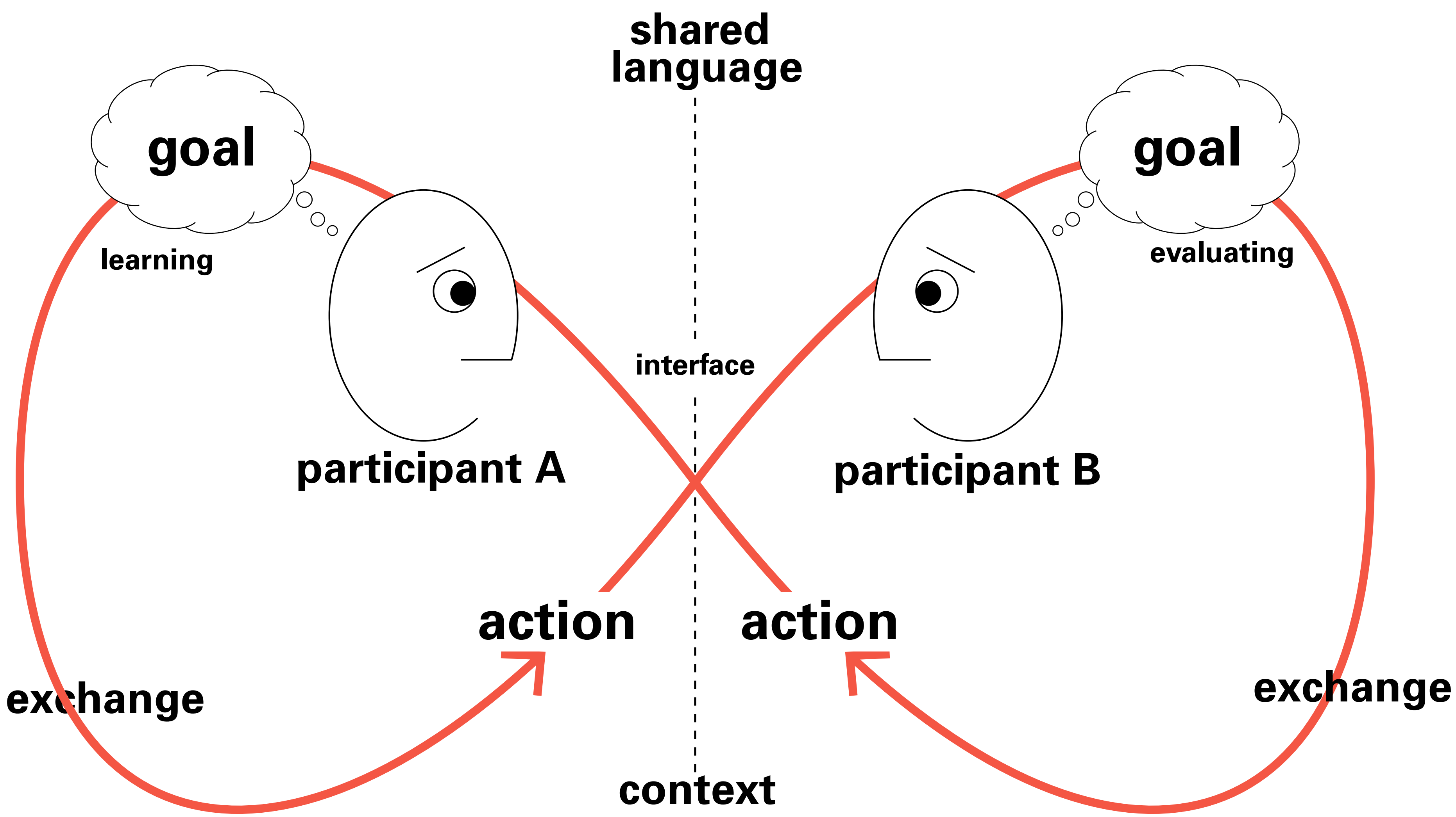
begins an exchange



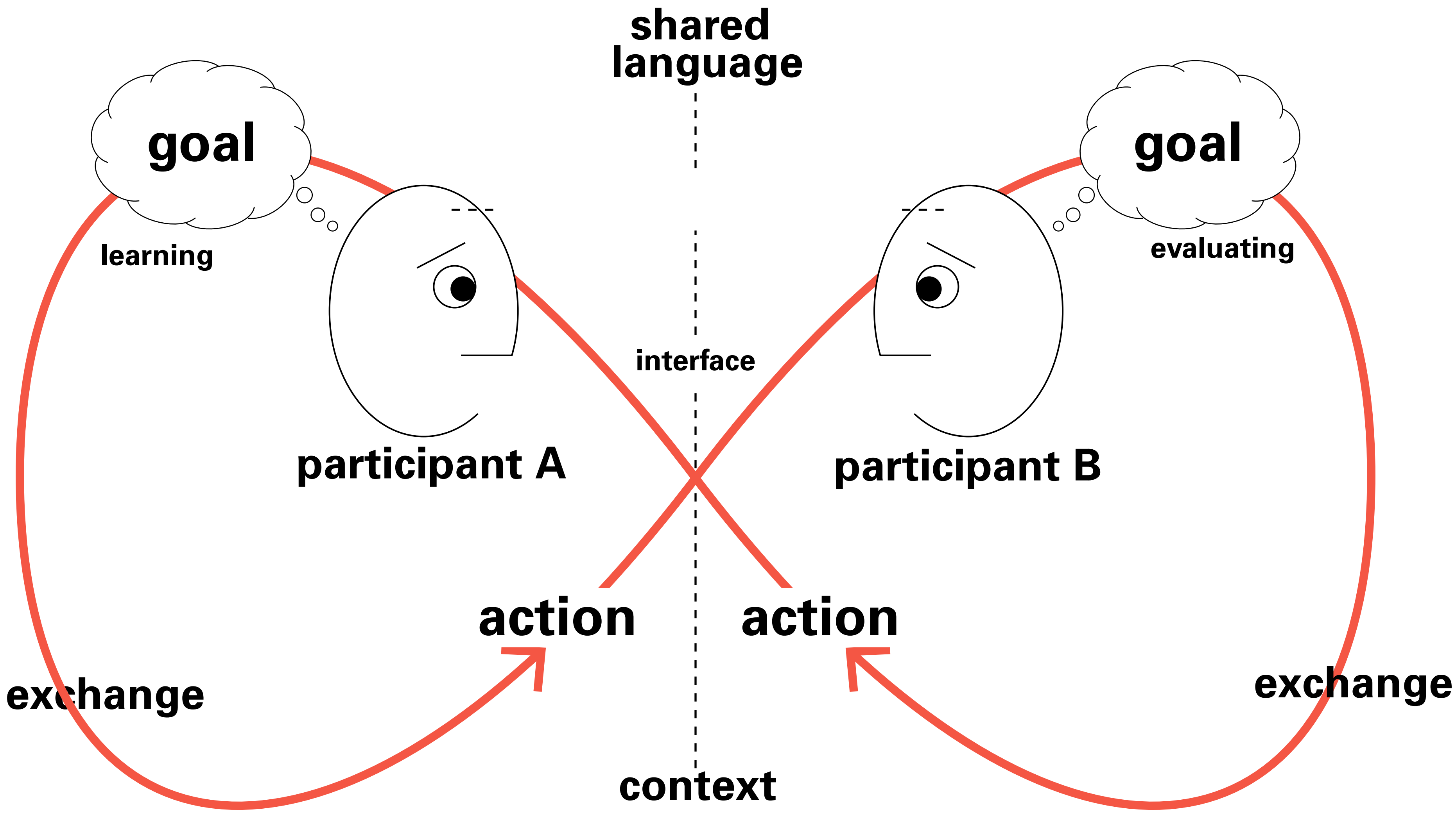
evokes a reaction...



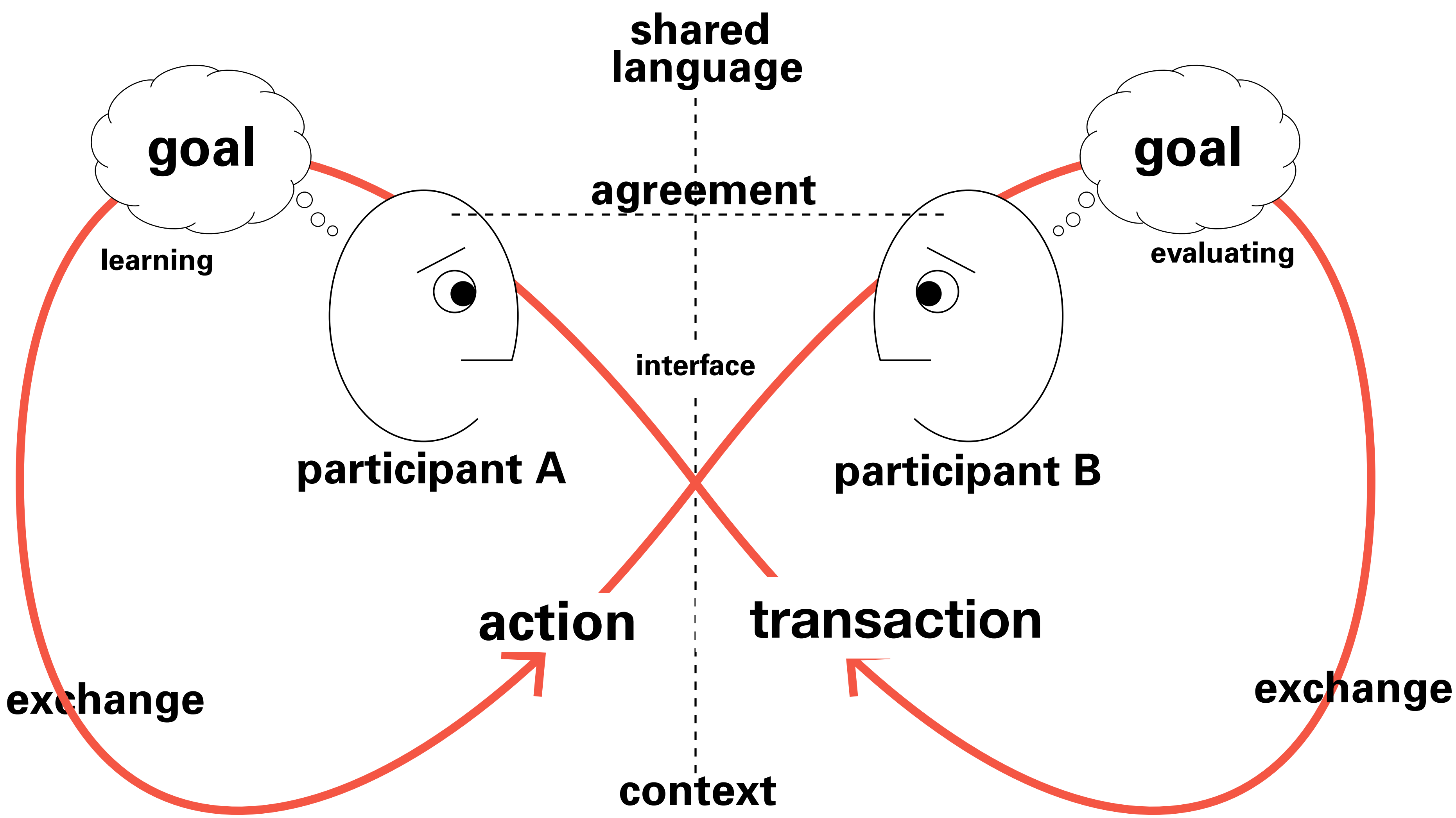
...that evokes a reaction



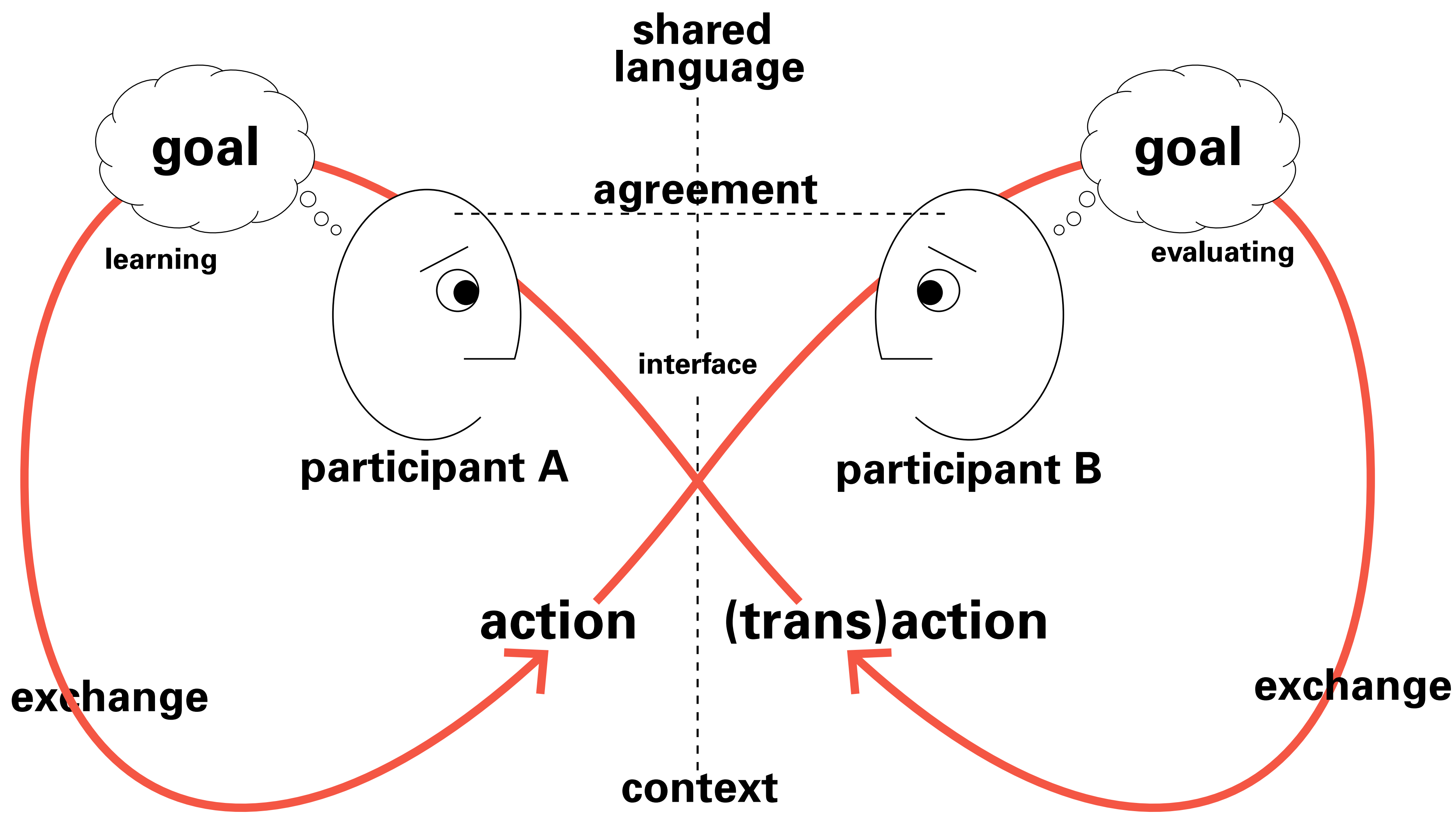
agreement may be reached



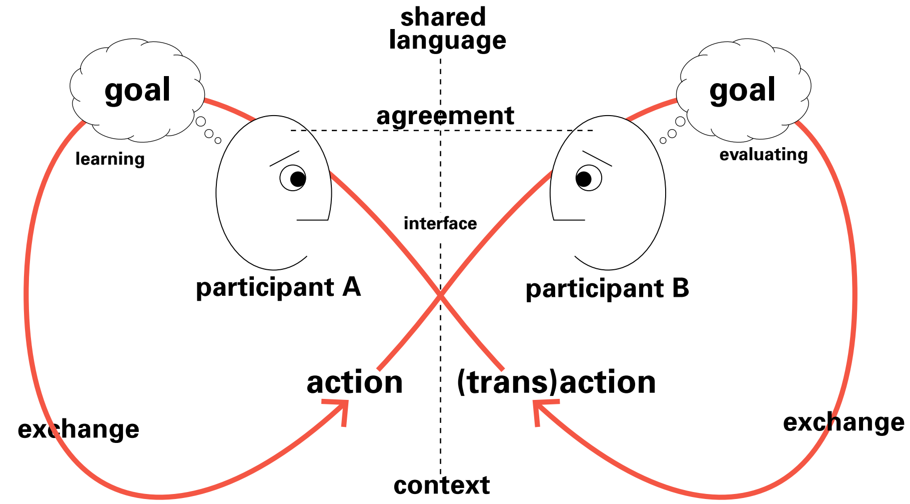
a transaction may occur



what is conversation?



what is conversation?



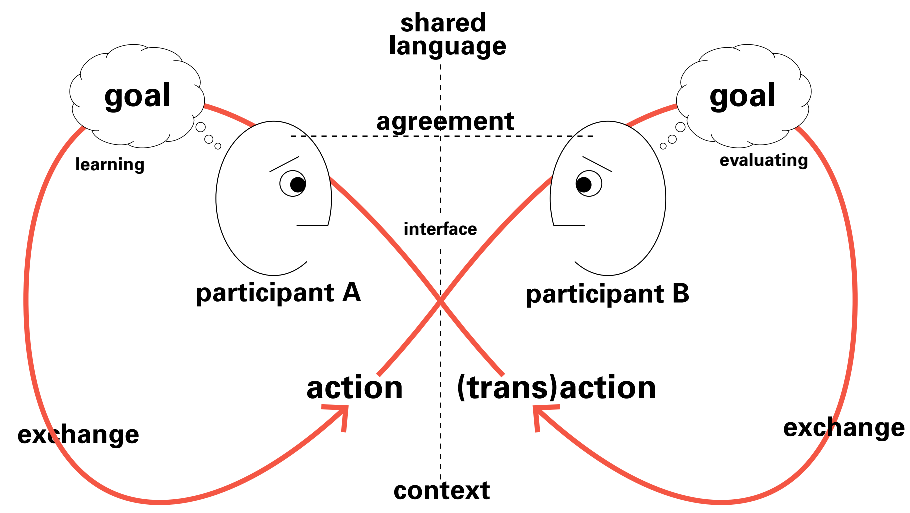
conversation =

- context
- language
- exchange
- agreement
- transaction

context—language—exchange—agreement—transaction

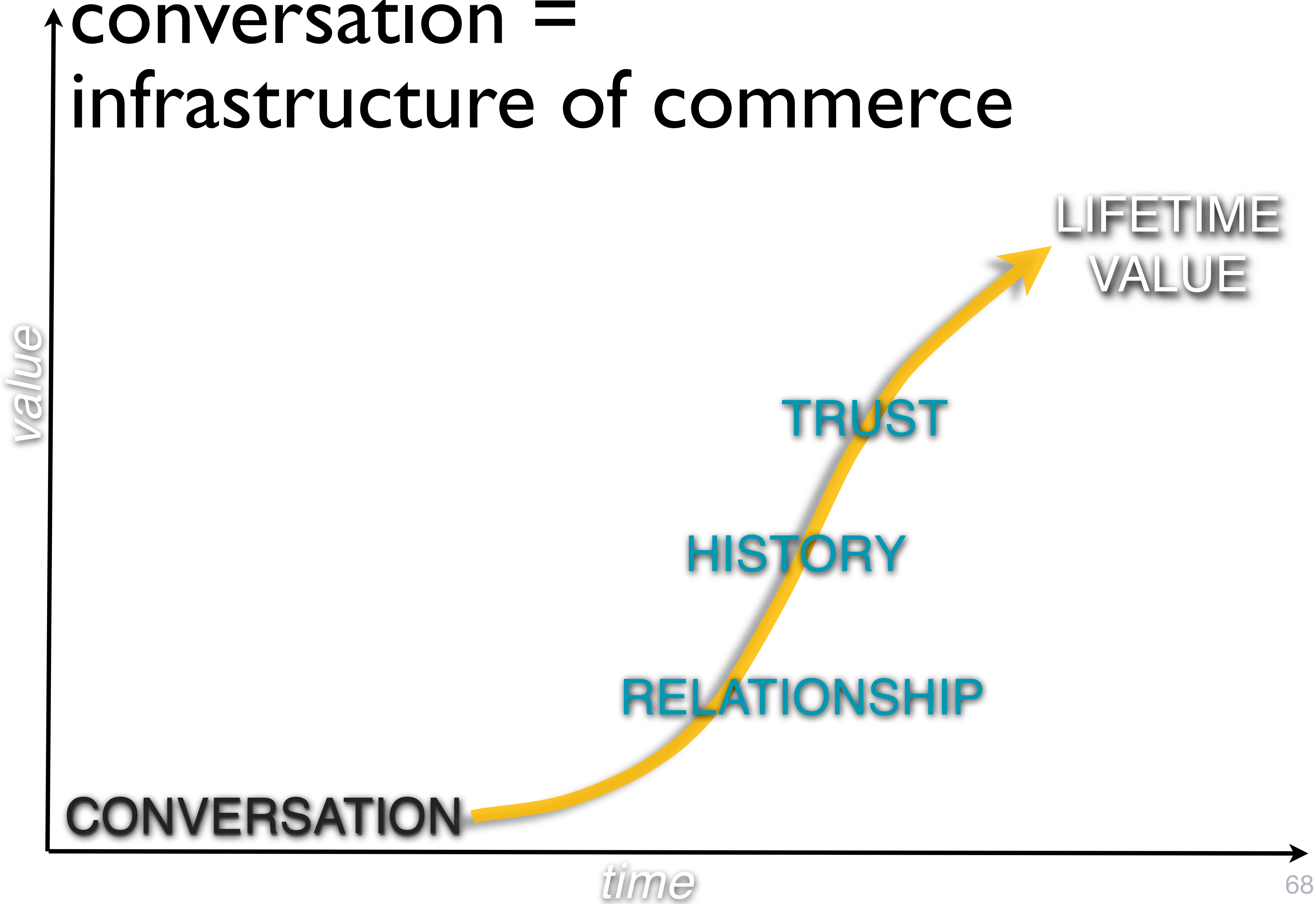
cleat = conversational traction

what is conversation?

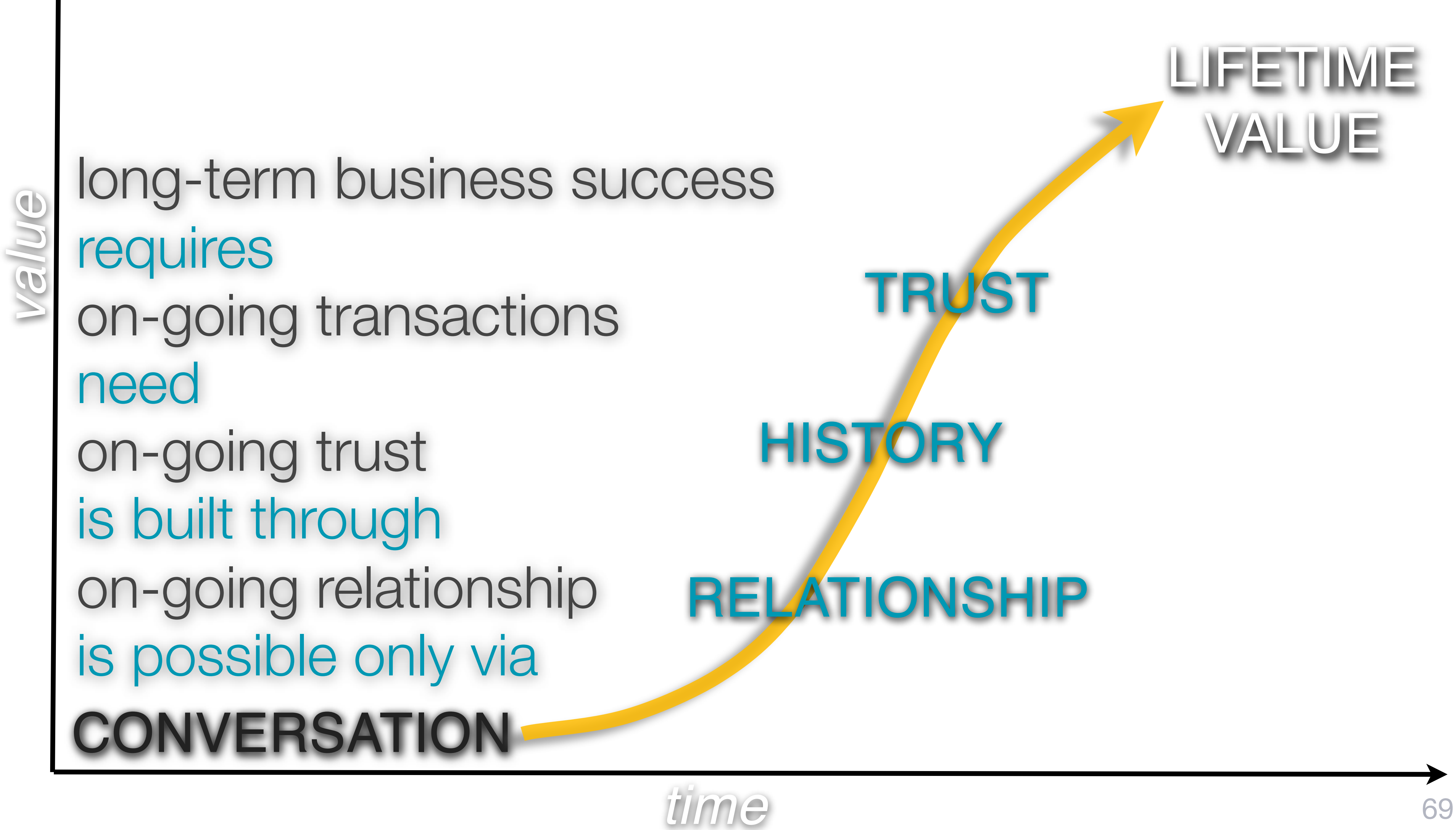


conversation = basis for long-term relationships

conversation = infrastructure of commerce



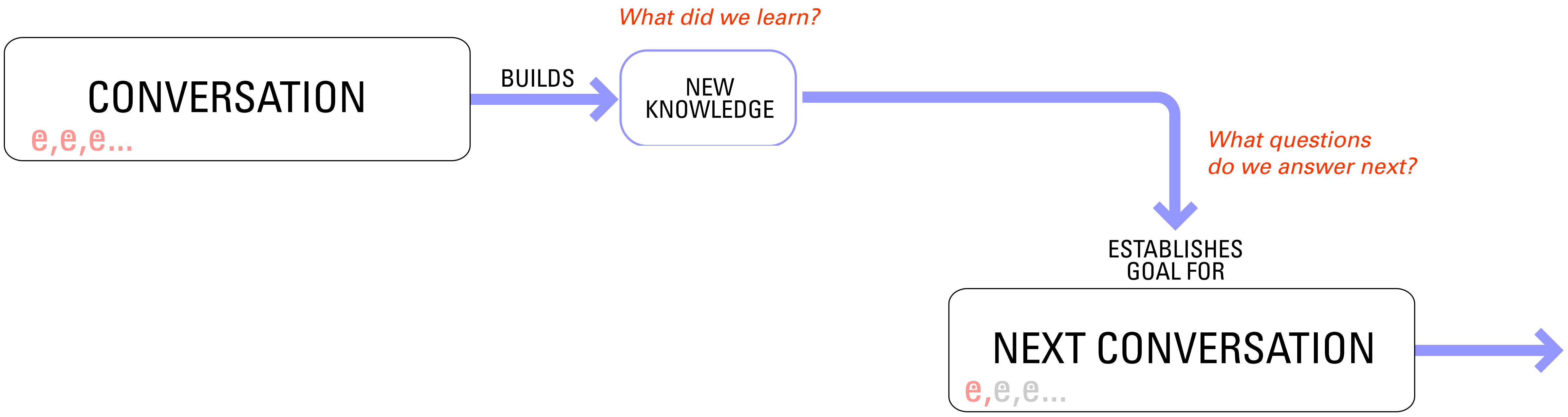
conversation = infrastructure of commerce

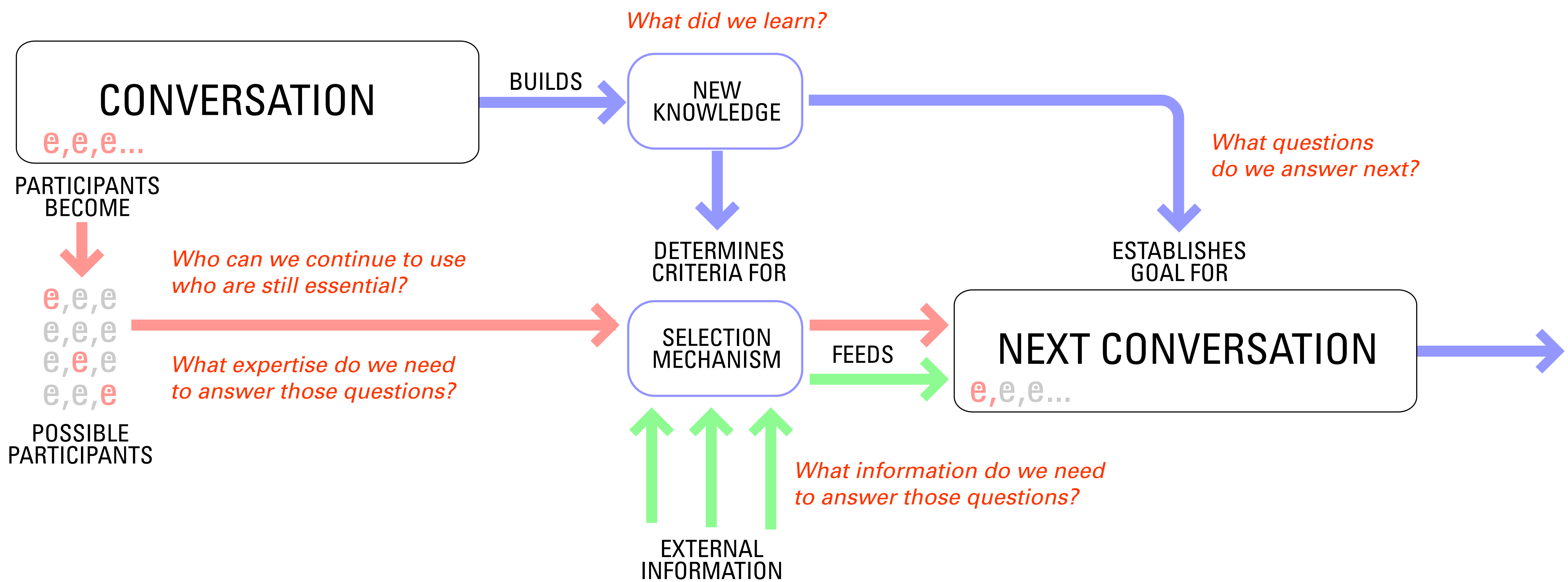


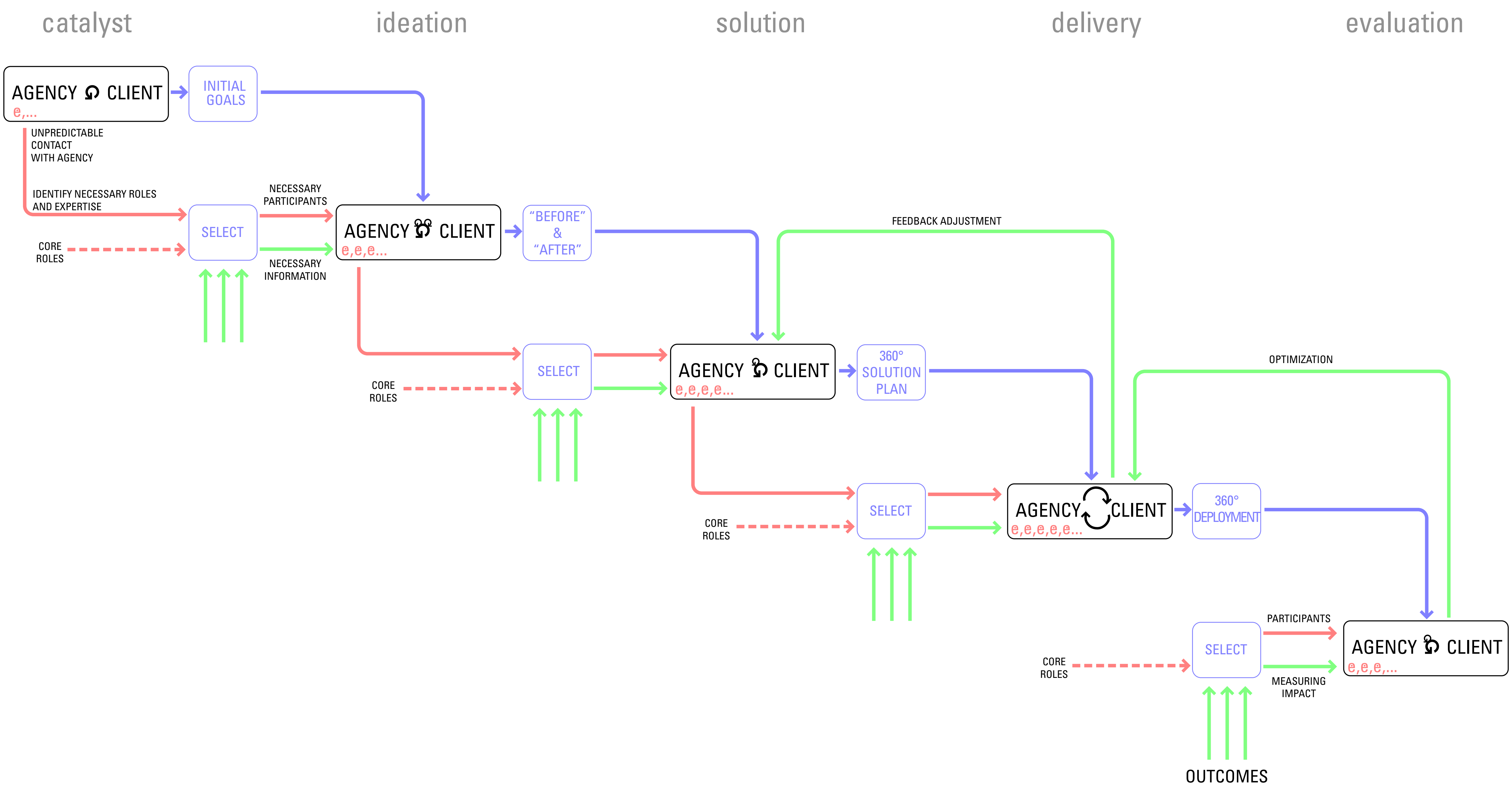
iii. Modeling Conversations

Cybernetics has a rigorous definition of conversation, making it practical to "design for conversation".

Modeling organizational conversations in the course of operations can improve productivity and creativity.


What did we learn?
CONVERSATION
e,e,e...
BUILDS
NEW KNOWLEDGE
What questions do we answer next?
ESTABLISHES GOAL FOR
NEXT CONVERSATION
e,e,e...


What did we learn?
CONVERSATION
e,e,e...
BUILDS
NEW KNOWLEDGE
What questions do we answer next?
PARTICIPANTS BECOME
Who can we continue to use who are still essential?
DETERMINES CRITERIA FOR
ESTABLISHES GOAL FOR
e,e,e
e,e,e
e,e,e
e,e,e
What expertise do we need to answer those questions?
SELECTION MECHANISM
FEEDS
NEXT CONVERSATION
e,e,e...
POSSIBLE PARTICIPANTS
What information do we need to answer those questions?
EXTERNAL INFORMATION



catalyst
ideation
solution
delivery
evaluation
AGENCY CLIENT
e,...
INITIAL GOALS
UNPREDICTABLE CONTACT WITH AGENCY
IDENTIFY NECESSARY ROLES AND EXPERTISE
SELECT
CORE ROLES
NECESSARY PARTICIPANTS
NECESSARY INFORMATION
AGENCY CLIENT
e,e,e...
"BEFORE" & "AFTER"
FEEDBACK ADJUSTMENT
SELECT
CORE ROLES
AGENCY CLIENT
e,e,e,e...
360° SOLUTION PLAN
OPTIMIZATION
SELECT
CORE ROLES
AGENCY CLIENT
e,e,e,e,e...
360° DEPLOYMENT
SELECT
CORE ROLES
PARTICIPANTS
MEASURING IMPACT
AGENCY CLIENT
e,e,e,...
OUTCOMES

Examples of organizational conversations

Exercise #2
Modeling conversations

Consider a standard process from inside an organization,
one that is complex or seen to be inadequate.

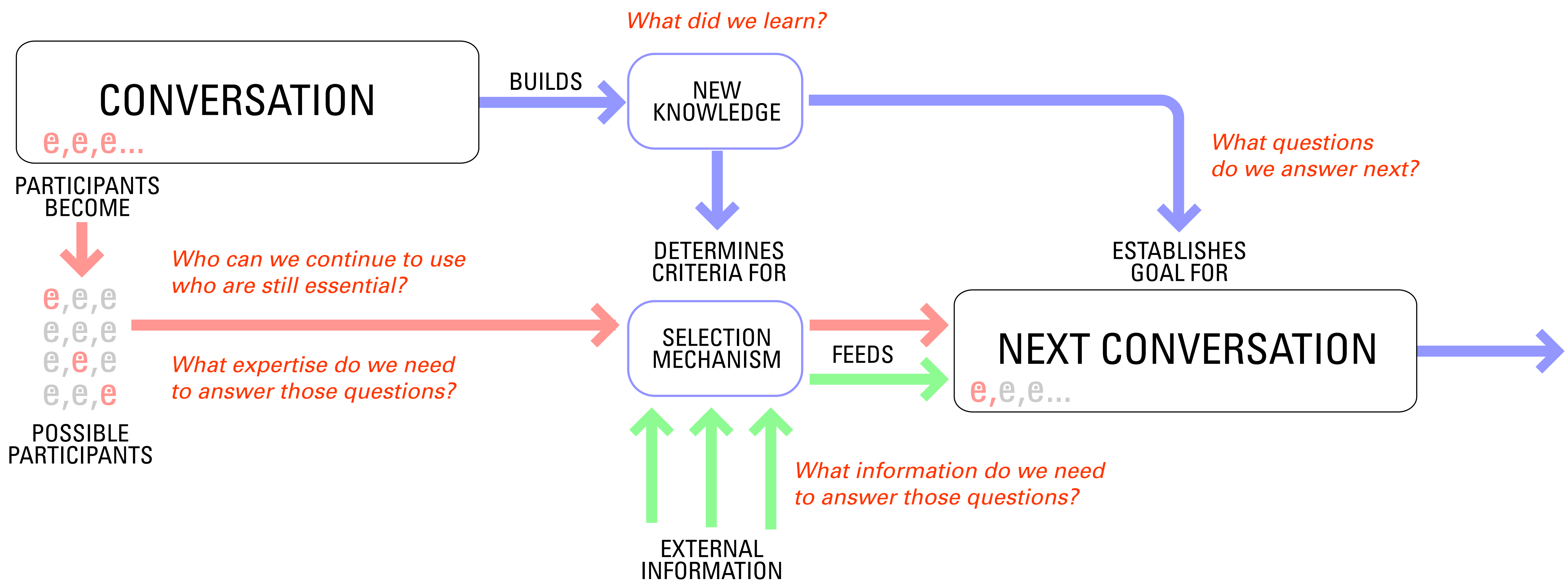
Render it as a series of conversations, each one having
a goal, participants, and outcomes.

Model the series as far as possible, using the visual language and terms below.

Who are the necessary and sufficient participants in the next conversation?

What is the necessary and sufficient external information to add?

conversation	next conversation
goal	selection mechanism
participants	new participants
new knowledge	external information



What did we learn?
CONVERSATION
e,e,e...
BUILDS
NEW KNOWLEDGE
PARTICIPANTS BECOME
DETERMINES CRITERIA FOR
What questions do we answer next?
ESTABLISHES GOAL FOR
Who can we continue to use who are still essential?
e,e,e
e,e,e
e,e,e
e,e,e
What expertise do we need to answer those questions?
POSSIBLE PARTICIPANTS
SELECTION MECHANISM
FEEDS
NEXT CONVERSATION
e,e,e...
What information do we need to answer those questions?
EXTERNAL INFORMATION

Exercise #2

Review conversation models

Consider a standard process from inside an organization, one that is complex or seen to be inadequate.

Render it as a series of conversations, each one having a goal, participants, and outcomes.

Model the series as far as possible, using the visual language and terms below.

Who are the necessary and sufficient participants in the next conversation?

What is the necessary and sufficient external information to add?

conversation	next conversation
goal	selection mechanism
participants	new participants
new knowledge	external information

Leadership from a Systems Perspective

Cybernetics explained

i. Model of Learning Systems

Exercise #1

Limits of Social Systems

ii. Requisite Variety

iii. Modeling Conversations

Exercise #2

Co-evolution

iv. Model of Innovation

Exercise #3

innovation

innovation

lots of talk about “innovation”

...we’re told it’s the key for businesses to pull out of the economic downturn

...“we must continue to innovate!”

...but there are not many specifics.

innovation

– what is innovation?
– how do we get it?
– when do we need it?

innovation

– what is innovation?
– how do we get it?
– when do we need it?

innovation

innovation is
an insight that
inspires change
that creates value.

innovation
insight
convention convention

innovation
change
insight
convention convention

innovation is not simply

...an idea

...an invention

...an improvement

...simple creativity.

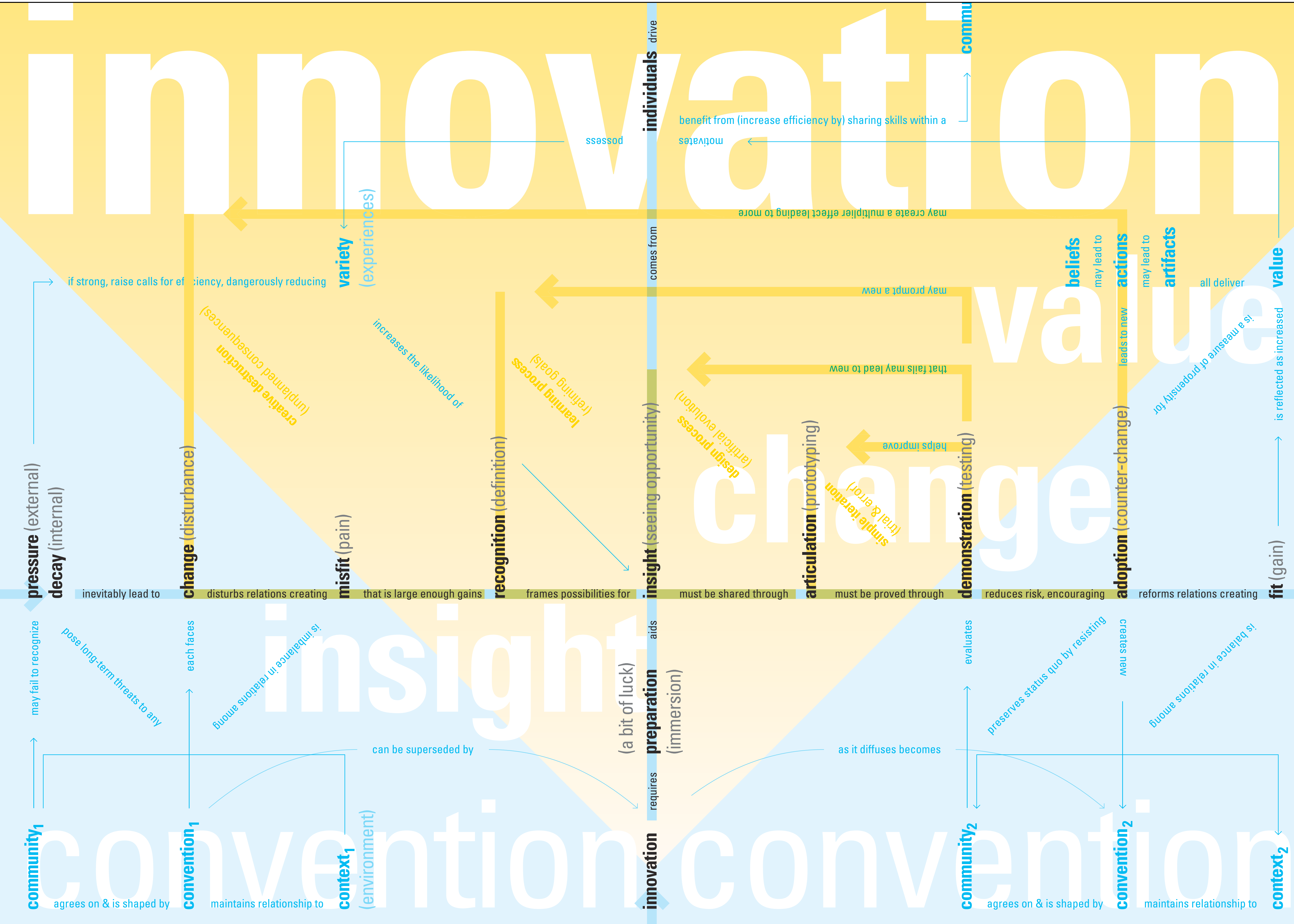
innovation

...can be modelled as a conversation
— goals + feedback + actions

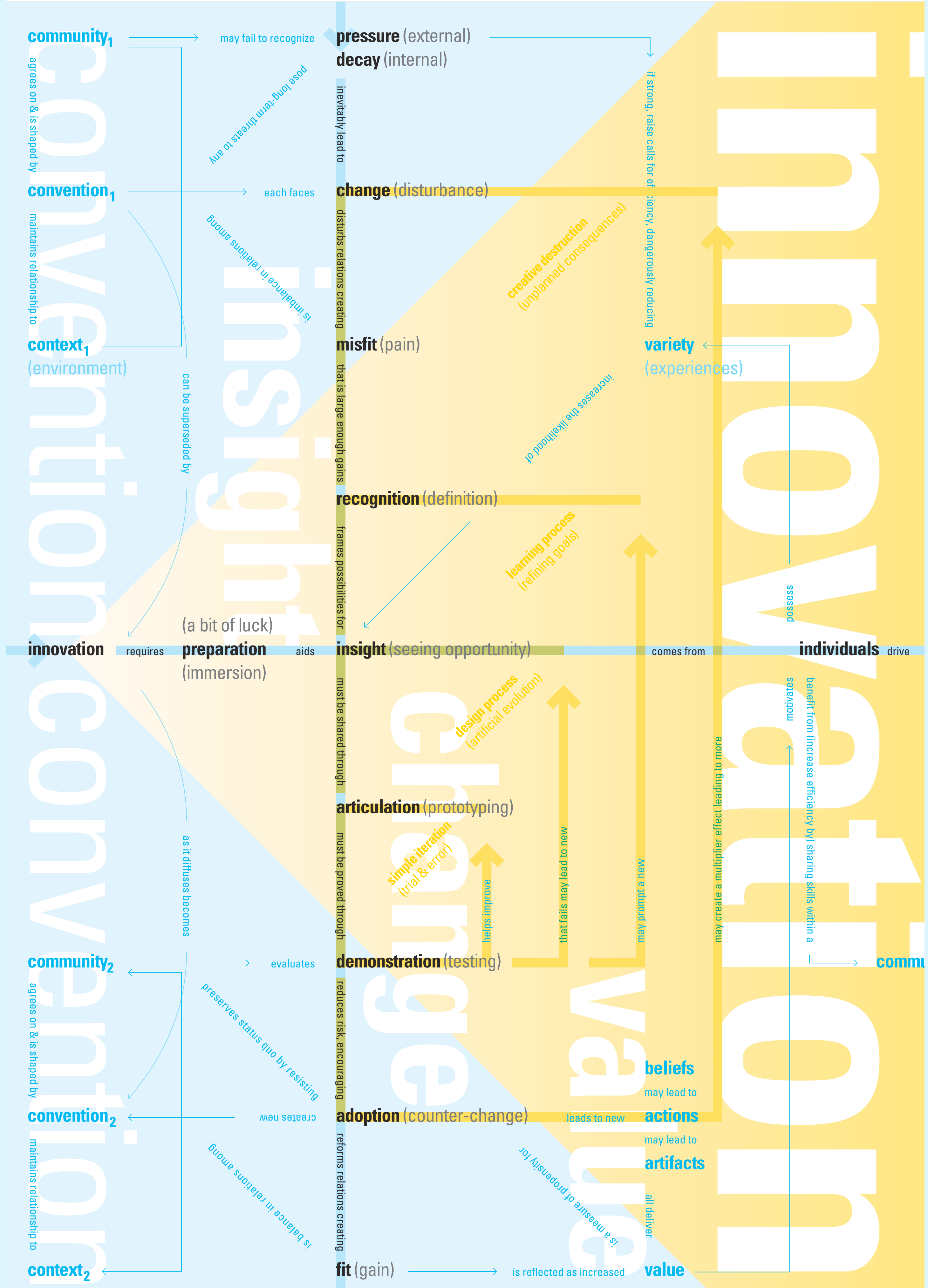
...requires sufficient variety

...is a co-evolutionary process.

innovation
change
insight
convention convention



innovation
value
change
insight
convention
convention
individuals
drive
comes from
benefit from (increase efficiency by) sharing skills within a
commu
possess
motivates
may create a multiplier effect leading to more
may prompt a new
that fails may lead to new
helps improve
beliefs
may lead to
actions
may lead to
artifacts
all deliver
value
leads to new
is a measure of
propensity for
is reflected as increased
if strong, raise calls for efficiency, dangerously reducing
variety (experiences)
creative destruction (unplanned consequences)
increases the likelihood of
learning process (refining goals)
design process (artificial evolution)
simple iteration (trial & error)
pressure (external)
decay (internal)
inevitably lead to
change (disturbance)
disturbs relations creating
misfit (pain)
that is large enough gains
recognition (definition)
frames possibilities for
insight (seeing opportunity)
must be shared through
articulation (prototyping)
must be proved through
demonstration (testing)
reduces risk, encouraging
adoption (counter-change)
reforms relations creating
fit (gain)
may fail to recognize
pose long-term threats to any
each faces
is imbalance in relations among
aids
(a bit of luck)
preparation (immersion)
requires
evaluates
preserves status quo by resisting
creates new
is balance in relations among
can be superseded by
as it diffuses becomes
community$_1$
agrees on & is shaped by
convention$_1$
maintains relationship to
context$_1$ (environment)
innovation
community$_2$
agrees on & is shaped by
convention$_2$
maintains relationship to
context$_2$



innovation
insight
change
value
convention
convention
community$_1$
may fail to recognize
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may create a multiplier effect leading to more
as it diffuses becomes
must be proved through
community$_2$
evaluates
demonstration (testing)
preserves status quo by resisting
agrees on & is shaped by
reduces risk, encouraging
beliefs
may lead to
convention$_2$
creates new
adoption (counter-change)
leads to new
actions
may lead to
artifacts
maintains relationship to
is balance in relations among
reforms relations creating
is a measure of prosperity for
all deliver
context$_2$
fit (gain)
is reflected as increased
value

old

innovation requires **preparation**

old

innovation requires **preparation**
(immersion)

(a bit of luck)

innovation requires **preparation** aids **insight** (s

(immersion)

frames possibilities for

must be shared through

articulat

(a bit of luck)

preparation aids **insight** (seeing opportunity)

(immersion)

frames possibilities for

must be shared through

learning proces
(refining goal

design process
(artificial evolution)

ng process
ning goals)

comes from

individuals drive

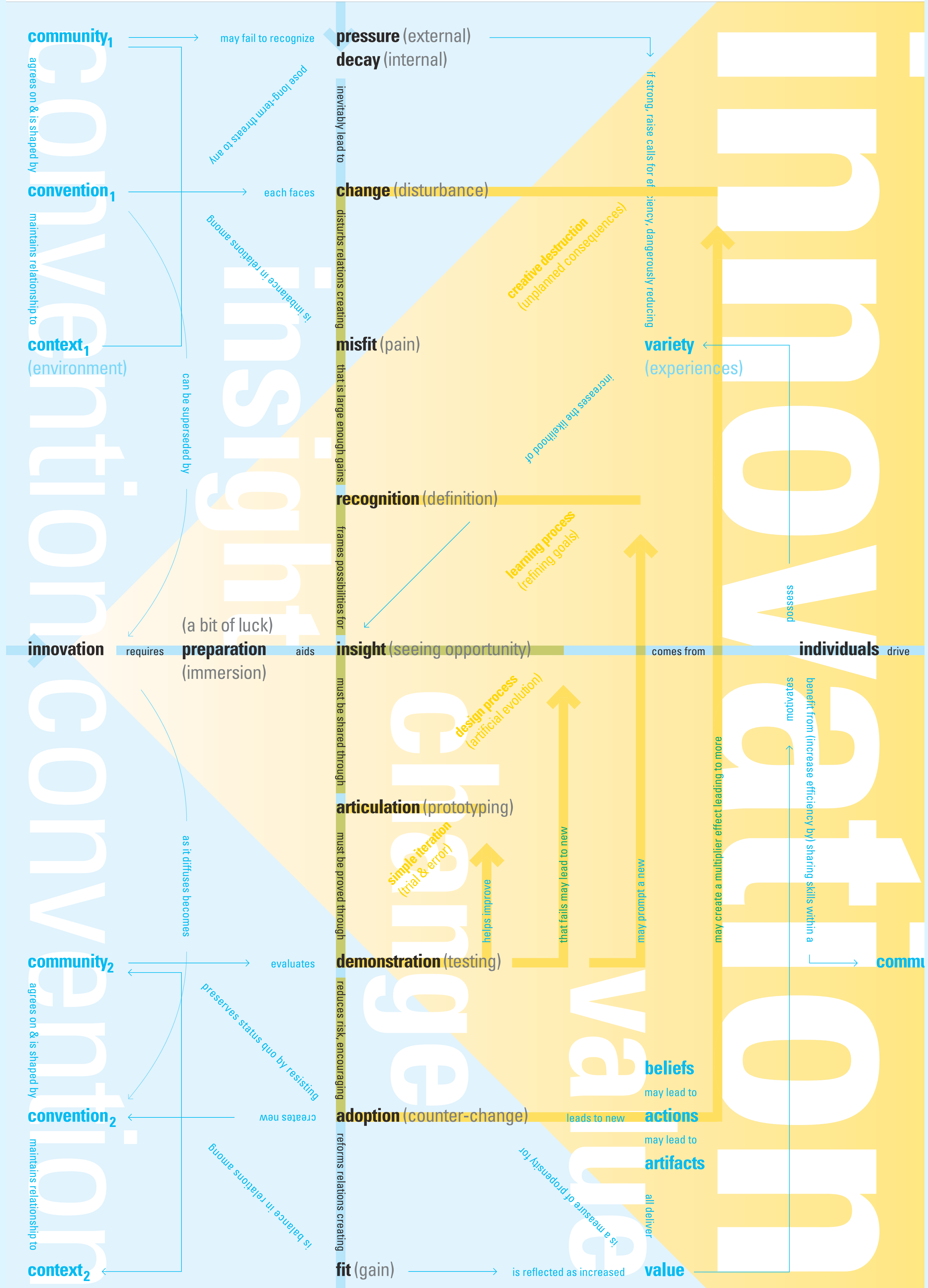
possess

motivates

benefit from (increase effici

eading to more

n)


community1
may fail to recognize
pressure (external)
decay (internal)
agrees on & is shaped by
pose long-term threats to any
inevitably lead to
if strong, raise calls for efficiency, dangerously reducing
convention1
each faces
change (disturbance)
maintains relationship to
is imbalance in relations among
disturbs relations creating
creative destruction
(unplanned consequences)
context1
(environment)
misfit (pain)
that is large enough gains
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comes from
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drive
must be shared through
design process
(artificial evolution)
motivates
benefit from (increase efficiency by) sharing skills within a
articulation (prototyping)
simple iteration
(trial & error)
helps improve
that fails may lead to new
may prompt a new
may create a multiplier effect leading to more
as it diffuses becomes
community2
evaluates
demonstration (testing)
commu
agrees on & is shaped by
preserves status quo by resisting
must be proved through
reduces risk, encouraging
beliefs
may lead to
convention2
creates new
adoption (counter-change)
leads to new
actions
may lead to
artifacts
maintains relationship to
is balance in relations among
reforms relations creating
is a measure of propensity for
all deliver
context2
fit (gain)
is reflected as increased
value
convention
insight
change
value
innovation

convention$_1$

community$_1$

agrees on & is shaped by

convention$_1$

community$_1$

agrees on & is shaped by

convention$_1$

maintains relationship to

context$_1$

(environment)

community$_1$ may fail to recognize **pressure** (external)

decay (internal)

agrees on & is shaped by

pose long-term threats to any

inevitably lead to

convention$_1$ each faces **change** (disturbance)

maintains relationship to

is imbalance in relations among

disturbs relations creating

context$_1$
(environment)

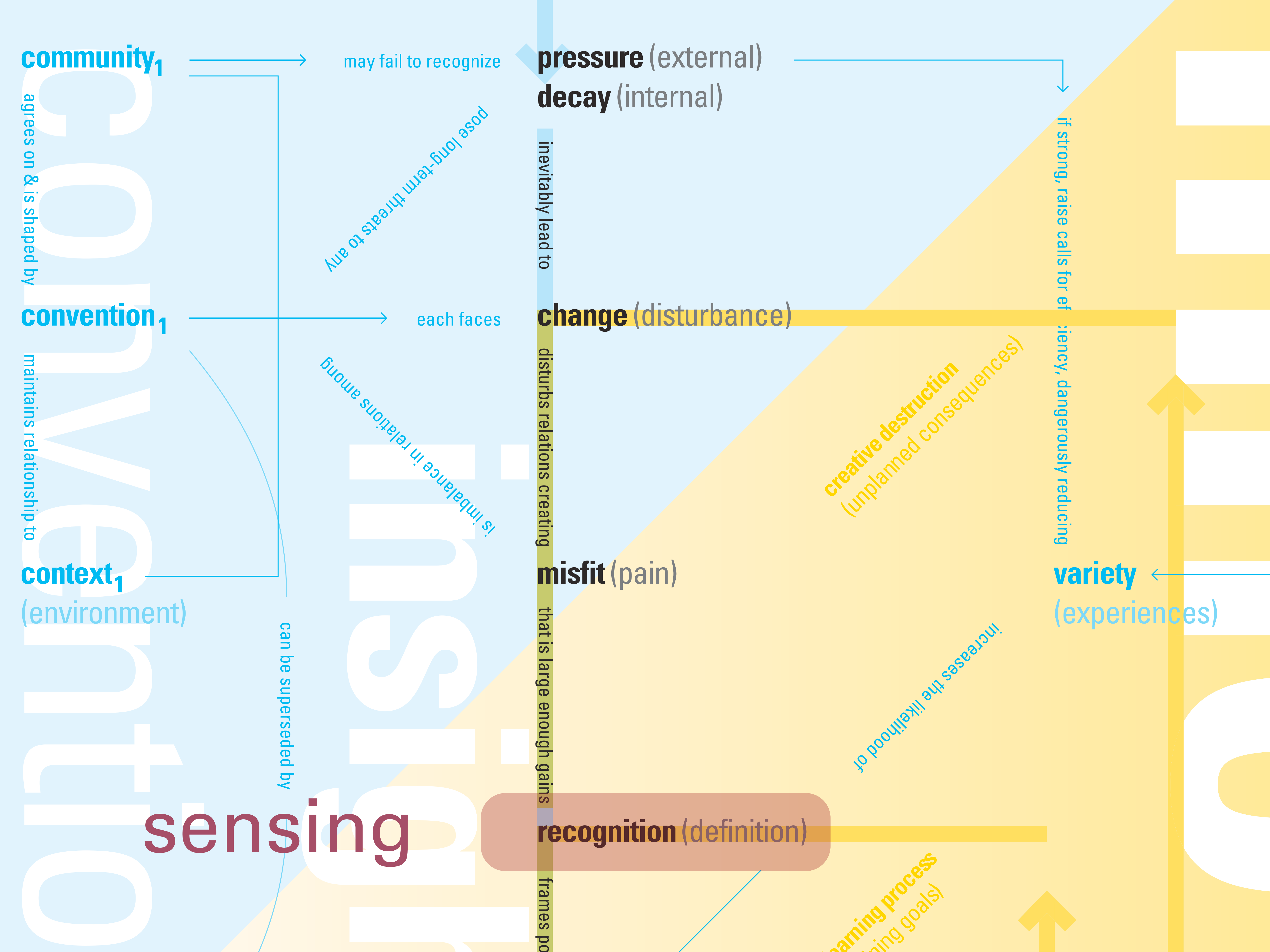
misfit (pain)

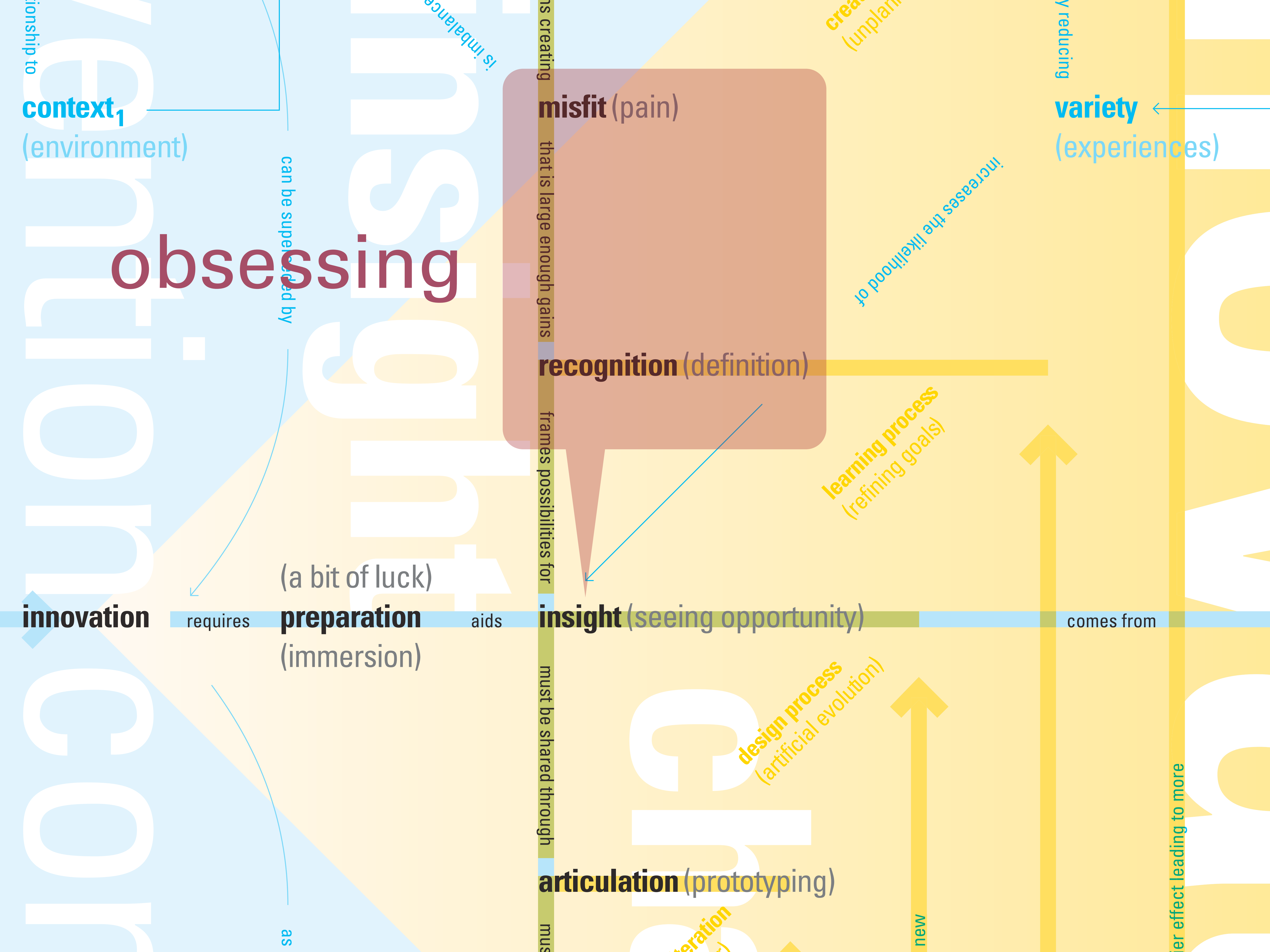
that is

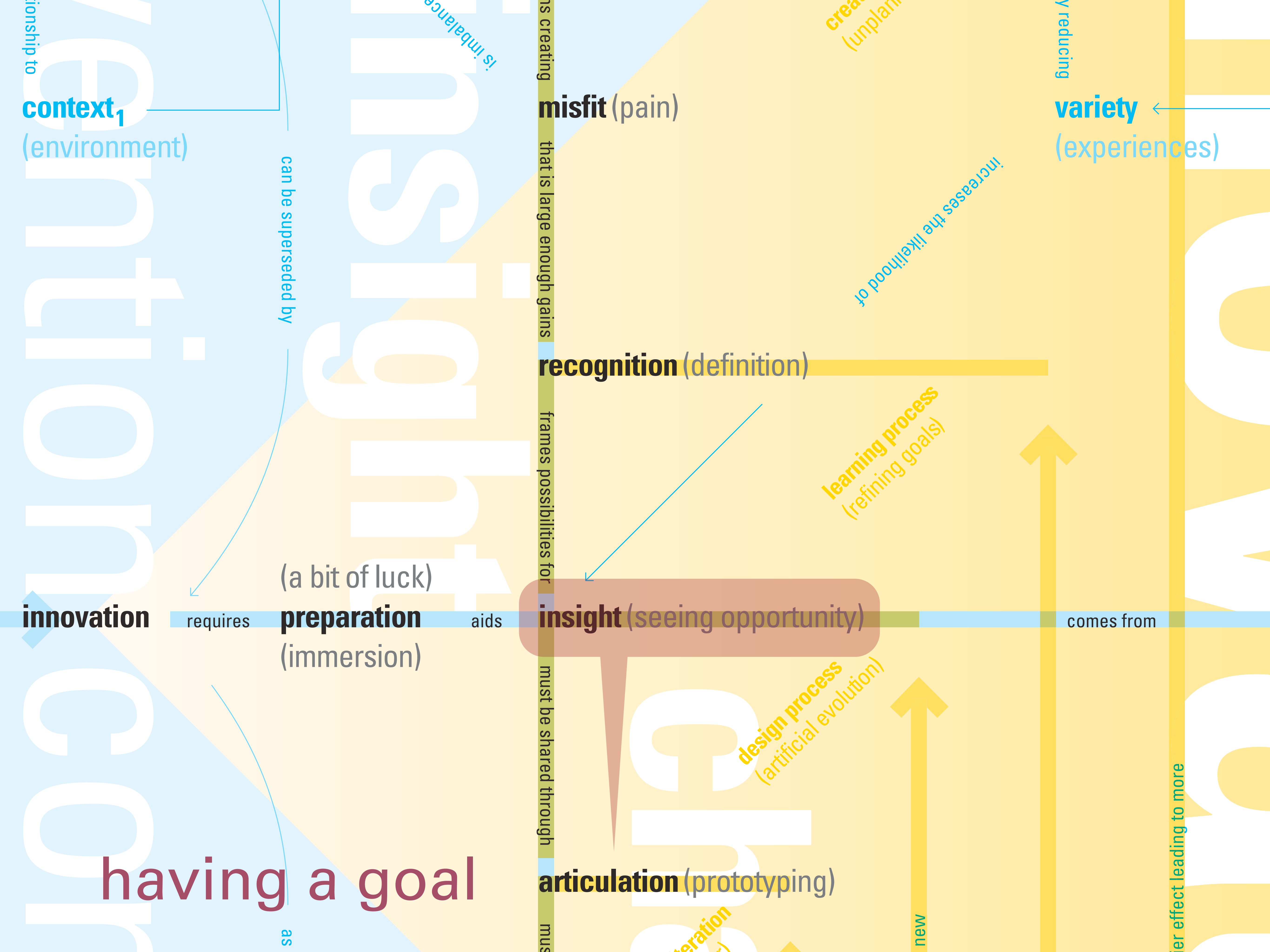
can b

creati

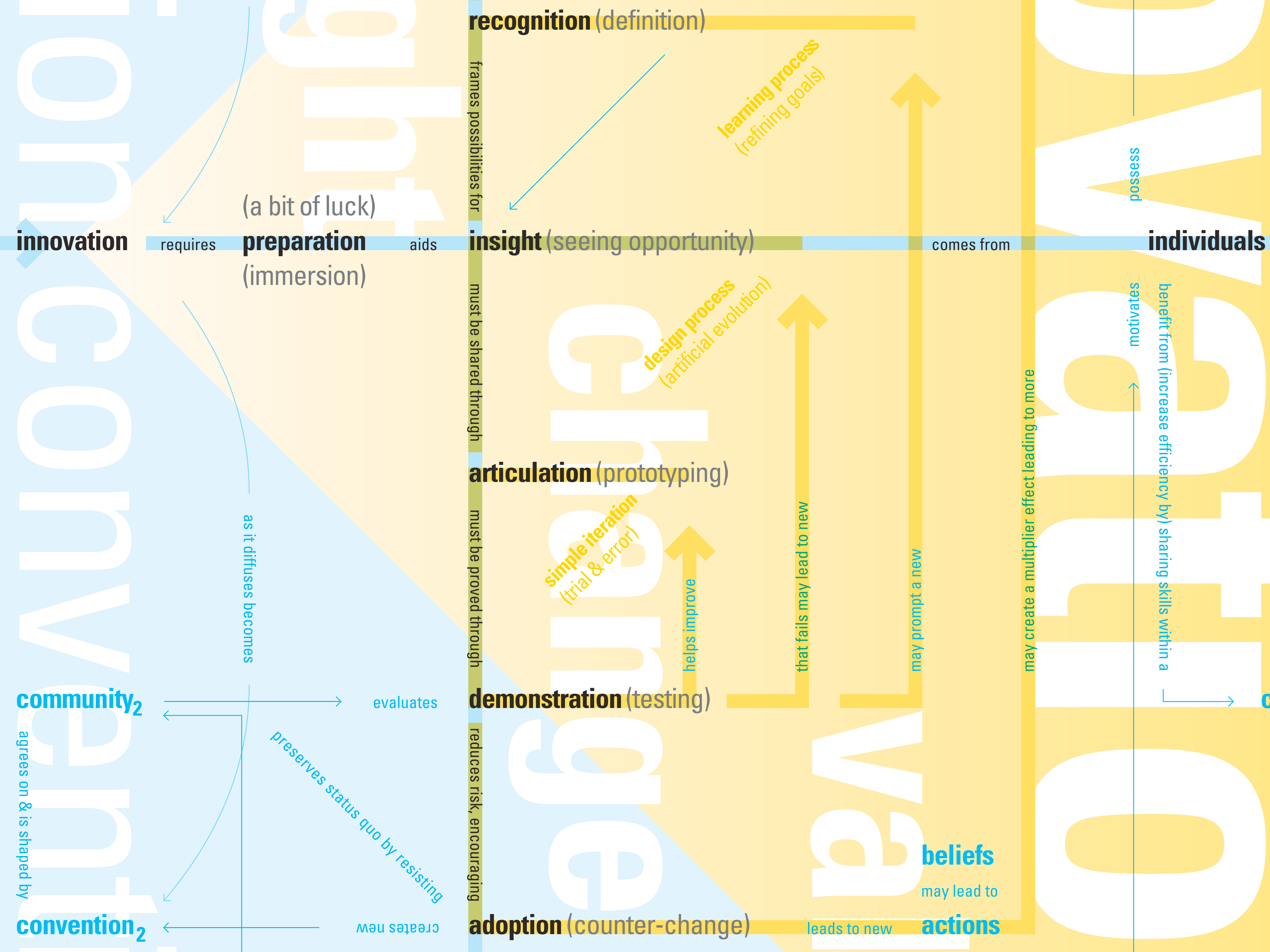
(un


community$_1$
may fail to recognize
pressure (external)
decay (internal)
agrees on & is shaped by
pose long-term threats to any
inevitably lead to
if strong, raise calls for ef iency, dangerously reducing
convention$_1$
each faces
change (disturbance)
maintains relationship to
is imbalance in relations among
disturbs relations creating
creative destruction
(unplanned consequences)
context$_1$
(environment)
misfit (pain)
variety
(experiences)
can be superseded by
that is large enough gains
increases the likelihood of
sensing
recognition (definition)


context1
(environment)
variety
(experiences)
misfit (pain)
recognition (definition)
obsessing
increases the likelihood of
learning process
(refining goals)
that is large enough gains
frames possibilities for
(a bit of luck)
innovation
requires
preparation
(immersion)
aids
insight (seeing opportunity)
comes from
design process
(artificial evolution)
must be shared through
articulation (prototyping)
as
new



context$_1$
(environment)
can be superseded by
is imbalance
is creating
misfit (pain)
that is large enough gains
recognition (definition)
frames possibilities for
insight (seeing opportunity)
must be shared through
articulation (prototyping)
variety
(experiences)
y reducing
increases the likelihood of
learning process
(refining goals)
design process
(artificial evolution)
innovation
requires
(a bit of luck)
preparation
(immersion)
aids
comes from
having a goal
as
new
insight
invention
er effect leading to more


recognition (definition)
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comes from
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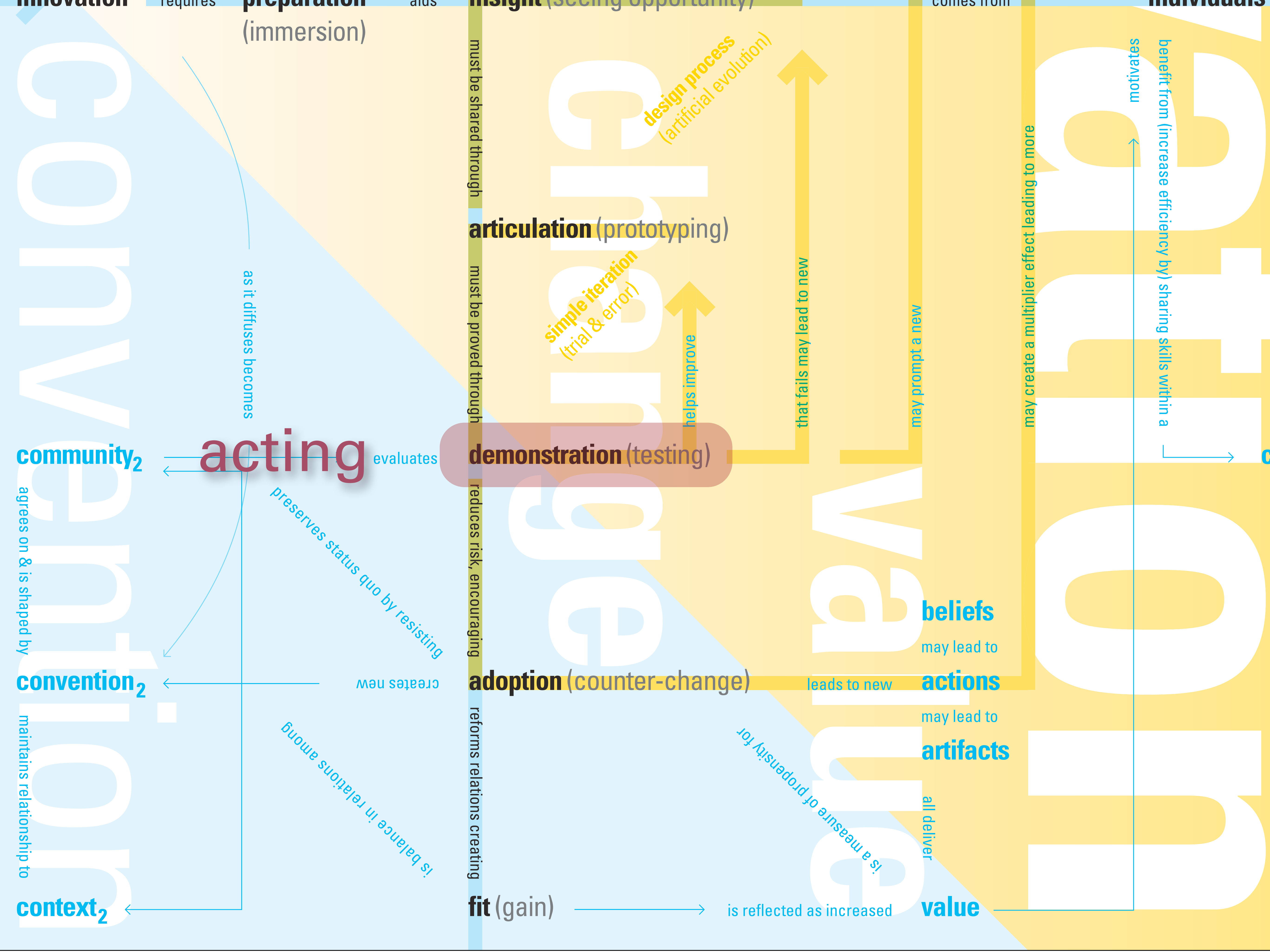
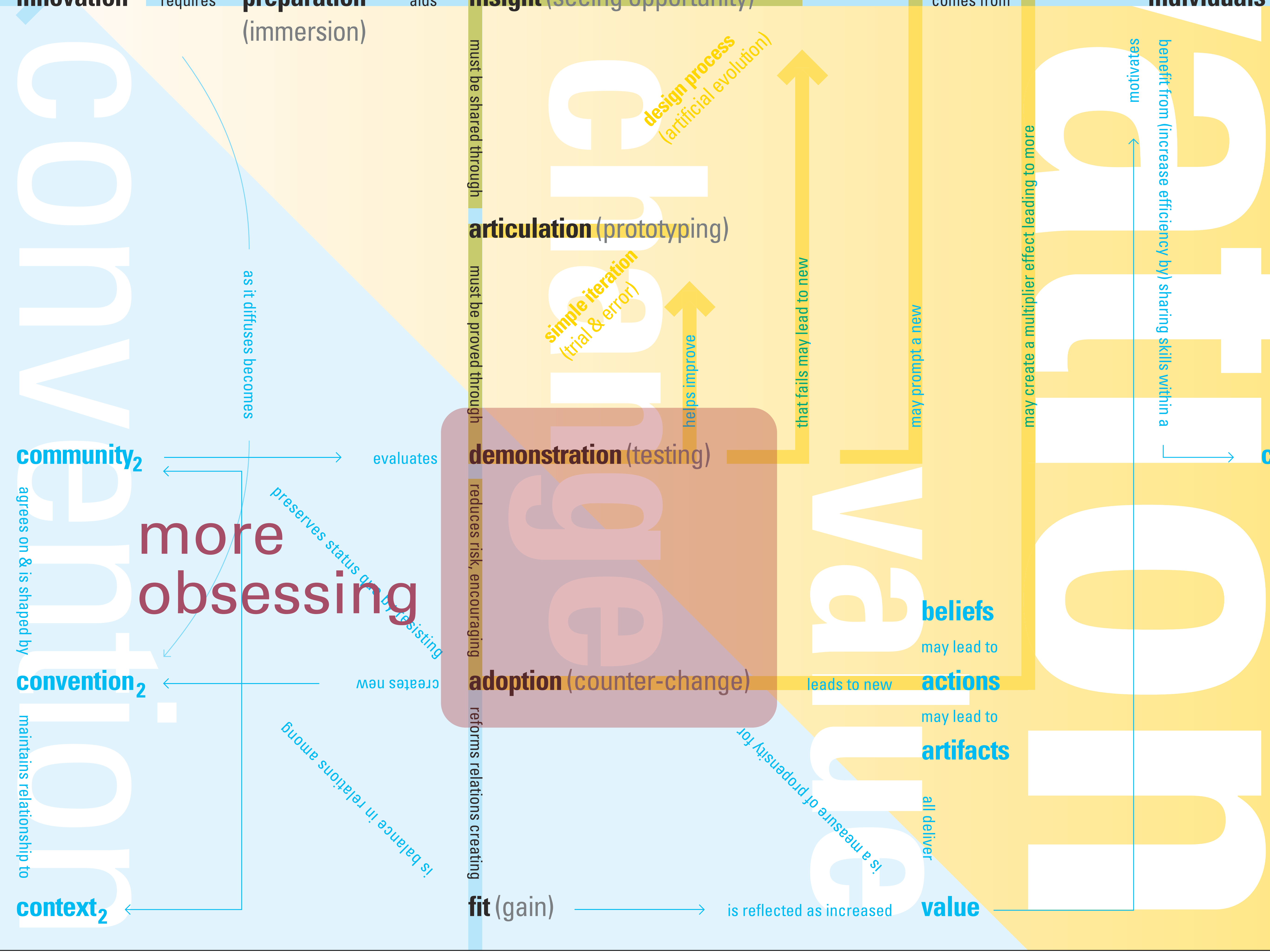
must be shared through
design process
(artificial evolution)
motivates
benefit from (increase efficiency by) sharing skills within a
articulation (prototyping)
as it diffuses becomes
must be proved through
simple iteration
(trial & error)
helps improve
that fails may lead to new
may prompt a new
may create a multiplier effect leading to more
community$_2$
evaluates
demonstration (testing)
agrees on & is shaped by
preserves status quo by resisting
reduces risk, encouraging
beliefs
may lead to
convention$_2$
creates new
adoption (counter-change)
leads to new
actions



(immersion)
convention
change
value
action
must be shared through
articulation (prototyping)
design process
(artificial evolution)
simple iteration
(trial & error)
must be proved through
helps improve
that fails may lead to new
may prompt a new
may create a multiplier effect leading to more
motivates
benefit from (increase efficiency by) sharing skills within a
as it diffuses becomes
community₂
acting
evaluates
demonstration (testing)
agrees on & is shaped by
preserves status quo by resisting
reduces risk, encouraging
beliefs
may lead to
convention₂
creates new
adoption (counter-change)
leads to new
actions
may lead to
maintains relationship to
is balance in relations among
reforms relations creating
is a measure of propensity for
artifacts
all deliver
context₂
fit (gain)
is reflected as increased
value


innovation
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change
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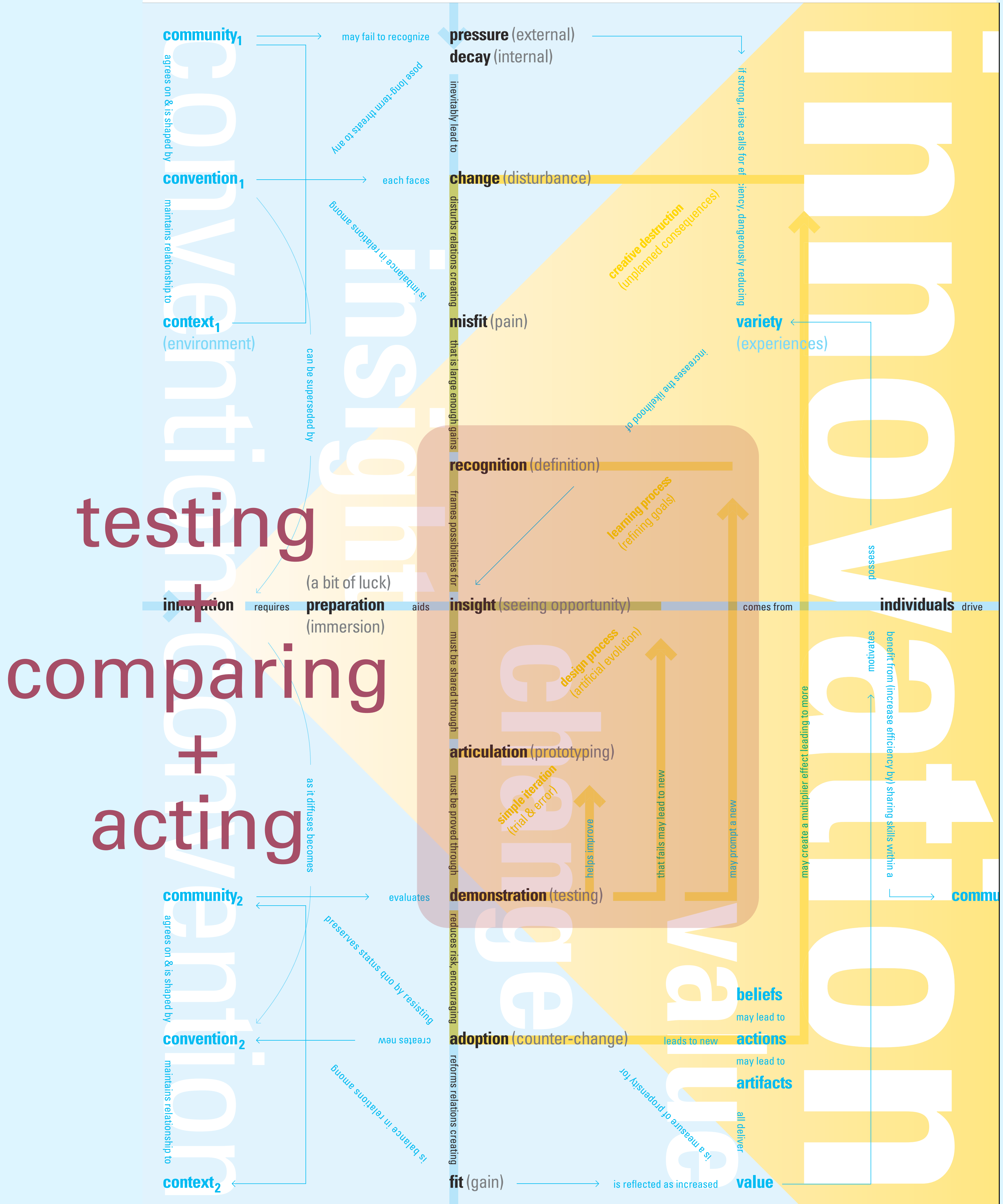

testing
+
comparing
+
acting
community1
may fail to recognize
pressure (external)
decay (internal)
agrees on & is shaped by
pose long-term threats to any
inevitably lead to
if strong, raise calls for efficiency, dangerously reducing
convention1
each faces
change (disturbance)
maintains relationship to
is imbalance in relations among
disturbs relations creating
creative destruction
(unplanned consequences)
context1
(environment)
misfit (pain)
variety
(experiences)
can be superseded by
that is large enough gains
increases the likelihood of
recognition (definition)
frames possibilities for
learning process
(refining goals)
possess
(a bit of luck)
innovation
requires
preparation
(immersion)
aids
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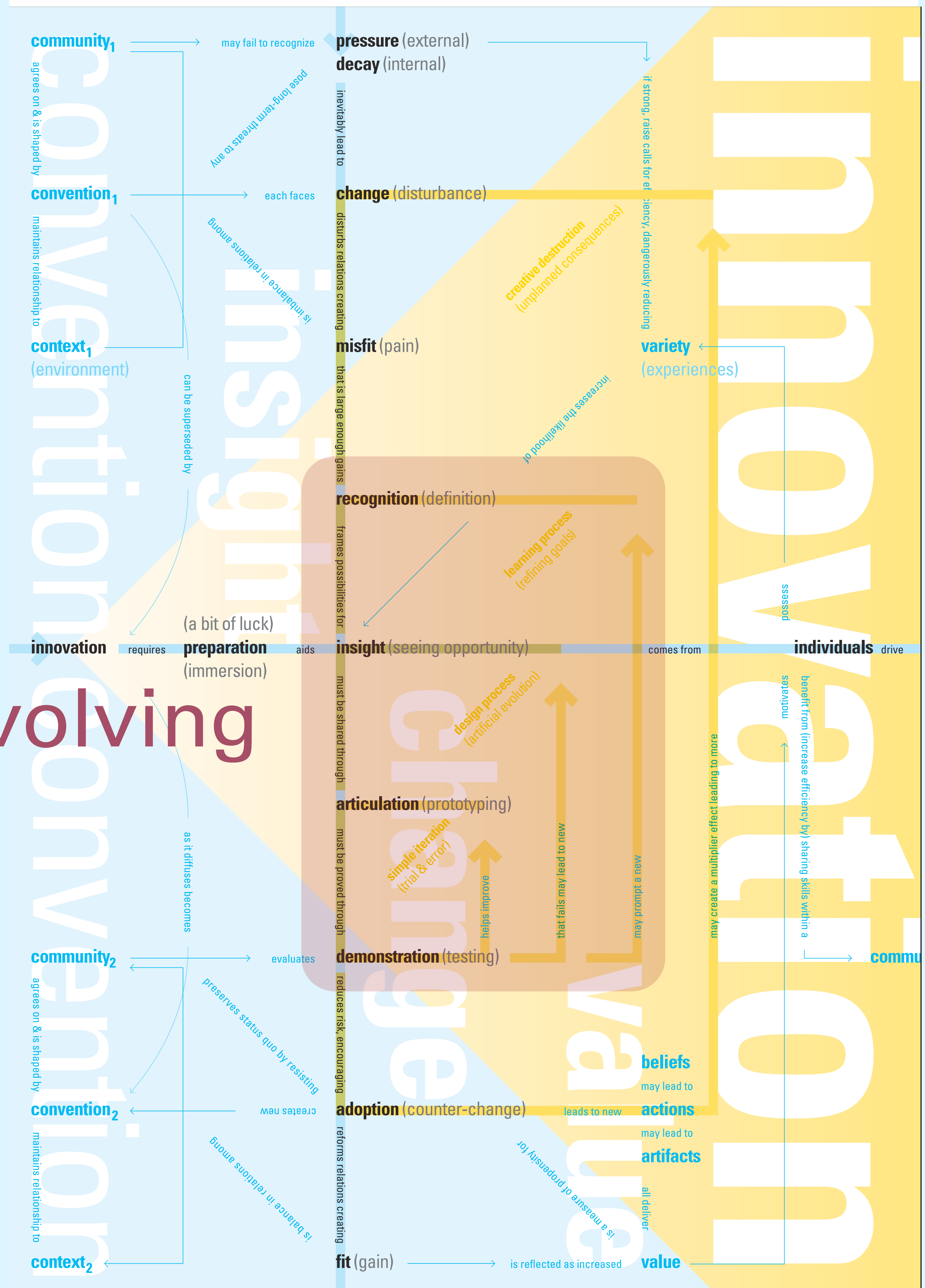
comes from
individuals
drive
must be shared through
design process
(artificial evolution)
motivates
benefit from (increase efficiency by) sharing skills within a
articulation (prototyping)
may create a multiplier effect leading to more
as it diffuses becomes
must be proved through
simple iteration
(trial & error)
helps improve
that fails may lead to new
may prompt a new
community2
evaluates
demonstration (testing)
community
agrees on & is shaped by
preserves status quo by resisting
reduces risk, encouraging
beliefs
may lead to
convention2
creates new
adoption (counter-change)
leads to new
actions
may lead to
maintains relationship to
is balance in relations among
reforms relations creating
is a measure of propensity for
artifacts
all deliver
context2
fit (gain)
is reflected as increased
value
convention
insight
change
value
innovation

co-evolving



community1
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preparation
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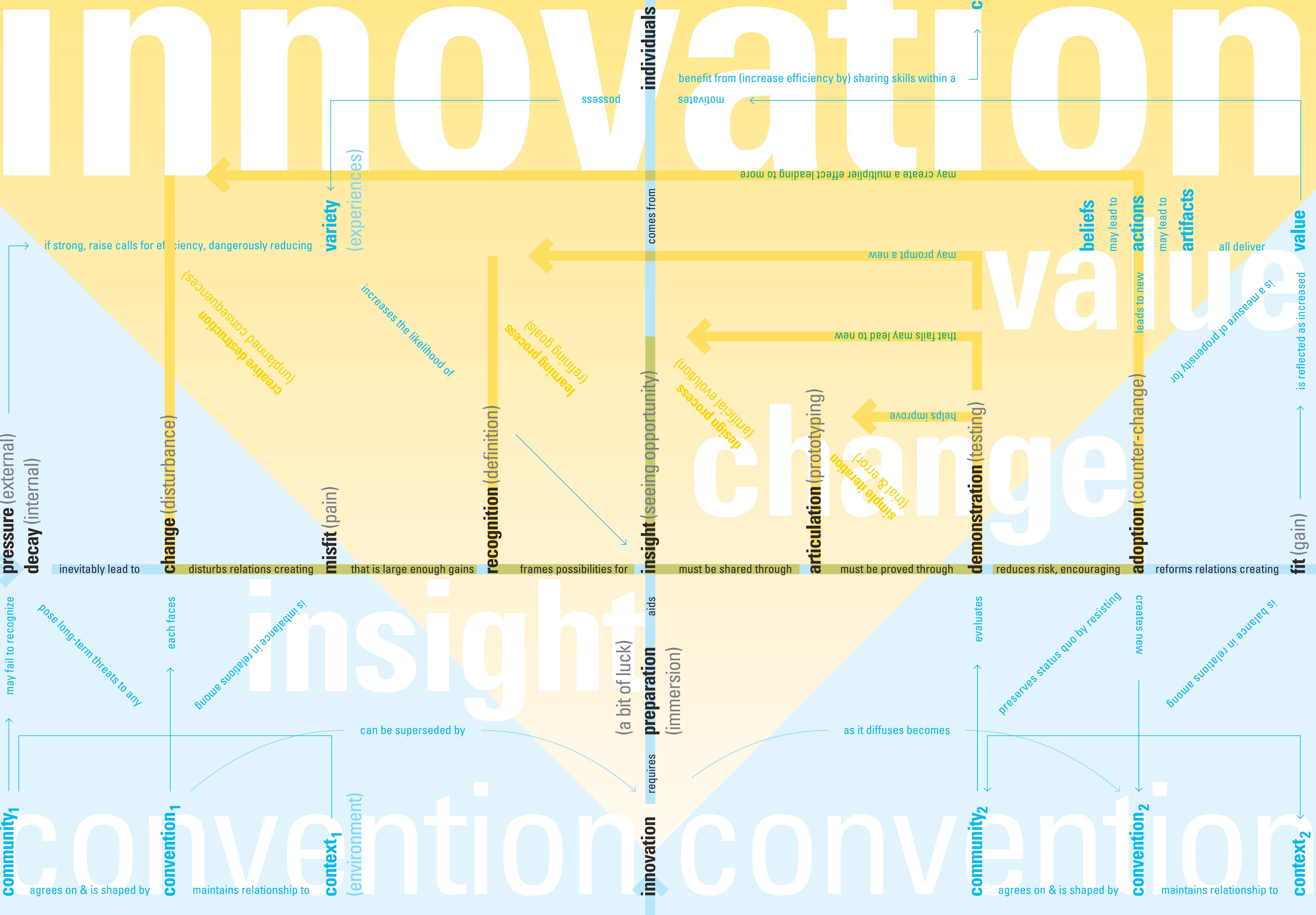
(a bit of luck)
aids
comes from
individuals
drive
possess
who
benefit from (increase efficiency by) sharing skills within a
community
may create a multiplier effect leading to more
community2
evaluates
agrees on & is shaped by
preserves status quo by resisting
convention2
creates new
maintains relationship to
is balance in relations among
context2
as it diffuses becomes
beliefs
may lead to
actions
leads to new
may lead to
artifacts
all deliver
is a measure of propensity for
insight
change
value
innovation
convention


innovation
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context$_1$
(environment)
innovation
community$_2$
agrees on & is shaped by
convention$_2$
maintains relationship to
context$_2$


innovation
value
change
insight
convention
innovation
convention

innovation

– what is innovation?
– how do we get it?
– when do we need it?

innovation

most “innovation strategies”
are vague suggestions:

- be open-minded
- encourage diversity
- learn to trust each other
- encourage experimentation
- spend money.

innovation

how do we increase the likelihood of innovation?

- focus on a specific problem
- choose participants carefully
- encourage obsession
- pay attention to language.

innovation requires both domains of language

reaching insight requires...

creating new language

looking outside of current conventions

seeing new possibilities

agreeing on goals

deciding on what to do

...creating VARIETY.

innovation requires both domains of language

creating change and value requires...

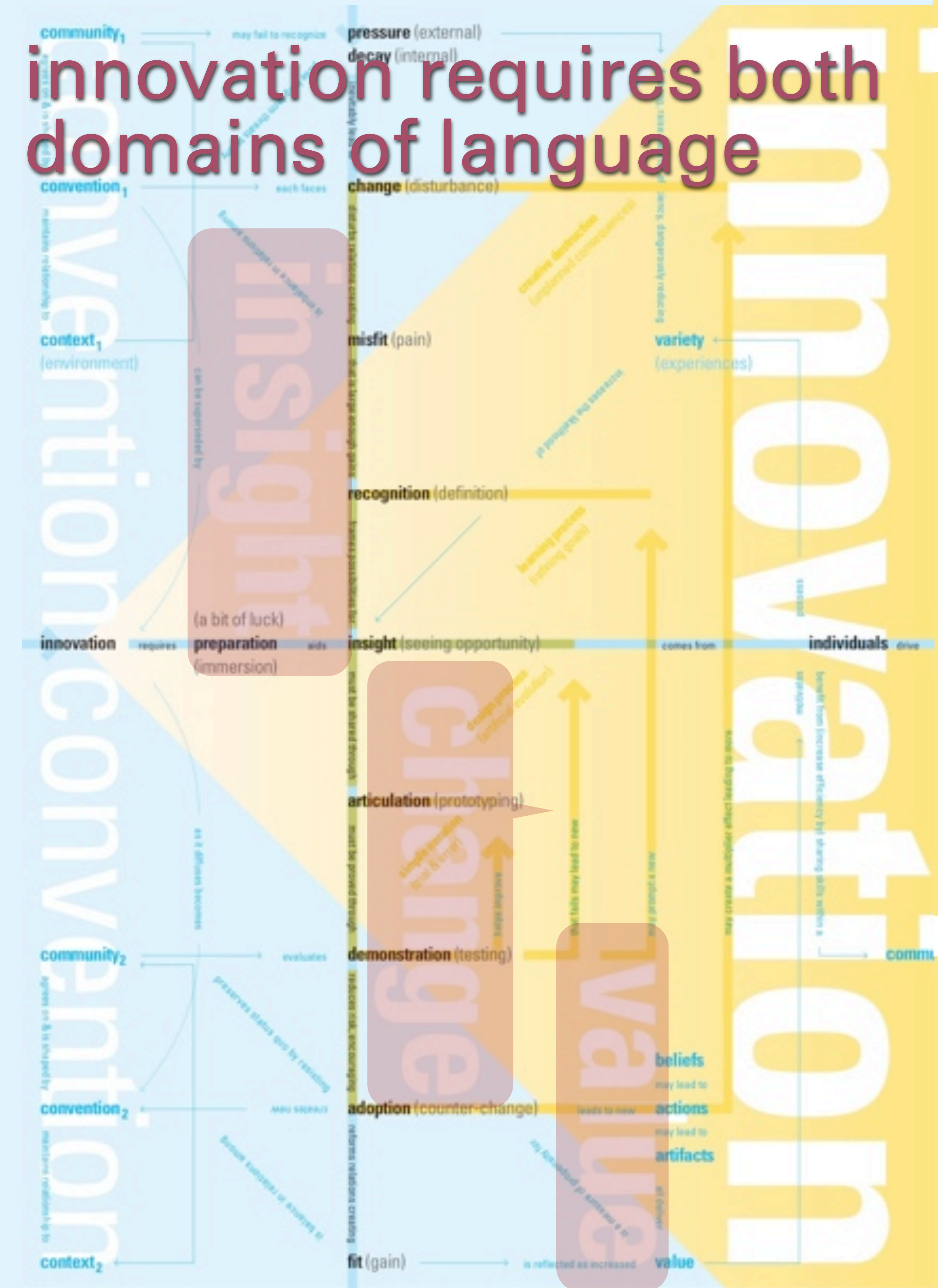
implementing new language

developing plans

focusing on doing what has already been agreed

...creating QUALITY.

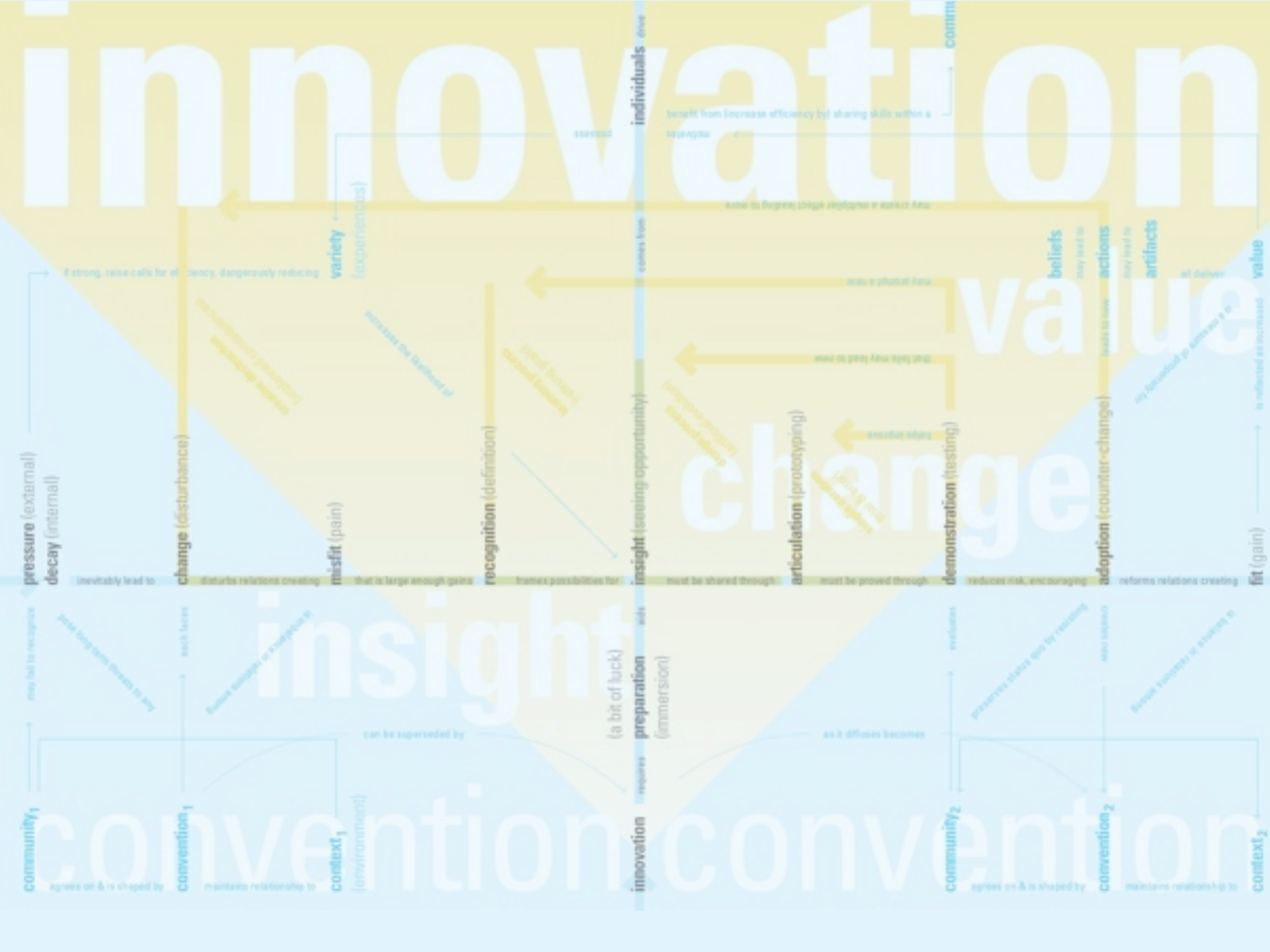
innovation requires both domains of language



VARIETY

+

QUALITY


innovation
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agrees on & is shaped by
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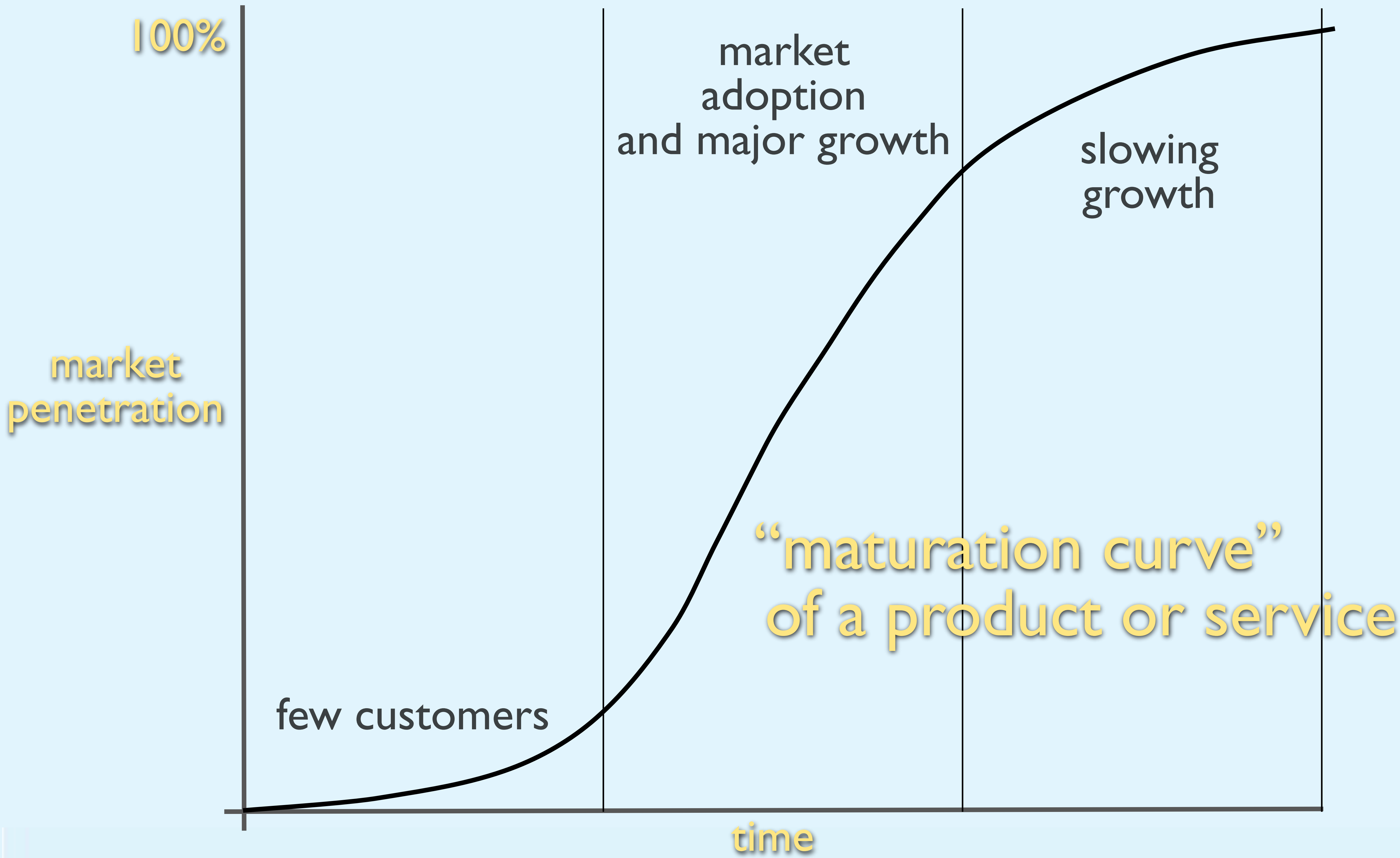
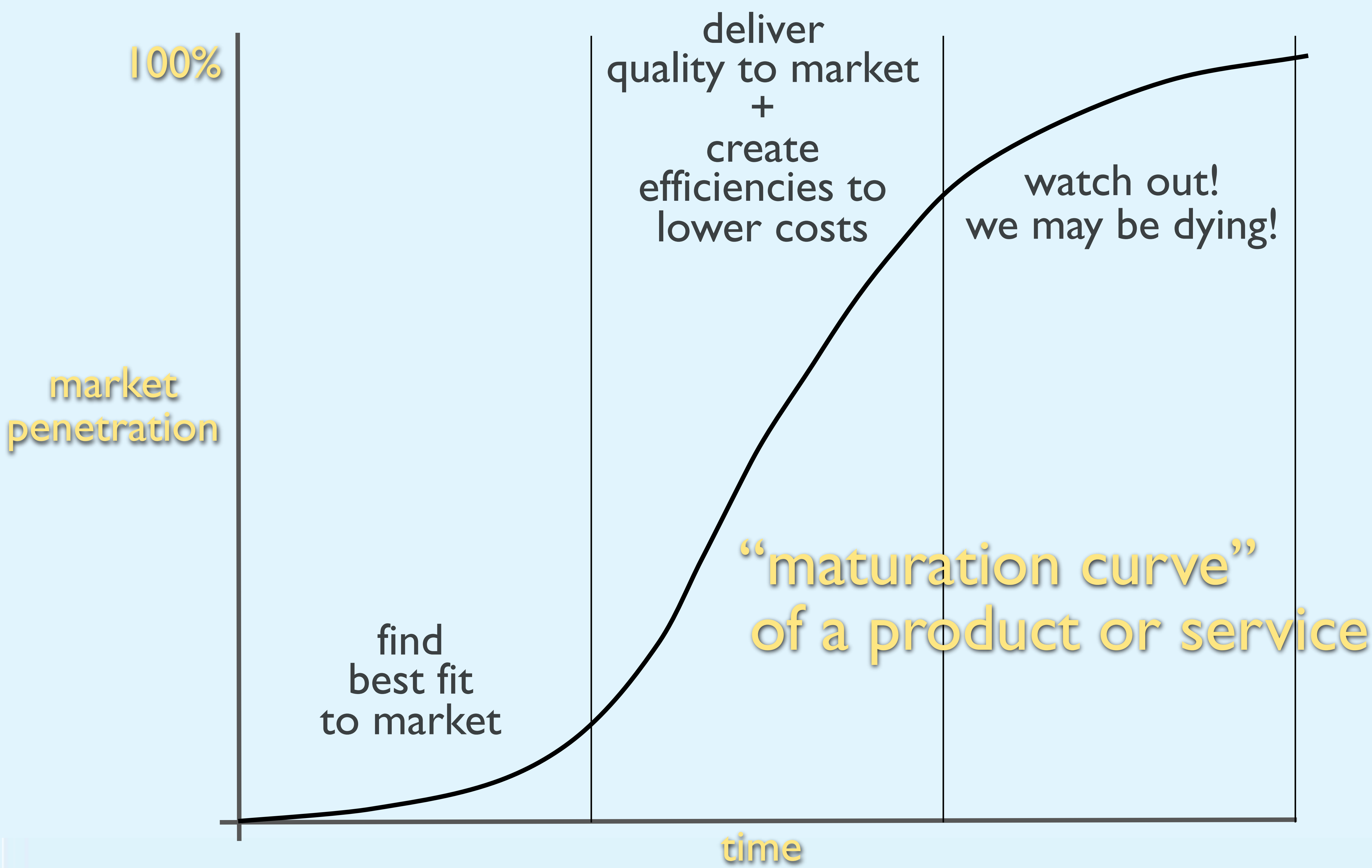
maintains relationship to
context (environment)
innovation
community
agrees on & is shaped by
convention
maintains relationship to
context

– what is innovation?
– how do we get it?
– when do we need it?

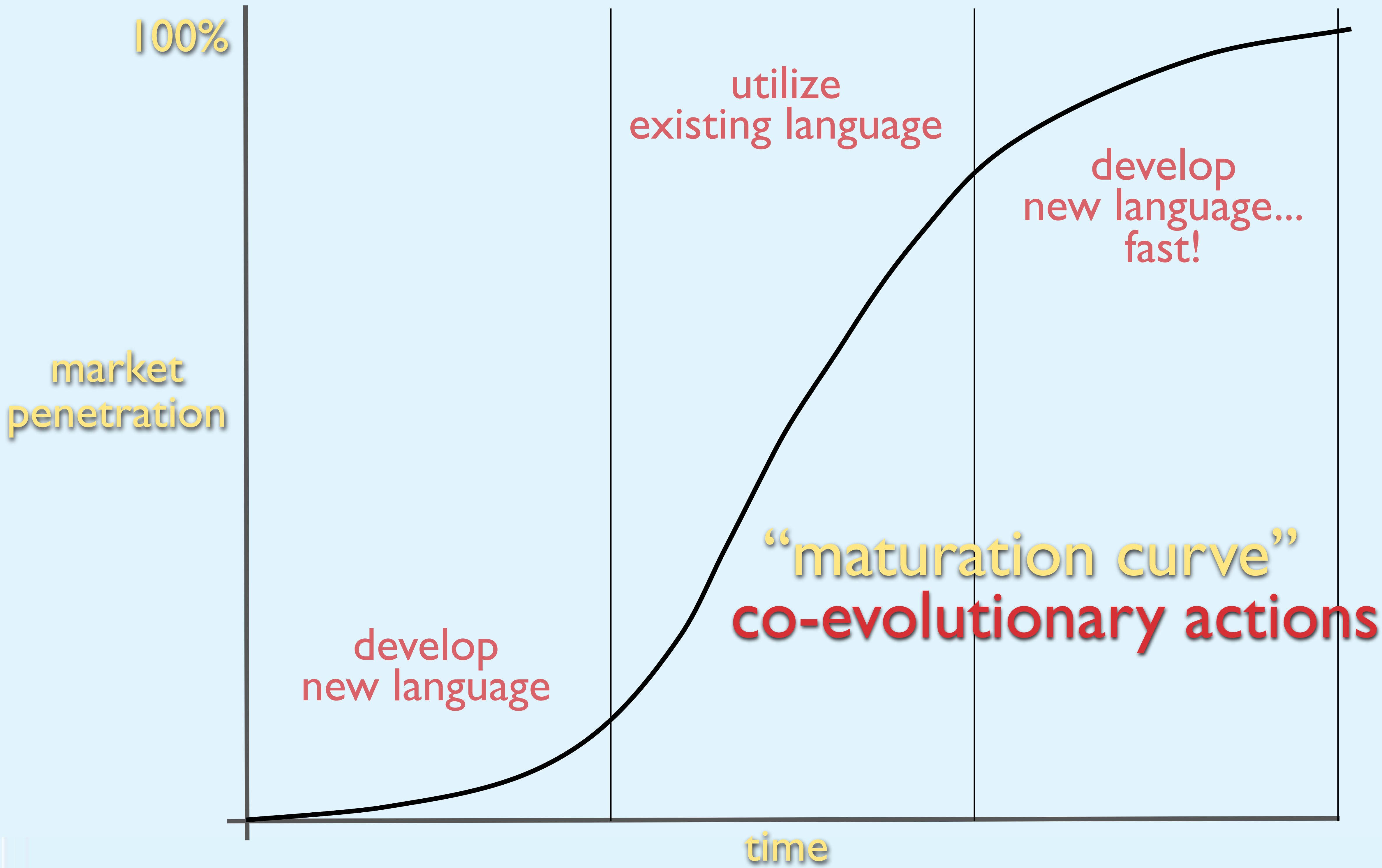
innovation


100%
market penetration
market adoption and major growth
slowing growth
few customers
"maturation curve" of a product or service
time

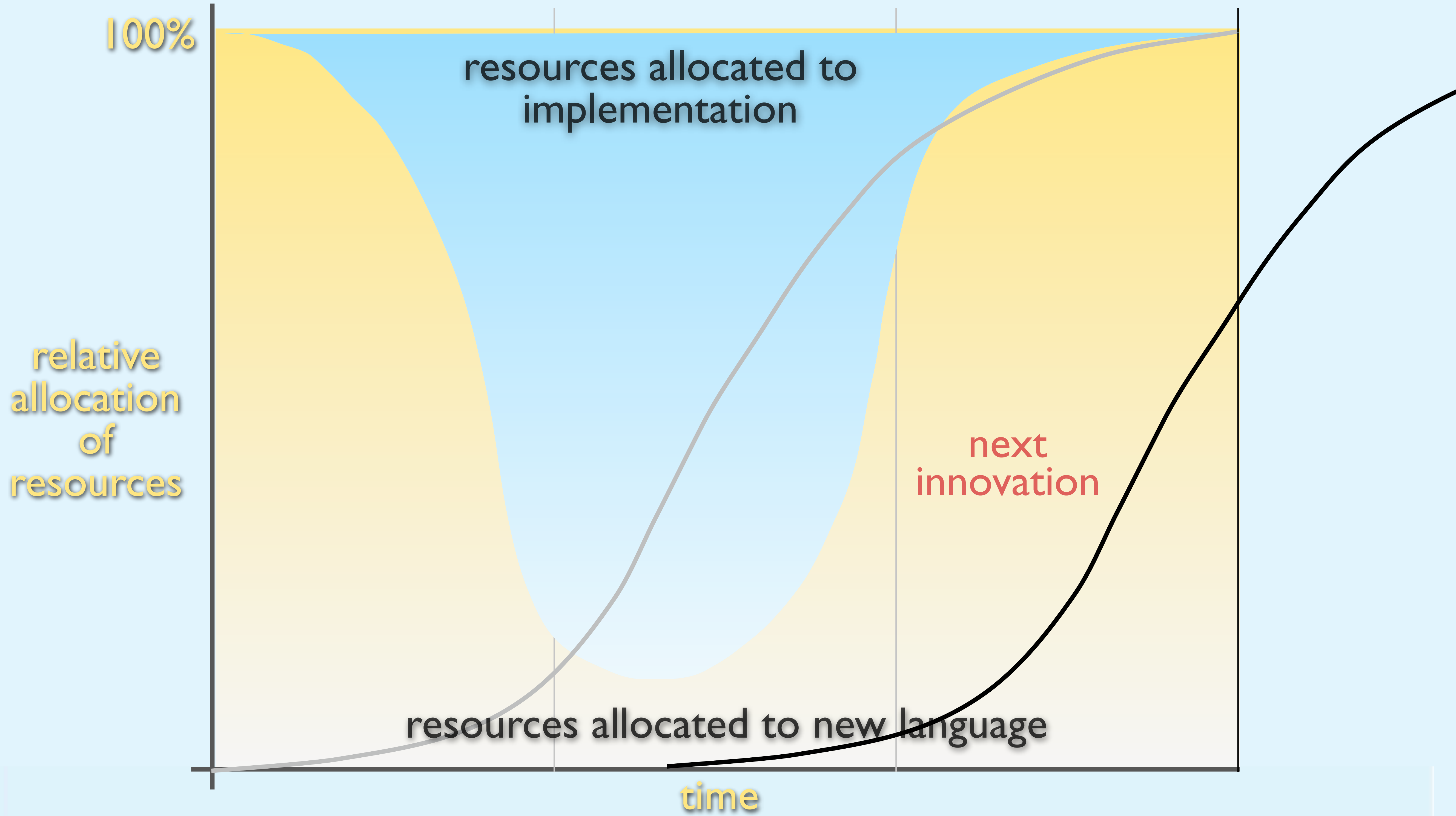
innovation


deliver
quality to market
+
create
efficiencies to
lower costs
100%
watch out!
we may be dying!
market
penetration
"maturation curve"
of a product or service
find
best fit
to market
time

innovation


100%
market
penetration
utilize
existing language
develop
new language...
fast!
"maturation curve"
co-evolutionary actions
develop
new language
time

innovation


100%
resources allocated to implementation
relative allocation of resources
next innovation
resources allocated to new language
time

– what is innovation?
– how do we get it?
– when do we need it?

Prescriptive Innovation

Start with Sensing
- Where are the "misfits"?
- What problem are you trying to solve?

Consider maturity of business / market

Incorporate "Orders of Change"
- Efficiency or discovery or invention?

Change = Defining . . .

New domains.
Systems within a domain.
Efficiencies in a system.

Change takes place only in relationship—
in the context of conserving a way of living.
Change can be understood
only in the context of what remains unchanged.

First-order change
creates new domains
and new generative languages.

Second-order change
affects system rules within a new domain.

Third-order change
seeks increased efficiency within that system.

Levels of change
are analogous to orders of creativity
(invention, discovery, efficiency).

Change moves in only one direction:
from identification, to selection, to efficiency.

Creativity =

Recognizing invention.
Profiting from discoveries.
Developing efficiencies.

Successful organizations
support at least three orders of creativity.

They provide resources to recognize invention,
which opens up new domains of language.
In these new domains,
profitable discoveries may be made.

They provide the necessary conditions
for discovering and marketing
products and services
that emerge from these new domains.

Then, they develop more cost-effective ways
of producing and delivering
these new products and services.

Exercise #3

order of change

III			
II			
I			
	early	mid	late

degree of maturation

Leadership from a Systems Perspective...

means the organization as a whole:

- understands the requirements of a learning system
- remembers that all systems have limits,
  and designs with these limits in mind
- understands that it exists in language and therefore
  what cannot be discussed cannot be done
- gains productivity and creativity by designing conversations
- looks at innovation as a prescriptive process
- focuses on co-evolving with the market.

Leadership from a Systems Perspective

Cybernetics explained

- Models of Learning Systems
- Exercise #1

Limits of Social Systems

- Models of Requisite Variety + Conversation
- Exercise #2

Co-evolution

- Model of Innovation
- Exercise #3

Leadership from a Systems Perspective

http://pangaro.com/mitsloan2009/

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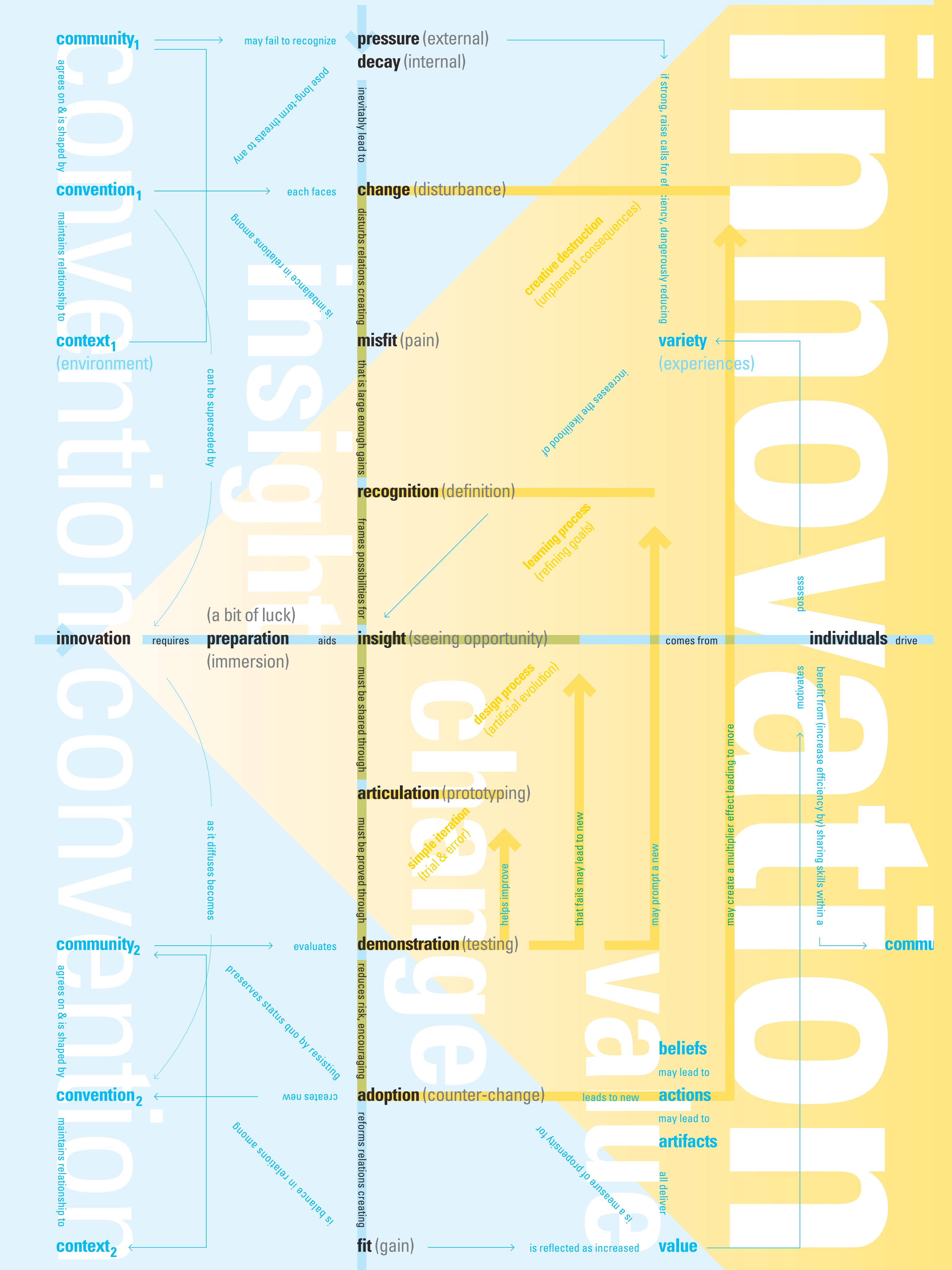
SIP Period
October 2009



Notes on the Role of **Leadership and Language** in Regenerating Organizations