



Duolearning

visit www.duolearning.org

John Kirkland and Mike Saywell

Design School, Palmerston North, New Zealand

Presentation at the International Association of Perceptual Control Theory

York, UK, October 2026

(For enquiries and any associated artefacts contact johnkirkland@gmail.com)

Snip 1 & 2

With appreciation

Metaphor

In plain sight --

Two snips from *Law and Order*

Pres 2

Point light displays



www.biomotionlab.ca/Demos/bmlwalker

Pres 3

Our PCT variation



[https://duolearning.org/conference/
pct-levels](https://duolearning.org/conference/pct-levels)

Pres 5



[https://duolearning.org/conference/
colour-theory](https://duolearning.org/conference/colour-theory)

Pres 5



[https://duolearning.org/conference/
Synonym-Map](https://duolearning.org/conference/Synonym-Map)

Conclusion of Phase I
Check duolearning.org

We asked: Could we
Model the PCT model?

Framed in PCT-speak
- a student?
- a teacher?

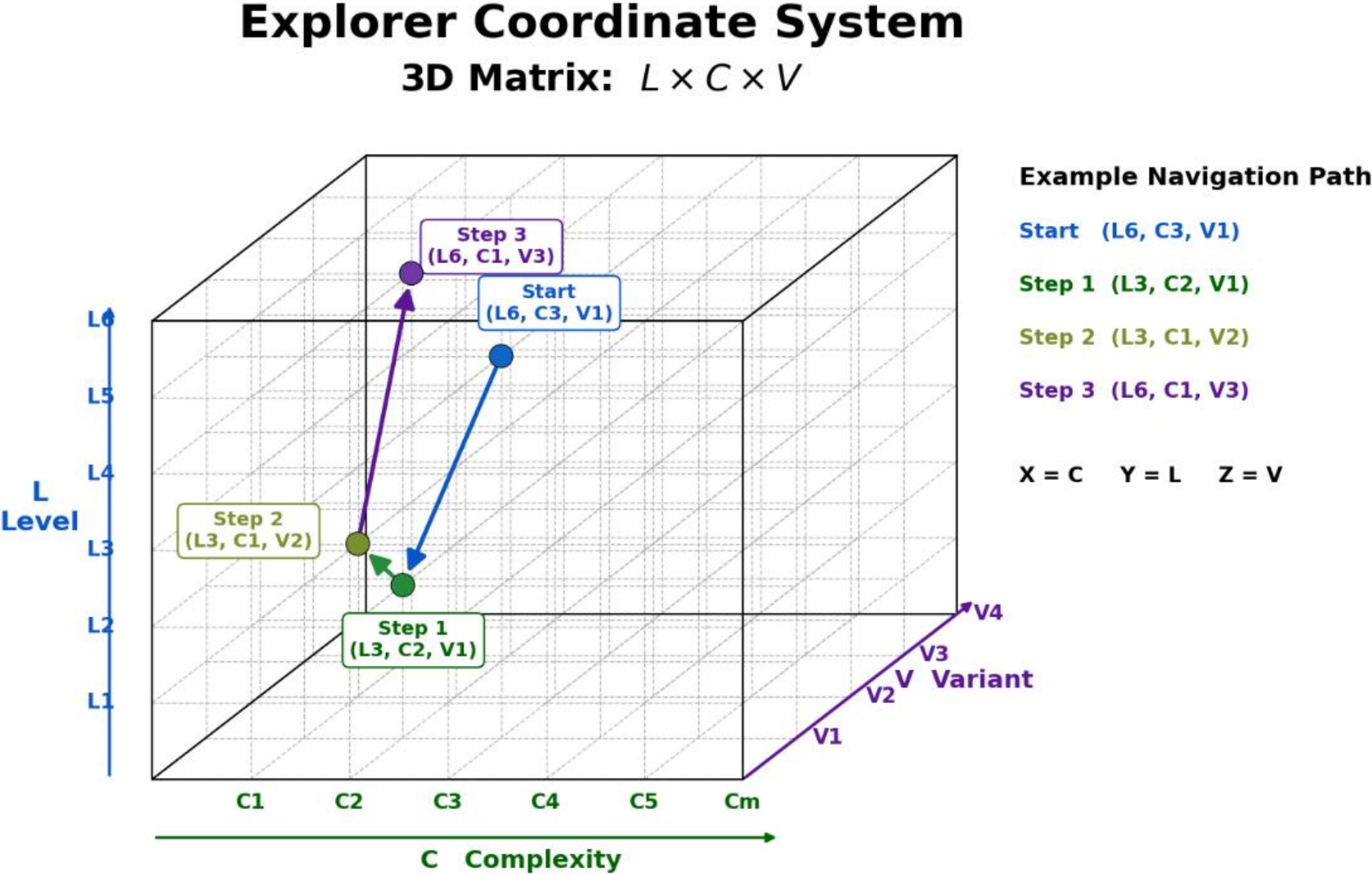


<https://duolearning.org/conference/explorer>

Pres 6

In plain PCT sight

Fractions Exploration — L × C × V Trajectory

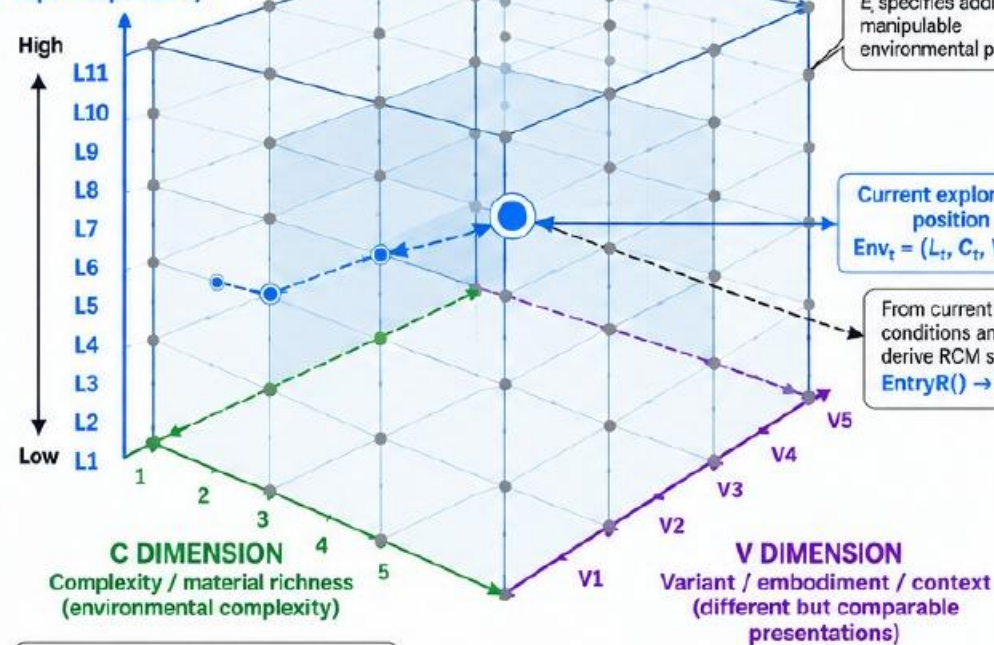


L - C - V + R EXPLORATION FIELD

CANONICAL VISUAL REPRESENTATION (Revision 1.2)

L DIMENSION

Perceptual organisation
(PCT hierarchy – lexicon kept independent)



- Current position
- Previous positions (trajectory)
- Other possible exploration conditions

EXPLORATION STATE

$$Env_t = (L_t, C_t, V_t, E_t)$$

E_t = environmental configuration
(additional manipulable properties)

$R_t^{potential}$ = what the current environment could support

$R_t^{evidence}$ = what current evidence supports

MOVEMENT IN THE FIELD

Explorer selects displacements in one or more dimensions:

ΔL change perceptual organisation
 ΔC change complexity
 ΔV change variant / context
 ΔE change environmental conditions

$$\Delta Env = (\Delta L, \Delta C, \Delta V, \Delta E)$$

Environmental opportunity is then reassessed:
 $AssessPotential() \rightarrow R^{potential}$

Small Displacement

Nearby in one or two dimensions. Fine adjustment.

Medium Displacement

Across several cells in the field. Substantial change in conditions.

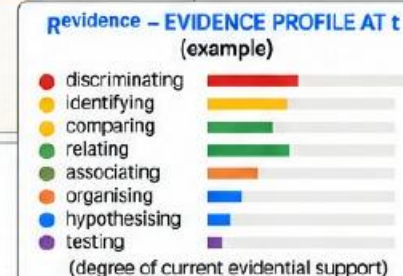
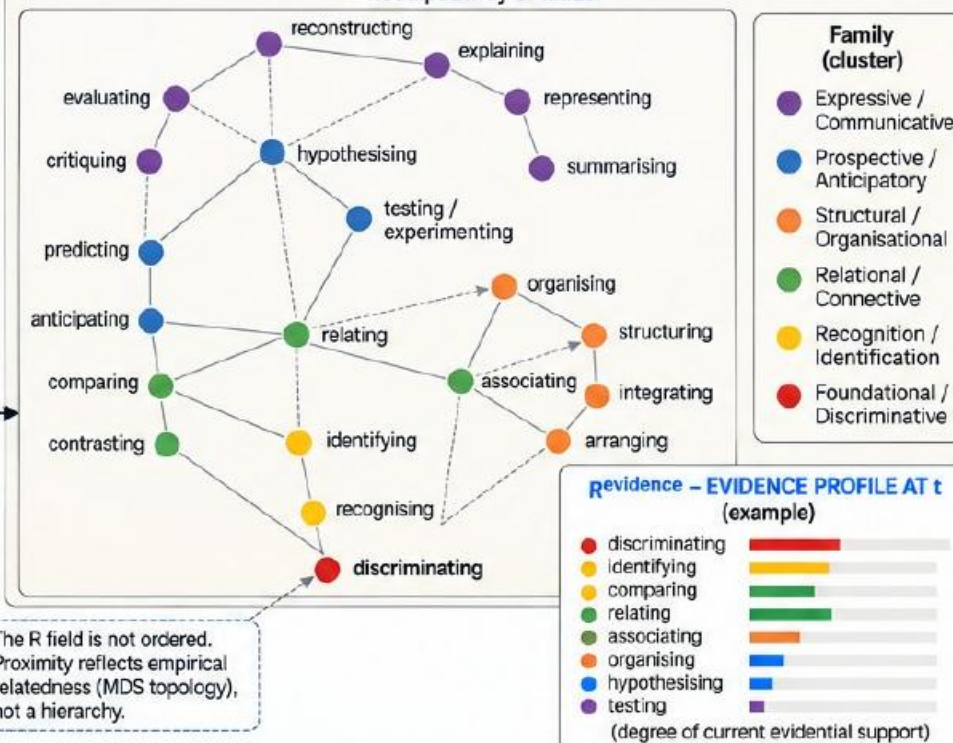
Large Displacement

Far across the field. Reframe the exploration space.

REASONING & CONCEPTUALISATION MODEL (RCM)

ILLUSTRATIVE MDS SPACE

Selected elaborative operations shown in an empirical multidimensional topology – not a pathway or ladder



The R field is not ordered. Proximity reflects empirical relatedness (MDS topology), not a hierarchy.

KEY R CONSTRUCTS

- R^{entry} – where Explorer starts searching (derived from Env_t , context and $R^{potential}$)
 - $R^{candidate}$ – possible elaborative opportunity (from $CandidateR()$)
 - $R^{potential}$ – what the environment could support (from $AssessPotential()$)
 - $R^{evidence}$ – what current evidence supports (from environmental evidence)
- $R^{entry} \neq R^{candidate} \neq R^{potential} \neq R^{evidence}$

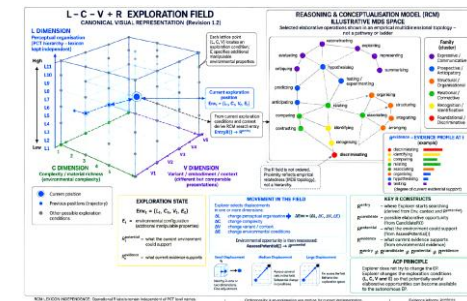
ACP PRINCIPLE

Explorer does not try to change the EP. Explorer changes the exploration conditions (L, C, V and E) so that potentially useful elaborative opportunities can become available to the autonomous EP.

The whole exploration field

This is the complete map. The left side describes where an exploration is taking place and how its environment can change. The right side describes a separate field of reasoning and conceptual operations. Explorer uses both, but they are not the same thing.

There is a slide set which separates the parts so that we can see what each contributes—and, just as importantly, what each does not represent.



Explainer slide set

Necessary?

Smart, intuitive with well
built functional architecture
like phone or TV controller

Explorer Model: what it is for

A short guide to the current Revision 055 prototype

For the Explorer Partner

The Explorer Partner starts with something puzzling, tries ideas, meets changes or disturbances, rebuilds an explanation, reports it, and then decides where to go next.

The aim is not to collect right answers. It is to help the EP gain better control of what they are trying to understand.

For the Adaptive Partner

The Adaptive Partner helps shape the conditions for exploration. They can ask questions, offer another example, make a challenge simpler or wider, and notice when the EP is stuck.

They do not take over the thinking. The EP remains the person who chooses, acts, explains and changes direction.

Pedagogical purpose: create useful conditions in which an Explorer Partner can investigate and reorganise their own understanding.

Fractions — live adaptive loop experiment

Explorer
view

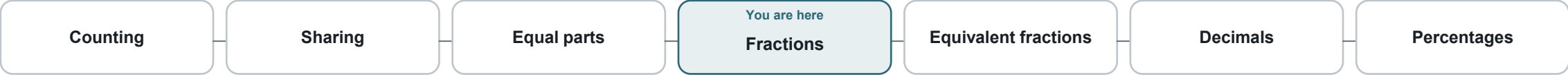
Adaptive
Partner

Start over

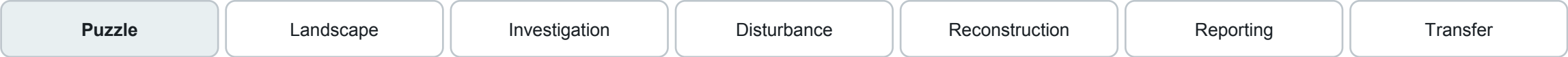
Landscape — The bigger picture

Click anywhere in the Landscape to look around. Click again to close.

▲ close



Fractions — Your present exploration: describing equal parts of a whole.



Puzzle

Which is bigger?

Which is bigger: one-half or one-third? If 3 is bigger than 2, how can one-third be smaller than one-half?

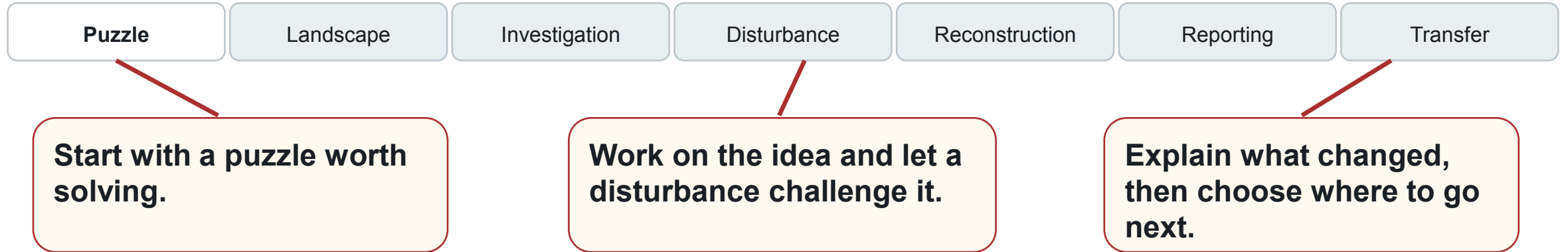
What seems puzzling here?

Begin Investigation

At the outset, the Explorer can see the surrounding territory as well as the opening puzzle.

The exploration has a visible pathway

The ribbon shows where the current exploration is, without turning learning into a test.



The stages give orientation, not a rigid lesson script. The Explorer Partner can look around the Landscape, try another example, look more closely, take a wider view, or continue.

1. Puzzle: begin with a genuine snag

Explorer — Operational Revision 055

Puzzle

Landscape

Investigation

Disturbance

Reconstruction

Reporting

Transfer

Landscape — The bigger picture

Puzzle

Which is bigger?

Which is bigger: one-half or one-third? If 3 is bigger than 2, how can one-third be smaller than one-half?

What seems puzzling here?

Adaptive Partner

Talk it through.
Notice what helps the Explorer keep exploring.

Questions

Ask without giving away the answer.
Offer another direction if needed.

The opening question creates a reason to explore.

“Begin Investigation” moves into exploration only when the Explorer Partner is ready.

2. Landscape: see the bigger picture

Explorer — Operational Revision 055

Puzzle Landscape Investigation Disturbance Reconstruction Reporting Transfer

Landscape — The bigger picture

Landscape

The bigger picture

Click anywhere in the Landscape to look around. Click again to close.

How big a step? Small Medium Large

Adaptive Partner

Talk it through.
Notice what helps the Explorer keep exploring.

Questions

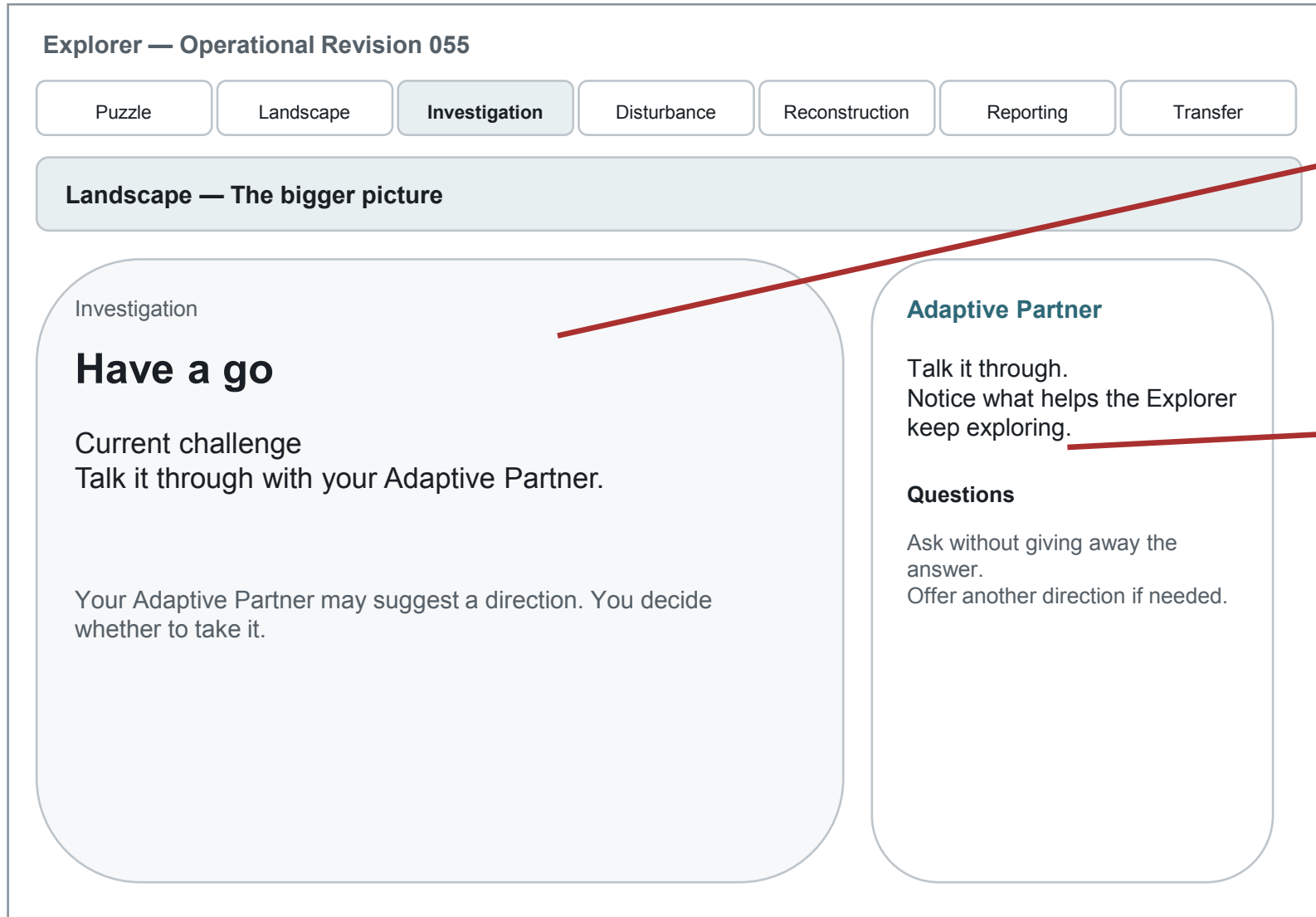
Ask without giving away the answer.
Offer another direction if needed.

The Landscape lets the Explorer Partner look around rather than being forced down one path.

Small, Medium and Large change how far the next move may go.

Navigation changes the exploration, not the person.

3. Investigation: have a go



The Explorer Partner works on the challenge instead of being shown the answer.

The Adaptive Partner can suggest a direction, but the Explorer decides whether to take it.

Adaptive Partner support: change the conditions, not the Explorer

Explorer — Operational Revision 055

Puzzle

Landscape

Investigation

Disturbance

Reconstruction

Reporting

Transfer

Landscape — The bigger picture

Investigation

Have a go

Look more closely • Another example

Take a wider view • Continue

After chatting with your Adaptive Partner, select where to turn next.

Adaptive Partner

Talk it through.
Notice what helps the Explorer keep exploring.

Questions

Ask without giving away the answer.
Offer another direction if needed.

Look more closely if the present challenge is too large.

Another example keeps the same broad idea but changes the case.

Take a wider view when a broader connection may help.

4. Disturbance: test whether the explanation still works

Explorer — Operational Revision 055

Puzzle Landscape Investigation **Disturbance** Reconstruction Reporting Transfer

Landscape — The bigger picture

Disturbance

Change the whole

Can one-half of a tiny pizza be smaller than one-third of a large pizza?

What must stay fixed before the fractions can be compared?

Adaptive Partner

Talk it through.
Notice what helps the Explorer keep exploring.

Questions

Ask without giving away the answer.
Offer another direction if needed.

A disturbance changes the situation so the first explanation may no longer be enough.

The point is to notice what has to stay the same for the comparison to make sense.

5. Reconstruction: rebuild the explanation

Explorer — Operational Revision 055

Puzzle

Landscape

Investigation

Disturbance

Reconstruction

Reporting

Transfer

Landscape — The bigger picture

Reconstruction

Tell the story again

What have you changed in your explanation?

Once the idea is clear: the bottom number tells how many equal parts the whole is divided into.

Adaptive Partner

Talk it through.
Notice what helps the Explorer keep exploring.

Questions

Ask without giving away the answer.
Offer another direction if needed.

The Explorer says what changed in their own explanation.

Technical language is introduced after the idea has become clearer, not as the starting point.

Explorer Model — Revision 055 explainer

9

6. Reporting: make the new understanding usable

Explorer — Operational Revision 055

Puzzle

Landscape

Investigation

Disturbance

Reconstruction

Reporting

Transfer

Landscape — The bigger picture

Reporting

Explain it to someone else

How would you explain why $\frac{1}{3}$ can be smaller than $\frac{1}{2}$?

Reporting can also be shown, drawn, constructed or acted out.

Adaptive Partner

Talk it through.
Notice what helps the Explorer keep exploring.

Questions

Ask without giving away the answer.
Offer another direction if needed.

Explaining to someone else makes the Explorer organise the idea again.

Reporting need not mean writing. Different forms can show the same understanding.

7. Transfer: decide what to explore next

Explorer — Operational Revision 055

Puzzle

Landscape

Investigation

Disturbance

Reconstruction

Reporting

Transfer

Landscape — The bigger picture

Transfer

Where next?

Talk through what might be worth trying next, then choose a direction.

The bigger picture — Open the Landscape and look around.

Adaptive Partner

Talk it through.
Notice what helps the Explorer keep exploring.

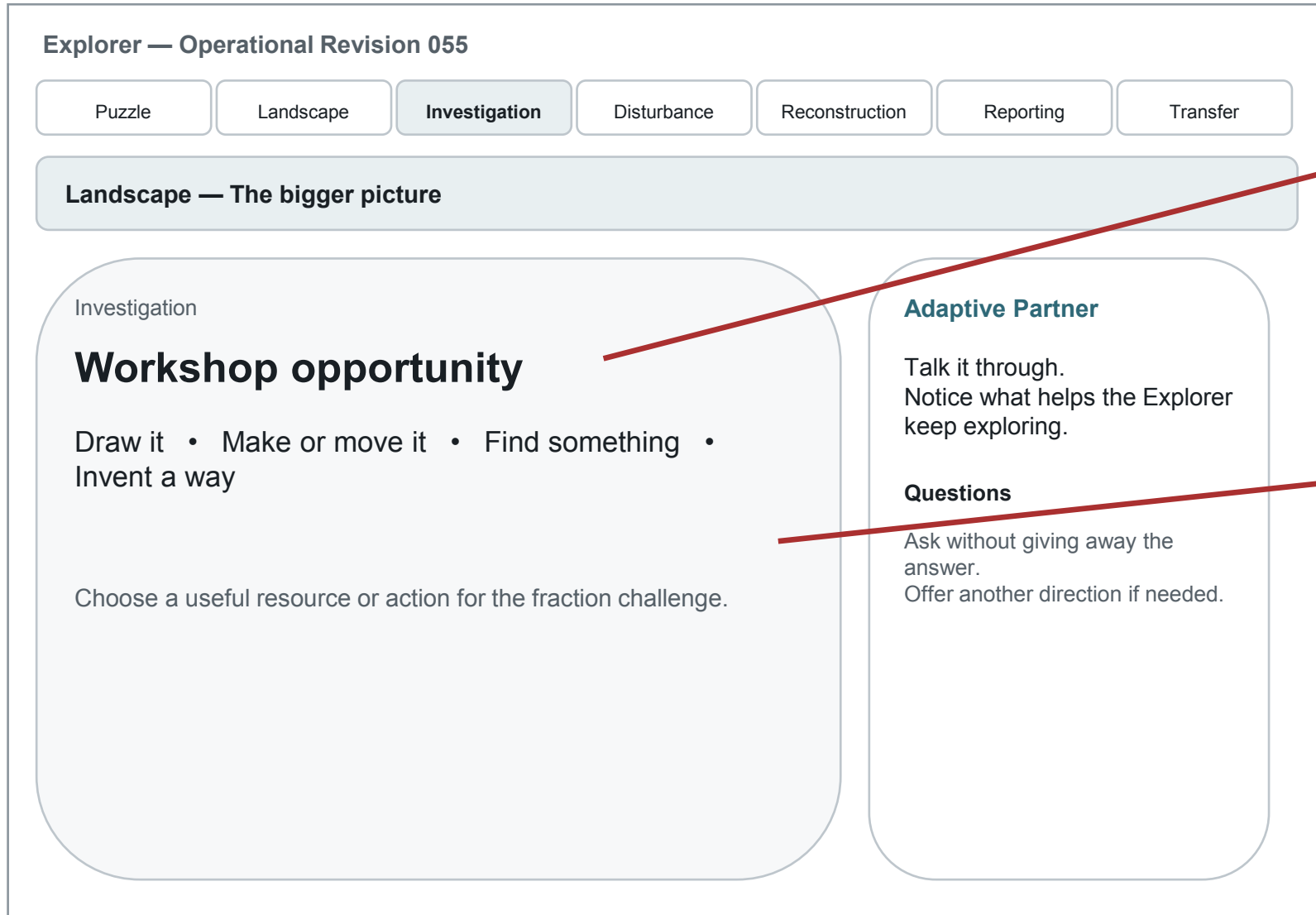
Questions

Ask without giving away the answer.
Offer another direction if needed.

Transfer asks whether the idea can travel into another example or direction.

The next move is chosen, not awarded. There are no points, levels to win or badges.

Exploration can use more than talk



The prototype can move the exploration into drawing, making, moving or finding things.

This matters because understanding can be explored through action and environment, not only words on a screen.

What the Explorer Model is trying to protect

Explorer ownership

The Explorer Partner remains the person who chooses, acts, notices and explains.

Adaptive support

The Adaptive Partner offers options for exploration without taking over the thinking.

Useful disturbance

Challenges are used to reveal where an explanation needs to change.

Movement, not scoring

The system offers directions through an exploration rather than marks, badges or rankings.

Evidence with restraint

Explorer can use what happens in the interaction without pretending it can directly see inside the person's mind.

In short: the model organises opportunities for exploration. It does not prescribe the understanding that must result.

Demo of the E-model DIY PCT

How could the Explorer model describe itself?



[https://duolearning.org/conference/
exploring-explorer](https://duolearning.org/conference/exploring-explorer)

Conclusion of Phase II

Designing a PCT-informed slide show

The explorer model

**The learner gets the right answer.
Have they caught on?**

$$\frac{1}{2} = \frac{2}{4}$$

What, exactly, would convince you that this is more than a remembered rule?

**Ask for another
answer?**

**Ask for an
explanation?**

**Change the
situation?**

Choose what you would do next — and keep your reason in mind.

Start with uncertainty, not the conclusion.

A correct answer is useful evidence, but it does not tell us by itself how the learner produced it. They may have remembered a rule, copied a pattern, or found a relationship they can use.

Explorer begins here because it does not need to guess what is happening inside the learner. Instead, it can change the conditions and observe what happens next.

That small shift—from deciding what the learner knows to arranging another opportunity—is the doorway into the rest of this presentation.

Do not rush to resolve the puzzle. Let the audience notice the distinction.

Where does ordinary education usually look?

Assessment

What does the learner know?

Teaching

What should we explain?

Correctness

Did they get the answer?

Progress

Are they ready to move on?

Behaviour

Are they doing what is expected?

Personalisation

What kind of learner are they?

These are not mistakes. They are familiar starting points.

Schools need assessment, explanations, standards and decisions about progression. Explorer does not make those jobs disappear.

The question is whether those familiar tools are enough when we want to know what happens while a learner is finding their way through something new.

Explorer adds another view: instead of beginning with a judgement about the learner, begin with the interaction between the learner and the conditions around them.

Do not rush to resolve the puzzle. Let the audience notice the distinction.

Try three ways of finding out



Repeat

Give another equivalent-fraction question.

What does success show?



Explain

Ask the learner to tell you the rule.

What does a fluent explanation show?



Explore

Change the representation or the whole.

What survives the change?

Explorer does not prohibit A or B. It asks what additional evidence C can make available.

The issue is not whether explanations and tests are useful.

Repeating a problem can show consistency. Explaining a rule can show that the learner can report something about it. Both matter.

Explorer adds a different test: alter the environment while keeping the important relationship in play. The learner now has to deal with variation rather than simply meet the same demand again.

This begins to separate getting an expected result from maintaining something that matters when the circumstances change.

Do not rush to resolve the puzzle. Let the audience notice the distinction.

Now change something that should not matter

Keep the relationship:

$$\frac{1}{2} = \frac{2}{4}$$



Change the surroundings:

3/6

different shape

pieces rearranged

number line

unfamiliar example

If the learner changes what they do but preserves the relevant relationship, what does that tell us?

Difficulty is not the purpose. Discrimination is.

A disturbance is useful when it helps distinguish a fragile success from a more robust one. We change something in the situation and see whether the learner can continue to deal with what matters.

Notice the important PCT feature: the learner may need to change their actions. Repeating the same behaviour is not the goal.

Different actions that preserve the relevant perception can be more informative than perfect imitation of the procedure they were shown.

Do not rush to resolve the puzzle. Let the audience notice the distinction.

What has changed in our picture of assessment?

A familiar tendency

Score the answer



Locate the learner



Correct the error



Prescribe the route



Optimise expected behaviour



Explorer's additional move

Observe consequences

Vary conditions

Use error as information

Offer navigable possibilities

Adapt the exploration

The shift is from classifying the person to examining the interaction.

Explorer can still use answers, explanations and reports. The difference is what it does with them.

Evidence becomes a reason to arrange the next opportunity, not a licence to claim direct knowledge of the learner's internal organisation.

This is why assessment is probably the hardest obstacle. Explorer separates exploratory evidence from the later institutional job of certification.

Do not rush to resolve the puzzle. Let the audience notice the distinction.

The obstacles now look different

Assessment → evidence from interaction

Progress → robustness across variation and transfer

Teaching → resources within exploration

Behaviour → evidence, not the optimisation target

Correct answer → one observation, not the endpoint

Personalisation → adapt opportunities, not hidden learner labels

Mistake → possible source of productive discrepancy

Difficulty → purposeful disturbance, not pointless frustration

Teacher → Adaptive Partner / environmental arranger

Curriculum map → possible territory, not the learner's map

Now the ten obstacles can be named without giving them away.

At the start, these points would have been claims on a slide. After the puzzle, investigation and disturbance, they can be read as a reconstruction of what the audience has just explored.

Explorer is not asking educators to abandon assessment, teaching or curricula. It is asking them not to confuse those institutional tools with direct access to the learner's perceptual organisation.

The Adaptive Partner works with observable interaction and changes the conditions of exploration.

Do not rush to resolve the puzzle. Let the audience notice the distinction.

Would the same distinction survive outside fractions?

Reading

A student pronounces every word correctly. Have they caught the meaning?

Science

A student recites the definition. What happens when the experiment changes?

History

A student remembers the account. Can they work with conflicting evidence?

Practical skill

A student copies the demonstration. What happens when the conditions vary?

What would you change in the environment to see what survives?

The deck should now hand control back to the audience.

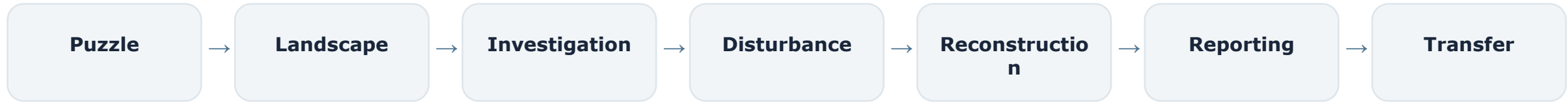
Equivalent fractions were only the first territory. The same question can be carried into reading, science, history, practical work or almost any other field.

The task is not to invent a hidden score for 'understanding'. It is to create a changed situation in which something relevant can be explored again.

That is the sense in which Explorer is closer to a navigational aid than a map-maker: it helps provide conditions in which the learner can find their own way.

Do not rush to resolve the puzzle. Let the audience notice the distinction.

What did this presentation do differently?



It did not begin by telling you the ten obstacles.

It arranged a small exploration in which those obstacles could become visible.

Explorer controls the exploration, not the explorer.

The form of the deck is part of its argument.

This presentation was designed to behave more like Explorer. It began with a puzzle, opened a landscape, offered comparisons, introduced disturbance and delayed the full list of conclusions until reconstruction and reporting.

The audience was still free to disagree. The deck controlled the sequence and the opportunities, not the audience's conclusion.

That is the radical difference: Explorer is not merely something to describe on slides. Its architecture can shape how the slides themselves invite exploration.

Do not rush to resolve the puzzle. Let the audience notice the distinction.

Conclusion of phase III

(How's the metaphor coming?)

Explorer models the exploration, not the learner

Why Explorer is different from conventional adaptive learning

Presenter notes — Slide 1

Opening idea

Start with the main difference. Explorer is not trying to build a hidden picture of what sort of learner someone is.

Instead, it watches what happens during an exploration and changes what the environment makes available next.

The learner stays in control of their own learning. Explorer controls only the exploration around them.

Two different ways to adapt

Common adaptive-learning pattern

- Watch the learner's performance
- Estimate what the learner knows
- Choose instruction from that estimate

Explorer pattern

- Watch what happens in the exploration
- Reconsider the exploration
- Offer a useful next possibility

Presenter notes — Slide 3

The change is in the middle

Both systems use evidence and both can adapt. The important difference is what sits between evidence and the next action.

Many adaptive systems create a learner model: for example, an estimate of mastery, ability or readiness.

Explorer does not need that step. Evidence can change the exploration without first becoming a judgement about the learner.

What did we really observe?

- A wrong answer tells us that a wrong answer happened in those conditions.
- It does not directly show that the learner lacks ability or understanding.
- A correct answer shows successful performance, but it does not prove mastery.

Performance under particular conditions $\neq$ underlying capability

Presenter notes — Slide 5

Evidence is not the same as explanation

Use an everyday example: a person may miss an easy question because they misread it, were distracted, or understood it in a different way.

The same caution applies to success. A correct answer may come from understanding, but it could also come from a familiar example or a lucky guess.

Explorer keeps the evidence useful without turning it into a permanent label.

“Don’t know” is useful evidence

- The EP can select “Don’t know” without being marked as a failure.
- Explorer can respond by changing the representation, comparison, complexity or other part of the environment.
- It does not have to decide that the EP “doesn’t understand.”

Don’t know → evidence → reconsider the exploration

Presenter notes — Slide 7

No diagnosis is required

This is a simple example of the whole architecture. Explorer can do something useful without first diagnosing the learner.

The next opportunity might be another example, a closer look, a wider view, or no movement at all.

The important point is that the response changes what is available to explore, not a stored judgement about the EP.

Explorer changes the environment

- Explorer can change what is shown, compared, varied or disturbed.
- It can change the level, complexity, context or environmental opportunity.
- It does not calculate the change that must happen inside the learner.

Explorer controls the exploration, not the explorer.

Presenter notes — Slide 9

The object of control

This is where Perceptual Control Theory matters. The EP is an autonomous control system, not a component that Explorer can directly operate.

Explorer has much better access to its own environment than to the learner's internal perceptions, references or error signals.

So the engineered system works on the part it can legitimately configure: the exploration.

Why PCT matters

- Explorer can observe actions and other evidence in the shared environment.
- It cannot directly see the EP's private perceptual signal, reference or error signal.
- The same action can serve different purposes for different people or at different times.

Observed action does not automatically reveal the perception being controlled.

Presenter notes — Slide 11

Do not read behaviour backwards

Seeing an action does not give Explorer a direct view into the learner's mind.

For example, two people may make the same choice for quite different reasons. One person may also use different actions to keep the same perception under control.

Explorer therefore treats behaviour as evidence from interaction, not as transparent access to an internal learner state.

The reasoning map is not a learner map

- Explorer can map reasoning possibilities available in an exploration.
- It can record evidence that appears while those possibilities are explored.
- It does not place the EP at a fixed point on that reasoning map.

Explorer maps the reasoning field; it does not place the learner upon it.

Presenter notes — Slide 13

RCM stays on the exploration side

The Reasoning Component Model can still be rich and useful. It helps Explorer organise possible reasoning operations and interpret evidence.

But the RCM is not a hidden test that says where the learner sits on a scale.

That protects the difference between a map of opportunities and a measurement of a person.

An LLM can suggest — not decide

- A language model may notice patterns and suggest possible next moves.
- Its explanation can sound convincing without being something Explorer has observed.
- Explorer checks proposals before they can affect the exploration.

Statistical plausibility does not confer observational authority.

Presenter notes — Slide 15

AI does not get a special shortcut

Large language models are very good at producing plausible explanations from limited information.

Explorer treats those explanations as proposals, not facts about the learner. A Permission Bridge checks whether a proposal is allowed.

This stops a learner model from being rebuilt indirectly just because an AI can produce a convincing diagnosis.

What each system mainly models

Conventional adaptive learning

- Learner state or learner model
- Mastery, readiness or similar estimates
- Instruction chosen from those estimates

Explorer

- State of the exploration
- Evidence from interaction
- Environmental opportunities that can be changed

Presenter notes — Slide 17

A different kind of intelligence

Explorer can know a great deal without claiming to know what the learner is.

It can know the Design Brief, current environment, earlier movements, available representations, reasoning possibilities and observed evidence.

Its intelligence lies in using that information to shape a useful exploration while preserving learner autonomy.

The difference in three sentences

- Explorer models the exploration, not the learner.
- Explorer controls the exploration, not the explorer.
- The system adapts the exploration; the learner adapts themselves.

A learning-promotion architecture, not a learner-diagnosis machine.

Presenter notes — Slide 19

Closing message

Bring the three statements together. They describe what Explorer models, what it controls, and who does the adapting.

Explorer is still adaptive and can be highly intelligent. Its difference is that evidence changes the opportunities in the exploration without needing to become a judgement about the person.

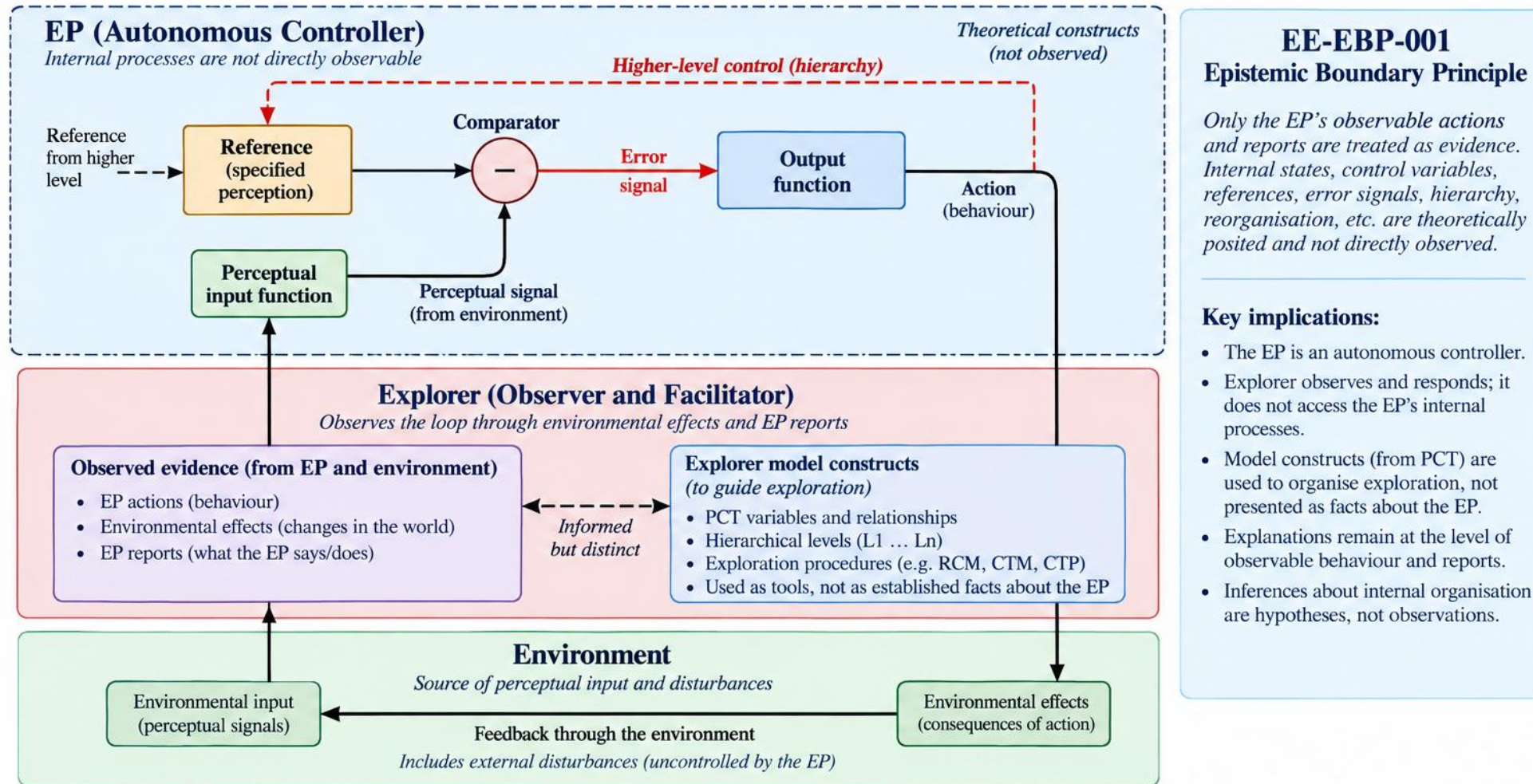
That is why 'learning-promotion architecture' is a more precise description than simply calling Explorer an adaptive-learning system.

Conclusion of Phase IV

*The explorer model goes out of its way
not to infer any cognitive functioning.
Yet PCT is an implicit mental
operation.*

EE-EBP-001 – Epistemic Boundary Principle

Closed-loop control with a clear boundary between observation and theoretical constructs



EE-EBP-001 – Summary

*“The Explorer uses observations and reports as evidence, and theoretical constructs as tools.
It maintains a clear epistemic boundary between what is observed and what is posited.”*

Explorer MkIII
EE-EBP-001
16 Jun 2025

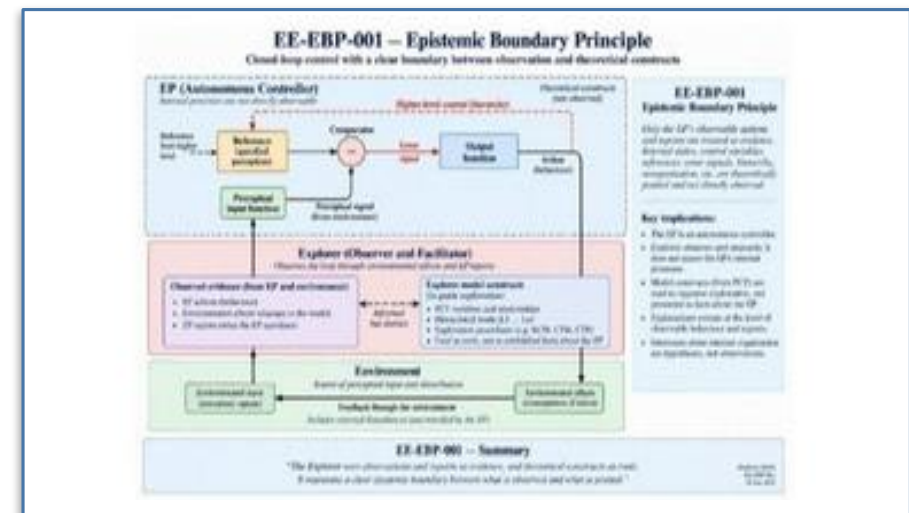
Epistemic Boundary Figure - Commentary

SLIDE 1

Begin with the whole figure. Its central claim is not that PCT is absent from Explorer, but that Explorer must distinguish the PCT model from what it can directly observe of the EP.

The upper closed loop is PCT's theoretical account of control. The lower interaction field is where Explorer obtains evidence: actions, reports, environmental conditions, disturbances and observable consequences.

The epistemic boundary permits PCT-informed hypotheses while preventing those hypotheses from being presented as direct observations of the person's internal control organisation.



2. Two domains must not be collapsed

The PCT account of internal control and Explorer's observable interaction field have different epistemic status

**PCT ACCOUNT OF EP
CONTROL ORGANISATION**

**EXPLORER'S
OBSERVABLE FIELD**

EPISTEMIC BOUNDARY

Explorer may use the first domain to interpret the second; it must not present the first as if it were directly observed.

Two domains must not be collapsed - Commentary

SLIDE 2

This is the basic architecture of Explorer. Explorer is PCT-derived, so it needs PCT constructs. But those constructs do not arrive with direct observational access to the EP's internal organisation.

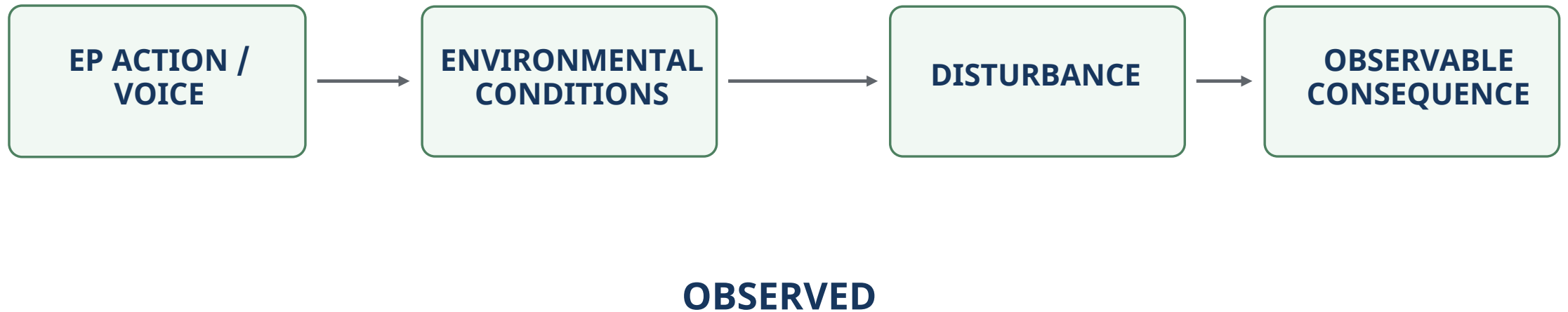
The boundary therefore separates kinds of warrant, not two unrelated systems. PCT remains the explanatory framework while observation remains grounded in the interaction field.

Crossing the boundary is permitted as inference. Crossing it as unqualified fact is not.



3. What Explorer can directly observe

Evidence arises in the shared interaction field



Observation concerns what happens in interaction — not a transparent view of the EP's private perceptual machinery.

What Explorer can directly observe - Commentary

SLIDE 3

The evidence base includes what the EP says or does, what environmental conditions are present, what disturbances occur and what observable consequences follow.

Even an EP report is observed as a report. Its content may describe private experience, but Explorer does not thereby gain independent direct access to that experience.

This gives Explorer a rich evidence field without requiring a hidden learner-state model.

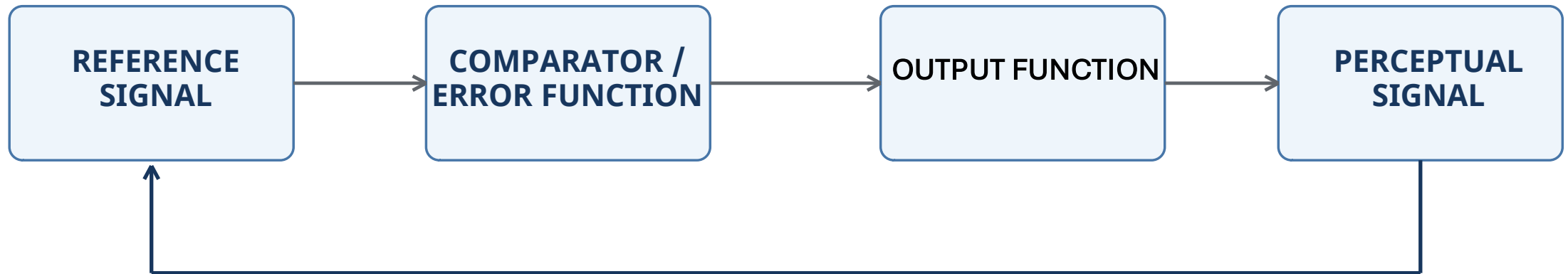
3. What Explorer can directly observe Evidence arises in the shared interaction field



Observation concerns what happens in interaction — not a transparent view of the EP's private perceptual machinery.

4. What PCT theoretically posits

The internal control loop is explanatory architecture



THEORETICALLY POSITED WHEN ATTRIBUTED TO THE EP

The PCT loop is a theoretical instruction sheet for explanation, not an inspectable photograph of the EP.

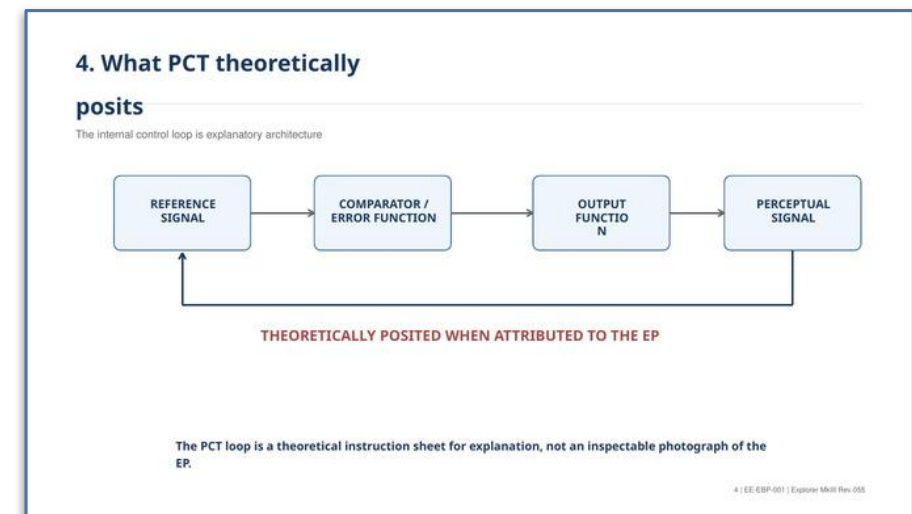
What PCT theoretically posits - Presenter

SLIDE 4

Reference signal, comparator function, error signal and perceptual signal are indispensable PCT constructs. Explorer does not remove them.

When Explorer attributes such organisation to the EP, however, their epistemic class is **THEORETICALLY POSITED**. They are supplied by the explanatory theory rather than directly established by Explorer.

Accumulating compatible observations may strengthen confidence in a PCT interpretation without converting these constructs into **OBSERVED** entities.



5. Inference is the bridge

Explorer needs inference — but must preserve its status



INFERENCE ≠ OBSERVATION

Explorer cannot escape inference; its discipline lies in never confusing inference with observation.

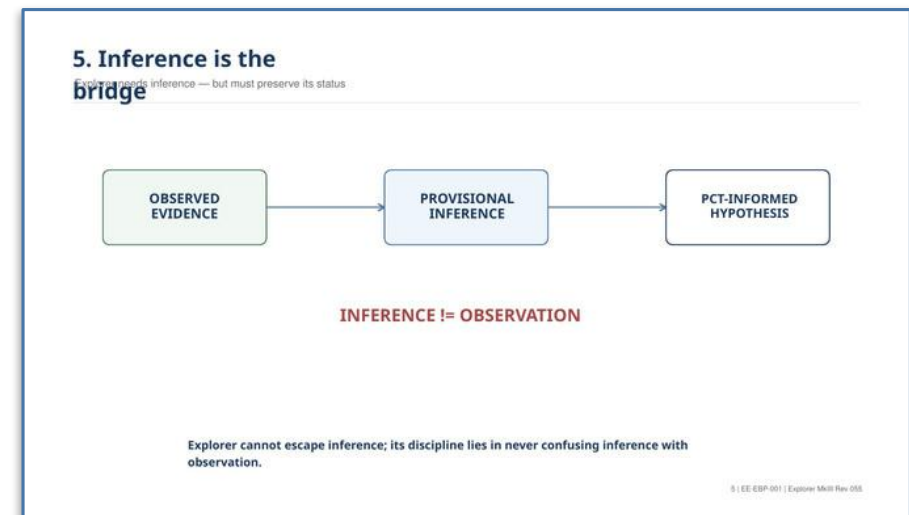
Inference is the bridge - Commentary

SLIDE 5

Without inference, Explorer could record events but could scarcely investigate perceptual control. With unconstrained inference, it would become a mind-reading system.

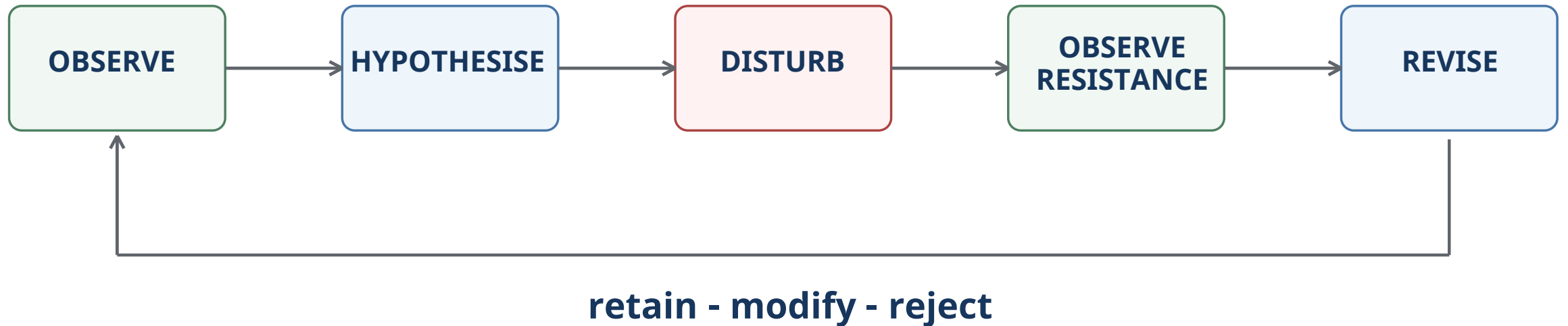
The middle position is deliberate: observed evidence can support provisional hypotheses about possible controlled variables, references, levels or reasoning organisation.

The hypothesis remains revisable and explicitly labelled as inference rather than being promoted into an observed property of the EP.



6. Testing a possible controlled variable

Inference can be disciplined through disturbance and observation



Testing can strengthen or weaken a hypothesis without turning the hypothesised controlled perception into a direct observation.

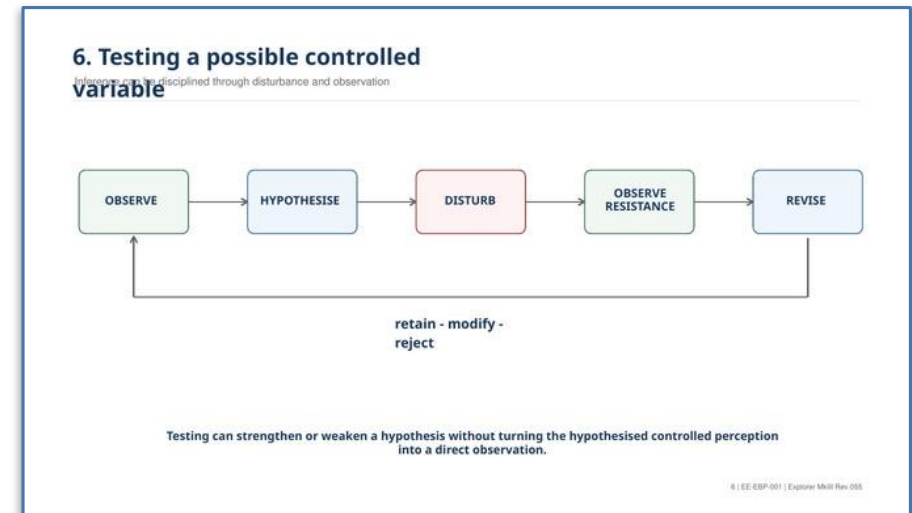
Testing a possible controlled variable - Commentary

SLIDE 6

The Test for the Controlled Variable gives inference an empirical discipline. Explorer or a researcher hypothesises a variable, introduces a disturbance and observes whether action resists the disturbance.

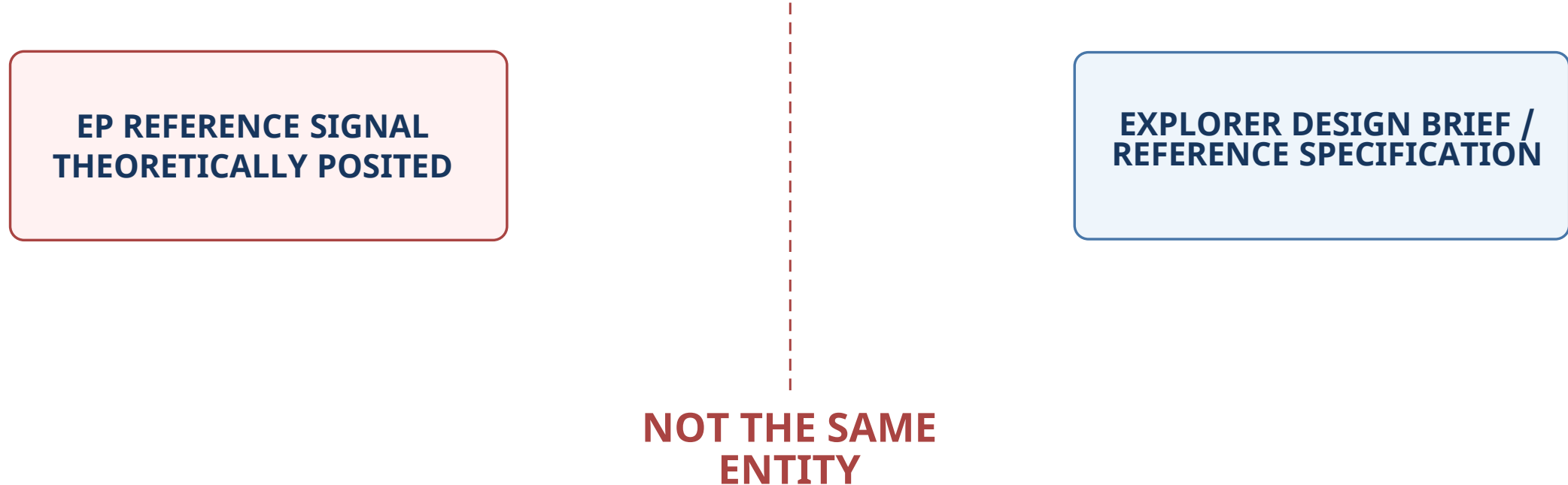
Resistance is evidence consistent with control of the candidate variable. It is not direct observation of the private perceptual signal itself.

The return loop matters: hypotheses are retained, modified or rejected rather than simply confirmed.



7. The Design Brief stays on the Explorer side

An operational reference specification is not the EP's private reference signal



The Design Brief can operationalise a hypothesised reference condition without claiming access to the EP's actual reference.

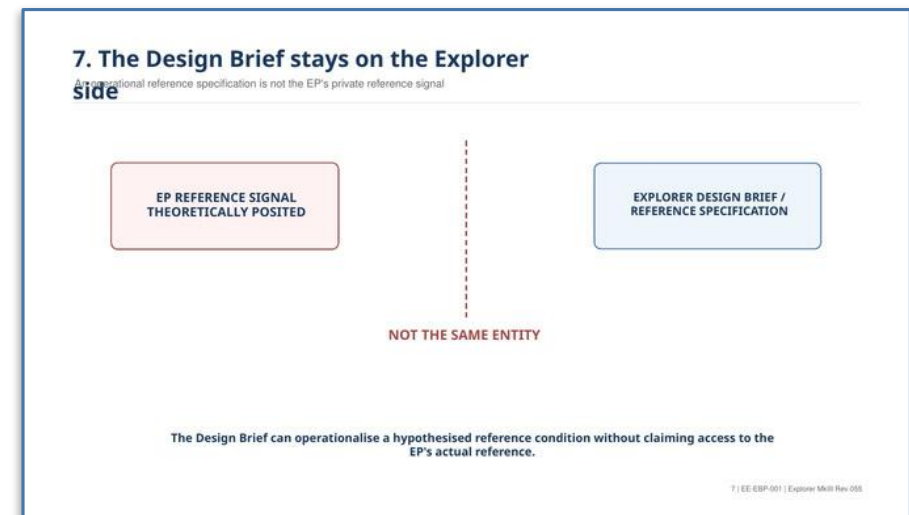
The Design Brief stays on the Explorer side - Commentary

SLIDE 7

This distinction is especially important. Explorer needs comparator-ready reference specifications for its own operational procedures.

Those Design Briefs are MODEL CONSTRUCTS. They may represent a working hypothesis about a reference condition, but they are not the EP's actual internal reference signal.

This prevents an engineering representation from silently becoming a psychological claim about the person.



8. Explorer locates the exploration — not the person.

Coordinates, reasoning maps and trajectories describe the configured field



**MAP ≠
PERSON**

Explorer locates the exploration in PCT space; it does not locate the person there as an established fact.

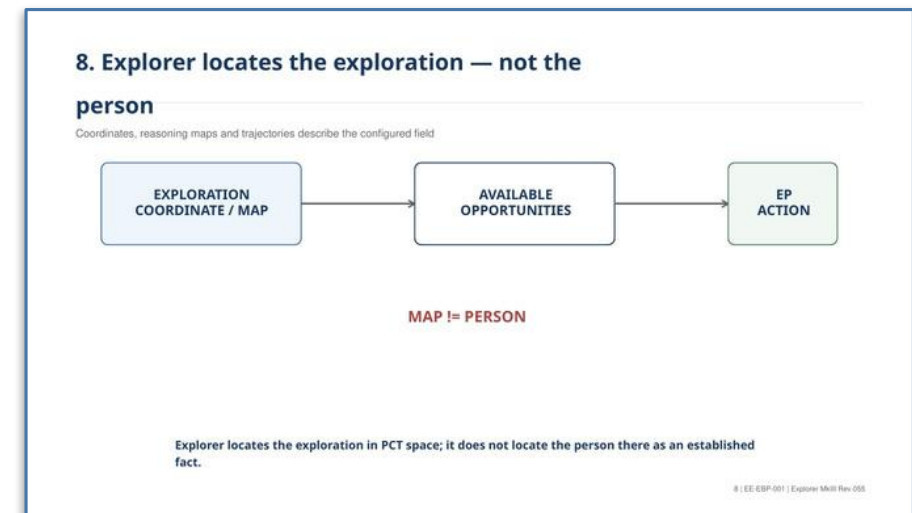
Explorer locates the exploration — not the person - Presenter

SLIDE 8

The same epistemic boundary applies to the Reasoning Component Model, coordinate model and trajectory model.

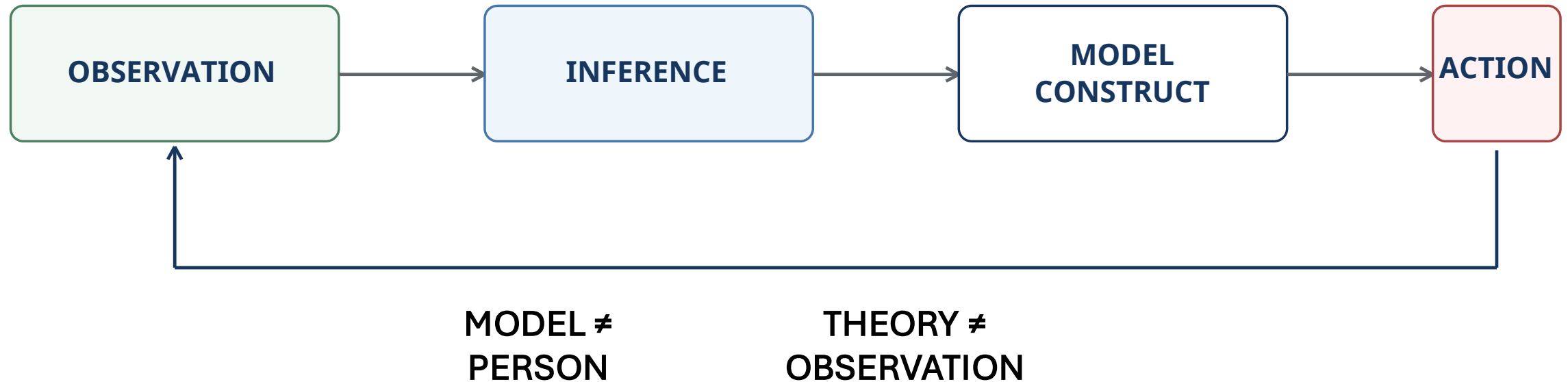
These structures can organise reasoning possibilities, environmental opportunities and movement through the exploration. They do not establish a hidden coordinate for the EP's mind.

The distinction preserves the usefulness of rich modelling while keeping the person outside the model's ontological claim.



9. In the mature architecture

PCT can organise Explorer without becoming a claim of mind access



EE-EBP-001 permits active PCT-informed exploration while preserving a clear boundary around what Explorer can claim to know.

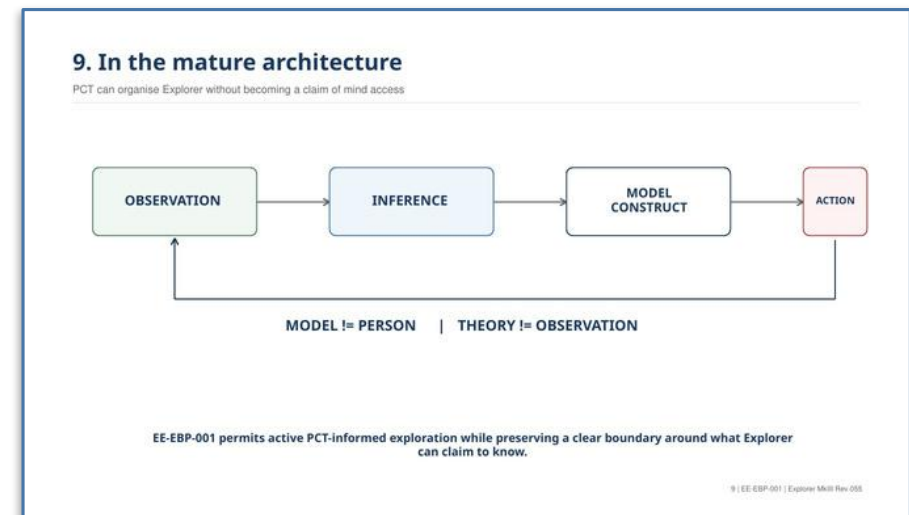
The mature architecture - Commentary

SLIDE 9

The mature Explorer cycle is observation, inference, model construction, intervention and renewed observation.

EE-EBP-001 governs every transition by preserving epistemic labels. Causal provenance is added later, once model-guided action changes the evidential field; the EP remains an autonomous controller.

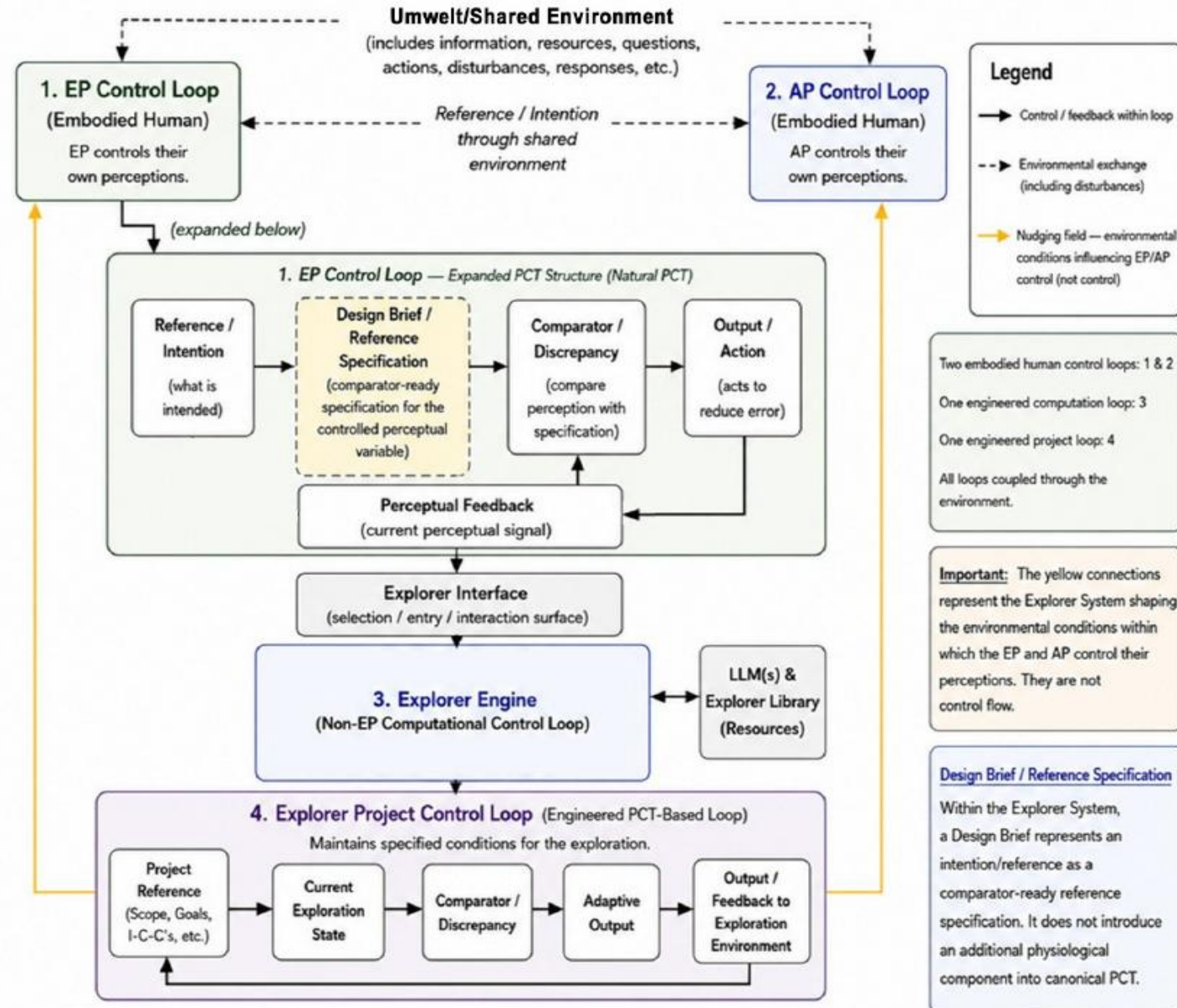
The resulting system uses PCT seriously without pretending that its theoretical account is direct access to the person.



That's really all folks

Explorer System — EP's Mission Control

Four Control Loops and Their Connections

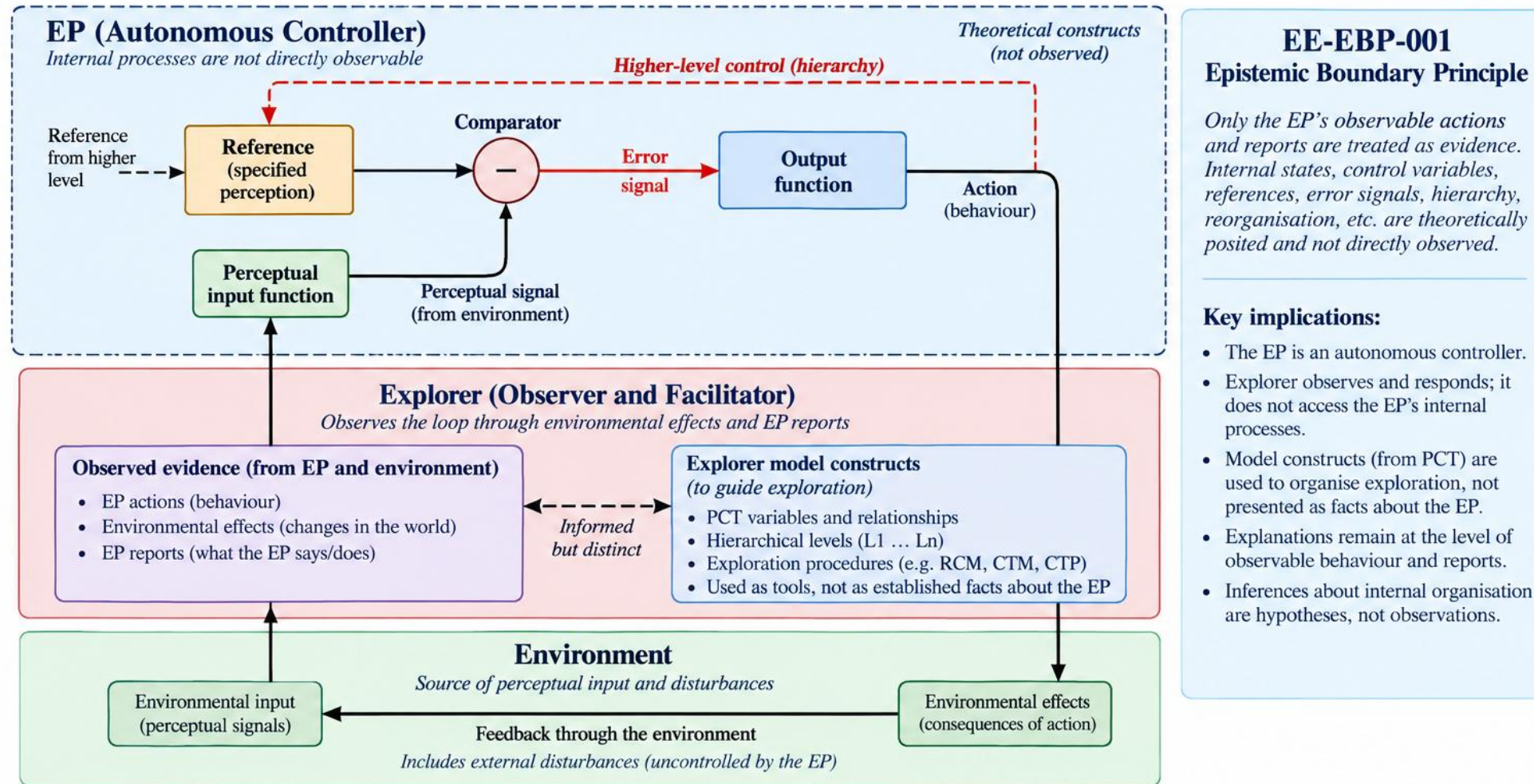


Note: Loops 1 & 2 (EP & AP) are natural PCT control loops.

Loops 3 (Explorer Engine) and 4 (Explorer Project) are engineered control systems within the Explorer System.

EE-EBP-001 – Epistemic Boundary Principle

Closed-loop control with a clear boundary between observation and theoretical constructs



EE-EBP-001 – Summary

*“The Explorer uses observations and reports as evidence, and theoretical constructs as tools.
It maintains a clear epistemic boundary between what is observed and what is posited.”*

Explorer MkIII
EE-EBP-001
16 Jun 2025