



# Systems Thinking Assessment

## Synthesis Report — State of the Art Investigation (T2.1)

Revision Version: 1.0

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| WORK PACKAGE     | WP2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| REVIEWERS        | All Partners                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| ABSTRACT         | <p>This report presents the State of the Art investigation carried out under Task 2.1 of Work Package 2. It consolidates a two-phase Systems Thinking assessment across the twelve SYNAPSE partner organisations, a scored questionnaire and personalized written interviews, into a single evidence base. The report profiles the consortium's current capacity, identifies shared gaps in the applied and visual tools of Systems Thinking and System Dynamics, and sets out implications for the capacity-building curriculum and training materials.</p> |
| KEYWORDS         | Systems Thinking, System Dynamics, Capacity Building, Assessment, Youth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

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\* R: Document, report (excluding the periodic and final reports)

DEM: Demonstrator, pilot, prototype, plan designs

DEC: Websites, patents filing, press & media actions, videos, etc.

DATA: Data sets, microdata, etc. DMP: Data management plan E

ETHICS: Deliverables related to ethics issues

SECURITY: Deliverables related to security issues

OTHER: Software, technical diagram, algorithms, models, etc.

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# 1. INTRODUCTION AND OVERVIEW

Work Package 2 'Youth Serving Institutions Capacity Building' gives the SYNAPSE consortium a common footing in systems thinking, which later work packages rely on. That footing cannot be assumed. The consortium runs from telematic universities to grassroots NGOs, across Southern Europe and five African countries, and exposure to systems thinking varies as much as the organisations do. Before any course can be designed, WP2 needs to know what these partners already understand and where they struggle.

Task 2.1 supplies that reading. Its job is to diagnose, not to grade. The point was never to rank partners or catch them out, but to map the consortium's capacity so that the curriculum (D2.1, led by IUL) and the training materials (D2.2, led by SYDIC) land where they are needed. The assessment ran in two phases across all twelve partner organisations: a scored questionnaire covering the core concepts, from what a system is through feedback loops, archetypes, and the visual tools of system dynamics; then a written interview with each partner, personalised to the gaps the partner had shown on the questionnaire.

The two phases align. Partners are secure on the foundations and weaker on the applied, visual side of systems thinking. Every partner answered the basic questions on what a system is correctly. Scores held up on causality and system properties, then dropped on feedback loops and dropped further on the formal notation used to represent system structure. The interviews explain why this matters. Almost every partner described a real case from their own work where an intervention backfired or a problem kept returning: a tree-planting site that turned out to have the wrong soil, a community garden defeated by elephants, a mobility scheme that barely shifted behavior. Partners see these dynamics clearly. What they cannot yet do is name them, draw them, or analyse them with the systems thinking and system dynamics tools. Not one partner had ever drawn a causal loop diagram of a problem they were working on.

Two results run through the whole report and shape what follows. Partners rate themselves lowest in the same areas where they score lowest, so their own account of their gaps is reliable. And when asked how they want to learn, they were near-unanimous: real cases and hands-on tools, not theory. Both point to the same place, and Section 8 turns them into concrete guidance for the curriculum.

The report is anonymised throughout. Results are reported for the consortium. Where a partner's words capture something the group shares, they appear without a name attached. Feedback to individual partners on their own results is handled in separate documents, outside this one.

## 2. METHODOLOGY

### 2.1 THEORETICAL GROUNDING

Three books anchor the assessment. Meadows' *Thinking in Systems* (2008) supplies most of the working vocabulary: stocks, flows, feedback loops, leverage points. Senge's *The Fifth Discipline* (1990) adds the organisational angle and the systems archetypes, which fit the kinds of organisations in SYNAPSE. Sterman's *Business Dynamics* (2000) informs how feedback structure, dynamic behavior, and endogeneity are treated.

One scope decision shaped everything that followed. The assessment covers systems thinking and the qualitative side of system dynamics, reading stock-and-flow structure, recognising feedback, and making sense of behavior over time. It leaves out quantitative modeling and the formal modelling process. WP2 is meant to produce informed users and methodological supporters, not quantitative modelers, and the instrument was built to that scope. This distinction also matters for reading the results later: where the questionnaire probes stock-and-flow, it asks whether partners grasp accumulation, not whether they can build a simulation.

### 2.2 THE THREE PHASES

**Phase A, the questionnaire.** All twelve partners answered a scored questionnaire online. It opened with a self-assessment, where partners rated their own knowledge by theme, and moved through multiple-choice questions of rising difficulty: system definition, properties, causality and endogeneity, feedback loops and behavior, archetypes and leverage, and a closing section on the visual tools of system dynamics. Each section ended with a confidence check, which lets perceived knowledge be set against measured knowledge.

**Phase B, the interviews.** This phase went after the things a questionnaire cannot reach. It was first planned as live peer-to-peer interviews, then changed to asynchronous written responses in personalised documents. For a consortium spread across two continents and several time zones, that adaptation was the difference between full participation and a scheduling problem. Each document carried a common set of questions on how the organization reasons about complex problems and what it wants from the training, plus a few questions matched to that partner's own questionnaire results.

**Phase C, the analysis.** Both phases were brought together into this synthesis report, alongside brief individual reports returned to each partner.

Of the eleven partners outside the WP2 lead, ten completed the interview and one submitted questionnaire responses only. Partners were asked to disclose any use of AI. One said it had used a tool to organise and language-edit its responses, with the content its own. That kind of disclosure is exactly what the note was designed to surface, and it does not undermine the responses; it lets them be read accurately.

### 3. THE ASSESSED POPULATION

Twelve partner organisations were assessed. SYDIC, which built and ran the assessment as WP2 lead, is not among them. The consortium covers two Southern European countries and five in sub-Saharan Africa, and it is weighted toward Africa, where eight of the twelve partners sit.

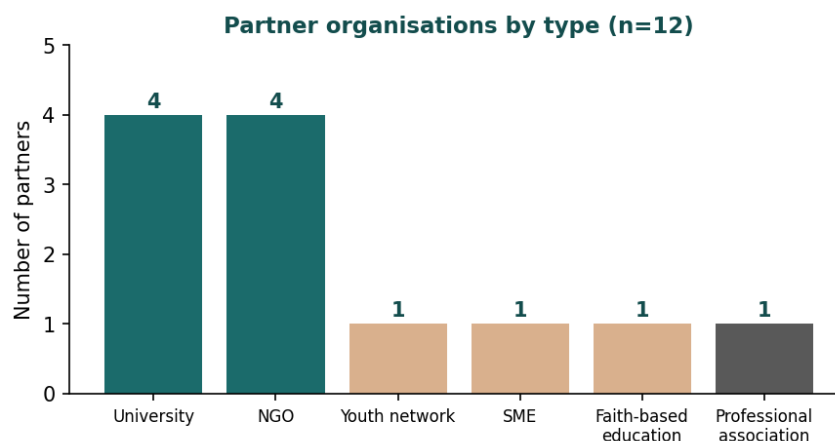


Figure 1. Partner organisations by type.

The spread of organisation types is not incidental. It changes how the training will be received. Four partners are universities, which tend to meet systems thinking through research methods, stakeholder analysis and evaluation. Four are NGOs working directly with young people and communities, whose exposure comes through designing and running projects. The rest are a youth climate network, a faith-based organisation running schools and vocational centers at scale, and a technology-transfer SME.

That last case is worth holding onto, because it breaks the assumption that the consortium is uniform. The SME partner said plainly that most training materials are written for non-profits or universities and will need translating for a business that judges everything by whether it can be sustained commercially. A curriculum that speaks only to the university and NGO majority will miss that partner, and possibly others who face the same test more quietly.

| Country | Partners | Profile range                         |
|---------|----------|---------------------------------------|
| Italy   | 2        | University; professional association  |
| Spain   | 2        | University; youth-mobility NGO        |
| Nigeria | 2        | University; hub foundation            |
| Kenya   | 2        | University; science NGO               |
| Namibia | 2        | Youth climate network; technology SME |

| Country  | Partners | Profile range                  |
|----------|----------|--------------------------------|
| Malawi   | 1        | Community-development NGO      |
| Ethiopia | 1        | Faith-based education and TVET |

*Table 1. Geographic distribution of the assessed population.*

Two context constraints came up repeatedly among the African partners, and they bound what the curriculum can take for granted. Several work with young people whose educational backgrounds vary widely, including participants who use sign language or have low literacy; one partner asked directly that inclusion be built in so that nobody is left behind. Others work in low-bandwidth settings, and one operates in places with active security problems. These are not footnotes to the demographics. They set real limits on what a training design can assume about who is in the room and how they can take part.

## 4. QUESTIONNAIRE RESULTS

Across the twelve partners, the mean score was 79 percent, ranging from 55 to 100. One caution before the detail. With twelve respondents, these numbers reflect a particular consortium, not a sample to generalise from. Read as a guide to where attention is needed, not as a precise measurement, the report leans on the interviews wherever the numbers alone would be thin.

### 4.1 PERFORMANCE BY SECTION

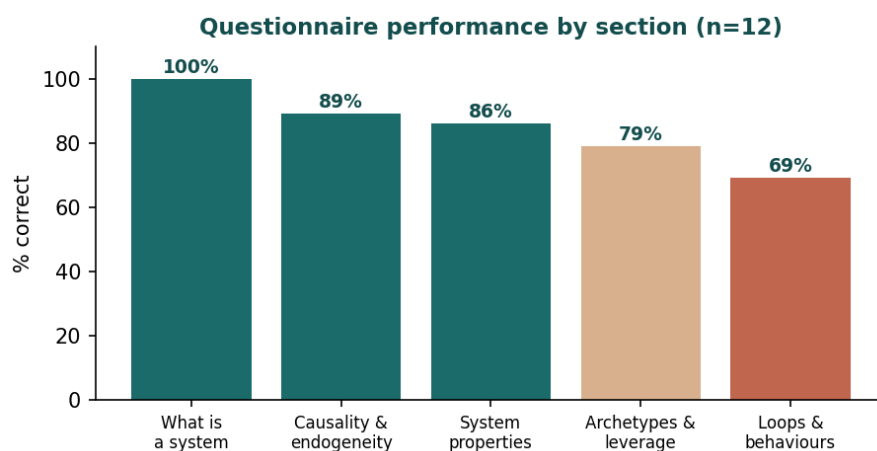


Figure 2. Questionnaire performance by section.

The pattern is a gradient, and it runs the same way for the whole group. Partners are strongest at the base. Everyone answered the questions on what a system is correctly, and the group did well on causality, endogeneity, and system properties. Scores then slide as the questions ask for more than recognition. Feedback loops and behavior were the weakest multiple-choice section at 69 percent. The questions on representing system structure visually were weaker still. Put simply, the trouble starts when partners have to move from seeing that something is a system to working out how it behaves over time.

### 4.2 THE VISUAL TOOLS OF SYSTEM DYNAMICS

The closing section, on the qualitative side of system dynamics, produced the widest split anywhere in the questionnaire, and it is worth reading closely because it tells the curriculum where to aim. The intuitive items went well. Questions about a stock staying level when inflow equals outflow, about a quantity that rises and then settles as it drains, about a backlog that keeps growing when new work outpaces the fixes, were answered correctly by nearly everyone. Partners understand accumulation when it is described in plain terms.

The formal items were harder. When the same ideas appeared as notation, an iceberg model relating structure to behavior, or the specific words inflow and outflow attached to a diagram, the correct-answer rate fell to around half. The iceberg question relating structure to behavior was answered correctly by half the partners, and the inflow question by two-thirds, against near-universal success on the plain-language items just above. The gap is in vocabulary and

representation, not in the underlying idea. Partners already reason about stocks and flows; they have not been taught to draw or label them in the field's formal notation. That is squarely a training problem, and a tractable one.

## 4.3 PERCEIVED VERSUS ACTUAL KNOWLEDGE

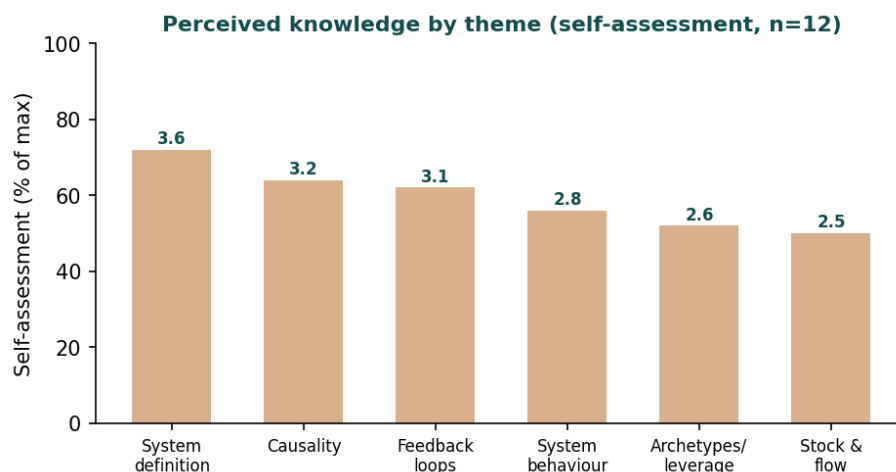


Figure 3. Self-assessed knowledge by theme.

The self-assessment lines up with performance, which is the useful result here. Partners rated themselves highest on system definition and causality and lowest on archetypes, leverage, and stock-and-flow. That matches the order of their scores. The confidence checks did the same thing: confidence was highest on causality and lowest on loops, tracking the data rather than pulling away from it.

What did not appear is as telling as what did. No partner combined high confidence with low performance, the pattern that would mean someone does not know what they do not know. The group's read on its own gaps can be taken at face value. For whoever designs the curriculum, that removes a common headache: the stated learning needs and the measured ones are the same needs.

## 5. FROM ASSESSMENT TO INTERVIEW: PERSONALIZING THE INQUIRY

The two phases were joined on purpose. Rather than send every partner the same interview, the questionnaire results were used to tailor part of each one to the gaps that partner had actually shown. This kept the interviews short, spared partners from elaborating on what they had already demonstrated, and directed the qualitative phase to the areas where it would learn the most.

Four triggers drove the tailoring, each tied to a questionnaire theme. A partner set off a trigger by scoring low or reporting low confidence in that area. G1 was feedback loops and behavior. G2 was archetypes and leverage. G3 flagged a gap between confidence and performance. G4 was the visual stock-and-flow tool. A partner who set off a trigger got a deepening question on that theme; a partner who set off none got a substitute question about where their existing knowledge came from and how they use it.

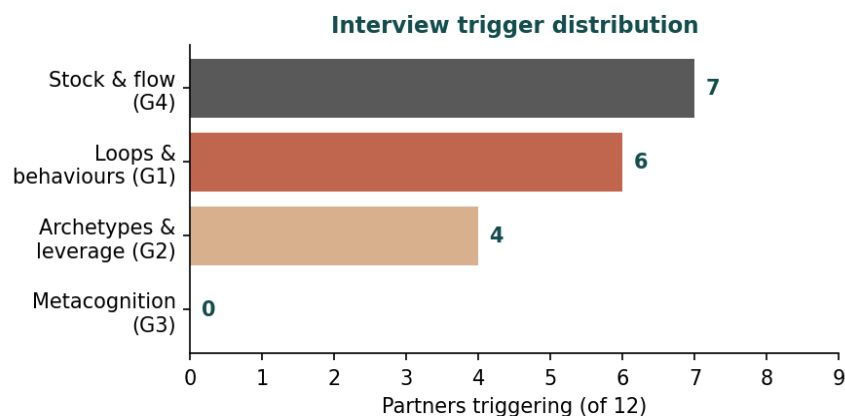


Figure 4. Distribution of interview triggers across the twelve partners.

The distribution is a finding in its own right. Stock-and-flow (G4) and feedback loops (G1) fired for the most partners, more than half in each case, confirming from a second direction that these are where the consortium is thinnest. Archetypes and leverage (G2) fired for a third of partners. The metacognition trigger (G3) fired for nobody, which quantitatively echoes the self-assessment result: no partner was running meaningfully ahead of their own performance in confidence. The gaps are real, shared, and sit at the applied and visual end of the subject.

## 6. INTERVIEW FINDINGS

The interviews put flesh on the questionnaire. Six themes came up across partners. Taken together, they show not only where the gaps sit but why closing them would change how these organizations work.

### 6.1 THEY LIVE SYSTEMS THINKING, WITHOUT THE WORDS FOR IT

The strongest theme is that partners run into systemic dynamics constantly and rarely call them that. Asked whether an intervention had ever produced effects they did not expect, almost every partner had a concrete story ready. A tree-planting site looked wet and suitable but had the wrong soil and drainage, and many of the trees died. A community garden could not go ahead because elephants destroyed the fields, forcing a rethink of the whole initiative. A university's cycling and sustainable-travel scheme moved behavior far less than hoped, because whether someone cycles turns out to depend on wind, distance, timetables, cost and where they live, not only on how much they care about the climate.

*"An intervention aimed at changing individual behavior is also dependent on a wider system and on circumstances that are often beyond the individual's control." — university partner, on a sustainable-mobility scheme*

*"A location that appears favorable visually may not necessarily be suitable for particular tree species. The young people also did not have enough technical knowledge about site assessment, planting techniques and aftercare." — science NGO, on a tree-planting initiative*

These are systemic observations made without systemic language. Partners see the interactions; what they lack is a way to hold them still and look at them. One partner described doing genuinely analytical stakeholder-and-constraint mapping on a logistics project, then added that they would not have called it systems thinking at the time and had never sat down to draw a causal loop diagram of a problem. The distance between that instinct and a method is the distance the curriculum has to cover.

### 6.2 CAUSAL REASONING THAT STARTS INSIDE

Asked how they work out what is driving a problem, partners were consistent. They look at both internal and external causes, but most start with what they can actually change. Several framed it as a working discipline rather than a theoretical stance.

*"We tend to look inward first, not because external factors are unimportant but because they are rarely something we can move within a project cycle. The useful question for us is what we can change: how we scoped the work, who we chose to work with, how we sequenced it." — technology-transfer SME*

For systems thinking, this is a good place to start. The field treats a system's behavior as coming mostly from its own structure rather than from outside shocks, and few partners reach first for an external actor to blame. The endogenous instinct is already there. What is missing is a way to act on it without relying on argument alone. The same SME was candid that they

spot leverage points by intuition and have no way to tell a real one from a merely visible constraint except by talking it out.

## 6.3 A RECURRING STRUCTURAL TRAP: SUSTAINABILITY AFTER FUNDING

One pattern showed up across several partners in different clothes: things that work while a project pays for them and then fall over once the money stops. What stood out in the interviews was that at least one partner had stopped filing this under bad planning and started filing it under structure.

*"We have been treating it as a planning failure when it is a structural one. The funding architecture rewards the creation of new things far more than the maintenance of existing ones."* — technology-transfer SME

A community-development partner told the same story from the other end. They spent two years building up an early-childhood center in a village, walking three kilometers to run sessions and using their own resources, on the understanding that the community would take it over. Attendance held while they were there and thinned once they left, until only the families who could pay kept sending their children.

This is a systems archetype in all but name, and it points straight at SYNAPSE's own problem of making its results last. It is good raw material for the curriculum precisely because partners have already lived through it and do not need to be convinced it is real.

*"Some parents started to feel discouraged since they were the only ones making the contributions, until everyone decided to stop. When we had gone, only those who could manage to pay went on."* — community-development NGO, on an early-childhood center

## 6.4 PRIOR EXPOSURE IS REAL BUT SITS WITH INDIVIDUALS

Most partners had brushed past systems thinking without ever training in it. It reached them through project-management habits, Theory of Change, stakeholder analysis, or one earlier project. Two partners had firmer exposure through past initiatives on systemic approaches, one through a sustainability-in-higher-education project, another through a youth-futures programme that dealt in systems and long-term change. But the exposure is patchy, and where it exists it tends to live in a person rather than in the organisation.

*"This knowledge is not yet systematically shared across the whole organisation. It tends to be concentrated in particular projects, teams and areas of expertise. Many of us already use elements of systems thinking, but we do not always identify it explicitly as such."* — university partner

This has a direct consequence for the design. Training one representative will not, by itself, build capacity in their organisation. If the point is organisational capacity, the curriculum needs to think about how what one person learns travels to the rest of the team once the sessions end.

## 6.5 THE GAP THEY NAME THEMSELVES: VISUAL AND FORMAL TOOLS

Asked outright which concepts felt least familiar, partners landed on nearly the same list every time: feedback loops, causal loop diagrams, leverage points, system boundaries, and stock-and-flow representation. It is the qualitative version of both the questionnaire scores and the trigger counts. Partners know these ideas loosely and cannot yet put them on paper or use them on a live problem.

*"Feedback loops were the least familiar as a formal concept. We recognise the idea, but we have never sat down and mapped one ourselves. Delays came second: we understood delay as a scheduling problem, not as something that generates a system's behavior."* — technology-transfer SME

## 6.6 HOW THEY WANT TO LEARN: CASES AND TOOLS, NOT THEORY

On delivery, the consortium barely disagreed with itself. Partners want concrete cases and hands-on tools, introduced simply and tied at once to their own work. Several warned, in almost the same words, that anything pitched at the level of principle would be heard out politely and then shelved.

*"We could try solving a case through an 'obvious' approach, addressing the most evident problem, and then a systems thinking approach, taking in the wider context, and compare the two."* — university partner, proposing a format

*"Conceptual frameworks that stay at the level of principle do not travel well. What gets adopted is what solves something concrete."* — technology-transfer SME

Several partners also asked for time-flexible or asynchronous parts, given distributed teams all running live projects, and for material that works for mixed educational backgrounds and low-bandwidth settings. One asked for something on collaborating across cultures, since their work spans very different partners whose ideas of a reasonable timeline or a clear decision do not match.

## 7. SYNTHESIS: CAPACITY PROFILE AND GAPS

Read side by side, the two phases tell one story. The consortium has a firm conceptual base and a shared, openly acknowledged gap in applied and visual systems-thinking tools. The phases back each other up: where the questionnaire scores fell, the triggers fired, and the interviews named the same concepts as the unfamiliar ones, without being led there.

| Area                         | Questionnaire            | Interviews                              | Curriculum implication             |
|------------------------------|--------------------------|-----------------------------------------|------------------------------------|
| System definition, causality | Strong, 86 to 100%       | Reasoned about fluently                 | Consolidate, move through quickly  |
| Feedback loops and behavior  | Weakest MCQ section, 69% | Named as least familiar; G1 fired for 6 | Core teaching priority             |
| Archetypes and leverage      | Moderate, 79%            | Recognized, but no method; G2 for 4     | Teach through worked cases         |
| Visual and stock-flow tools  | Lowest of all            | The convergent top gap; G4 for 7        | Highest priority for visual skills |
| Awareness of own gaps        | Well calibrated          | Candid and specific                     | Stated needs can be trusted        |

Table 2. Consolidated capacity profile across both assessment phases.

The synthesis also brings up something the questionnaire could not have caught: the sustainability-after-funding trap. It is not a knowledge gap in the ordinary sense. It is the systemic problem partners most want to understand, and it comes with a teaching case already attached, drawn from their own work.

## 8. IMPLICATIONS FOR THE CAPACITY BUILDING CURRICULUM

The findings turn into fairly direct guidance for D2.1 and D2.2.

### 8.1 WHAT TO TEACH

1. Put the applied and visual tools at the center: causal loop diagrams, reinforcing and balancing feedback, behavior over time, stocks and flows, leverage points. Every source of evidence points here.
2. Handle the foundations as revision rather than instruction. Partners are secure on what a system is and on causality, so the curriculum can move through these at pace.
3. Give archetypes a case-based treatment, not a taxonomy to memorise. Partners recognise the patterns and lack a way to work with them.
4. Use the sustainability-after-funding trap as an anchoring case. It is systemic, it recurs across partners, and they already want to understand it.

### 8.2 HOW TO DELIVER IT

5. Lead with real cases and hands-on practice. The demand for this was almost unanimous, and theory was flagged repeatedly as likely to be ignored.
6. Keep theory short and always next to an example, and let partners apply each tool to their own work during the session.
7. Offer the comparison exercise partners proposed themselves: solve a case the obvious way, then the systems way, and set the two against each other.
8. Build in time-flexible or asynchronous parts so that whole teams can take part rather than one representative attending and reporting back.

### 8.3 CONTEXT TO RESPECT

9. Design for mixed educational backgrounds and genuine inclusion, including participants with low literacy or who use sign language.
10. Assume low-bandwidth conditions for some partners, and note that at least one works in an insecure environment.
11. Give at least one framing aimed at a business rather than a non-profit or university, or the SME partner will have to translate everything for itself.
12. Plan for how knowledge moves from the trained representative to the wider organisation, since prior exposure tends to stay with individuals.

## 9. CONCLUSION

Task 2.1 has achieved its objective. The consortium now has an evidence-based reading of its own systems thinking capacity, from two phases that point the same way. Partners bring a solid conceptual base and a real, practiced instinct for systemic problems. What they need is the vocabulary and the visual tools to name and work with what they already sense, taught through the concrete, case-based approach they asked for.

That diagnosis is the ground the next steps stand on. It gives the curriculum a clear starting point and the training materials a defined focus, both fitted to what the consortium actually needs rather than to what might have been assumed.

This matters because of what the partners go on to do. Each partner organization will train youth facilitators (WP3), who in turn support the young people taking part in the virtual exchanges (WP4). The systems thinking capacity built here is passed down that chain, so the quality of the assessment and the training that follows shapes the whole pathway. Closing the distance between instinct and method is what WP2 exists to do.

## APPENDIX A. ASSESSMENT INSTRUMENTS

Two instruments underpin this report. The questionnaire carried thirteen scored multiple-choice items alongside the self-assessment and confidence scales, plus a closing section on the visual tools of system dynamics. The interview guide had two fixed blocks, one on systems thinking in the partner's own practice and one on what they want from the training, and a conditional block whose questions were selected per partner by the trigger logic set out in Section 5. Both are held as separate project documents and were issued to partners in personalized form.

Appendix B, returned to partners individually and not reproduced here, contains the brief per-partner report required under Task 2.1.

## APPENDIX B. ASSESSMENT QUESTIONNAIRE

The questionnaire administered in Phase A is reproduced in full below. Correct answers are marked in bold. Self-assessment and confidence items used a 1 to 5 scale and are described rather than reproduced.

### SECTION 1 — SELF-ASSESSMENT

Partners rated their current knowledge of each theme on a scale from 1 (no knowledge) to 5 (expert knowledge): system definition and properties; causal relationships and feedback; feedback loops and system structure; system behavior over time; systems archetypes and leverage points; stock and flow.

### SECTION 2 — WHAT IS A SYSTEM

**Question 1.** Which of the following best defines a system?

- A. A collection of parts that can each be studied on their own
- B. A set of interconnected elements that together produce their own behavior over time**
- C. A group of components that only respond to outside forces
- D. A chain of causes and effects with a clear start and end point

**Question 2.** Which of the following examples is best understood as a system?

- A. Sand piled on a beach
- B. Names listed in a directory
- C. A community whose residents, organizations, and resources interact around shared problems**
- D. Tools stored in a warehouse

### SECTION 3 — SYSTEM PROPERTIES

**Question 3.** Traffic jams, market crashes, and ant colonies all have something in common. Which of the following best describes it?

- A. They are all controlled by a single decision-maker
- B. Their behavior emerges from interactions among parts; no single part intends or produces that behavior alone**
- C. They all follow predictable linear patterns when observed over time
- D. They are all responses to external shocks, rather than dynamics deriving from interactions between the parts

**Question 4.** A crop faces increasing stress due to temperature changes. With 10% stress, yield drops by 15%. At 20% stress, yield drops by 60%. What does this pattern suggest about the relationship between temperature stress and crop yield?

- A. The relationship is proportional — each unit of stress removes a fixed amount of yield
- B. The relationship is non-linear — yield losses accelerate as stress increases**
- C. The system is compensating — yield losses slow down as the crop adapts
- D. There is no clear relationship between stress and yield

**Question 5.** A team wants to understand why youth unemployment persists in a rural region, despite active job creation programs. Which of the following would most likely fall outside the boundary of this local-level analysis?

- A. Local employers and their hiring practices
- B. Skills and training available to local youth
- C. Global commodity prices on international markets**
- D. Vocational training offered by community organizations

## SECTION 4 — CAUSALITY AND ENDOGENEITY

**Question 6.** In a coastal town, ice cream sales and drowning incidents rise and fall together throughout the year. A local councilor proposes banning ice cream sales near beaches to reduce drowning risk. What is wrong with this reasoning?

- A. Nothing — reducing ice cream sales will reduce drownings
- B. The two variables are unrelated and should be ignored
- C. Both variables rise in summer because of hot weather — they move together without one directly causing the other**
- D. The relationship is too complex to analyze without building a full system model

**Question 7.** Fish stocks in a coastal region have been declining for decades. Local fishers and authorities blame bad weather years and foreign vessels. From a systems thinking perspective, what is the main problem with this explanation?

- A. It underestimates how much foreign vessels contribute to the decline
- B. It looks outwards for causes while missing the feedback dynamics inside the system — such as how fishing effort, fish catch, and stock recovery affect each other over time**
- C. It focuses too much on internal factors and ignores external pressures
- D. It fails to quantify the exact contribution of each cause

**Question 8.** A region with chronic food insecurity receives a large food aid program. Hunger falls initially. But over the next few years, local food production drops and dependence on aid grows — making the original problem worse. What is the mechanism that most directly explains how food aid led to a decline in local farming?

- A. Aid agencies did not coordinate well enough with local agricultural cooperatives
- B. The aid was insufficient in quantity to meet the region's needs
- C. Food aid lowered local food prices, which made farming less profitable, reduced local production, and increased dependence on aid**
- D. Ongoing drought conditions eroded local agricultural capacity regardless of the aid

## SECTION 5 — FEEDBACK LOOPS AND BEHAVIOR

**Question 9.** The diagram shows two variables connected in a loop (Population and Births), each link marked positive. What kind of loop is this, and what would you expect it to do over time?

- A. A balancing loop — it will push the system toward a stable point and keep it there
- B. A reinforcing loop — it will drive the system toward exponential growth or collapse**
- C. A balancing loop — the system will oscillate around a fixed point
- D. A reinforcing loop — it will resist change and return to its starting point

**Question 10.** A vaccination campaign reduces the number of susceptible people in a population. Fewer susceptible people means fewer new infections. Fewer infections reduce

the perceived urgency to vaccinate. Over time, vaccination rates drop. What type of feedback structure drives this pattern?

- A. A reinforcing loop — the program generates exponential growth in coverage until the disease is eliminated
- B. A balancing loop — as the gap between current and desired infection levels closes, the pressure driving the intervention weakens**
- C. A reinforcing loop — declining infections accelerate the vaccination effort
- D. A virtuous circle: vaccination becomes unnecessary as infections disappear

**Question 11.** A community group runs a campaign to increase youth participation in local decision-making. Participation grows at first, then begins to fall. The group responds, but by the time each response takes effect, participation has already dropped further. They respond again, but the same thing happens. What best describes the feedback structure driving this pattern?

- A. The system is goal-seeking — a balancing loop is pulling participation toward a natural level the group cannot change
- B. A reinforcing loop drove early growth, then reversed and caused collapse
- C. A balancing loop with a significant delay — the group's responses keep arriving too late to correct the trajectory**
- D. Participation is declining because of external pressures the campaign cannot address

## SECTION 6 — ARCHETYPES AND LEVERAGE

**Question 12.** Every few years, a region hit by drought receives emergency government funding to restore food production. Yields recover, and the crisis fades from attention. The funding stops. No structural changes are made to water management or agricultural practices. The next drought arrives, and the situation is just as bad — sometimes worse. This has happened four times in twelve years. Which Systems Archetype best describes this pattern?

- A. Limits to Growth — a reinforcing process runs into a constraint
- B. Fixes that Fail — a short-term response relieves the symptoms but leaves the underlying conditions untouched, so the problem keeps coming back**
- C. Shifting the Burden — the repeated external funding has gradually reduced the region's own ability and motivation to build resilience
- D. Escalation — two parties respond to each other in a way that intensifies the problem

**Question 13.** The same region is now deciding how to break the cycle. Four options are on the table. Which option targets the highest-leverage point in this system—the intervention most likely to produce lasting change by addressing root causes?

- A. Increase the size of the emergency relief fund for faster response to the next drought
- B. Run a public information campaign to raise awareness about food security risks
- C. Invest in soil restoration, water harvesting, and farmer training to reduce how vulnerable the region is to drought in the first place**
- D. Negotiate food-sharing agreements with neighboring regions as a backup during crises

## SECTION 7 — VISUAL SYSTEMS AND SYSTEM DYNAMICS TOOLS

**Question 14.** Every hour, exactly 10 people walk into a local coffee shop, and at the same time 10 people leave. What is happening to the total number of people inside the coffee shop?

- A. The number of people inside stays exactly the same**

- B. The number of people inside is shrinking
- C. The number of people inside is growing
- D. It cannot be determined from the information given

**Question 15.** A doctor prescribes a daily vitamin pill. The body filters out 20% of whatever amount of the vitamin is currently in the bloodstream every 24 hours. If the patient takes the same-sized pill every morning, what happens to the total amount of the vitamin in the body over a month?

- A. The level stays at zero because the body filters it out daily
- B. The level rises for the first few days but eventually levels off and stabilizes at a steady plateau**
- C. The level rises without limit for the whole month
- D. The level rises and falls unpredictably

**Question 16.** A team is trying to empty their To-Do list by fixing errors in an app. Every time they rush to fix 5 errors, their rushed changes create 10 new errors added back to the list. If they keep working at this pace, what happens to their workload?

- A. The To-Do list will grow larger and larger over time, despite the team working as hard as they can**
- B. The To-Do list will eventually hit zero if they just work longer hours
- C. The To-Do list will grow until they work long enough, then start shrinking
- D. The To-Do list will stay constant

**Question 17.** A researcher studies foxes and rabbits on an island and wants to predict how their populations change over time. Which graph best shows how the number of rabbits changes over time?

- A. An oscillating curve: rabbit numbers rise and fall in repeating cycles as predator and prey interact**
- B. A straight line rising steadily
- C. A flat line staying constant
- D. A single peak followed by permanent extinction

**Question 18.** How many feedback loops are there in the causal loop diagram shown?

- A. One
- B. Two**
- C. Three
- D. Four

**Question 19.** The statement "the structure produces behavior" describes which levels of the iceberg model?

- A. Mental Models - Events
- B. Structure of the System - Mental Models
- C. Patterns of Behavior - Structure of the System**
- D. Events - Patterns of Behavior

**Question 20.** In the stock-and-flow diagram of money in a piggy bank, which word best describes the inflow?

- A. Income**
- B. Getting rich
- C. Getting poor

***Note.** Question 9 was accompanied by a population-births causal loop diagram with positive polarities. Questions 17, 18 and 20 were accompanied by their respective diagrams. Correct answers derive from the source questionnaire scoring.*

## APPENDIX C. INTERVIEW GUIDE

The interview guide is reproduced below. Blocks A and C were common to all partners. Block B was conditional: each partner received the two questions matched to their questionnaire triggers, or a substitute question where no trigger fired. An AI-use note closed each document.

### BLOCK A — SYSTEMS THINKING IN PRACTICE

A1. In your work on youth, climate, or social inclusion, has your organization ever tried to address a problem only to find that the intervention made things more complicated, or set off effects you did not anticipate? Tell us what happened.

A2. When that kind of situation comes up, how does your team usually think about what is driving it? Do you tend to look for causes inside the way things are set up, or does the explanation usually point outward, to funding, policy, or external actors?

A3. Have you come across systems thinking before, in a course, a project, or anything similar? How did it come up?

### BLOCK B — CONDITIONAL DEEPENING

**B1 (feedback loops trigger).** One of the questionnaire questions described a community campaign where participation kept falling even as the group pushed harder. How did you read that? What did you think was happening?

**B2 (archetypes and leverage trigger).** Think of a problem your organization has tried to fix more than once, something that came back after you thought it was worked out. What do you think keeps bringing it back?

**B3 (metacognition trigger).** Looking back at the questionnaire, were there questions where you felt confident at the time but might think differently now? What made them feel straightforward?

**B4 (stock and flow trigger).** Think about something your organization manages over time, such as funding, staff capacity, or trust with a community. How do you keep track of whether it is building up or running down?

**Substitute (no trigger).** Your responses showed solid familiarity with systems thinking concepts. Where did that come from: past training, specific projects, particular people on the team? And how is that knowledge used within your organization today?

### BLOCK C — CURRICULUM EXPECTATIONS

C1. Going through the questionnaire, which concepts felt least familiar? What would you most want to get better at through this project?

C2. Thinking about the work you actually do with young people, on climate, or on social issues, is there a situation where seeing it through a systems lens might have changed how you approached it?

C3. When your team learns something new, what tends to stick? Some groups learn best from real cases, others from concrete tools or more conceptual frameworks. What has worked for you before?

C4. Is there anything about your organization or the context you work in that we should keep in mind when putting the training together?

## AI-USE NOTE

These questions are meant to capture how your organization thinks about these issues in its own words. Polished answers are not the goal; we are interested in your actual reasoning. If you used any AI tool to help draft your responses, please let us know how, so we can read the answers accurately.