

Part I — Framing

Drawing the Boundary

Online, with a lab for each exercise: thinking-in-diagrams.aryehnielsen.com

System context maps Part I · Framing · Chapter 2 of 12 · the one chapter on system context maps

What is inside the system you're responsible for? A system context map shows a named boundary around that system, the parties outside it that it deals with, and each thing that crosses between them, by name.

Signals you need this diagram

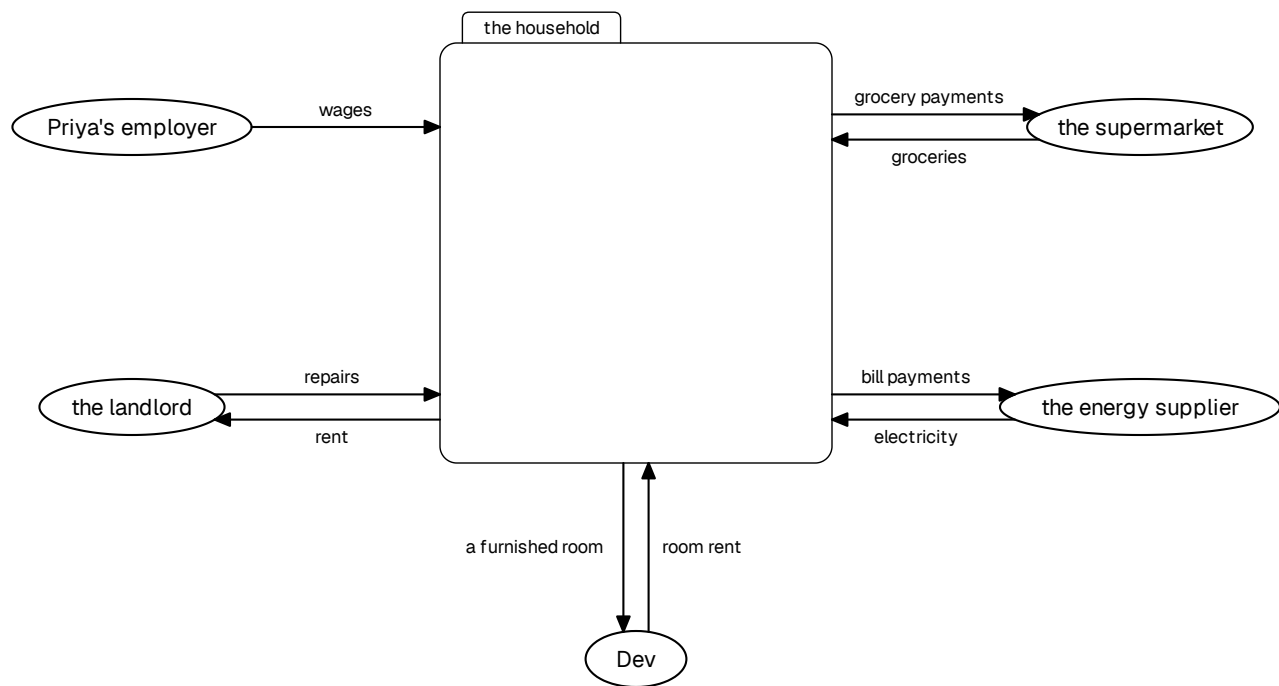
- People disagree about whose job something is.
- Something arrives that nobody expected to deal with: a bill, a request, a complaint.
- A new job, project or household starts, and nobody has listed who it deals with.
- A party outside is spoken of as if it were run from inside.
- A problem passes from one part to another, each saying it belongs elsewhere.

A household with a lodger

Priya and Sam rent a house with their ten-year-old daughter. Sam's nephew Dev rents their spare room, furnished, and buys and cooks his own food. Sam shops and cooks for the family; Priya pays the rent and the bills.

Each month Priya's wages arrive from her employer, and the household pays the landlord rent, the supermarket for groceries and the energy supplier for electricity. Dev pays the household rent for his room.

In January the boiler fails. Dev asks Sam when his room will be warm again; Sam phones the landlord, who sends a plumber three days later. The household owes Dev a warm room, and depends on the landlord to provide one.



What the notation expresses

The boundary

A **boundary** is a thin, solid, rounded outline drawn around the system, with a tab carrying the system's name. It marks what the map explains. What sits outside, the map doesn't explain: it shows what the landlord gives the household and receives from it, not how the landlord runs a business.

Every boundary has a name, since drawing one means saying which system it bounds: here, *the household*. A boundary is never dashed: in this book a dashed line means a hypothesis.

External entities

An **external entity** is a party outside the boundary that the system exchanges something with: a person, an organization or, at the scale of a planet, the Sun. It's drawn as its name in an oval. A party appears because something crosses between it and the system; one with nothing crossing is left off.

The system runs what is inside its boundary and only exchanges with what is outside. Dev lives in the house, but he pays for his room and runs his own meals, so he's an external entity; the daughter, whose room and meals the household provides, is inside.

An external entity isn't a variable: nothing on a system context map rises or falls.

CHECK YOUR UNDERSTANDING

Dev stops paying rent. Sam's sister asks the household to take him in as one of the family, and from then on he eats its meals and shares its money and chores. Is Dev still an external entity?

- a** Yes: he's a nephew, not one of Priya and Sam's children
- b** No: the household now runs his meals and money, so he's inside the boundary, with no oval
- c** Yes: he still sleeps in the spare room
- d** Yes, drawn as an oval inside the boundary

Feedback: Answers, chapter 2

Exchanges

An **exchange** is one named thing crossing the boundary between the system and an external entity: *wages*, *rent*, *electricity*. It's drawn as a solid line with one arrowhead, joining an oval to the boundary, with its name beside its middle. One exchange carries one thing: *rent* and *repairs* is two exchanges. A line without a name shows *that* something crosses, not what.

Direction

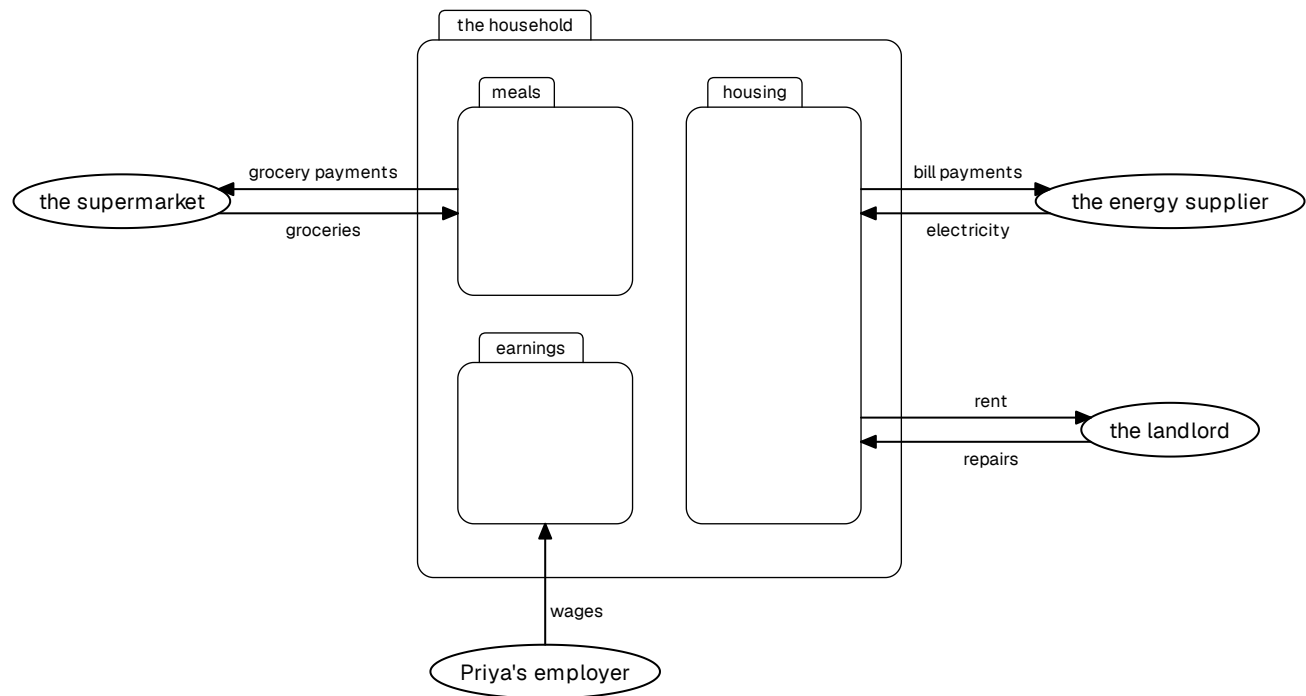
An exchange's **direction** runs from the party that gives to the party that receives. The household gives the landlord rent and receives repairs: two exchanges, pointing opposite ways.

The exchanges leaving the boundary are what the system answers for to others, such as Dev's furnished room; those arriving are what it depends on, such as the landlord's repairs.

Nested boundaries

A **nested boundary** is a boundary inside another, naming a part of the system. Nesting is read from position: a boundary drawn wholly inside another is its part. Two boundaries either nest or stay apart; overlapping ones leave it unclear which part a thing belongs to.

A part is named for what it does, not for who does it: *meals*, not *Sam*. If Priya takes over the cooking, the part stays.



Owners

An exchange's **owner** is the boundary it reaches. With parts drawn, each exchange reaches the part that handles it: groceries and grocery payments reach *meals*, wages reach *earnings*, and rent, repairs, electricity and bill payments reach *housing*. When the boiler fails, chasing the landlord's repairs falls to *housing*. An exchange drawn to the outer boundary belongs to the system as a whole.

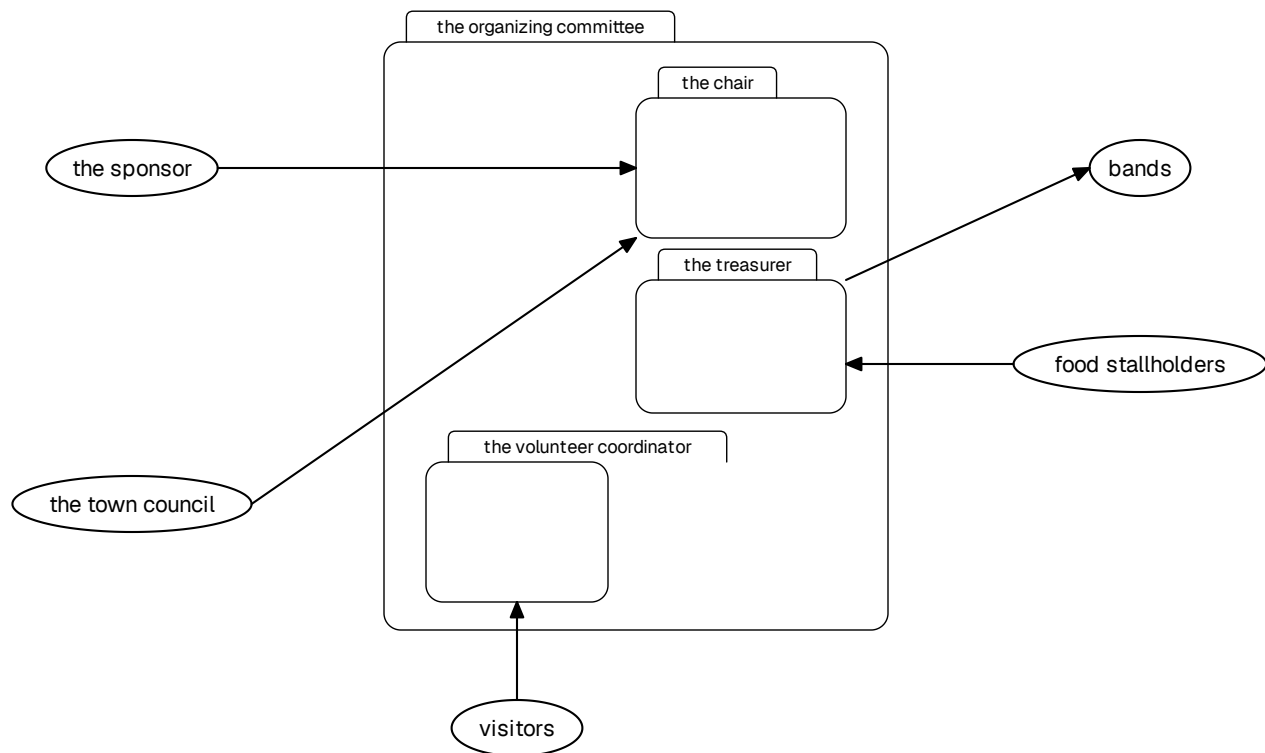
What stays informal

With one or two parties, a sentence does what the map would: *the household pays the landlord rent and gets repairs*. When a reader needs only who the system deals with, not what crosses, as on a list of emergency phone numbers, a list of parties does it.

The map shows no amounts and no timing: not how much the rent is, nor when it's due. Nor does it show causes, such as why the electricity bill rose; influence maps and causal loop diagrams, from chapter 3, show those. What passes between parts, such as *earnings* paying for *meals*, stays in a sentence.

The bad diagram

What's wrong with this map of a volunteer-run festival?



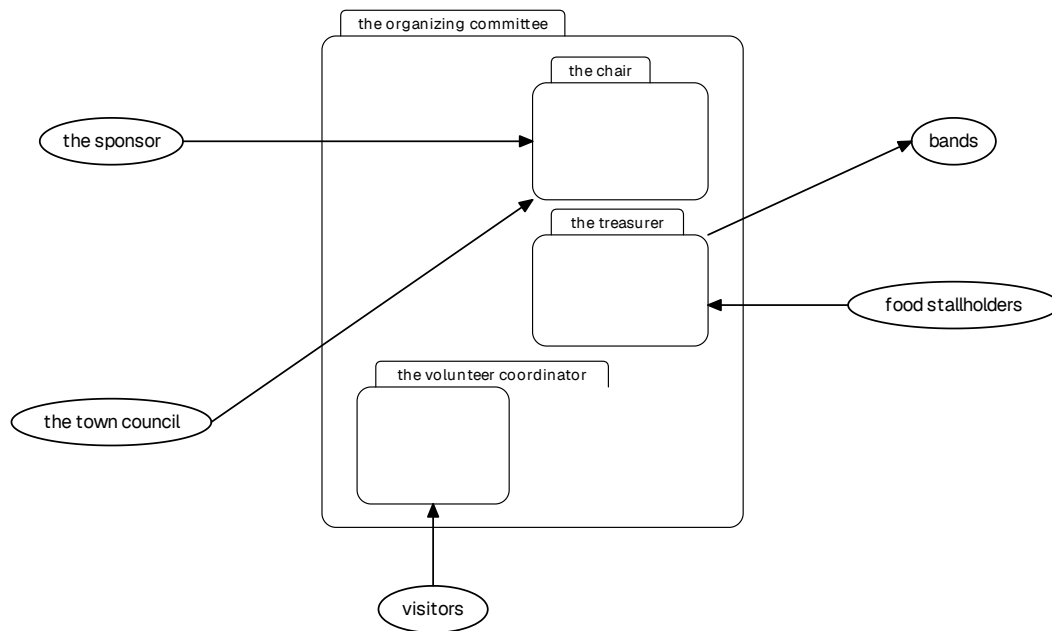
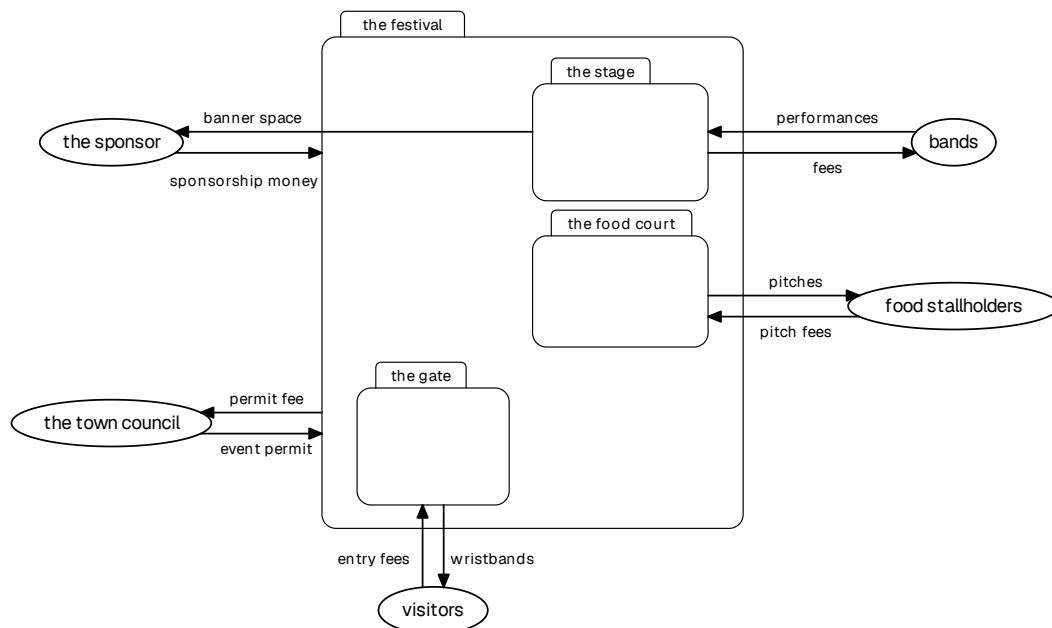
Its boundary is *the organizing committee*, with nested boundaries for the chair, the treasurer and the volunteer coordinator: an organization chart, showing who sits on the committee, not what the festival runs. Its five exchanges have no names and each runs one way only, so the map shows that the town council, the sponsor, bands, food stallholders and visitors deal with someone, not what they give or receive. The lab's check reports:

5 of 5 exchanges have no name yet: from the town council to the chair; from the treasurer to bands; from food stallholders to the treasurer; from visitors to the volunteer coordinator; from the sponsor to the chair. Name the one thing each carries.

The lab checks names, not what a boundary is drawn around: the committee's map with every exchange named would pass.

The corrected diagram

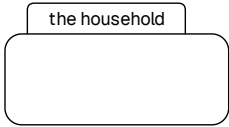
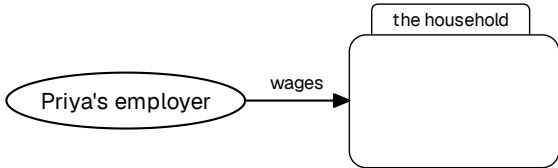
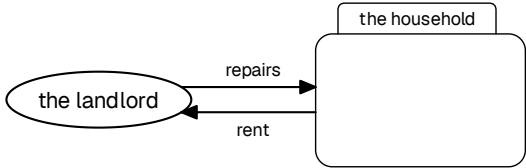
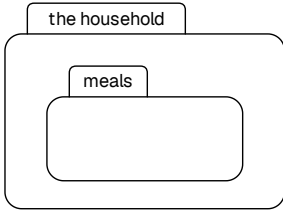
Corrected, the boundary is *the festival*, with parts for what it runs: *the stage*, *the food court* and *the gate*. The same five parties exchange named things both ways, each with the part that handles it: bands give the stage performances and receive fees; visitors give the gate entry fees and receive wristbands. The council's event permit and the sponsor's money reach the festival as a whole.

Bad diagram**Corrected diagram**

Labels unchanged. Boundaries: 4 renamed. Exchanges: 5 added, 5 named, 3 given another owner.

A new treasurer leaves the corrected map unchanged; a second stage would add a part.

Notation moves

Notation move	When	What it shows	Example
Draw a boundary and name it	You can name the system you're responsible for	What the system is	<i>the household</i>
			
Place an external entity	A party gives to the system or receives from it	Who the system deals with	<i>the landlord</i>
			
Draw an exchange and name it	Something crosses between the system and a party	One thing crossing, and which way	<i>wages</i> , from Priya's employer
			
Draw the exchange back	Something crosses the other way	What the system gives as well as what it receives	<i>rent out, repairs</i> in
			
Draw a nested boundary	Different parts of the system handle different exchanges	A part of the system	<i>meals</i>
			

Notation move	When	What it shows	Example
Draw an exchange to its part	Parts are drawn	The exchange's owner	<i>groceries to meals</i>

Check your understanding

CHECK YOUR UNDERSTANDING

Ana, who lives down the street, starts minding the daughter after school, and the household pays her each week. On the map with the parts meals, earnings and housing, how are these drawn?

a

One exchange, childminding, between Ana and the household

b

A new nested boundary, childcare, with childminding running into it from Ana and fees running out to her

c

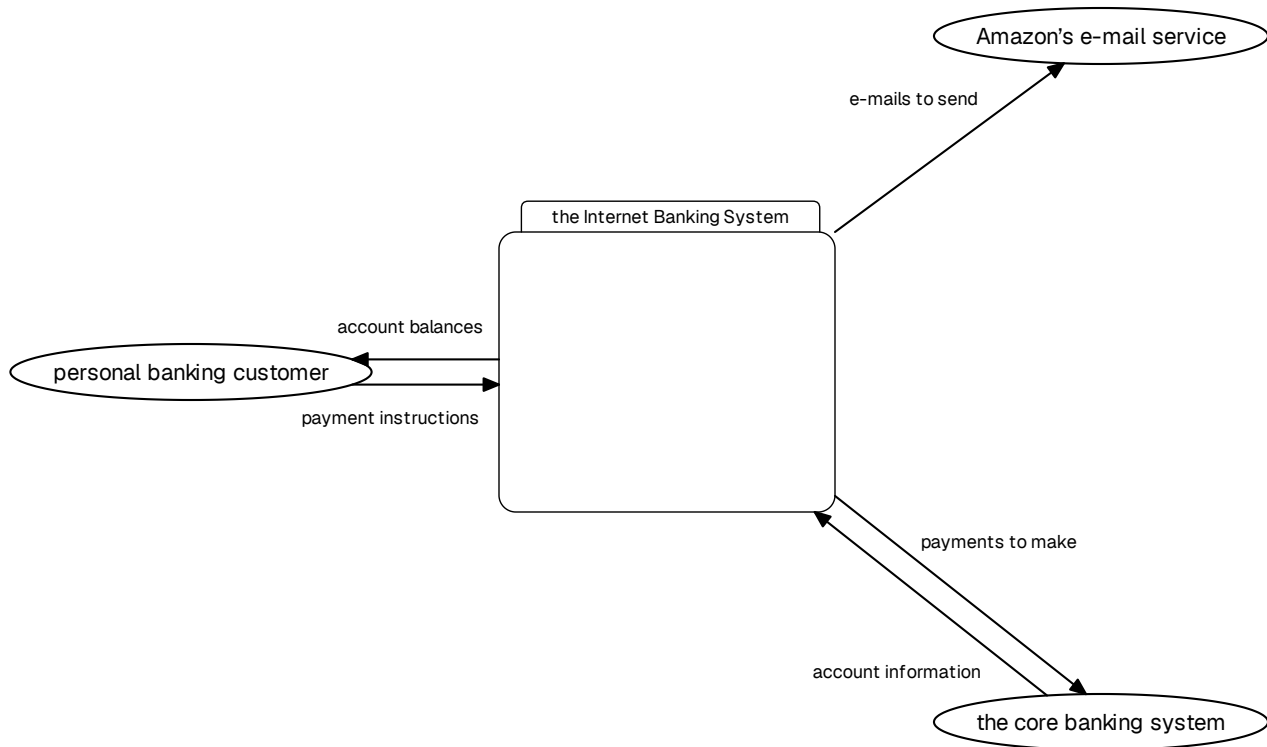
Fees out of earnings, since earnings receives the wages

d

A nested boundary named Ana, inside the household

Feedback: Answers, chapter 2

The Internet Banking System, redrawn



Redrawn from Simon Brown, “System context diagram”, The C4 model (c4model.com) c4model.com/diagrams/system-context, the system context diagram of the Internet Banking System. CC BY 4.0 creativecommons.org/licenses/by/4.0/.

The system's box drawn as the boundary and the other three boxes as external entities; each dashed line, which points from a party to what it relies on, drawn as solid exchanges named for what crosses, one for each thing it carries, pointing from the party that gives; the e-mail service's name shortened; colors and descriptions left out; the e-mail service's line to the customer, between two parties outside, left out.

QUESTION 1 OF 3

Which parties sit outside the boundary?

- a None: the source's figure has every party in a box, as it has the system.
- b Only the personal banking customer: the other two are software, as the system is.
- c All three: the customer, Amazon's e-mail service and the core banking system.

QUESTION 2 OF 3

The source's figure has four lines. Which one is no exchange on this map, and so is left out?

- a The customer → the system, since the customer also receives from the system.
- b Amazon's e-mail service → the customer, labeled Sends e-mails to.
- c The system → Amazon's e-mail service, since an e-mail is information, not a thing given.

QUESTION 3 OF 3

The core banking system belongs to the same bank as the Internet Banking System. With the boundary drawn around the bank instead, what changes?

- a** Nothing: the core banking system is a separate piece of software either way.
- b** The customer moves inside too, as a customer of the bank.
- c** The core banking system moves inside, and account information and payments to make no longer cross the boundary.

Feedback: Answers, chapter 2

Exercises

Passing the checks means meeting the brief, not being right.

SC 01 A first term away from home

One boundary and the parties outside it

Reasoning ●○○○○ 1 of 5 Polish ●○○○○ 1 of 5

Maya starts a geology degree at a university three hundred miles from home. The university gives lectures, sets essays and returns them with grades. Her parents send her an allowance each month. She works two evening shifts a week at a café, which pays her wages, and borrows books from the city library. Draw her studies as the system, with the parties they exchange with outside it. Leave out her housemates and the friends she makes in lectures.

The brief

- ☐ Draw one boundary around Maya's studies.
- ☐ Place four to six external entities outside it.
- ☐ Draw at least four exchanges.
- ☐ Each external entity is a party that gives or receives something, not a feeling or a task.

Your palette



Draw here

A large grid of dots for drawing the system boundary and external entities.

SC 02 Earth

One boundary, at the largest scale

Reasoning ●○○○○ 1 of 5 Polish ●●○○○ 2 of 5

Sunlight reaches Earth from the Sun. Earth reflects part of that sunlight back out to space and radiates heat to space. A trickle of meteoric dust falls in from space, and light gases such as hydrogen escape from the top of the atmosphere. Draw Earth as the system, with what crosses between it and the parties outside it.

The brief

- ☐ Draw one boundary: Earth.
- ☐ Place two external entities outside it.
- ☐ Draw at least four exchanges.
- ☐ Show at least one external entity that both gives to Earth and receives from it.
- ☐ The names show which crossings are energy and which are matter.

Your palette



Draw here

A large grid of dots for drawing the system boundary.

SC 03 A shared house

Named exchanges in both directions

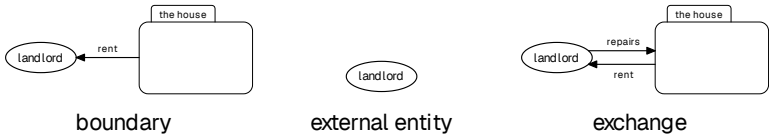
Reasoning ●●○○○ 2 of 5 Polish ●●○○○ 2 of 5

Five students share a rented terraced house for their second year. They pay the landlord rent each month and send him a fault report when something breaks, and he sends a plumber or an electrician to make the repair. An energy supplier provides gas and electricity, and the students pay it by monthly direct debit. The council collects council tax, empties the bins each Tuesday and issues a parking permit for the one car they share. The neighbours take in the students' parcels, and the students feed the neighbours' cat when the neighbours are away. Draw the household as the system, with the parties it exchanges with outside it.

The brief

- ☐ Draw one boundary around the household.
- ☐ Place at least four external entities outside it.
- ☐ Show at least three external entities that both give to the household and receive from it.
- ☐ Each exchange names one thing: rent and repairs is two exchanges.

Your palette



Draw here

A large grid of dots for drawing the system diagram.

SC 04 A national blood service

Named exchanges in both directions, across a nation

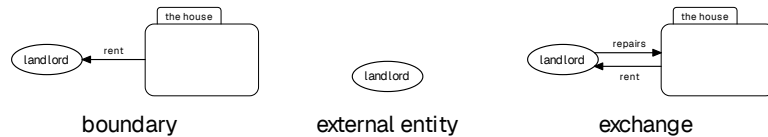
Reasoning ●●○○○ 2 of 5 Polish ●●●○○ 3 of 5

A national blood service collects blood from volunteer donors at sessions across the country. It tests every donation and writes to any donor whose blood shows an infection. It separates the blood into red cells and platelets and delivers both to hospitals, which order what they need each day and pay for each unit. The health ministry funds the service and receives its annual report. The regulator licenses the service and receives a report of every serious incident, such as a transfusion given to the wrong patient. Research laboratories receive donations unfit for transfusion as research samples and send back their study results. Draw the service as the system, with the parties it exchanges with outside it.

The brief

- ☐ Draw one boundary around the blood service.
- ☐ Place at least five external entities outside it.
- ☐ Show at least four external entities that both give to the service and receive from it.
- ☐ Draw at least eight exchanges.
- ☐ Donors sit outside the boundary: the service exchanges with them and doesn't run them.

Your palette



Draw here

SC 05 A community garden

Nested boundaries and owners

Reasoning ●●●○○ 3 of 5 Polish ●●●○○ 3 of 5

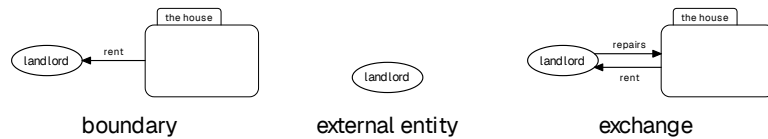
Linden Street garden is a community garden on a former car park, divided into growing beds, compost bays and a tool shed. The water supplier pipes water to the growing beds, and the vegetables grown there go to the food bank each Saturday. A café on the corner brings its food scraps to the compost bays, and the parks department delivers fallen leaves there each autumn and collects finished compost for its flower beds.

Neighbours bring their grass cuttings to the compost bays and borrow tools from the tool shed. Draw the garden as the system, divided into its parts, with each exchange reaching the part that handles it.

The brief

- ☐ Draw at least two nested boundaries inside the garden, one for each part.
- ☐ Place at least five external entities outside the garden.
- ☐ Draw each exchange to the part that handles it.
- ☐ Each part is named for what it does, not for who works in it.

Your palette



Draw here

CS 02 Kelsham Primary School and the parties it deals with

Exchanges both ways, and a party that only receives

Reasoning ●●○○○ 2 of 5 Polish ●●○○○ 2 of 5

Before the governors meet the county council, Tom Hale asks them to list what Kelsham Primary School exchanges with each party it deals with. Families send their children as pupils and tell the school what they think of it, and the school sends them a report on each child every term. The county council pays the school its funding and receives the count each October, and David Brennan, its officer for school places, sends a forecast of starters. Dale Coaches sends the school bus timetable, and the school sends it the list of children on the bus. When a child moves to Brayford Primary School, the school sends the child's records there. Larkfield Homes, the builder of the 60 homes at Mill Lane, sends the dates its first homes will be lived in, and the school sends leaflets for its buyers. Draw the school as the system, with the parties it exchanges with outside it.

The brief

- ☐ Draw one boundary around the school.
- ☐ Place at least five external entities outside it.
- ☐ Show at least four external entities that both give to the school and receive from it.
- ☐ Each exchange names one thing: funding and the forecast of starters are two exchanges.
- ☐ Leave off what passes between two parties outside the school, such as the county council's payments to Dale Coaches.

Your palette



Draw here

A large grid of dots for drawing the diagram.

Sources

- Tom DeMarco, *Structured Analysis and System Specification* (Yourdon Press, 1978), on structured analysis's top-level diagram: the whole system drawn as one process among the parties outside it.
- Edward Yourdon, *Modern Structured Analysis* (Yourdon Press, 1989), on the environmental model, the part of structured analysis that draws a system's surroundings.
- Simon Brown, *The C4 model: System context diagram* c4model.com/diagrams/system-context, on the C4 model's top level: a software system drawn as one box among the people and other systems it deals with.
- Donella H. Meadows, *Thinking in Systems: A Primer* (Chelsea Green, 2008), chapter 4, on boundaries as choices made afresh for each problem.
- John D. Sterman, *Business Dynamics: Systems Thinking and Modeling for a Complex World* (Irwin/McGraw-Hill, 2000), chapter 3, on the model boundary chart, which lists what a model treats as inside, as outside, and leaves out.
- Rebecca Lindsey, "Climate and Earth's Energy Budget"
science.nasa.gov/earth/earth-observatory/climate-and-earths-energy-budget (NASA Earth Observatory, 2009), on the sunlight Earth receives and the reflected sunlight and heat it sends to space: SC 02's situation.

Answers

Chapter 2 · Drawing the Boundary

Dev stops paying rent. Sam's sister asks the household to take him in as one of the family, and from then on he eats its meals and shares its money and chores. Is Dev still an external entity?

- a Yes: he's a nephew, not one of Priya and Sam's children
Not quite. Family ties don't place a party. What places Dev is whether the household runs his meals and money or only exchanges with him.
- b No: the household now runs his meals and money, so he's inside the boundary, with no oval
Yes. An external entity is a party the system exchanges with and doesn't run. Nothing crosses between Dev and the household any more: his meals and money are the household's, so he's part of it.
- c Yes: he still sleeps in the spare room
Not quite. The room was an exchange while Dev paid rent for it. Now no rent crosses, and the room is part of how the household houses its own members.
- d Yes, drawn as an oval inside the boundary
Not quite. An oval inside a boundary is a mistake the lab names: an external entity sits outside. A member of the system is inside it and has no oval.

Ana, who lives down the street, starts minding the daughter after school, and the household pays her each week. On the map with the parts meals, earnings and housing, how are these drawn?

- a One exchange, childminding, between Ana and the household
Not quite. One exchange carries one thing one way. Care comes in and fees go out: two exchanges. With parts drawn, each also reaches the part that handles it.
- b A new nested boundary, childcare, with childminding running into it from Ana and fees running out to her
Yes. No part on the map handles care, so a new part, named for what it does, owns both exchanges. Two things cross, one each way, so there are two exchanges.
- c Fees out of earnings, since earnings receives the wages
Not quite. An owner is the part that handles an exchange, not the part that receives the money: in this household meals pays the supermarket and housing pays the landlord.
- d A nested boundary named Ana, inside the household
Not quite. The household exchanges with Ana and doesn't run her, so she's an external entity, an oval outside. A part is named for what it does, not for who does it.

QUESTION 1 OF 3

Which parties sit outside the boundary?

- a None: the source's figure has every party in a box, as it has the system.
Not quite. Here the system's box became the boundary, and each other box a party in an oval, outside it.
- b Only the personal banking customer: the other two are software, as the system is.
Not quite. What kind of thing a party is doesn't place it. Amazon's e-mail service and the core banking system each exchange something with the Internet Banking System, and neither is run by it.
- c All three: the customer, Amazon's e-mail service and the core banking system.
Yes. Each gives the system something or receives something from it, and the system runs none of them: it hands e-mails to Amazon's service and gets account information from the core banking system.

QUESTION 2 OF 3

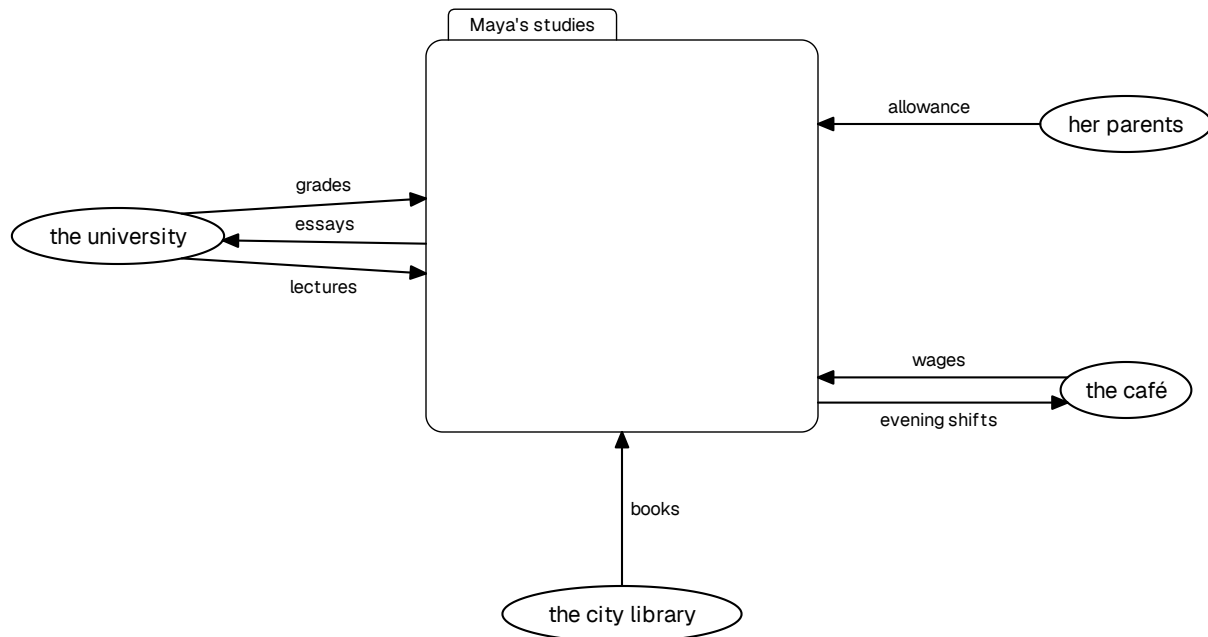
The source's figure has four lines. Which one is no exchange on this map, and so is left out?

- a The customer → the system, since the customer also receives from the system.
Not quite. That line carries two things, so it became two exchanges: payment instructions from the customer, account balances to the customer, each pointing from the party that gives.
- b Amazon's e-mail service → the customer, labeled Sends e-mails to.
Yes. An exchange crosses the boundary between the system and a party outside. This line runs between two parties outside, so it crosses no boundary drawn here.
- c The system → Amazon's e-mail service, since an e-mail is information, not a thing given.
Not quite. Information crosses as goods do: the system hands Amazon's service the e-mails to send, drawn as that exchange.

QUESTION 3 OF 3

The core banking system belongs to the same bank as the Internet Banking System. With the boundary drawn around the bank instead, what changes?

- a Nothing: the core banking system is a separate piece of software either way.
Not quite. A party's place comes from the boundary's name, not from what it is. Inside a boundary named the bank, the core banking system is a part of the system.
- b The customer moves inside too, as a customer of the bank.
Not quite. The bank doesn't run its customers: the customer still gives payment instructions and receives balances from outside.
- c The core banking system moves inside, and account information and payments to make no longer cross the boundary.
Yes. The boundary's name says what the map explains. Around the bank, the core banking system is a part, and what passes between it and internet banking stays inside, as what passes between parts does.

SC 01 A first term away from home

This is one defensible answer, not the only one. Yours can differ and still hold up: the lab's checks show whether it has the brief's structure.

One boundary, Maya's studies, with four parties outside it: the university, her parents, the café and the city library. Seven named exchanges cross the boundary. Lectures and grades come in from the university and essays go out to it; the café takes her evening shifts and pays wages.

Why it works

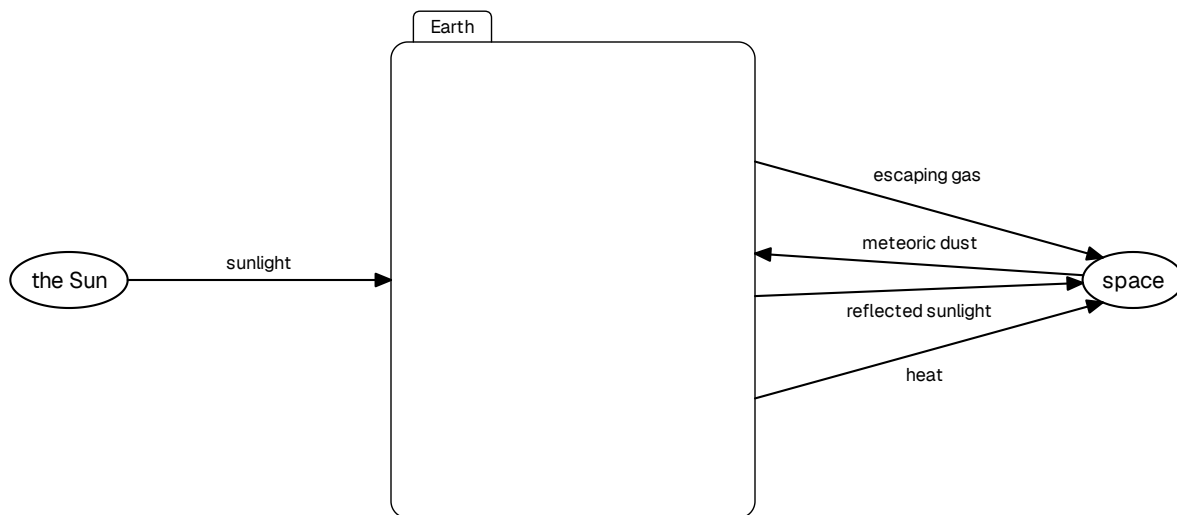
- One boundary, named for the system
- Four parties, each outside the boundary
- Every party gives or receives at least one thing
- Each exchange named for the one thing it carries
- Housemates and friends left out

Step by step

1. The boundary, Maya's studies, before any party, since every party goes outside it.
2. The university, the party the paragraph opens with, with lectures and grades crossing in and essays crossing out.
3. Her parents, with the allowance crossing in, and the café, with evening shifts out and wages back: the two parties that pay her, in the paragraph's order.
4. The city library, with books crossing in, the last party the paragraph names.

What another defensible answer might vary

Another defensible answer might draw her whole first term as the system, with a landlord as a fifth party, or name the café's exchanges as time and money. What stays the same is one named boundary, parties outside it, and a name on every exchange.

SC 02 Earth

This is one defensible answer, not the only one. Yours can differ and still hold up: the lab's checks show whether it has the brief's structure.

Earth is the boundary, with the Sun and space outside it. Energy crosses as sunlight in from the Sun, and as heat and reflected sunlight out to space. Matter crosses as meteoric dust in from space and escaping gas out to it.

Why it works

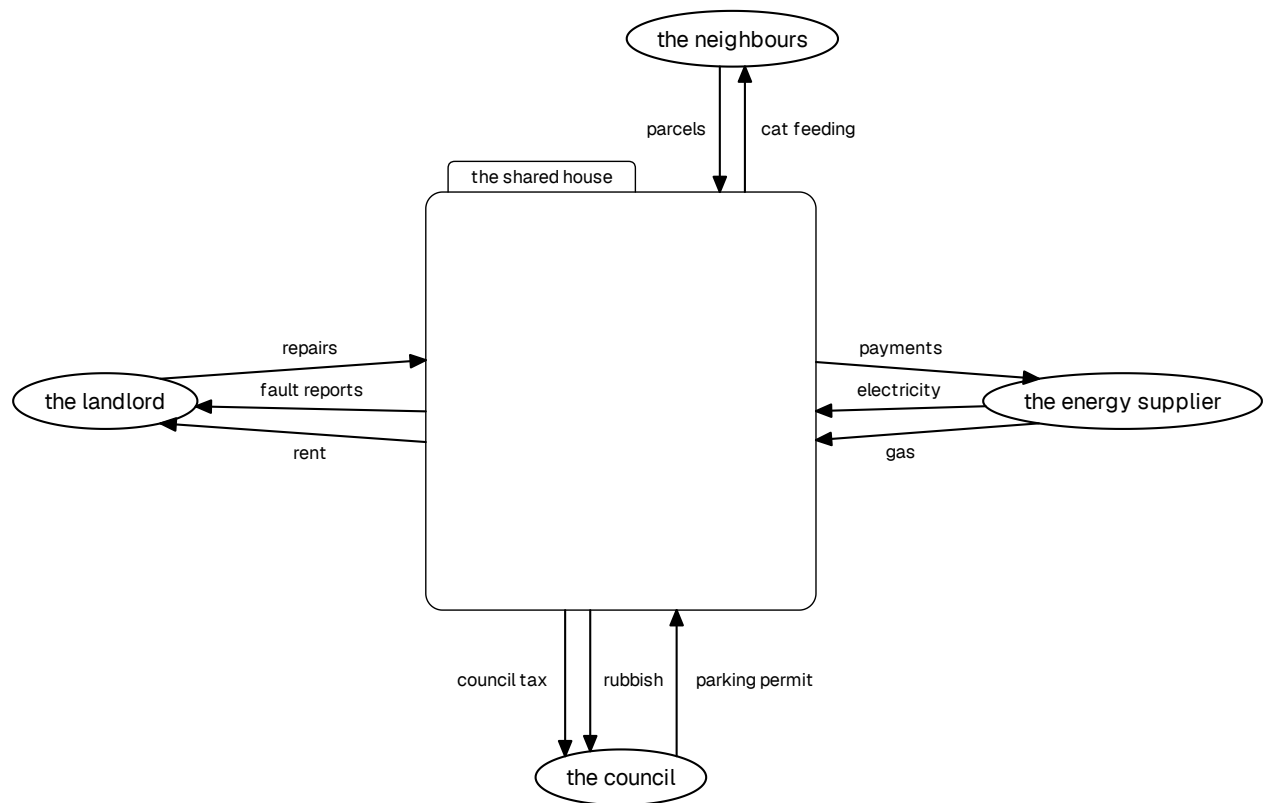
- One boundary around the planet, named Earth
- The Sun only gives; space both gives and receives
- Reflected sunlight and heat drawn as two exchanges, since they are two things
- Sunlight, heat and reflected sunlight are energy; meteoric dust and escaping gas are matter

Step by step

1. The boundary, Earth, before the Sun and space, since every crossing after it goes in or out across this line.
2. The Sun, with sunlight crossing in: the energy that the heat and reflected sunlight going out both start from.
3. Space, with heat and reflected sunlight crossing out to it as two exchanges, the energy leaving after the energy arriving.
4. Meteoric dust in from space and escaping gas out to it, the matter crossings, after the energy ones, as the paragraph lists them.

What another defensible answer might vary

Another defensible answer might name the heat as infrared radiation, or draw the escaping gas as two exchanges, hydrogen and helium. What stays the same is two parties, five things crossing, and each exchange carrying one thing one way.



This is one defensible answer, not the only one. Yours can differ and still hold up: the lab's checks show whether it has the brief's structure.

One boundary, the shared house, with four parties outside it: the landlord, the energy supplier, the council and the neighbours. Eleven named exchanges cross it, and every party both gives and receives. Rent and fault reports go to the landlord and repairs come back; gas and electricity come in from the supplier and payments go out; council tax and rubbish go to the council and a parking permit comes back; parcels come in from the neighbours and cat feeding goes out.

Why it works

- One boundary, named for the household
- The five students are the system, so none of them is drawn as a party
- Rent and repairs drawn as two exchanges, one each way
- Gas and electricity drawn as two exchanges, since they are two things
- Every party gives and receives at least one thing

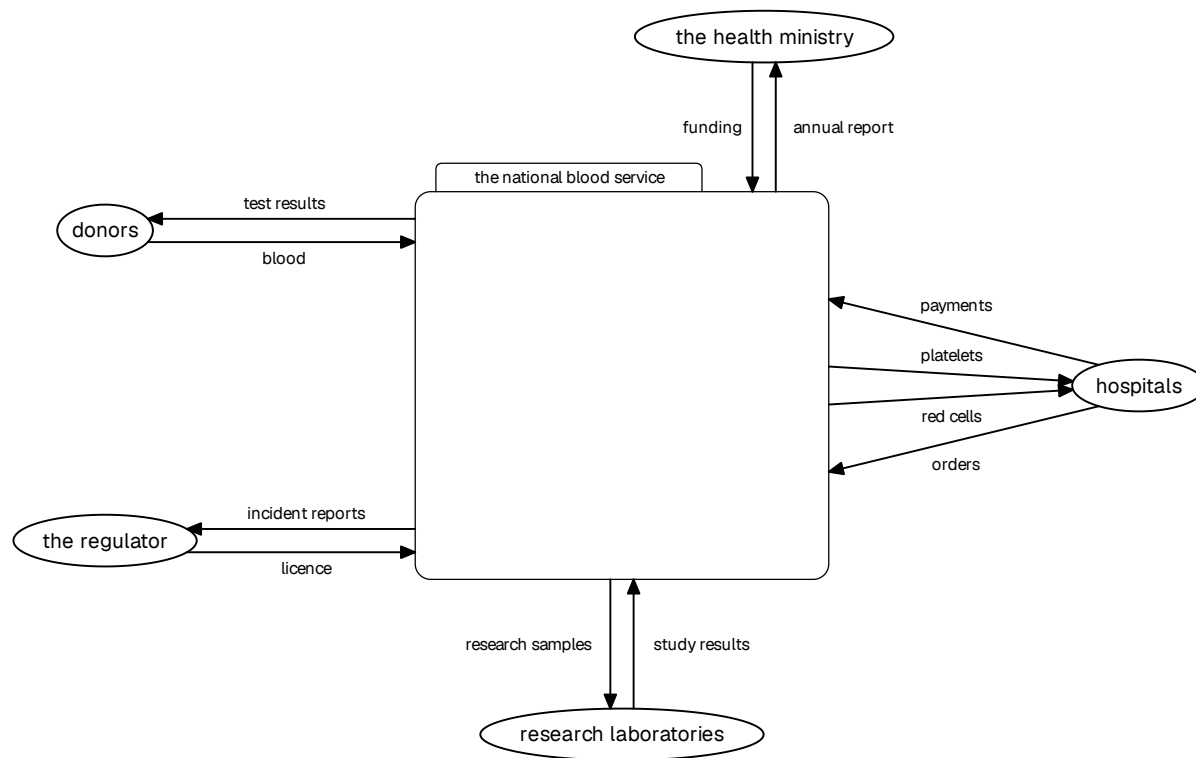
Step by step

1. The boundary, the shared house, with the five students inside it, before any of the parties they deal with.
2. The landlord, with rent and fault reports going out and repairs coming back, as the paragraph's second sentence lists them.
3. The energy supplier, with gas and electricity coming in as two exchanges and payments going out by direct debit.
4. The council, with council tax and rubbish going out and a parking permit coming back, one exchange for each thing it collects, empties or issues.

5. The neighbours, with parcels coming in and cat feeding going out, the last party and the only one paid in favours.

What another defensible answer might vary

Another defensible answer might leave out the parking permit, or add the supplier's quarterly bills as a further exchange. What stays the same is one named boundary, the four parties outside it, and one thing per exchange.

SC 04 A national blood service

This is one defensible answer, not the only one. Yours can differ and still hold up: the lab's checks show whether it has the brief's structure.

One boundary, the national blood service, with five parties outside it: donors, hospitals, the health ministry, the regulator and research laboratories. Twelve named exchanges cross it, and every party both gives and receives. Blood comes in from donors and test results go back; orders and payments come in from hospitals, and red cells and platelets go out to them; funding and a licence come in, and an annual report and incident reports go out; research samples go to the laboratories and study results come back.

Why it works

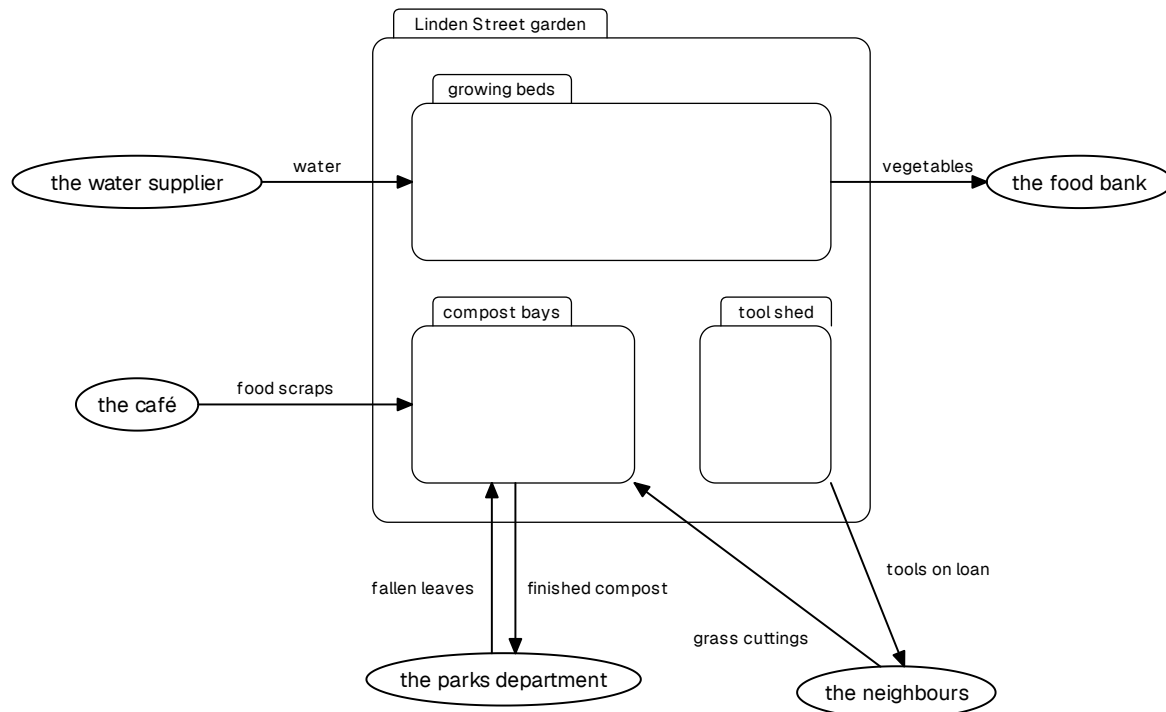
- One boundary around the service, named for it
- Donors outside the boundary, since the service doesn't run them
- Red cells and platelets drawn as two exchanges, since they are two things
- Every party gives and receives, each direction its own exchange

Step by step

1. The boundary, the national blood service, before any party, so that every party, donors included, goes outside it.
2. Donors, with blood coming in and test results going back, where the blood's path starts.
3. Hospitals, where the blood's path ends, with orders and payments coming in and red cells and platelets going out as two exchanges.
4. The health ministry and the regulator, the two parties that oversee the service, with funding and a licence coming in and an annual report and incident reports going out.
5. Research laboratories, with research samples going out and study results coming back: the donations unfit for transfusion, which leave the blood's path.

What another defensible answer might vary

Another defensible answer might add plasma as a third product, sent to a maker of medicines as a sixth party, or draw the regulator's inspections as an exchange beside the licence. What stays the same is one named boundary, donors and hospitals outside it, and one thing per exchange.

SC 05 A community garden

This is one defensible answer, not the only one. Yours can differ and still hold up: the lab's checks show whether it has the brief's structure.

One outer boundary, Linden Street garden, holds three parts: growing beds, compost bays and the tool shed. Five parties sit outside it. Each of the seven exchanges reaches the part that handles it: water and vegetables reach the growing beds; food scraps, fallen leaves, grass cuttings and finished compost reach the compost bays; tools on loan leave from the tool shed.

Why it works

- One outer boundary, named for the garden
- Three parts, each named for what it does
- Every exchange reaches one part, none the garden as a whole
- The neighbours exchange with two parts: grass cuttings go to the compost bays and tools come from the tool shed
- The parks department both gives and receives through the compost bays

Step by step

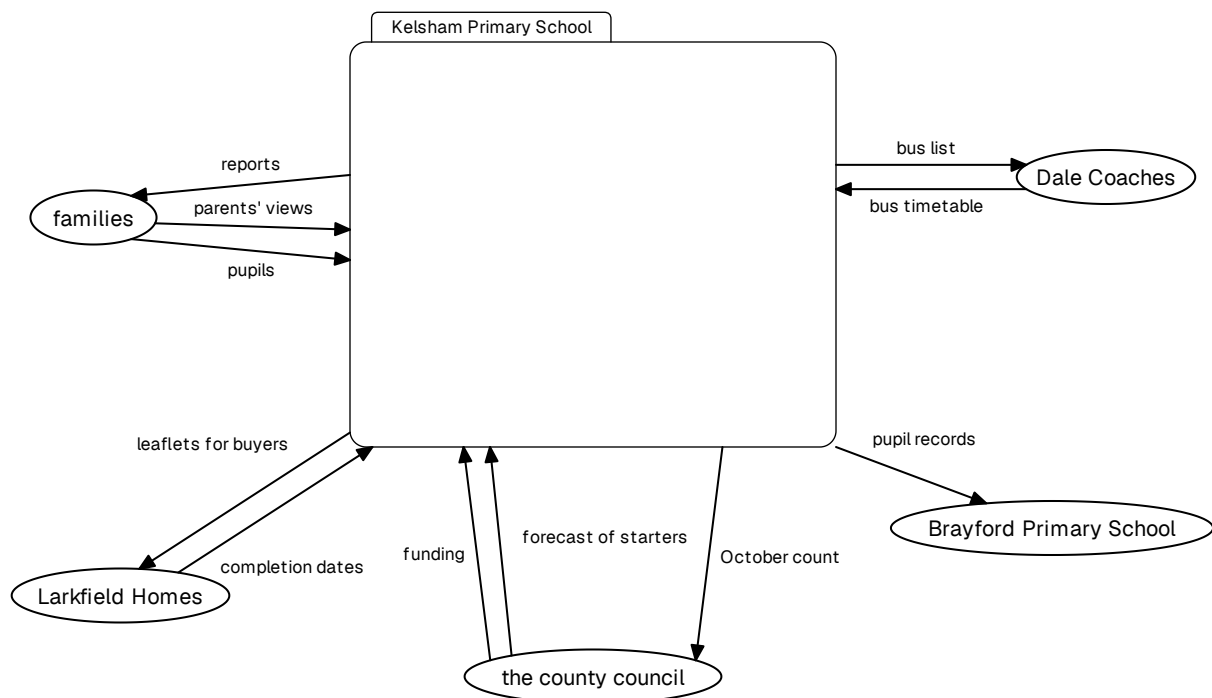
1. The outer boundary, Linden Street garden, before its parts, which sit inside it.
2. Its three parts, growing beds, compost bays and the tool shed, each a boundary inside it, before any party, since each exchange ends at a part.
3. The water supplier and the food bank, with water in to the growing beds and vegetables out from them, as the paragraph opens.
4. The café and the parks department, at the compost bays: food scraps and fallen leaves in, and finished compost back out to the parks department.

5. The neighbours last, since they reach two parts, with grass cuttings in to the compost bays and tools on loan out from the tool shed.

What another defensible answer might vary

Another defensible answer might draw the tools' return as a second exchange with the tool shed, or add a seed store as a fourth part. What stays the same is one outer boundary named for the garden, parts named for what they do, and every exchange reaching one part.

CS 02 Kelsham Primary School and the parties it deals with



This is one defensible answer, not the only one. Yours can differ and still hold up: the lab's checks show whether it has the brief's structure.

One boundary, Kelsham Primary School, with five parties outside it: families, the county council, Dale Coaches, Brayford Primary School and Larkfield Homes. Eleven named exchanges cross it. Pupils and parents' views come in from families and reports go out; funding and a forecast of starters come in from the county council and the October count goes out; the bus timetable comes in from Dale Coaches and the bus list goes out; pupil records go out to Brayford Primary School; completion dates come in from Larkfield Homes and leaflets for buyers go out.

Why it works

- One boundary, named for the school
- Funding, the forecast and the October count drawn as three exchanges with the county council, one thing each
- Four parties both give and receive; Brayford Primary School only receives, since nothing in the paragraph comes back from it
- The county council's contract with Dale Coaches left off: it crosses no part of the school's boundary

Step by step

1. The boundary, Kelsham Primary School, alone: every exchange in the paragraph crosses it.
2. Families, with pupils and parents' views coming in and reports going out, the party the paragraph names first.
3. The county council, with funding and a forecast of starters coming in and the October count going out: three exchanges, since each carries one thing.
4. Dale Coaches, with the bus timetable coming in and the bus list going out.
5. Brayford Primary School, with pupil records going out, the one party that sends the school nothing.

6. Larkfield Homes, with completion dates coming in and leaflets for buyers going out, the party whose 60 homes are not yet lived in.

What another defensible answer might vary

Another defensible answer might draw David Brennan as a party of his own beside the county council, or add pupils going out to Brayford Primary School beside their records. What stays the same is one boundary named for the school, the five parties outside it, and one thing per exchange.