

# Mapping data ecosystems

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In this guide, we introduce a tool for documenting and mapping data ecosystems. We have provided guidelines for how to do this by yourself, or in a workshop setting. We welcome feedback on the methodology, how it can be used, examples of its use in different contexts, and ways in which we can improve it in the future.

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This is work in progress. It is likely to be updated as we continue our work. Keep an eye out for updates!



How can it be improved? We welcome suggestions from the community in the comments.

# Background

When we started to explore how [open data could be used to deliver public services](#) through our [research and development programme](#), we knew we needed a means of capturing the variety of ways that people and organisations are collaborating with data, in order to help us clearly communicate that variety more widely.

To help us achieve that we have drawn on ideas from [rich picturing](#), systems thinking and [value network analysis](#) to develop an approach for mapping data ecosystems. By creating a visual map that illustrates how data is being accessed, used and shared by a variety of organisations, we have found it is easier to explain the ecosystems that exist around products and services.

We have tested this tool in a variety of projects and are already finding it a useful approach. Data ecosystem maps can help to identify the data stewards responsible for managing and ensuring access to a dataset, the different types of data users and the relationships between them. We think the approach can help to communicate where and how the use of open data creates value.

We have started using this tool in our own projects, but we are also keen to see how it can be applied in new projects and contexts. For example, it might be a useful way not only to explore existing data ecosystems, but also to map out new ecosystems that might be created through the publication of additional data. We are also interested in whether the tool might need to be adapted when used in different contexts, e.g. based on language, culture and location.

*Let us know your thoughts by commenting on this document or contacting Josh D'Addario ([josh.daddario@theodi.org](mailto:josh.daddario@theodi.org)).*

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# Why should we map data ecosystems?

[Data infrastructure](#) consists of data assets, the organisations that operate and maintain them, and guides describing how to use and manage the data. A [strong data infrastructure](#) will be as open as possible and designed to benefit everyone. It will support an ecosystem of organisations that collaborate to ensure that the infrastructure is sustainably funded and maximises the creation of value from its data assets.

Data infrastructure can be hard for people to visualise and understand. So we need to create tools to help us understand the ecosystems that it supports and to enable us to make better decisions about how that infrastructure operates to maximise the value it provides.

Creating a map of a data ecosystem can help us to understand and explain where and how the use of data creates value. A data ecosystem map can help to identify the key data stewards and users, the relationships between them and the different roles they play. Representing ecosystems in detailed maps can be particularly useful when contexts are complex, not well understood or not yet fully developed.

A data ecosystem map can be used to describe how data is being shared across [The Data Spectrum](#). A map can show how open data is being used to deliver a service, or how data is being shared in more limited ways, eg to enable access to personal data to support research, or internally within an organisation.

There are benefits to be gained not only from creating a map of a data ecosystem, but also from the process of drawing it.

Mapping requires you to consider different actors, relationships and ideas in the system, and can generate useful insights and talking points. As a collaborative process it can build understanding of a data ecosystem across different stakeholders. The end product is useful as a communication tool to support engagement across the data ecosystem.

We have found that creating data ecosystem maps of existing systems can help to:

- develop a shared understanding of the variety of ways in which participants add and create value
- clarify roles and responsibilities to help improve an ecosystem and the adoption of best practices
- support engagement, eg by identifying key stakeholders

We believe that creating ecosystem maps can also be useful in other ways, for example:

- understanding opportunities to adopt or use data standards to improve data flows between participants in an ecosystem
- identifying the potential impacts of changing how data is accessed, used and shared
- identifying the potential users and communities who might benefit from the creation of new data infrastructure in a sector

## Example ecosystem maps

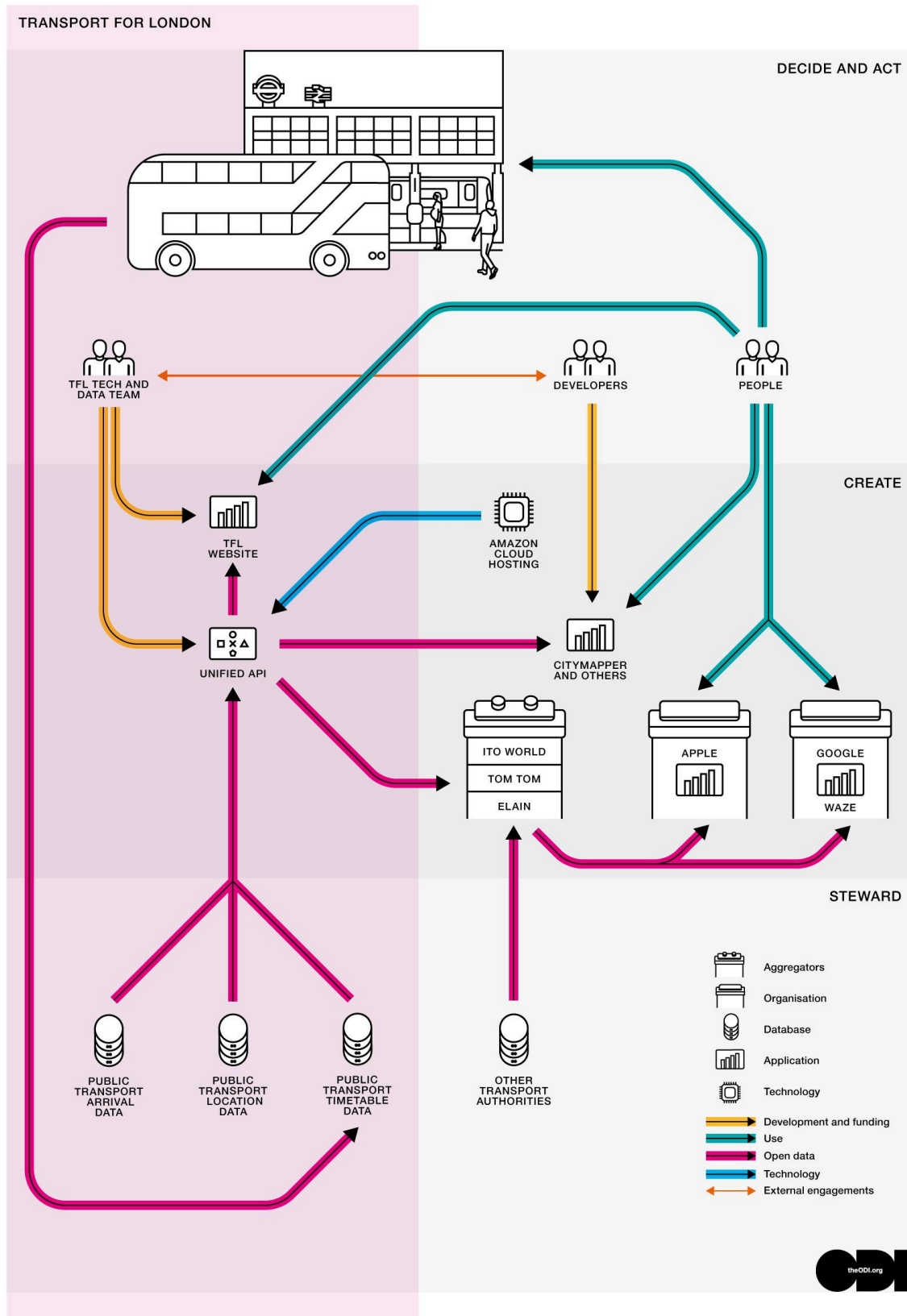
Here are some examples of data ecosystem maps that we have developed at the ODI. An ecosystem map can be a quick sketch or a more polished illustration.

In each example the map illustrates:

- the data assets that are being accessed, used and shared
- the people and organisations involved in either creating outputs using data, or benefiting from its use
- the relationships and roles that these actors have in the ecosystem

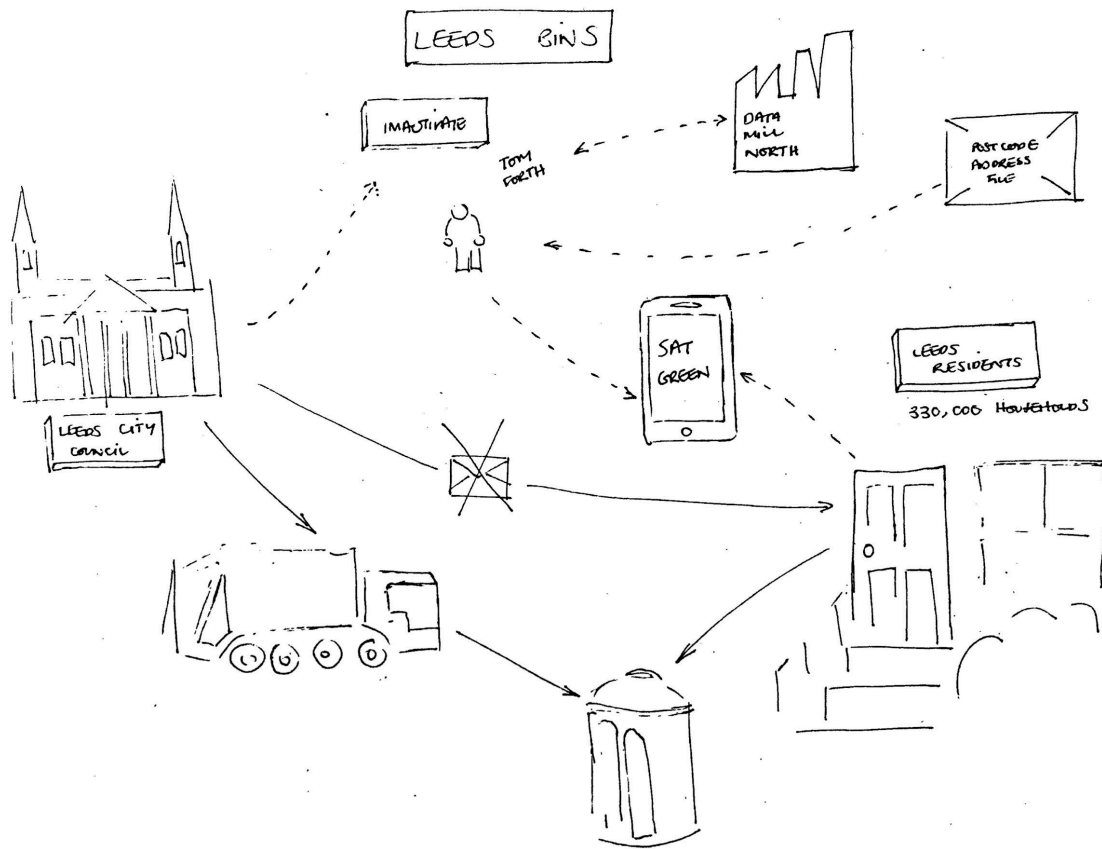
## Example 1: Transport for London release of transport data

This is a more polished example of an ecosystem map. It is based on a case study described in our report on [using open data for public services](#).



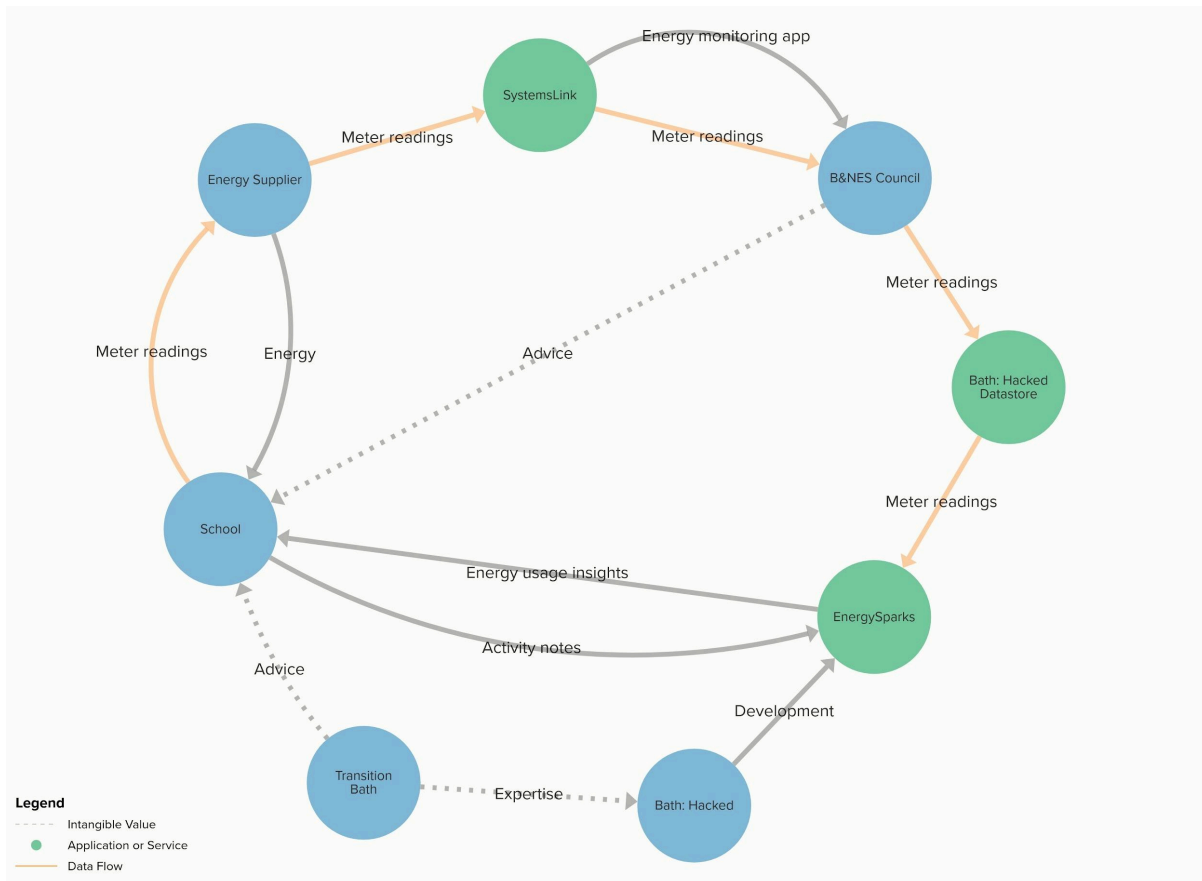
## Example 2: Leeds Bins app

This is an early sketch of the data ecosystem that exists around the Leeds Bins app.



## Example 3: School energy-saving application

This map illustrates the data ecosystem that supports an application that helps schools to be more energy efficient. This map has been [drawn using Kumu.io](#) to make it easier to explore online.





# Methodology

There are different ways to map out your data ecosystem, each of which has benefits and drawbacks:

- [On your own, or with some colleagues](#)

If you have a good knowledge of the data flows in an ecosystem, you can sit down and use this methodology by yourself – all you need is a pen and paper. This can be especially useful when it is difficult to get participants together. The drawbacks of this are that it is harder to verify whether your drawing is an accurate representation of the data flows. One way to overcome this is to share the map you create with other stakeholders in the ecosystem as a starting point for discussion, and then use their comments and queries as a way to explore the ecosystem in more detail.

- [In a workshop setting](#)

If you can bring together a group of 3–6 people who are involved in different areas in the ecosystem, and have facilitators in room, you can draw the ecosystem map together in a workshop setting. Ideally, you will need 1 to 2 hours of workshop time to draw the ecosystem map, with 2–3 rounds of written follow-up after the workshop to develop a shareable ecosystem map.

We loosely follow the methodology of [rich picturing](#). This means that your drawings don't have to follow a set structure or format, but they should contain as much detail as you think you need to understand the ecosystem. Maps can get very busy, very quickly, once you start drawing out the ecosystem, so we suggest focusing on the main value exchanges rather than trying to be completely comprehensive (at least at first).

## Scoping

This section is relevant whether you are creating an ecosystem by yourself or with a couple of people, or in a workshop setting.

### [Identify the problem/process/opportunity you want to understand](#)

Be clear about what the outcome of the ecosystem mapping exercise should be. This can be understanding an existing ecosystem or considering how an ecosystem might change, eg if new data was available. A useful tip is to clearly define the scope of the exercise to a particular service or type of data and start from there. By having clarity before you start, you'll be able to capture all the relevant information with the right level of detail.

### Identify categories of actors and flows

If possible, it can be helpful to define a list of actors, flows or relationships that are particularly interesting. If you are running a workshop, this may help you to identify the right people to invite and to ask the right questions. Based on our experience, the following roles are common across different data ecosystems:

<b>Data stewards (or publishers)</b>	Responsible for collecting, managing and ensuring access to a dataset; may include provision of infrastructure, data governance, etc
<b>People or organisations</b>	People or organisations the data is about or who are impacted by its use
<b>Contributors</b>	People or organisations who contribute to or help curate a dataset; they may do so knowingly, using tools and frameworks provided by a data steward, or unknowingly through their use of a service
<b>Regulators</b>	Create the policies and legislative frameworks within which others operate
<b>Intermediaries</b>	Provide value-added services that wrap, host or enrich a dataset
<b>Aggregators</b>	Type of intermediary. Packages together datasets from many sources
<b>Creators (or reusers)</b>	Use data to create information, in the form of products and services, analyses and insights, or stories and visualisations
<b>Beneficiaries</b>	People or organisations that benefit from the data ecosystem by making better decisions informed by using products and services, along with their own experience and understanding
<b>Researchers</b>	Type of creator. Uses data for research purposes
<b>Policymakers</b>	Create principles and measures to generate outcomes

While one of the goals is to identify the different roles that organisations play in data ecosystems (eg “aggregator”) it is often easier to start with the individual organisation and their specific exchanges first, rather than the goal. Organisations may end up playing several roles, and the map will help to demonstrate that.

# If you're creating an ecosystem map by yourself/with colleagues

## Before you sit down

### Make sure you have the right supplies

You do not necessarily need anything specific when drawing out an ecosystem map by yourself or with others – you could draw it in a notebook or use a drawing package. If you are drawing with a few people you may find it easier to use bigger paper or a whiteboard, with different coloured pens and/or post-it notes.

## Drawing the ecosystem

### Start with the part of the ecosystem you know best

As you draw, start with the part of the ecosystem you know best. We recommend “following the data”. Start with the data exchanges and then add applications and related services. Stay with very specific examples as it encourages the representation to be realistic.

### Think about:

*“What role does your organisation play?”*

*“Who is directly involved in the delivery of the service?”*

*“Do people in different roles interact differently with the service?”*

*“What data do you use or publish?”*

Draw this on the whiteboard or on post-it notes and continue with the organisations or teams you interact with, including those involved in a process before and after, focusing on how data is used across the ecosystem. Add different players one by one and add lines to connect them, specifying the relationship between them and adding arrows for direction whenever possible.

### Think about:

*“What data does each player use, who provides it, how is it accessed?”*

*“What data does each player release, who uses it and for what?”*

*“Is data shared reciprocally?”*

Aim to capture the actors involved and how they collaborate, the types of data used, the role of standards and the flow of funding, if relevant. Using symbols and icons can make it easier and more intuitive to follow. Use different coloured markers for different flows, such as data and money. It can be useful to clearly define how data is shared across the ecosystem according to the [Data Spectrum](#).

### Think about:

*“How is data released? (eg via downloads, APIs, portals...)”*

*“Are there any data standards in place?”*

*“Who is funding what?”*

If you make any assumptions, or there are important points around the narrative or storyline of the ecosystem, add these to the map as you go – they will be helpful when writing up your ecosystem later!

Note: The ecosystem map will inevitably become messy, as no formal structure is followed. This is not a problem and in fact allows you to capture as much information as possible.

## If you're running a workshop

Follow all the steps in the Scoping section above before moving on to the steps below.

### Before the workshop

#### Identify people who could contribute

Get a range of different stakeholders from across the data ecosystem in the room to ensure a balanced perspective of processes and links. If that is not possible, do not worry – even a few people can produce a useful ecosystem map. The table in the scoping section lists some of the likely roles.

#### Prepare the workshop

To run your workshop you will need:

- a. ideally, two facilitators to guide the workshop – Facilitator 1 should explain the methodology, ask questions and draw the map. Facilitator 2 sense-checks the answers given, asks additional questions and captures the narrative alongside the drawing. If you only have one facilitator, we suggest:
  - i. recording the workshop and listening to it afterwards to make sure the narrative around the ecosystem map is captured;
  - ii. asking members of the group to take notes on post-its as you go through the exercise
- b. participants from across your data ecosystem
- c. a big enough room, with a whiteboard and different coloured markers (it works best if drawings can be erased and corrected during the workshop)
- d. post-it notes and pens

## During the workshop

### Explain the process (15 mins)

Introduce everyone, explain what the goal of the workshop is, give a short introduction to ecosystem maps, explain to stakeholders that they are here to draw the ecosystem map together. Answer any questions.

### Draw the ecosystem map (30–90 mins)

Facilitator 1: Start by asking participants about what they know, typically about their organisations, or the service they are trying to better understand. We recommend “following the data”. Start with the data exchanges and then add applications and related services. In our experience, it works best to use a very specific example that most participants are familiar with, as it encourages the representation to be realistic.

#### Suggested questions:

*“What role does your organisation play?”*

*“Who is directly involved in the delivery of the service?”*

*“Do people in different roles interact differently with the service?”*

*“What data do you use?”*

Draw them on the whiteboard and then continue with the organisations or teams they interact with, including those involved in a process before and after, focusing on how data is used across the ecosystem. Add different players one by one and add lines to connect them, specifying the relationship between them and adding arrows for direction whenever possible.

#### Suggested questions:

*“What data do you use, who provides it, how do you access it?”*

*“What data do you release, who uses it and for what?”*

*“Is data shared reciprocally?”*

Aim to capture the actors involved and how they collaborate, the types of data used, the role of standards and the flow of funding, if relevant. Using symbols and icons can make it easier and more intuitive to follow – for example, labelling data exchanges in some way to add a bit more context, perhaps by using thicker lines for key data exchanges, or a marker to indicate open (versus shared or closed) data sharing, or using different coloured markers for different flows, such as data and money. It can be useful to clearly define how data is shared across the ecosystem according to the [Data Spectrum](#).

#### Suggested questions:

*“What format is data released/used in?”*

*“Are there any data standards in place?”*

*“Who is funding what?”*

Encourage stakeholders in the room to clarify anything you do not understand, to add detail or to correct anything that is misrepresented, by asking them questions.

It will be more difficult to remember details after the workshop. Go through the list of actors and flows defined in step 4 to make sure you cover the most relevant aspects.

Note: The ecosystem map will inevitably become messy, as no formal structure is followed. This is not a problem and in fact allows you to capture as much information as possible.

#### Capture the storyline (30–90 mins, in parallel to drawing the ecosystem)

Facilitator 2 (if present): As the ecosystem map is drawn, use the post-it notes to capture the storyline. Write down in as much detail as possible the process and relationships explained on the ecosystem map on post-its. Encourage stakeholders in the room to clarify anything that is unclear, to add detail or to correct anything that may be misrepresented, by asking them questions. Go through the list of actors and flows defined in step 4 to make sure you cover the most relevant aspects.

Information may not be provided in a chronological or structured way, so moving post-it notes around as needed will help you to capture the explained process as accurately as possible.

#### Cross-check that content was captured correctly (15 mins)

Facilitators 1 and 2: Summarise the explained process using the ecosystem map and storyline back to the participants and check that it was captured correctly. Take note of anything that was misunderstood and note down any areas where follow-up is needed after the workshop. Take pictures of the ecosystem map and notes; the apps [Tiny Scanner](#) and [Post-it Plus](#) work well. We recommend sharing photos with participants for transparency.

Identify one of the stakeholders from each part of the ecosystem to be the contact person for follow-up questions.

## Mapping the present vs mapping the future

This section is relevant whether you are creating an ecosystem by yourself, with a couple of people, or through a workshop setting.

If you want to think about what an ecosystem might look like in the future, or identify opportunities for new data, relationships or services, it is best to start by drawing out what the ecosystem looks like now. Try to focus on real rather than potential exchanges of value. So, rather than brainstorm ways that sharing some data might provide useful, check whether you can point to some evidence of a tangible or intangible value exchange. For example:

- Tangible value exchange: Is someone signing up to a service; is there a documented API or data access route?
- Intangible value exchange: Is there an event, contact point or feedback form that allows this value to actually be shared?

Once this is done, you can identify roles, actors, flows of data or standards that are not in the system yet.

For example, almost all exchanges where a service is being delivered also include an implicit, reciprocal data exchange (eg users contributing data back to the service provider in the form of usage statistics, transactional data, etc). Identifying where that data is accruing (but not being shared) is a good way to identify future open data releases.

Clearly mark these as opportunities, for example by using different coloured post-it notes or pens to draw new arrows or add new interactions onto the relevant parts of the system, so that they do not get confused with the current ecosystem when you do the write up.

## Writing up and improving your map

This section is relevant whether you are creating an ecosystem by yourself, with a couple of people, or through a workshop setting.

### Write up narrative

Once you have finished drawing the ecosystem, it can be useful to write up the narrative in text in a few paragraphs (max. two pages), based on the ecosystem map and the narrative notes. If you ran a workshop, or created the map with others, share the write-up and picture of the ecosystem map with the relevant stakeholder contacts so they can review the content, add any missing information, or clarify questions.

### Optional: design ecosystem map using tools and icons

If the ecosystem map is meant to be shared with a wider audience, a cleaner and more intuitive design may be useful. Be aware that a very “finished” look may discourage people from challenging the maps, so we recommend creating and sharing less polished ecosystem maps, to encourage discussion. Make sure to explain the purpose of the ecosystem, the narrative behind it, and clearly label the icons, arrows and other drawings you have used. Useful tools include [kumu](#), [draw.io](#), and [realtimeboard](#).

**If you find others, please comment on this document, or email [josh.daddario@theodi.org](mailto:josh.daddario@theodi.org) – we are keen to add them to the list for others to find and use.**

### Optional: share the ecosystem map

While you might create an ecosystem to help your own understanding of a service, sharing this more widely with others can help to clarify whether the maps are accurate and explain how processes work. This can include other actors involved in the process, to challenge assumptions and help you arrive at a more accurate picture. It can also include external stakeholders who may benefit from understanding the ecosystem. It can be useful to print the ecosystem maps on posters to encourage discussion.

## How to provide feedback

We are looking for feedback on how this tool works for you. In particular, we are keen to learn more about:

- thoughts on the methodology we have outlined and how we can improve it
- how the tool is being used in different contexts and countries
- how useful people find the tool, and where we can make improvements to it
- different tools people can use to design their ecosystems
- different examples of ecosystem maps you have created

**Please leave comments on this document, or send any other feedback you have to [josh.daddario@theodi.org](mailto:josh.daddario@theodi.org)**

## Who to contact for more information

Contact [josh.daddario@theodi.org](mailto:josh.daddario@theodi.org) to discuss how the ODI can help you understand the ecosystems you are part of, as well as how our other tools can support you to use data better.



# Further reading

## Example ecosystem maps

- [Energy Sparks Data Ecosystem](#)
- [Open Data Camp: Open data ecosystems](#)
- [Open Data Monitor: The Open Data Ecosystem and its Stakeholders](#)
- [Open Knowledge: Building the \(Open\) Data Ecosystem](#)
- [Open Data Institute: Using Open Data to Deliver Public Services](#)

## Resources

- [Mapping innovation ecosystems](#)
- [Tips for open data ecosystem mapping](#)
- [Open Data camp workshop outline](#) and [handout](#)
- [Value network analysis](#)
- [Rich pictures](#)
- [Value Networks for Innovation Facilitated approach](#)