

Surges of development tool

Learning objectives

By the end of this exercise, you'll understand

- What a great surge of development is
- The part each person plays in keeping our unsustainable systems in place
- How rules evolve over surges

How to use this tool

This is a discussion prompt tool. We have developed three exercises to meet the learning outcomes with facilitation notes and talking points to help guide the session. Facilitators should also read the DT foundational thinking document before starting this exercise.

Part 1

Life during the five great surges

There are two parts to this exercise. To start, groups should orientate themselves with the first image and accompanying text. Then they can move on to image two and share their reflections on the surges. Follow the instructions using the prompts and guidelines.

[Jump to Part 1](#)

Part 2

A day in the life

Keeping in mind the image and exercise from part one, groups can now move onto part two. Here we provide facilitation guidelines to help you guide discussion and support groups in bringing to life what they've learnt in the first section.

[Jump to Part 2](#)

Part 3

Evolution over surges

In this part of the exercise, the group see how individual rules have developed over two surges in the energy, mobility and food systems. They will then work on outlining how the rule changes with the advent of sustainability.

[Jump to Part 3](#)

Grounding information

Industrial societies have formed through **five great surges of development** (Perez, 2002). Different resources, technologies, policies, and ideologies form the core of each surge.

These always begin with **niches** (alternative practices, such as renewable energy cooperatives) producing a new way of thinking and end up influencing many socio-technical systems.

Socio-technical systems provide basic needs, such as energy, mobility, and food. They dictate everyday behaviour, from our modes of transport to the food we consume and the values we hold. Our current socio-technical systems are based on a series of unsustainable rules such as fossil fuel dependence, globalisation, linear mass production and mass consumption.

The evolution of each system is driven by a set of rules. **A rule** is a humanly devised constraint and enabler that structures human action leading to a regular pattern of practice, present in a socio-technical system. Rules are present across many dimensions, including our culture (beliefs and values), policy and governance, business and industry, science and technology, and users and markets.

Rule examples:

Mobility system rule: Design cars for a nuclear family.

Food system rule: Develop technologies mainly for large-scale, industrial, intensive and standardised farming practices.

Surges of development constituted by rules begin in single systems (say the energy system) and spread to multiple systems (energy, food, mobility, and so on). Over time collections of stable rules create a **meta-regime** (rule-sets present in multiple socio-technical systems, coordinating their development and leading to a shared directionality). Each surge brings beliefs, rules, and behaviours that become characteristic of every industrial society.

Successive surges generate **industrial modernity**: a set of interlinked, pervasive and durable ideas, institutions and practices related to the natural environment, science, technology, and innovation characterising every industrial society.

Key concepts

Great surge	Industrial societies have formed through five great surges of development – different resources, technologies, policies, and ideologies form the core of each surge (See image 1)
Niches	Alternative practices such as renewable energy cooperatives
Socio-technical systems	Networks of human, social, organisational and technical elements that provide for a basic need. (e.g. energy, mobility or food systems)
Rule	A humanly devised constraints and enablers (such as values, ideas, laws, regulations and habits) that direct us towards choices and practices, present in a socio-technical system. (e.g. Mobility system rule: Design cars for a nuclear family)
Regime	Relatively stable and aligned rule-sets directing the behaviour of actors, present in a single socio-technical system
Meta-regime	Rule-sets present in multiple socio-technical systems, coordinating their development and leading to a shared directionality

Part 1: Life during the five great surges

Here we take a brief look at how life would differ for people in the western world. Discuss with the group image 1 & 2 and the accompanying text. Then ask them: can you see other ways life would have differed? Focus on the 4th and 5th surge. Help them with your facilitation prompts.

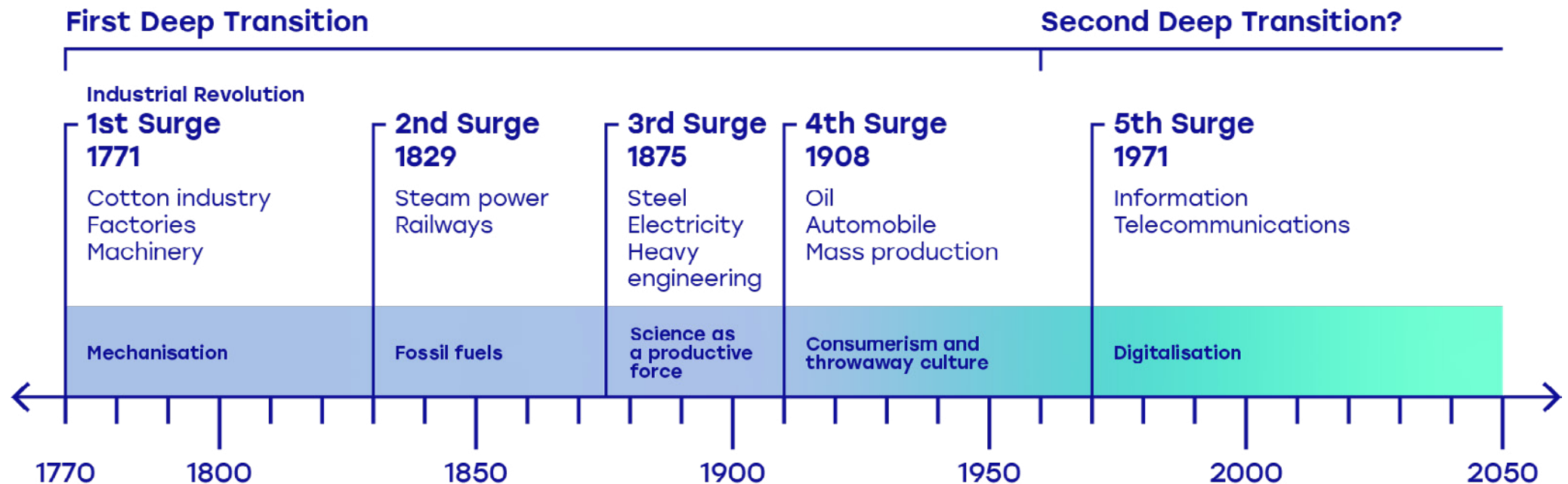


Image 1: Surges of development

Image 2: Examples from surges of development

1st Surge



1771

Production is organised in large factories in industrial districts (this has centralised the workforce and moved work from rural areas to the city).

Example:
People move from the countryside to the city and work in large-scale operations.

2nd Surge



1829

Steam power is used to power machines and industrial production.

Example:
People can take a train.

3rd Surge



1875

Electricity is used to power machines and light buildings.

Example:
Work is no longer restricted to daytime hours. Now factories can be lit, work can continue into the hours of darkness.

4th Surge



1908

Standardised products are mass produced.

Example:
People can use a car to get to work.

5th Surge



1971

Production activities are digitalised and automated.

Example:
Computers are in work places and emailing becomes a line of communication.

Notes and reflections based on discussions of image 1 & 2

For example, it may help to consider:

- How would people have travelled?
- How would they have consumed media entertainment?
- Where and how would they have shopped?
- How would they have communicated with each other?

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To support groups, here are a few examples of technical developments and how they changed everyday lives.

1st Surge

- Production was organised in industrial districts. This moved work from rural areas to the city. Consider how people's everyday lives would have changed working in factories and living in cities.

2nd Surge

- The telegraph: changed the way people could communication across distances
- National markets formed
- Sailing ships and railways were synchronised

3rd Surge

- Electricity was used to power machines.
- People were travelling by tram

4th Surge

- Mass production changed lives. For example, the Singer (sewing machine) was mass produced and people were able to make their own clothes from patterns
- Mass consumption also entered the household in terms of items like washing machines
- Convenience food became available such as canned goods.

5th Surge

- Consider how the internet has changed our lives. Such as banking, shopping, work, socialising.

[Back to overview](#)

Part 2:

A day in the life

Here we discuss in groups all the things we do during an average day and explore how these are linked to different surges.

To start, get the group to write down (alone or in pairs) some of the things they do in an average day.

Then once that is complete, begin a discussion (as a whole group or in small groups) about what surges they believe their activities originated in.

This exercise shows the group that just by moving through the world in an average day, each person plays a huge part in reinforcing our unsustainable systems.

The following questions might help prompt thinking

- What's the first thing you do when you wake up?
- How do you get to work?
- What chores do you need to do?
- What do you do for leisure or entertainment?

Activities

Surges

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To support groups, here are a few examples of every day activities and the surges they originated in.

- You wake up and turn the lights on (3rd)
- You make breakfast (3rd, electricity or globalisation)
- You drive to work (4th)
- You take the train (2nd)
- You check your work emails (5th)
- You go shopping: Online shopping (5th), shopping in main stores (4th, mass production), window displays in shops (3rd)
- You want to go to the doctor so you use an app or an online appointment system (5th)
- You go to the supermarket (3rd globalisation)
- You watch TV or Netflix (5th)
- You listen to music (apps like Spotify are 5th surge but radio is 3rd surge)
- You check your banking app or tap to pay (5th)
- You use your points cards or a loyalty scheme (5th)
- You do laundry or use a washing machine (4th)

Part 3:

Evolution of surges

Here we see how individual rules evolve over surges. You have a choice about how to conduct this exercise. Either follow option 1 or option 2.

Option 1:

Groups should look at the three tables of rules. There is one for energy, mobility and food respectively. Highlight to the group how individual rules have changed from the 4th surge to the 5th surge.

Then invite the group to think of missing rules for the sustainability surge. You will find some examples to help the groups on [page 15](#).

Finally, ask groups to present some of the rules that they thought of. Encourage them to set out how the new rules are shaping the latest surge of development.

Ask groups to focus on one system or dimension only (to make the exercise shorter) or complete all three systems if time allows.

Option 2:

Divide group into pairs and give them each one dimension from one system.

For example: energy system, science and technology dimension with the three differing rules.

Then give the sustainability rule that completes their line. Get them to discuss where they see everyday examples of each rule.

For example: energy system, science and technology.

4th example is petrol for the car

5th example is catalytic converter for the car

6th example is electric cars

Once they have discussed in pairs or small groups, they need to present back to the group.

Mobility system

Dimension	4th surge: Mass production	5th surge: Digitalisation	Sustainability surge
Science & technology	Use fossil fuels for propelling the vehicles and steel for bodies	Use information technology to optimize fossil fuel consumption	Use electricity (or hydrogen) for propelling the vehicles
Business & industry	Design the car to be individually operated	Design the car to be self-driving	Design the car to be autonomous, electric, connected and shared
Policy & governance	Plan cities and suburbs for an increased number of cars	Plan smart cities to reduce traffic jams, noise and pollution	Restrict car use to increase the quality and diversity of urban places and spaces
Users & markets	Car is expected to enable highly personalized movement profiles	Smart mobility infrastructure is expected to enable highly personalized multi-modal movement profiles	Users are expected to be responsible for various socio-environmental impacts of car use (e.g. congestion charges)
Culture	Car is a protective cocoon, a private space and extension of the living room enabling self-expression	Use customizable digital entertainment to make the car more homely	Shared car is a hybrid space, combining the instrumental aspect of public transport and the personal aspect of private transport

Energy system

Dimension	4th surge: Mass production	5th surge: Digitalisation	Sustainability surge
Science & technology	Use fossil fuels	Use fossil fuels more efficiently	Use renewables
Business & industry	Pursue economies of scale by building increasingly large power plants	Utilise computing technologies for reducing labour input in operations	Offer a range of energy services in 'energy platforms'
Policy & governance	Prioritise affordability over other policy objectives	Prioritise energy security as well as affordability	Policies must align with net zero commitments
Users & markets	Energy can be consumed without concern of scarcity	Users should monitor how much energy they use	Users have more power to monitor and adapt their energy consumption habits
Culture	Petroleum is central to modern economies and everyday life	Society is dependent on petroleum to function	Using and producing renewable energy in a sufficient way is part of a good life

Food system

Dimension	4th surge: Mass production	5th surge: Digitalisation	Sustainability surge
Science & technology	Exploit genetic modification of crops to enhance them with desirable traits	Use digital techniques to accelerate and deepen genetic modification	Minimize dependency on weather and use of natural resources through vertical farming
Business & industry	Treat food as a 'commodity', rather than as a right which produces branded food products	Use surveillance and user data to strengthen marketing of branded food products	Treat food as a right
Policy & governance	Make dietary guidelines available to public, theoretically allowing them to make individual choices of healthy diets	Make data regarding the nutritional quality on branded and standard food items available on apps	Make carbon footprint labels available to public
Users & markets	Perceive food as abundant and always available	Reduce reliance on processed foods through slow foods and other niches	Purchase food responsibly, aiming to reach zero-waste
Culture	Meet caloric and nutritional needs at the lowest cost possible	Establish environmental standards such as animal welfare	Meet caloric and nutritional needs at the lowest levels of environmental harm possible

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Examples

Rules are a humanly devised constraint and enabler that directs practices. These practices can manifest in policy, culture, business and more. We have five dimensions where rules are present and these include: our culture (beliefs and values), policy and governance, business and industry, science and technology, and users and markets. From the example rules for sustainability surge in the table below, we can see how different rules in different dimensions help to shape a surge of development.

Dimension	Energy	Mobility	Food
Science & technology	Use renewables	Use electricity (or hydrogen) for propelling the vehicles	Minimize dependency on weather and use of natural resources through vertical farming
Business & industry	Offer a range of energy services in 'energy platforms'	Design the car to be autonomous, electric, connected and shared	Treat food as a right
Policy & governance	Policies must align with net zero commitments	Restrict car use to increase the quality and diversity of urban places and spaces	Make carbon footprint labels available to public
Users & markets	Users have more power to monitor and adapt their energy consumption habits	Users are expected to be responsible for various socio-environmental impacts of car use (e.g. congestion charges)	Purchase food responsibly, aiming to reach zero-waste
Culture	Using and producing renewable energy in a sufficient way is part of a good life	Shared car is a hybrid space, combining the instrumental aspect of public transport and the personal aspect of private transport	Meet caloric and nutritional needs at the lowest levels of environmental harm possible

Notes and reflections about these concepts

Invite groups to share their reflections on the workshop. The following questions may help to surface feedback:

- What has surprised you?
- On the one hand ... On the other ...
- What are you wondering right now?
- How might you apply this thinking to your work?

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