

# SDG 14 Future of the Ocean

## MM6: Problem to Pitch Marine Plastic Waste



### Micro Module 6: Problem to Pitch Marine Plastic Waste

#### Implementation

#### Lesson 9: Prototyping 1 - Circular Design and Life Cycle Analysis

**Subjects: Design, Technology, Maths, Environment, Science, Sustainability**

#### **Lesson Title and Summary: Prototyping 1 - Circular Design and the Life Cycle Analysis**

In this lesson, learners are asked to consider a product case study for its sustainability and learn how to break down the 'system' in which the design / product is part of.

Learners will then apply this skill to thinking about their own possible ideas by undertaking a life cycle analysis by considering the inputs, processes, and outputs involved.

**Vocabulary: Inputs, Life Cycle Analysis, Outputs, Processes, Systems Thinking.**

#### **In this lesson, the learner will:**

- Learn more about the circular economy and circular design
- become aware of the concept of design systems and systems thinking
- understand the potential of design interventions for sustainability
- develop system thinking and system analysis skills
- begin to consider their design interventions from a systemic perspective

#### **Materials:**

- Worksheet: Product Case Study
- Worksheet: Life Cycle Analysis Zoning map
- Pens
- Pencils





## Activity Instructions

### Activity 1 Introduction to Circular Economy and the Life Cycle Analysis (20 mins)

1. Watch the Video: 'The circular economy: A new way to design, make, and use things [3:50 mins].
2. Discuss the video with the learners and how this might lead to design innovations.
3. Organise learners into groups of two or three depending on the class size.
4. In their groups, ask them to undertake the Product Design Case Study Life cycle analysis.
5. Ask each group to summarise their findings on poster paper and present their findings by putting them on the wall and everyone to look at them.
6. Ask teams to photograph their answers and upload to Microsoft teams. It is important everyone can all see the answers and think about them.
7. Keep their poster papers for reflection during prototyping and developing their ideas.

### Activity 2 Life Cycle Analysis of Fishing Nets - (25 mins)

1. Organise learners into groups of 2 or 3.
2. Using the information from lesson 2 on Net Manufacturing, ask groups to select (or assign) one of the following: Inputs, Processes and Outputs.
3. Learners will then use the relevant Zone mapping Life Cycle Analysis sheet and map relationally the various research findings.
4. Ask teams to photograph their sheets and upload to Microsoft teams so everyone can all see the answers and think about them.

### REFLECTIVE EXERCISE: 3-2-1 (10mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - [www.mentimeter.com](http://www.mentimeter.com) - to gather reflections



#### EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, undertake activity 1 only with an extended discussion about the case study.

Extension: For a longer class, watch: 'The Vision for a Circular Economy' for Plastic as activity 3 and ask learners to think about their ideas and where they need to be more circular.

Flipped Classroom Option: Watch - Explaining Circular Economy: Best Real-Life Examples | The Circular Economy Show Episode 11 <https://www.youtube.com/watch?v=Yvsps9DhVcw>

Ask learners to consider and be ready to share which was their favourite example and why and what their 'take away' was for their ideas.

#### MEDIA BOX: (materials, online video links, extra resources, case studies etc)

- The circular economy: A new way to design, make, and use things [3:50 mins] <https://www.youtube.com/watch?v=ZIAYu-N98tI>
- The vision for a circular economy for plastic [8:50 mins] <https://www.youtube.com/watch?v=xmTQA-RNygQ>
- Fishy Filaments [www.fishyfilaments.com](http://www.fishyfilaments.com)
- Fishing Net Recycling <https://www.keepbritaintidy.org/uk-fishing-net-recycling>
- Circular Business Models 1 - Types of Product Service System [3:31 mins] [https://www.youtube.com/watch?v=QAWJLu0d6\\_I](https://www.youtube.com/watch?v=QAWJLu0d6_I)

Examples of Circular Design and Business Models

- Gerrard St Headphones <https://www.youtube.com/watch?v=S94o9hZ2os0>
- Terracycle (1:68min) <https://www.youtube.com/watch?v=zEND9KG67PM>

#### Local Trip / Expertise / Additional Work and Assessments

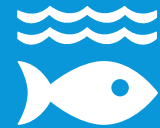
Learners could contact Ireland's Net Makers CarryMacarry Nets, KT Nets and Swan Net Gundry all in Donegal and ask them:

- about their design processes and how they are managing their waste
- have they introduced circular design into their processes
- how have they engaged with the single use plastic directive

Contact the local County Council's environment / utilities officer and ask about their recycling policies. Invite them to discuss the local authorities work on SDG 14.

## MM6: L9WS PRODUCT CASE STUDY LCA

14 LIFE BELOW WATER



Consider the complete lifecycle of two nylon jackets and plot their life cycle on the Life cycle analysis chart.

Jacket A Tesco jacket  
Cost €69.99



This jacket is made from a number of different materials including virgin nylon, virgin polyester and PET polyester thinsulate filling.

Nylon/Polyester: Lining is virgin polyester shell is raw virgin nylon. Filling is PET polyester thinsulate.

Fibre made in China. Jacket made in Bangladesh.

Transported by land and sea to a warehouse in Manchester, UK.

Purchased in Manchester at a Tesco store.

Machine Washed at home at 30 degrees.

Discarded after 1 year of wear because seams are unravelling. Jacket is sent to landfill.

Jacket B. Infinity Jacket Napapij  
Cost €250



The material in this jacket is a mono-material: its filling and trims are made from Nylon 6, while its fabric is made from ECONYL® Regenerated Nylon, a high-performance nylon 6 yarn recycled from discarded fishing nets and other waste materials.

Fibre Made in Slovenia. Jacket made in Slovenia.

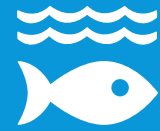
Transported by land and sea to a warehouse in Italy. Purchased online.

Spot Washed at home.

Jacket is worn for 2 years and returned to manufacturer. Through a digital take-back programme the jacket can be returned and recycled into a new garment. ECONYL® Regenerated Nylon can be recycled again and again.

## L9: MM4 PRODUCT CASE STUDY LCA

14 LIFE BELOW WATER



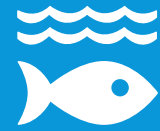
Each phase of the lifecycle should be carefully considered when scoring the jackets on the chart on p3.



- Concept design: Overall need for the product.
  - Materials: How important are the processes and considerations of the materials used?
  - Reducing waste: What will happen at the end of life? And how can this consideration be anticipated at the beginning of the lifecycle?
  - Manufacturing: New technologies for increasing productivity, increasing sustainable impact, and improving factory conditions. Where is this garment made?
  - Transport: How far does this garment travel? Where is the fabric produced? Where is the garment manufactured, etc.?
  - Use phase: Laundry: What levels of Behavioural change might prolong the life of this garment?
- Customisation and personalization: Does this garment have scope for personalization? Adding or taking away elements that might give it added value?
- Durability/ Longevity: How long will this garment last? How can you prolong its life? End of Life/ Start of new life, what about new tech for recycling garments and sorting garments? What is the best case scenario and what is the worst case scenario?
  - End of Use/ Disposal: Reducing waste: Build this into the design. What will happen at the end of life? And how can this consideration be anticipated at the beginning of the lifecycle?

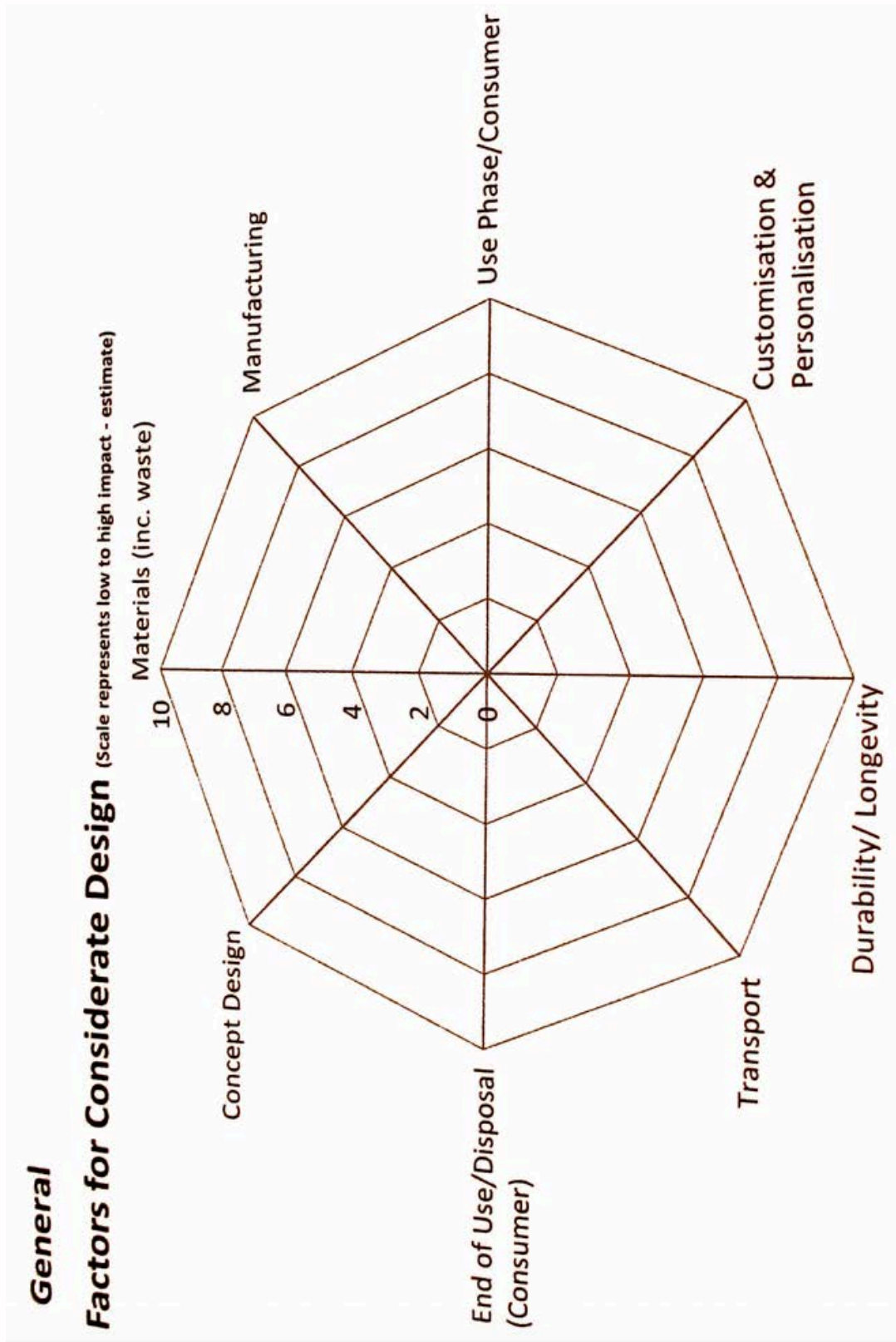
## L9: MM4 PRODUCT CASE STUDY LCA

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Each phase of the lifecycle should be carefully considered:

Please score out of 10 for each category with high marks being the worst- case scenario and low marks being the best- case scenario. Add up your scores. Use a different colour pen for each jacket.



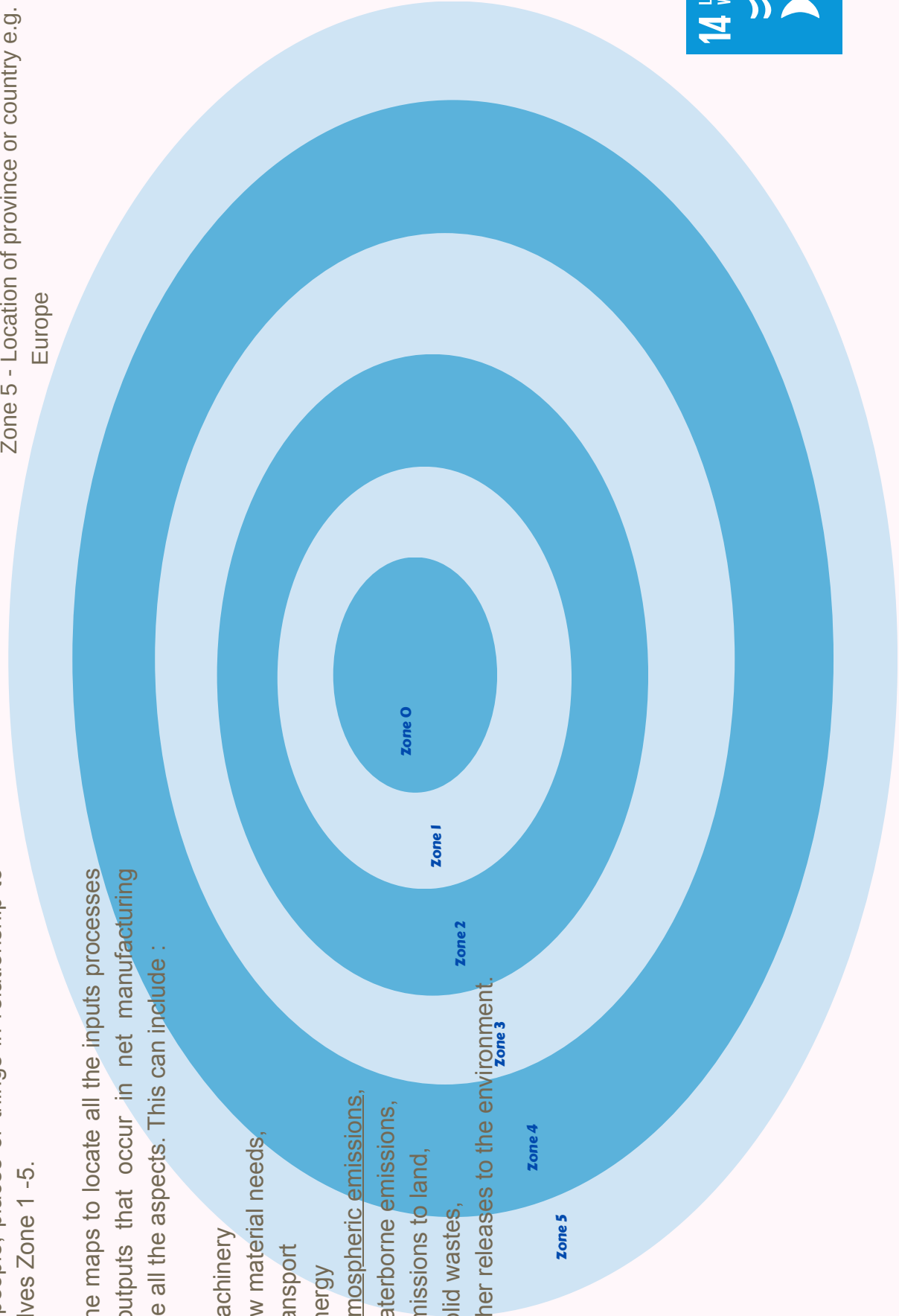
## MM6 I9 INPUTS ZONE MAP EXERCISE

A zone map allows us to start from ourselves, Zone 0, (your project or your town) and include other people, places or things in relationship to ourselves Zone 1 -5.

Use the maps to locate all the inputs processes and outputs that occur in net manufacturing include all the aspects. This can include :

- machinery
- raw material needs,
- transport
- energy
- atmospheric emissions,
- waterborne emissions,
- emissions to land,
- solid wastes,
- other releases to the environment.

- Zone 0 - the self, the project
- Zone 1 - Location of project e.g. school or town
- Zone 2 - Location of school or town
- Zone 3 - Location of town e.g. Iveragh, Kerry
- Zone 4 - Location of county e.g. Munster or Ireland
- Zone 5 - Location of province or country e.g. Ireland or Europe



14 LIFE BELOW WATER



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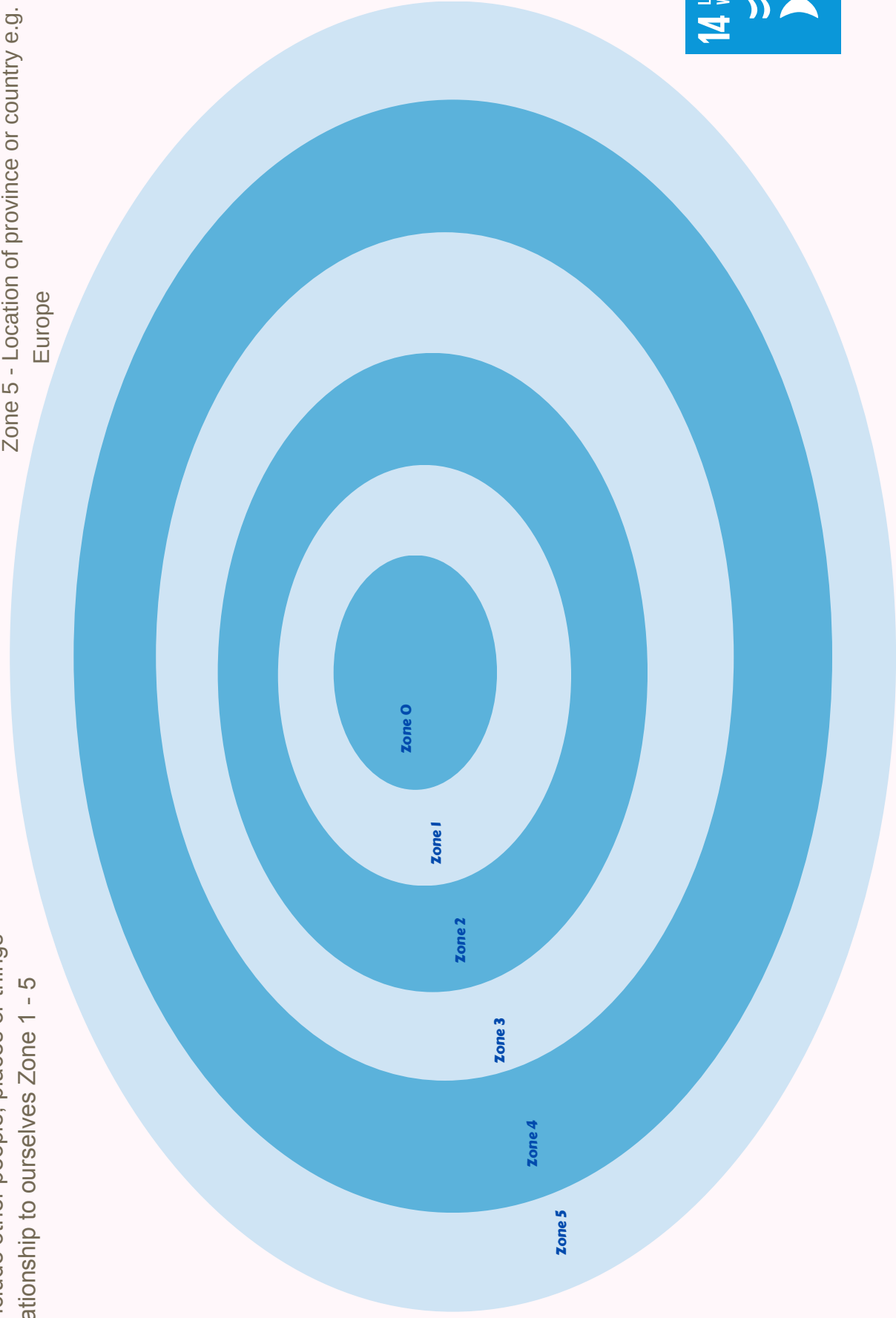
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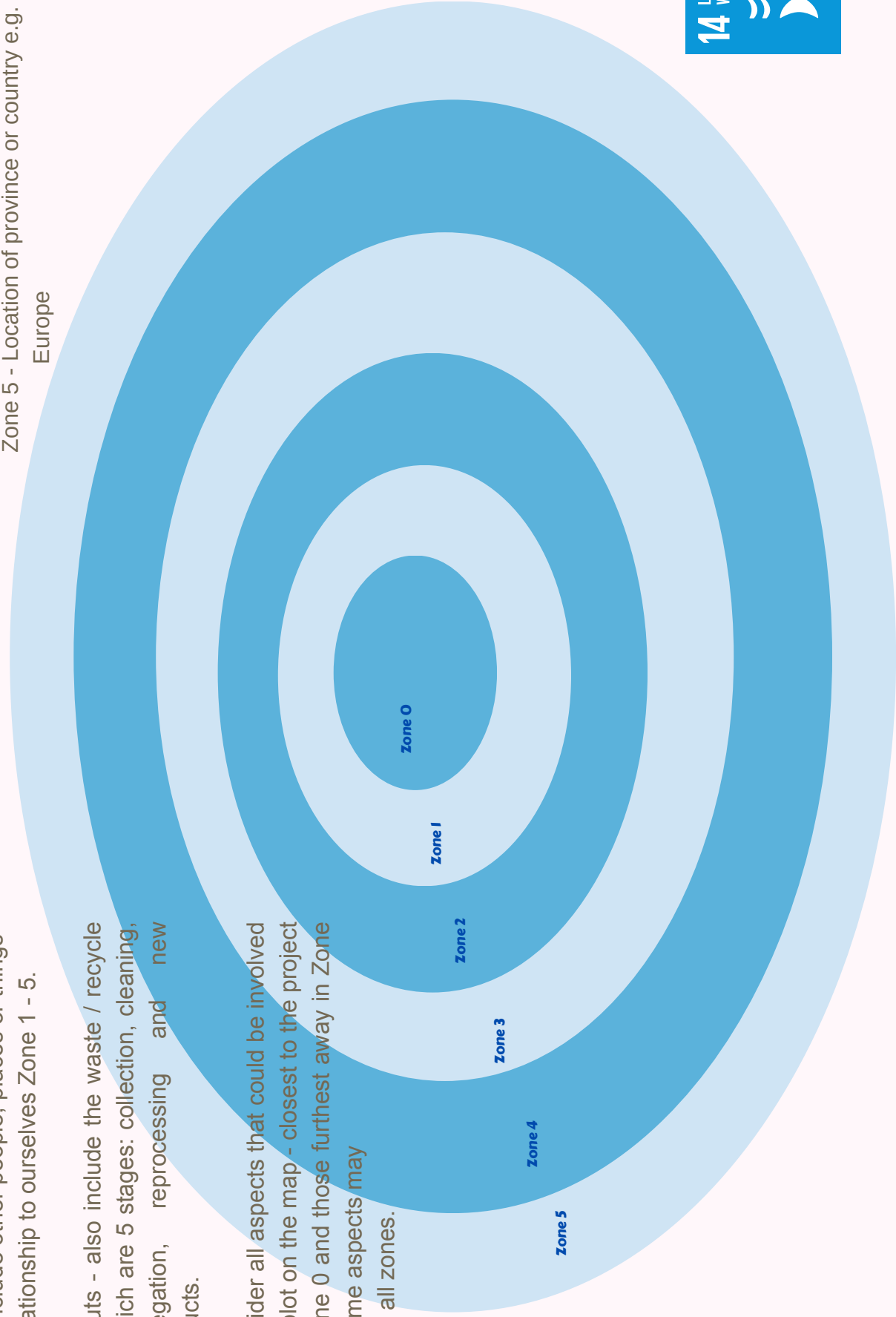
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Outputs - also include the waste / recycle in which are 5 stages: collection, cleaning, segregation, reprocessing and new products.

Consider all aspects that could be involved and plot on the map - closest to the project in Zone 0 and those furthest away in Zone 5. Some aspects may cross all zones.

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