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### Versions

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	Materials	Society / People	Structures
<b>System Level</b> <b>Spatio-social-socio-technical system</b> <ul style="list-style-type: none"> <li>• Infrastructures</li> <li>• Resources</li> <li>• Governance</li> <li>• Ethics</li> <li>• Culture</li> </ul>	<ul style="list-style-type: none"> <li>• What resources and infrastructures does the system rely on (e.g. renewable/non-renewable energy, shipping, etc.)</li> <li>• What are the key environmental impacts of this system?</li> <li>• What are the ethical issues of the system? Consider the ethics of resource extraction/production; displacement of communities; trade-offs in intensive production processes; etc.</li> <li>• How adaptable is the system or its component parts? Can it work with less energy and few resources? What are the trade offs? (e.g. using less/different energy or resources)?</li> <li>• What are the likely long-term impacts on resources and pollution?</li> <li>• Are there regulations and guidelines that determine how resources are used within this system?</li> <li>• Is this system a site of political contestation?</li> <li>• Are there alternative, less resource intensive options?</li> <li>• Why are these options not implemented?</li> </ul>	<ul style="list-style-type: none"> <li>• How do technology, culture and infrastructure influence the expectations people have about their needs /wants?</li> <li>• What needs (now and in the future) are satisfied within this innovation system?</li> <li>• What are the social norms associated with material consumption in the system?</li> <li>• What key things influence system-level issues, e.g. media, markets, technology, consumption, climate change?</li> <li>• Which actors have opportunities to influence decisions in this system? (e.g. policy makers, manufacturers, consumers, society)</li> <li>• Who benefits as a result of the innovation system</li> <li>• Who is disadvantaged as part of the innovation system?</li> <li>• What ethical considerations are visible at the system level?</li> <li>• Are there communities groups or other citizen groups with social, sustainability concerns? What are their arguments?</li> </ul>	<ul style="list-style-type: none"> <li>• How is the innovation system influenced by different geographical/ technological, cultural and infrastructure contexts?</li> <li>• What geographical or time scale(s) does the system rely on or affect?</li> <li>• What are the key trends at a system level that influence the effectiveness of innovation functions or outcomes? (e.g. increased interconnectedness through smart technology)</li> <li>• What opportunities are there for interventions at the system level to influence changes in the context of innovation? (e.g. technological, regulatory, cultural)</li> <li>• What political factors are relevant to the innovation system?</li> </ul>
<b>Service Level</b> <b>Product - service system</b> <ul style="list-style-type: none"> <li>• Needs</li> <li>• Functions</li> <li>• Outcomes</li> <li>• Resources</li> <li>• Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• What function(s) does the service provide?</li> <li>• What needs are met through the service?</li> <li>• What materials are required for the service to function effectively?</li> <li>• Which part of the service life cycle has the most environmental impact?</li> <li>• What technologies are required for the service to function effectively</li> <li>• Can the service evolve to meet new needs?</li> <li>• Would the service require additional functionality/material things in order to make it adaptable and to meet other types of need?</li> <li>• Do users own the product components or are they leased? What are the implications of various ownership models?</li> </ul>	<ul style="list-style-type: none"> <li>• Who uses this service? How and where do people access the service? Does this involve travel or technologies?</li> <li>• What needs are met by the service? How are these needs met (innovation functions and outcomes)?</li> <li>• What other needs could be met by the service(s)?</li> <li>• Do needs differ in different contexts (geographical/cultural/market)?</li> <li>• How is the service used or interacted with?</li> <li>• Is this interaction influenced by cultural or behavioural contexts?</li> <li>• What is the main interface(s) between provider and customer?</li> <li>• Who are the primary stakeholders in the service provision?</li> <li>• Who manages the service?</li> </ul>	<ul style="list-style-type: none"> <li>• What physical infrastructures (e.g. materials, energy, water, communications) are required to ensure an effective service?</li> <li>• Where is the service located?</li> <li>• What infrastructure supports the delivery of the service?</li> <li>• What challenges does the service present to local economic and social context?</li> <li>• Which cultural systems support the service concept?</li> <li>• What external pressures impact on service functions?</li> <li>• Does context determine the nature of the service functionality and outcomes?</li> </ul>
<b>Product Level</b> <b>material component</b> <ul style="list-style-type: none"> <li>• Materials</li> <li>• Energy</li> <li>• Technologies</li> <li>• Interface</li> <li>• Functions</li> <li>• Durability</li> <li>• Adaptability</li> </ul>	<ul style="list-style-type: none"> <li>• What resources does the product contain or use during its lifespan?</li> <li>• Are these resources renewable or non-renewable; rare or easily accessible and replenished?</li> <li>• Could the product use less resources, and if so, how?</li> <li>• What technologies are utilised in the product or in its production, distribution, use or disposal?</li> <li>• Is the product technologically vulnerable in a fast-changing technology sector? Does its reliance on technology affect its durability?</li> <li>• How durable is the product? Can it be maintained /repaired / serviced / reused / adapted?</li> <li>• Where is the product manufactured? Is it mass manufactured?</li> <li>• Where are the key markets for the product?</li> </ul>	<ul style="list-style-type: none"> <li>• What basic human needs does the product meet?</li> <li>• What functions of the product meet this need(s)?</li> <li>• What is the interface(s) between product and user? Is this effective?</li> <li>• Who uses the product? How is the product used – can it be misused? How does culture(s) influence practices of use?</li> <li>• Does the way in which the product is used greatly influence its environmental impact?</li> <li>• Who are the main stakeholders and who are the decision-makers in the product system?</li> <li>• Who makes the product? Are the employees fairly paid and treated? Who benefits from the existence of this product? Who doesn't (e.g. human/other species)?</li> </ul>	<ul style="list-style-type: none"> <li>• What are the geographical location(s) of production and use?</li> <li>• How is the product/sector affected by regulation, legislation or markets?</li> <li>• Which systems, such as ecosystems or infrastructure, support the delivery of product functionality (e.g. power, water, etc.)?</li> <li>• What are the cultural and technological contexts of the product and how do these influence interactions with the product throughout its lifespan?</li> <li>• What context(s) is the product designed to be used in?</li> </ul>
	<b>Materials</b> <b>Materials Analysis Context</b> <ul style="list-style-type: none"> <li>• Ecosystem impacts</li> <li>• Materials used, Materials in 'use'</li> <li>• Production, Technologies</li> <li>• Resource flows</li> </ul>	<b>Society / People</b> <b>Socio-Cultural-Personal Analysis Context</b> <ul style="list-style-type: none"> <li>• What and whose needs are met (or not met)?</li> <li>• Who are the stakeholders?</li> <li>• Cultures of use (e.g. behaviors, habits)</li> <li>• Key interactions with product, service or system</li> </ul>	<b>Structures</b> <b>Socio-Technological Context</b> <ul style="list-style-type: none"> <li>• Policy and regulation</li> <li>• Physical infrastructures</li> <li>• Social / economic structures</li> <li>• Whose interests are served – and not served</li> </ul>

