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| Emergency |  | Explanation | Domain of change | Domain of learning |
| Manifest | Direct | Impacts facing universities worldwide from changing weather, such as floods, storms, water shortages, or financial crises or commodity price collapses affecting investments (e.g. pensions) that result in emergencies. Slowly changing stressors may culminate towards critical thresholds (e.g. unaffordable or undesirable university fees for some students). | Actions, behaviours, technologies, decisions, investments, policies and programmes | Single-loop learning that asks: ‘Are we doing things right? (e.g. learning to improve methods of knowledge creation, teaching, developing new technologies) |
| Transitional | Emergencies associated with shifts in society towards low carbon, such as in rising costs (e.g. old high carbon energy) or market shifts leading to stranded assets (e.g. empty student halls if low carbon online teaching prevails). Demands for staff with new expertise and skills (e.g. for bringing about societal change) . |
| Reputational | Emergencies facing universities if they fail to act or are seen to be greenwashing, or through failure to adapt to changing notions of value in society by not playing a key role in developing a wider mandate for change. |
| Conceptual | Conceptual foundations | Emergencies where new concepts, approaches, tools and capacities are needed for working with complex, highly interconnected issues, across social scales, values, and goals, and with anticipatory forms of knowledge and transcend the problems created by past approaches and thinking. Critical pedagogical shifts will be needed to develop capacities for working with complex integrated challenges. New concepts will be needed to support Universities’ own transitions. | Systems, structures, formal and informal rules, norms, strategies, approaches, modes of governance, assumptions, mindsets | Double-loop learning with change in strategies and approaches. It involves asking ‘What are the right things to be doing?’ (e.g. re-structuring departments to be networked rather than siloed, or developing new kinds of rules and governance) |
| Systems & structures | Emergencies relating to the way current systems and structures are unable to support uptake of new behaviours, technologies, concepts, and approaches (e.g. silo based disciplines can make integrated working difficult). Structural issues need to change to enable alternative research and teaching, to emerge. |
| Rules, norms & models of governance | Emergencies arising from limited capacity of existing informal and formal rules, norms and modes of governance to support change and new practices. Current business and planning models, for example, support old patterns, limiting possibilities for novel configurations or ways of working. |
| Mindsets, worldview, assumptions | Emergencies arising from mindsets and assumptions that limit new patterns and concepts. Examples include assumptions of what constitutes learning, teaching, education, knowledge, knowledge creation, progress, or development. Many models of research and teaching, for example, are underpinned by assumptions that effective knowledge creation comes from distant observers standing on the outside looking in, which limits possibilities for including other kinds of knowledge, ways of knowing, or learning. |
| Existential | Values & ethics | Emergencies arising from past values and ethics no longer congruent with a rapidly changing world. For example, universities have developed over the last three centuries alongside high carbon and fossil fuel-based economies, notions of colonial power, or knowledge and expertise. Societal shifts, e.g. in millennials, about what is considered ‘right’ and ‘whose voice matters’ mean that implicit values and ethics are increasingly under question. | Values, ethics purpose, cultures, identity | Triple-loop learning with changes in higher order processes. It involves askings: ‘What is right?’ (e.g. ethical issues associated with purpose of a university, and how these change as societal needs change) |
| Cultures, identity, & purpose | Emergencies arising from a threat to the maintenance of a way of life, a culture, in a particular place that challenge a sense of ‘who we are’ or ‘role and purpose’. For universities, relevance in a world of climate change is increasingly being challenged, and there is a risk of being perceived as outmoded or anachronistic. To be viable, universities will need to re-purpose towards being institutions more focused on the public good. |
| Psychological wellbeing | Emergencies striking at an ability to make sense of and work effectively in the world. A core requirement for health is a sense of coherence, yet people are becoming overwhelmed by rapid change and complexity and struggling to fathom their place within it. universities need to consider to what extent they themselves are an extractive-industry. Can an academic system that burns out staff and students survive in the mid to longer term? A regenerative approach to education will need to cultivate wellbeing not just as a ‘nice to have’ but as a critical enabler of quality and performance. |

Table 1: The three emergencies of climate change facing universities.