

Chapter 55

Design for Emergency and Disaster Scenarios: Concepts that Serve Humanity

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Abstract

Industrial design can provide a valuable lens through which existing solutions or persistent problems can be questioned, reframed, and ultimately reimagined as innovations or high-impact incremental changes. There are few things more important than receiving timely care and treatment for emergency medical situations or search and rescue scenarios. Through appropriately designed products, services, and systems, it is possible to reach and attend to patients, victims, and vulnerable people efficiently and compassionately. Likewise, medical and rescue personnel can be equipped with the necessary means to carry out their tasks effectively and with minimal frustrations. This chapter discusses the rationale and outcomes of a student design project resulting in 47 concepts for emergency and disaster scenarios. Benefiting from inputs from professional medical and rescue personnel, the concepts give a glimpse into how humanity could serve itself better than current solutions. However, without follow-up commitments and investments in R&D and implementation, the best concepts will never achieve their impact potential. Accordingly, whilst the chapter underlines the value of knowledge and ideas generated through design, it also points out that stakeholders outside of design are essential collaborators within the wider innovation ecosystem. Furthermore, in the special arena of design for emergency and disaster scenarios, the paper proposes a new global design competition as one plausible route to help design concepts become reality, leveraging funding and expertise from NGOs, think tanks, and philanthropic investors.

Keywords: *Industrial Design, Emergencies, Disasters, R&D, Implementation*

Introduction

Humanity is challenged on a regular basis to respond to the occurrences and after-effects of emergency and disaster scenarios. These scenarios occur worldwide and give concern to all countries. Examples include natural disasters (huge losses of life, injuries, and devastation through earthquakes, wildfires, and floods), as well as recurrent day-to-day emergency medical situations. Türkiye is especially poignant as a case study for this paper: a country severely affected on a regular basis by all three of the mentioned natural disasters¹, whilst also being the authors' country of residence.

¹AFAD Turkish Republic Ministry of Interior Disaster and Emergency Management Presidency, "About Us," 2025. Accessed September 6, 2025 [<https://en.afad.gov.tr/about-us>].

Disaster and emergency planning/management is well established as both a practice and an academic field². In Türkiye, responsibility for these matters is overseen by the Disaster and Emergency Management Authority (AFAD), a government agency operating under the Ministry of Interior. After the country's severe earthquakes of February 2023, it was clear that disaster readiness and response dialogues amongst the media and academics were heavily centred on the roles of civil engineering, architecture, and city or regional planning. Industrial design, service design, and design thinking more generally rarely enter the discourse on Turkish natural disasters. Recent efforts have started to raise awareness amongst stakeholders of the benefits of including design in emergency and disaster solutions within Türkiye and globally^{3,4,5}. We expect similar situations in other countries.

Our chapter provides insights in two critical areas: (i) the value and power of educational design projects and design competitions to contribute creative and innovative solutions for emergency and disaster scenarios, and (ii) the responsibility of stakeholders other than designers to help turn the best of these solutions into impactful realities. We see the work as having relevance to all countries and parties committed to doing what they can to improve the situation of emergency scenario mitigation, preparedness, response, and recovery.

Industrial Design: A Journey of Change from Speculation to Reality

When design is effective, it leads to beneficial change⁶. Design provides an invaluable lens through which existing solutions or persistent problems may be questioned, reframed, and ultimately reimaged as innovations or high-impact incremental changes. Industrial designers focus on changes-for-the-better in the products, services, and systems that people can use: how they ought to be and how they can improve lives. This requires principles of user-centredness, to carefully consider and shape the experiences of people who will own, use, or interact with a designed solution. Successful solutions can deliver necessary functionalities, grab attention, deliver pleasing and comfortable experiences, and bring relevance and meaning. Moreover, designers must respect the demands for sustainable transition on environmental, social, and economic grounds⁷.

²David Alexander, *Principles of Emergency Planning and Management*, (Oxford: Oxford University Press, 2002).

³Sedef Süner-Pla-Cerdà, "Afet Yönetiminde Topluluk Katılımı: Bir Tasarım Çerçevesi Denemesi (Community Participation in Disaster Management: In Pursuit of a Framework for Design)," *Tasarım Kuram* 21, no. 44 (2025): 39–60.

⁴Owain Pedgley and Bahar Şener, "Natural Disaster Readiness and Response: Bringing Designers, Design Thinking, and Design Innovation into The Agenda," *She Ji: The Journal of Design, Economics, and Innovation* 10, no. 1 (2024): 120-138.

⁵Areli Avendano Franco, Liam Fennessy, and Judith Glover, "The Role of Industrial Design in Effective Post-Disaster Management," In Mitsutaka Matsumoto, Keiji Masui, Shinichi Fukushige, and Shinsuke Kondoh (Eds.), *Sustainability Through Innovation in Product Life Cycle Design*, (Singapore: Springer, 2017): 651–62.

⁶Donald Norman, *Design for a Better World: Meaningful, Sustainable, Humanity Centered*, (Cambridge: MIT Press, 2024).

⁷Michele Zannoni, et al., "Transitional Industrial Designer: The Responsibility of Designers and Companies for a Sustainable Transition," *AGATHÓN - International Journal of Architecture, Art and Design* 15 (2024): 332-343.

The act of designing provides a means of pushing the boundaries of existing knowledge about how the world is, and how it might alternatively be. Designers are necessarily researchers of current circumstances and creators of possible new futures. This holds independent of the sector of work, the complexity of the problem being tackled, or its tameness/wickedness⁸. Design brings excitement through new possibilities. At a high level of conception, designers reciprocate between a problem space (real, grounded, observed, investigated) and a solution space (imagined, modelled, predicted, foreseen, envisaged). Design solutions are inherently speculative until they can be tested, iterated, implemented, and evaluated.

METU Emergency Response Project

To understand how industrial design could contribute to solutions for emergency and disaster scenarios, we organised a term project in the third-year design studio at Middle East Technical University (METU), Ankara. An open brief was set in which the goal was ‘...to design a new or improved product and/or service for emergency response scenarios’. Students were expected to define their own project statement, dimensions, and priorities, relevant to the problem area they chose to work on. The class of approximately 100 students was divided into teams or individuals based on students’ preferences. Over the 8-week project, we benefited from input from professional and volunteer ambulance, medical, and rescue personnel, especially AKUT (Türkiye’s volunteer-based Search and Rescue Association). These personnel provided expertise, marketplace knowledge, and technical insights. At the final jury, we assessed 47 separate concept designs giving, a window into how humanity can serve itself better in emergency and disaster scenarios.

Analysis: What the Portfolio of Design Concepts Reveal

Disasters and emergencies are typically described with reference to various stages, such as the Design for Disaster Readiness and Response Framework⁹, which spans mitigation, preparedness, response I (self-help), response II (specialist / professional intervention), and recovery. We used the framework to analyse the content of the 47 concept designs, to determine the distribution of design effort made by students (Figure 1). Compared with the original framework, no concepts were generated within the ‘lighting’ sector but a new sector, ‘indoor and outdoor structures’ was created to contain several concepts that would otherwise be outside the framework. Cross-sectoral projects were placed in the sector to which they most strongly related. The analysis extended and validated the original framework. A total of 29 projects were in response II (specialist / professional intervention); 11 in response I (self-help); and 7 in stages either side of response, underlining our project interpretation of ‘response’ as the ‘designer’s response’ to emergencies and disasters. Regarding distribution across sectors, the results

⁸Ben Sweeting, “Tame Problems, Wicked Possibilities: Interpreting the Distinction between Wicked and Tame Problems through the Cybernetic Concepts of Variety and Constraint,” *She Ji: The Journal of Design, Economics, and Innovation* 10, no. 1 (2024): 32-52.

⁹Owain Pedgley and Bahar Şener, “*Natural Disaster Readiness and Response*,” 134.

were: medical first aid and emergency (15); automotive and vehicle (12); information services (5); indoor and outdoor structures (5); digital devices (4); personal protection (3); humanitarian (2); and medical rehabilitation (1). Although most design concepts were either related to first aid / medical assistance or transportation, the remaining were distributed across six other sectors, underlining our encouragement for creativity and a diverse portfolio of solutions.

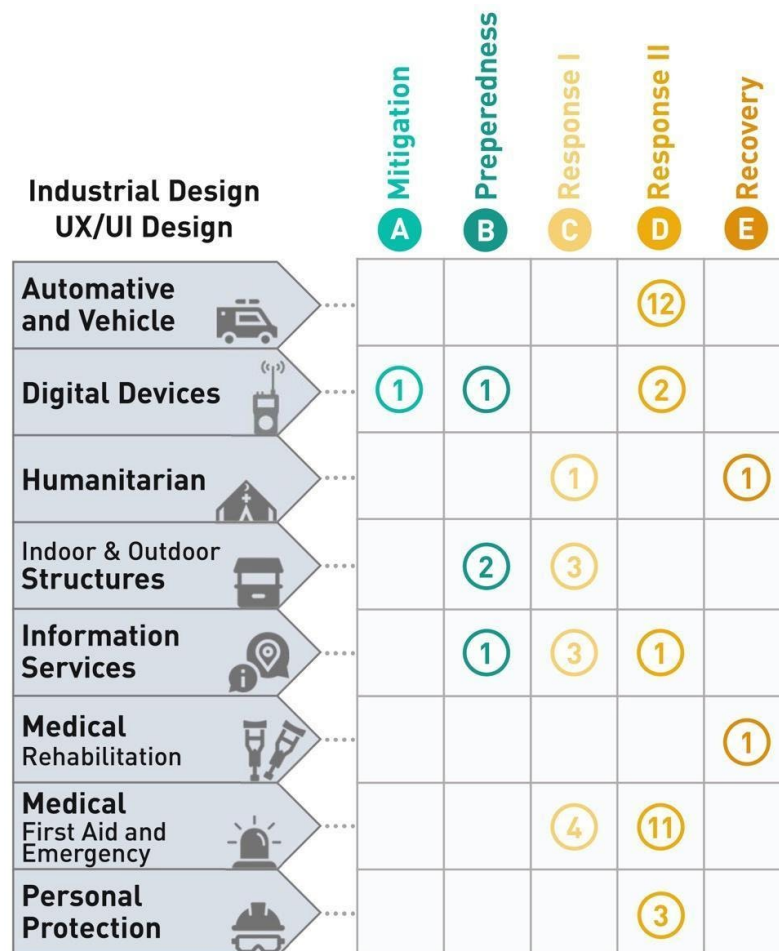


Figure 1: Projects mapped onto the design for disaster readiness and response framework.

Discussion

Amongst 47 student design concepts, the standard of design and persuasiveness varied. Many were good designs, but a relatively small number (~20%) could be seen to embody radical new thinking and directions (Figure 2). Typically, these highest quality solutions dealt especially well with human factors. For example, by focusing on ease of use under emergency and disaster conditions, minimal losses of time can occur between decision-making and actions. Medical and rescue personnel can be equipped with improved tools and better facilities to carry out their tasks more effectively and with reduced frustrations. Other strong concepts allowed victims, patients, and the vulnerable to be reached and attended more efficiently and compassionately.



Figure 2: Selection of projects embodying radical new thinking and directions: ‘Aura’ AI and AR powered device for automotive crash rescues (Aylin Aygün, Serhat Sorgusormaz); ‘Cervical Collar’ for use by a solo medic (Barış Arman Karakaş); ‘Side by Site for Pets’ emergency care shelter for rescued pets (Beste Toprak, Firuze Şenyurt, Betül Akkurt); ‘Aegis Core’ search and rescue helmet with integrated accessories (Aybüke Durmaz, Semina Çalışkan).

Beyond Design

There is never a shortage of ideas coming from an educational design project such as METU’s Emergency Response. The highest quality concept designs leave a very strong impression, communicated via advanced visualization, digital simulation, and physical mock-ups. Design concepts are impactful in that they get us thinking about how things and situations can be made better, and why it is that solutions do not already exist. But proposing and arguing a good design is only the start of a long journey. Turning a design into a reality that has impact on its intended users (and commercial impact if relevant too) requires activities beyond design. Conventionally it requires a transition into R&D, or to start-up/incubator support, which if successful can then attract the substantial financial investments necessary for implementation (Figure 3).

We should acknowledge that industrial designers and design students are not inherently entrepreneurial (they have other designs to get on with) and often lack the technical expertise to transition to R&D, although some individuals may be willing to take on such roles that extend beyond design. Usually, multidisciplinary collaborations are needed to turn conceptually sound ideas into physical or digital¹⁰ realities. In other words, although design may be the creative spark or the valuable precursor to innovation, design concepts must be nurtured and supported by other stakeholders if they are to have a chance of making genuine impact. Otherwise, even the most promising concepts will disappear into obscurity.

¹⁰Laura Giraldi, “Design for Emergency: A New Area of Development and Application,” *DIID Disegno Industriale Industrial Design* 77 (2022): 118.

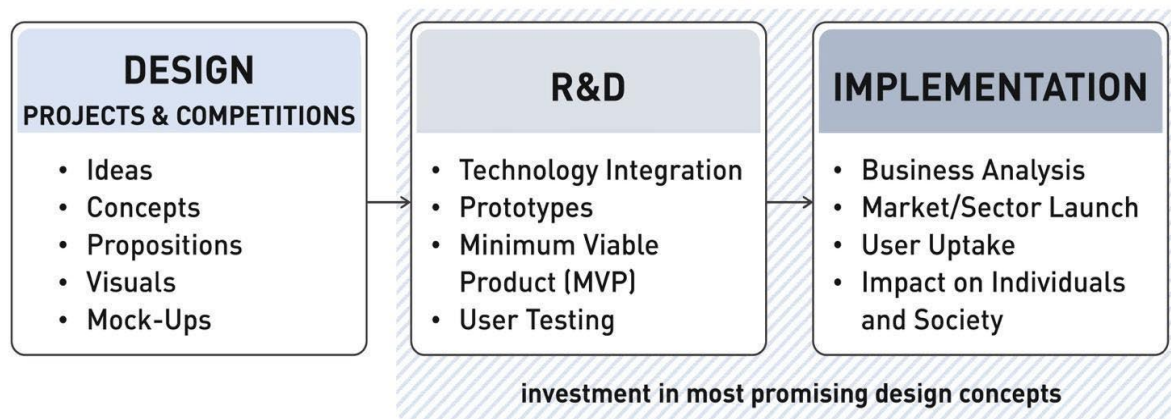


Figure 3: Design, R&D, and implementation as a continuum.

A New Global Design Competition?

Emergency and disaster solutions often function as insurance for potential crises rather than as regularly used products. This can make them difficult to conceive and develop under commercial design practice or have limited relevance for competitive marketplaces. However, emergencies and disasters seem fundamentally important to address for humanity and societal good. Solutions should be available without privilege or prejudice. New ways should be found to effectively engage governments, policymakers, think tanks, investors, private companies, NGOs, and the like to help turn new design concepts into reality. One plausible route could be to establish a new global student and professional design competition specifically for emergency and disaster scenarios. Designers of award-winning concepts may receive the most valuable prize: a commitment by the competition sponsors to organise and fund the transition of the concept through R&D and, if successful, implementation stages.

Conclusions

The work in this chapter has sought to underline the value of design as a creative and integrative discipline that draws upon technological and scientific breakthroughs as well as its own disciplinary principles of user-centredness. Designers can contribute substantially to solutions for emergency and disaster scenarios. However, a lack of follow-on collaboration, opportunities, or investment to elevate the technology readiness level of design concepts should not be an acceptable excuse for outstanding ideas failing to be realized and achieving an impact.

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