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## THE CASE of HURRICANE KATRINA

three main causes for Hurricane Katrina disaster:

(1) a major natural disaster (the hurricane itself);

(2) the poor performance of the ﬂood protection system due to localized engi- neering failures, questionable judgments, errors, etc., involved in the detailed design, construction, operation and maintenance of the system;

(3) more global “organizational” and institutional problems associated with the govern- mental and local organizations responsible for the design, construction, opera- tion, maintenance, and funding of the overall ﬂood protection system” (Seed et al., 2005, xviii).

## Katrina as a Case for Engineering Ethics

speciﬁcally engineering-related failures:

1. Inadequate margins of safety. The factor of safety used for the design of the levee system was inappropriately low to protect an urban population.
2. An incomplete system.
3. A fragmented system.
4. Inadequate design.
5. Failure to learn from others.
6. Lack of central control.

## Studying Katrina

Petroski rightly says, “no disaster need be repeated, for by talking and writing about the mistakes that escape us we learn from them, and by learning from them we can obviate their recurrence”

## 5.1 SAFETY: A SPECIAL CONCERN FOR ENGINEERS- ENGINEERING AS ”SOCIAL EXPERiMENTATiON”

At times, seem like minor design deci- sions can bring harms or beneﬁts to millions or even billions of people.

deﬁne these responsibilities as follows:

(l) A primary obligation to protect the safety of human subjects and respect their right of consent.

(2) A constant awareness of the experimental nature of any project, imaginative forecasting of its possible side effects, and a reasonable effort to monitor them.

(3) Autonomous, personal involvement in all steps of a project.

(4) Accepting accountability for the results of a project” (Martin & Schinzinger, 2010, p. 86).

## 5.2 THE NATURE OF SAFETY: OBJECTIVE AND SUBIECTIVE

One of the easiest ways to keep members of the public from engaging in activities is to convince them that these activities are unsafe.

To carry out a risk-beneﬁt analysis, you would need to consider the following:

1. What kinds of damages are possible?
2. What are the potential severities of these damages? 3. What are the probabilities that human beings would be exposed to these damages? What are the technical feasibilities of the alternatives? What are the economic feasibilities of these alternatives? What are the potential adverse effects of these alternatives
3. For an extended treatment of risk analysis in public engineering projects, see Thompson and Perry (1992), Ayyub (2014), and Millar and Lessard (2001). Treatments of considerations of risk also vary within different domains of engineering. For an example concerning technological design, see Star (1969). For an example from civil engineering, see Faber and Stewart (2003).

The following outlines general criteria of risk assessment within the Western world:

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| --- | --- |
| Higher acceptance of risks | Lower acceptance of risks |
| Voluntary | Involuntary |
| In control | Not in control |
| Occupational | Nonoccupational |
| Common hazard | Dread hazard |
| Effect later | Effect immediate |
| Risk known | Risk unknown |
| Consequences reversible | Consequences irreversible |
| Statistical risk | Known individual at riska |

In engineering, products or processes are generally introduced on a society-wide basis, where the end users or those affected are not well known.

## THE CONNECTION OF SAFETY WITH OTHER RESPONSIBILITIES

Traditional ethical theories typically hold that any one life is equal to that of any other.

it is necessary to recognize that engineering duties cannot be understood in isolation, simply condemning any action that runs contrary to engineering duties as an illegitimate conflict of interests.