**Workshop 1: Handout 1: Writing the problem statement**

Technical design reports typically begin with a problem statement of about one to two sentences. These sentences provide the reader with a clear understanding of the problem that the design project aims to address.

This handout aims to guide you through the process of writing a concise and comprehensive problem statement.

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| **1. Example Problem Statement:** |
| Despite the development of mining technologies, there were 20 coal mine accidents in China, between 2006 to 2016. These accidents caused about 889 deaths, the worst of which occurred in Tunlan on 22 February 2006 where 78 people were killed and 114 of the rescued people were injured[1]. |

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| **Breakdown of the example problem statement** | | |
| Question | | Answer |
| 1. | What is the nature of the problem? |  |
| 2. | What specific data/information do you have about the problem. |  |
| 3. | When did the problem occur? |  |
| 4. | Where did the problem occur? |  |
| 5. | What are the current solutions? |  |

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| **Write a problem statement with your teammates.** | |
| Step 1 | INDIVIDUAL WORK:  Write a problem statement without discussing it with the rest of your team. |
| Step 2 | Compare Problem statements; compare each of the statements.  Look for, and highlight, common themes and terms and phrases. |
| Step 3 | Combine and Construct  Using the common themes and terms construct an improved problem statement. |
| Step 4 | Use the Problem statement checklist to ensure that you have included all essential information. |

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| **Problem Statement Checklist** | | ✓ |
| 1. | Is the statement 1-2 sentences long? |  |
| 2. | Did you state the time frame over which the problem has been occurring? |  |
| 3. | When you answered the WHAT question, did you quantify the problem?  *In your case, you could provide data on the destruction of property/lives or the delays caused by the inadequacies of the current solutions.* |  |
| 4. | Does your statement focus on current problems?  i.e., Is your assessment of the problem up-to-date? |  |
| 5. | Did you focus clearly on ONE problem?  The SINGLE problem can be comprised of several interrelated problems  E.g., *Because a SAR robot cannot navigate rough terrain…*(a few problems occur) |  |
| 6. | Does the statement lead into the need for your specific solution?  *Without mentioning any solutions?* |  |

[1] J. Zhao, J. Gao, F. Zhao, and Y. Liu, “A Search-and-Rescue Robot System for Remotely Sensing the Underground Coal Mine Environment,” *Sensors*, vol. 17, no. 10, p. 2426, Oct. 2017.