

# SAFETY OF HUMAN-MACHINE TEAMING

A safety framework for human-machine teaming to allow humans to safely operate alongside machines.

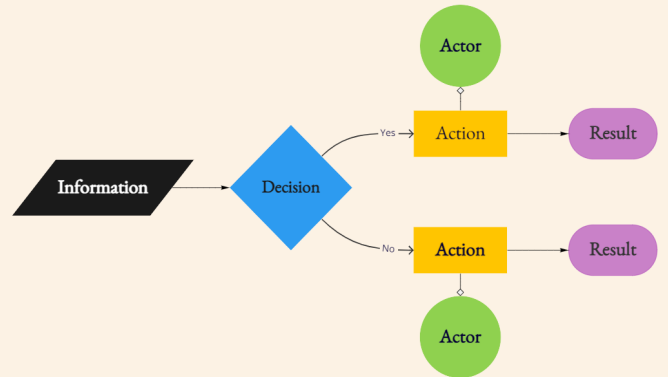
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The HMT safety framework involves a three step process to demonstrate the safety assurance of HMT operations.

## Step 1

Mapping the operation of the system

SYSTEM MAP

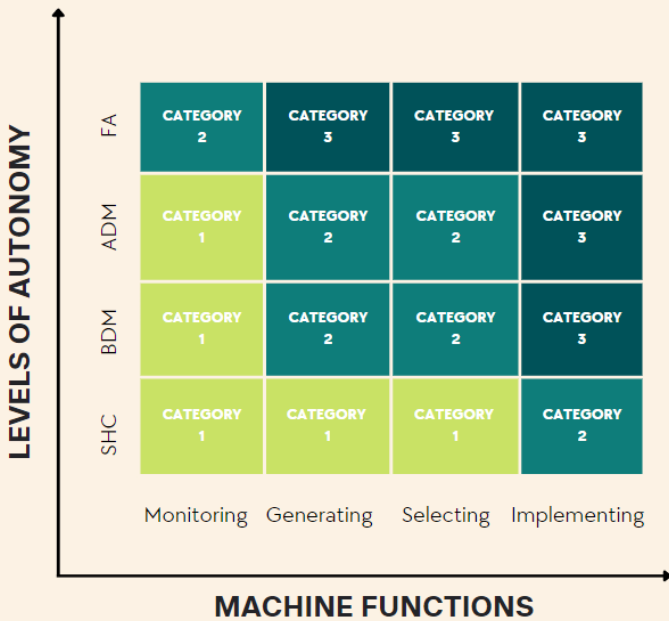


LEGEND

SYMBOL	NAME	FUNCTION
	Information	A parallelogram represents information received relevant to the operation of the system.
	Decision	A diamond represents a decision point.
	Action	A rectangle represents an action being carried out.
	Result	An oval rectangle represents the result of an action that has been carried out.
	Actor	A circle represents an actor in the system, which can be a human or non-human entity.

The 'system' can include many factors, such as humans, other machines and sources of information. Before assessing risk of a system, it is first necessary to determine what factors are included and what factors are not included in the operation of that system.

RISK CATEGORISATION



## Step 2

Risk categorisation

LEVELS OF AUTONOMY

Shared control (SHC)	Blended decision making (BDM)
Automated decision making (ADM)	Full automation (FA)

Differing levels of autonomy and machine functions will require different levels of rigour for assessing risk. Risk categorisation ensures proportionate measures of safety are being implemented.

## Step 3

Assess & manage risk

GUIDING PRINCIPLES

Adaptability	Communication	Ethics	Trust	Goal setting & goal actualisation
Understanding the capacity to which the human and the machine can adapt to their environment.	Understanding how, what, why and when information is communicated between human and machine.	Understanding the ethical implications of humans operating in close proximity to a machine within specific environment.	Understanding how trust between the two entities influences decision making.	It is necessary to understand how goals are determined and actualised for both humans and machines.

HMT operations involve risks that extend beyond concerns of physical safety. Safety assurance of HMT must encompass these broader risks. Guiding principles have been developed to help guide users with identifying the risks of HMT.