

```

1  --- select meta-model types of input and output
2  modeltype AD uses 'http://www.eclipse.org/uml2/5.0.0/UML';
3  modeltype mitigation uses 'http://sse.uni-due.de/mitigationtemplate';
4  modeltype hazardanalysis uses 'http://sse.uni-due.de/FHA';
5  modeltype HRD uses 'http://sse.uni-due.de/HRD';
6  --- define transformation function signature
7  ---  $AD^{hmr}$  is the set of activity diagrams containing
8  --- hazard-mitigating requirements out of which a
9  --- Hazard Relation Diagram  $hazRD$  is to be created.
10 ---  $CM^h$  is a set of partial mitigations needed to append mitigation partitions
11 ---  $fha(actD^{hir})$  is the results of the hazard analyses that was conducted on the
12 --- on the hazard-inducing requirements  $actD^{hir}$  which yield contextual information
13 --- about the hazard  $h$  that was mitigated in  $CM^h$ 
14 transformation generateHazardRelationDiagram
15     (in  $actD^{hmr}$ :AD, in  $CM^h$ :template, in  $fha(actD^{hir})$ :hazardanalysis, out  $hazRD$ :HRD);
16
17 main() {
18     --- select mitigated hazard by checking which hazard is referenced in first
19     --- partial mitigation in the array
20     let  $haz = h \in_t pm_i^h | pm_i^h \in CM^h$ 
21     --- check if all templates reference same hazard
22     foreach  $pm_i^h \in CM^h$  {
23         if  $h \in_t pm_i^h \neq haz$  {
24             throw error("Multiple Conceptual Mitigations detected. Aborting");
25             return  $hazRD = \emptyset$ ;
26         }
27     }
28     --- check if the mitigated hazard is part of the hazard analysis results
29     --- assume the mitigated hazard is not part of the hazard analysis results
30     boolean  $hazardFound = false$ 
31     foreach  $res \in fha(actD^{hir})$  {
32         if  $res = haz$  {  $hazardFound = true$  }
33     }
34     --- if hazard wasn't found, Hazard Relation Diagram cannot be created
35     if  $hazardFound = false$  {
36         throw error
37         ("Mitigated Hazard is not part of Hazard Analysis Result Set. Aborting.");
38         return  $hazRD = \emptyset$ ;
39     }
40     --- check if hazard-mitigating requirements are referenced
41     --- in some mitigation template.
42     foreach  $actD_i^{hmr} \in AD^{hmr}$  {
43         --- assume activity diagram is not referenced in mitigation template
44         boolean  $adReferenced = false$ 
45         foreach  $pm_i^h \in CM^h$  {
46             if  $actD_i^{hmr} \in_t pm_i^h$  {
47                  $adReferenced = true$ 
48             }
49         }
50         if  $adReferenced = false$  {
51             throw error("No Mitigation Template available for Hazard-Mitigating
52             Requirements. Cannot create mitigation partition. Aborting.");
53             return  $hazRD = \emptyset$ ;
54         }
55     }

```

Listing 4 Pseudo-Code Signature sig of a QVTo Script q^{hrd} to Generate Hazard Relation Diagrams