Subtask 1

- Define a SPARQL query that queries the direct and indirect instances of metaclass <CLASS/JITAI/CLASS> together with their descriptions and average duration.

- Expected result

```
----------------------------------------------------------------------------------
| class                       | description                                      | avgDuration |
==================================================================================
| <CLASS/JITAI>               |                                                  | 16.89       |
| <CLASS/RunningJITAI>        |                                                  | 40.0        |
| <CLASS/HillRunningJITAI>    | "Vigorous running."                              |             |
| <CLASS/BaseRunningJITAI>    | "Moderate running."                              | 40.0        |
| <CLASS/RecoveryRunningJITAI> | "Light running"                                 |             |
| <CLASS/ExerciseSnackingJITAI> | "Do some physical exercise anywhere and anytime." | 3.4       |
| <CLASS/WalkingJITAI>        |                                                  | 31.67       |
| <CLASS/NordicWalkingJITAI>  | "Walking with sticks."                           |             |
| <CLASS/BriskWalkingJITAI>   | "Moderate walking."                              | 31.67       |
| <CLASS/PowerWalkingJITAI>   | "Vigorous walking."                              |             |
----------------------------------------------------------------------------------
```

Subtask 2

- Define a SPARQL query that counts for each JITAI class the number of individual JITAI occurrences (considering direct and indirect instances and also considering JITAI classes that have no instances).

- Use the appropriate meta class in your query.

- Expected result

```
-----------------------------------------------------
| class                         | numberOfJITAIs |
=====================================================
| <CLASS/NordicWalkingJITAI>    | 0              |
| <CLASS/HillRunningJITAI>      | 0              |
| <CLASS/BriskWalkingJITAI>     | 3              |
| <CLASS/JITAI>                 | 9              |
| <CLASS/PowerWalkingJITAI>     | 0              |
| <CLASS/BaseRunningJITAI>      | 1              |
| <CLASS/RecoveryRunningJITAI>  | 0              |
| <CLASS/WalkingJITAI>          | 3              |
| <CLASS/RunningJITAI>          | 1              |
| <CLASS/ExerciseSnackingJITAI> | 5              |
-----------------------------------------------------
```

Subtask 3

- Define a SPARQL query that selects WalkingJITAI classes (use the appropriate meta class) that are also instances of meta class <byIntensity>.

- Expected result

```
--------------------------------
| class                        |
================================
| <CLASS/NordicWalkingJITAI>   |
| <CLASS/BriskWalkingJITAI>    |
| <CLASS/PowerWalkingJITAI>    |
--------------------------------
```

Subtask 4

- Define a SPARQL query that identifies for each JITAI class the limitations on <duration> made by SHACL property shapes using sh:minInclusive and sh:maxInclusive.

- Expected result

```
-------------------------------------------------------------------
| class                            | minInclusive | maxInclusive |
===================================================================
| <CLASS/JITAI>                    | 1            |              |
| <CLASS/RunningJITAI>             | 20           | 60           |
| <CLASS/HillRunningJITAI>         |              |              |
| <CLASS/BaseRunningJITAI>         |              |              |
| <CLASS/RecoveryRunningJITAI>     |              | 15           |
| <CLASS/ExerciseSnackingJITAI>    |              | 5            |
| <CLASS/WalkingJITAI>             | 10           | 60           |
| <CLASS/NordicWalkingJITAI>       |              |              |
| <CLASS/BriskWalkingJITAI>        |              |              |
| <CLASS/PowerWalkingJITAI>        |              |              |
-------------------------------------------------------------------
```

Subtask 5

- We have introduced various concepts of MLM using <duration>. Now we focus on regularity properties for <intensity>.

- Add SHACL property shapes for <minIntensity> and for <maxIntensity> at the appropriate powertype, specifying that <minIntensity> and <maxIntensity> have multiplicity 0..1 and datatype integer.

- You can evaluate these constraints by manually violating them.

Subtask 6

- Add SHACL rules for transforming a JITAI class' value for <minIntensity> and <maxIntensity> into property shapes with sh:minInclusive and sh:maxInclusive.

- You may use the rules that transform <minDuration> and <maxDuration> into property shapes as a template.

- Expected result, e.g., for <CLASS/RunningJITAI>

Subtask 7

- Compute the average intensity <avgIntensity> as resultant property for each JITAI class by defining a SHACL rule at the appropriate meta class.

- You may use the rule that computes <avgDuration> as a template.

- Expected result, e.g., for <CLASS/ExerciseSnackingJITAI>

Subtask 8

- Detect conflicts between <minIntensity> and <maxIntensity> within the class hierarchy using SHACL SPARQL-based constraints at the appropriate meta class.

- You may use the shape that detects conflicts between <minDuration> and <maxDuration> as a template.

- Expected result (additional validation result, Domain Model > Validate …)