General

ID[1]				
Use case name	Generative design of mechanical parts			
Context	Manufacturing			
Application domain	On-premise systems			
Status	In operation			
Contributor	Name	Affiliation	Contact	
Scope[2]	Help mechanical engineers design lighter, strong, better parts			
Objective(s)	Create optimized parts following precise mechanical constraint while permitting cost savings by reducing the amount of material necessary to achieve goals.			
Narrative	Short description (not more than 150 words)	From Wikipedia: Generative design is an iterative design process that involves a program that will generate a certain number of outputs that meet certain constraints, and a designer that will fine tune the feasible region by changing minimal and maximal values of an interval in which a variable of the program meets the set of constraints, in order to reduce or augment the number of outputs to choose from.		
	Complete description	https://en.wikipedia.org/wiki/Generative_design https://www.autodesk.com/solutions/generative-design http://www.neweguipment.com/research-and-development/what-generative-design-and-why-its-future-manufacturing		
Key performance indicators (KPIs)	ID	Name	Description	Reference to mentioned use case objectives
	1	Weight reduction	Is the resulting part lighter than original version	Use less material
	2	Mechanical constraints metrics	Various mechanical metrics	Obtain strong, better parts
AI features	Task(s)	Optimization		
	Method(s)[3]	Genetic algorithms, optimisation algorithms, generative adversarial networks		
	Hardware[4]	CPU, GPU		
	Terms and concepts used[5]	Design, generative adversarial network, genetic algorithm, mimicry		
Challenges and issues	Challenges: Environment may be cluttered, occlusions of target might occur, objects may move around. Issues: For safety reasons, speed and force of robot need to be limited in assistive environment to avoid harm. Human intervention can happen at any time.			
Societal concerns				

Data (optional)

Data characteristics	
Description	
Source[6]	
Type[7]	
Volume (size)	
Velocity (e.g. real time)[8]	
Variety (multiple datasets)[9]	
Variability (rate of change)[10]	
Quality[11]	

Process scenario (optional)

Scenario conditions					
No.	Scenario name	Scenario description	Triggering event	Pre-condition[12]	Post-condition[13]

Training (optional)

Scenario name	Training				
Step No.	Event[14]	Name of process/Activity[15]	Primary actor	Description of process/activity	Requirement

Specification of training data[16]	

Evaluation (optional)

Scenario name	Evaluation				
Step No.	Event[17]	Name of process/Activity[18]	Primary actor	Description of process/activity	Requirement

Input of evaluation[19]	
Output of evaluation[20]	

Execution (optional)

Scenario name	Execution				
Step No.	Event[21]	Name of process/Activity[22]	Primary actor	Description of process/activity	Requirement

Input of Execution[23]	
Output of Execution[24]	

Retraining (optional)

Scenario name	Retraining				
Step No.	Event[25]	Name of process/Activity[26]	Primary actor	Description of process/activity	Requirement

Specification of retraining data[27]	

References

References						
No.	Type	Reference	Status	Impact on use case	Originator/organization	Link

Footnote

[1] Leave this cell blank.

[2] The scope defines the limits of the use case.

[3] AI method(s)/framework(s) used.

[4] Hardware system used.

[5] Terms and concepts listed here can be used to extend the work of WG 1 (AWI 22989 and AWI 23053) as necessary.

[6] Origin of data, which could be from instruments, IoT, web, surveys, commercial activity, or from simulations.

[7] Structured/unstructured Images, voices, text, gene sequences, and numerical. Composite: time-series, graph-structured

[8] The rate of flow at which the data is created, stored, analysed, or visualized.

[9] Data from a number of domains and a number of data types. The wider range of data formats, logical models, timescales, and semantics complicates the integration of the variety of data.

[10] Changes in data rate, format/structure, semantics, and/or quality.

[11] Completeness and accuracy of the data with respect to semantic content as well as syntactical of the data (such as presence of missing fields or incorrect values)

[12] Describe which condition(s) should have been met before this scenario happens.

[13] Describe which condition(s) should prevail after this scenario happens. The post-condition may also define "success" or "failure" conditions.

[14] The event that triggers the step. This might be completion of the previous event.

[15] Action verbs should be used when naming activity.

[16] Training data can be further specified.

[17] The event that triggers the step. This might be completion of the previous event.

[18] Action verbs should be used when naming activity.

[19] Specify input of evaluation.

[20] Specify output of evaluation.

[21] The event that triggers the step. This might be completion of the previous event.

[22] Action verbs should be used when naming activity.

[23] Specify input of evaluation.

[24] Specify output of evaluation.

[25] The event that triggers the step. This might be completion of the previous event.

[26] Action verbs should be used when naming activity.

[27] Retraining data can be further specified.