ANNEX E - METRICS DESCRIPTION

A set of core metrics have been elaborated, to be used to describe the benchmark operations results. These are described in the following, in terms of their measurement strategies, applicable test cases and indicative range values.

Metric #M001	avgResponseTime	
Average Response Time	This metric is the average of all measured time spans from the last byte of the request sent to the time the first byte is received. This metric should reflect the average total time the server has processed your request and come with an answer. This measure should not be impacted by the network speed since it does not include transport time This measure may be impacted by network latency	
Measurement Unit	ms	
Range values	The values depend on the QoE Indicator under examination. Typical values range from < 100 msecond (very good) to > 5 seconds (very bad) for Reactivity and from < 1000 msecond (very good) to > 50 seconds (very bad) for Discoverability.	
Measurement Strategy	A low level HTTP request is performed with the following pseudo logic (all steps are synchronous): request <- HttpRequest.Send() timer <- StopWatch.Start() request.WaitForResponse() timer.Stop() **averageResponseTime** <- timer.TotalMilliseconds response()<-request.GetResponse() then an average of all the measurements is performed	
Dependencies and Variability	This metric is depending on the *load factor* and the *maximum parallelism* set for the test. Highest is the load factor more tests are performed and thus smoother the average and probably more representative.	
Limitations / Other comments	N/A	
Test Categories	Availability, Search & View, Download/Upload	
Test Cases	**Identifier**	**Interpretation**
	TC10X, TC20X, TC21X	Dataset search query speed performance. How long does the server take to perform a complex query (e.g. geo&time)
	TC30X, TC31X	Product file retrieval speed performance How long does the server take to serve the client (remote or local) with the requested file and start transferring it

Metric #M002	peakResponseTime
Peak Response Time	This metric is the maximum of all measured time spans from the last byte of the request sent to the time the first byte is received. This metric should reflect the maximum total time the server has processed your request and come with an answer. This measure should not be impacted by the network speed since it does not include transport time

	This measure may be impacted by network latency
Measurement Unit	ms
Range values	The values depend on the QoE Indicator under examination. Typical values range from < 200 msecond (very good) to > 10 seconds (very bad) for Reactivity and from < 2000 msecond (very good) to > 100 seconds (very bad) for Discoverability.
Measurement Strategy	A low level HTTP request is performed with the following pseudo logic (all steps are synchronous): request <- HttpRequest.Send() timer <- StopWatch.Start() request.WaitForResponse() timer.Stop() **averageResponseTime** <- timer.TotalMilliseconds response()<-request.GetResponse() then the maximum of all the measurements is used
Dependencies and Variability	This metric is depending on the *load factor* and the *maximum parallelism* set for the test. Highest is the load factor more tests are performed and thus more likely a high peak response time may occur, especially with high max parallelism value
Limitations / Other comments	N/A
Test Categories	Availability, Search & View, Download/Upload
Test Cases	See #M001

Metric #M003	**errorRate**	
Error Rate	This metric is the percentage of requests that ended with an error. This metric should reflect the proportion of request failure due to a server error	
Measurement Unit	%	
Range values	0% is perfect <10% is acceptable >10% is unacceptable	
Measurement Strategy	A 5XX HTTP Web response status code for a request is considered as an error.	
Dependencies and Variability	This metric is depending on the *load factor* and the *maximum parallelism* set for the test. Highest is the load factor more tests are performed and thus more likely a high peak error rate may occur, especially with high max parallelism value	
Limitations / Other comments	N/A	
Test Categories	Availability, Search & View, Download/Upload	
Test Cases	**Identifier**	**Interpretation**
	TC10X, TC20X, TC302, TC304, TC21X	Error rate for all requests made per test cases
	TC301, TC303, TC311, TC312	No concurrency nor bulk request so 0% or 100% are the possible measurement values
	TC41X	Error rate for all requests made per test cases
	TC60X	Error rate for all requests made per test cases

Metric #M005	**throughput**

Throughput	This metric is the average of the requests' ratio between a volume of data transported and the time for this volume of data to be transferred from a system to another (client/server)
	This metric should reflect the speed for data transmission in a given test case.
	This metric is likely impacted by test site and/or target site network performance and punctual infrastructure issues
Measurement Unit	Bytes/second
Range values	Value subject to interpretation regarding test site
Measurement Strategy	The transfer time of the relevant volume of data of the test case is measured on the time from the first byte to the last byte successfully transferred.
Dependencies and Variability	This metric is depending on the load factor and the maximum parallelism set for the test. Highest is the load factor more are tests performed and thus smoother is the mean and probably more representative.
Limitations / Other comments	N/A
Test Categories	Availability, Search & View, Download/Upload

Test Cases	Identifier	Interpretation
	TC30X	Product file download or upload speed performance. How fast was it for the client to download/upload a complete file?

Metric #M006	avgConcurrency
Average Concurrency	This metric reports the average parallelism capacity sustained by the server during a batch of requests
Measurement Unit	Float number
Range values	The range is from 1 to *maximum parallelism or virtual machines* value configured. The closest to this latter value is the best.
Measurement Strategy	All requests to a given service of the target site start and end time are sampled (sampling rate wrt TC) in the total test case time span. This measures the number of ongoing concurrent requests. An average is performed out of this sampling.
Dependencies and Variability	This metric is depending on the load factor, the maximum parallelism and the number of virtual machines set for the test. Highest is the load factor more are tests performed and thus smoother is the mean and probably more representative.
Limitations / Other comments	N/A
Test Categories	Availability, Search & View, Download/Upload

Test Cases	Identifier	Interpretation
	TC10X	Capacity for the target site to answer concurrently to the test site
	TC20X, TC21X	Capacity for the target site to answer search query concurrently to the test site
	TC302, TC304, TC312	Capacity for the target site to product download concurrently to the test site
	TC301, TC311	No concurrency nor bulk request so always 1
	TC41X	Average capacity vs. time for the target site to make available a

	certain amount of VM at the same time.

Metric #M007	peakConcurrency
Peak Concurrency	This metric reports the maximum parallelism capacity sustained by the server during a batch of requests
Measurement Unit	Float number
Range values	The range is from 1 to *maximum parallelism or virtual machines* value configured. A Value lower than this latter value is not good.
Measurement Strategy	All requests to a given service of the target site start and end time are sampled (sampling rate wrt TC) in the total test case time span. This measures the number of ongoing concurrent requests. The maximum is retrieved out of this sampling.
Dependencies and Variability	This metric is depending on the load factor and the maximum parallelism set for the test. Highest is the load factor more are tests performed and thus more likely is the maximum concurrency to be lower or closer than the max parallelism.
Limitations / Other comments	N/A
Test Categories	Availability, Search & View, Download/Upload

Test Cases	Identifier	Interpretation
	TC10X	Max capacity for the target site to answer concurrently to the test site
	TC20X, TC21X	Max capacity for the target site to answer search query concurrently to the test site
	TC302, TC304, TC312	Max Capacity for the target site to product download concurrently to the test site
	TC301, TC311	No concurrency nor bulk request so always 1
	TC41X	Maximum capacity vs. time for the target site to make available a certain amount of VM at the same time.

Metric #M008	avgSize
Average Size	This metric reports the average size of data volume transferred during a test case for each test unit
Measurement Unit	Byte number (long)
Range values	N/A
Measurement Strategy	Average of the data volume of the data unit transferred. For search results, it is the size of the feed of results returned by the search API. For downloaded/uploaded products, it is the size of the product file.
Dependencies and Variability	The size depends on the time when the test case is executed and on the time set for search query. Indeed, search results and thus downloaded files may largely differ if only small files are available at the selected time than large file (see other comments)
Limitations / Other comments	Most of the tests cases make a random selection in the data chosen to be searched and/or downloaded. Thus this metric may be important to weight other metrics (e.g. throughput may largely differ if only small data files are downloaded than larger files)

Test Categories	Search & View, Download/Upload	
Test Cases	**Identifier**	**Interpretation**
	TC20X, TC21X	Search results size. How big are the results of the search?
	TC302, TC303, TC304, TC312	Average product file size downloaded. How big is the batch of download/upload?
	TC301, TC311	No concurrency nor batch request thus average size is the size of the single file downloaded/uploaded

Metric #M009	**maxSize**	
Max Size	This metric reports the maximum size of units data volume transferred during a test case for each test unit	
Measurement Unit	Byte number (long)	
Range values	N/A	
Measurement Strategy	Maximum of the data volume of the data unit transferred. For search results, it is the size of the feed of results returned by the search API. For downloaded/uploaded products, it is the size of the product files.	
Dependencies and Variability	The size depends on the time when the test case is executed and on the time set for search query. Indeed, search results and thus downloaded files may largely differ if only small files are available at the selected time than large file (see other comments)	
Limitations / Other comments	Most of the tests cases make a random selection in the data chosen to be searched and/or downloaded. Thus this metric may be important to weight other metrics (e.g. throughput may largely differ if only small data files are downloaded than larger files)	
Test Categories	Search & View, Download/Upload	
Test Cases	**Identifier**	**Interpretation**
	TC20X, TC21X	Search results size. How big is the largest results feed of the search?
	TC302, TC303, TC304, TC312	Largest product file size downloaded
	TC301, TC311	No concurrency nor batch request thus max size is the size of the single file downloaded/uploaded

Metric #M010	**totalReadResults**
Total Read Results Count	This metric reports the total number of results retrieved. Beware this is different from #M011 (maxTotalResults).
Measurement Unit	Integer number
Range values	N/A
Measurement Strategy	When a search query is performed, the total number of results items retrieved are counted. The counts are summed up as the test case result metric.
Dependencies and Variability	N/A

Limitations / Other comments	Most of the relevant tests cases queries a random count of data results per query. This metric may be used to weight the average response time in the benchmarking.	
Test Categories	Search & View	
Test Cases	**Identifier**	**Interpretation**
	TC20X, TC21X	Search results items retrieved count. How Many results items retrieved in the search query?
	TC60X	Search results items retrieved count. How Many results items retrieved in the search query?

Metric #M011	**maxTotalResults**	
Max Total Results Count	This metric reports the total number of results available	
Measurement Unit	Integer number	
Range values	N/A	
Measurement Strategy	When a search query is performed, when available in the results feed, the total results items available in the target site is reported	
Dependencies and Variability	When available on the target site.	
Limitations / Other comments	This metric is available on the reference target site (Copernicus Scientific Data Hub). It is then used to compute the ratio of collection completeness. This metric may be used to weight the average response time in the benchmarking.	
Test Categories	Search & View, Dataset Completeness	
Test Cases	**Identifier**	**Interpretation**
	TC10X	Not Reported
	TC20X, TC21X	Search results size. Among how many results items available were the search queries performed

Metric #M012	**resultsErrorRate**	
Results Error Rate	This metric reports the ratio of results not corresponding to a search query or faulty downloaded products file.	
Measurement Unit	%	
Range values	N/A	
Measurement Strategy	When a search query is performed, every item metadata is validated against the search query filters. This ratio is the sum number of not successfully validated data item on the total results count	
Dependencies and Variability	When metadata available in the results feed of the target site.	
Limitations / Other comments	N/A	
Test Categories	Search & View, Dataset Completeness	
Test Cases	**Identifier**	**Interpretation**
	TC20X, TC21X	Search results consistency How good is the search query of the target site?
	TC302, TC303, TC304, TC312	Product file consistency

	How valid are the downloaded results?

Metric #M013	**avgDataAvailabilityLatency**
Average Data Availability Latency	This metric reports average latency of the availability of the data with respect to the availability on the reference target site
Measurement Unit	Seconds
Range values	N/A
Measurement Strategy	An average time is computed from the 20 latest products publication time on the target site then the average of the same 20 products publication time on the reference target site (scihub). The average time difference is reported.
Dependencies and Variability	When publication metadata available in the results feed of the target site.
Limitations / Other comments	N/A
Test Categories	Dataset Completeness
Test Cases	**Identifier**	**Interpretation**
	TC602	[Array] Data availability average latency per data collection division

Metric #M014	**avgDataOperationalLatency**
Average Data Operational Latency	This metric reports average latency of the availability of the data with respect to the sensing time of the product.
Measurement Unit	Seconds
Range values	N/A
Measurement Strategy	An average time is computed from the 20 latest products publication time on the target site then the average of the sensing end time is computed. The average time difference is reported.
Dependencies and Variability	When metadata available in the results feed of the target site.
Limitations / Other comments	N/A
Test Categories	Dataset Completeness
Test Cases	**Identifier**	**Interpretation**
	TC601	[Array] Data operational average latency per data collection division

Metric #M015	**catalogueCoverage**
Data Coverage	This metric reports the ratio between the number of relevant data products made available from the target site wrt to the reference target site (Open Hub).
Measurement Unit	%
Range values	0-100
Measurement Strategy	This is a vector of the values covering all the available catalogue entries. It takes the form of a matrix having the following structure: • Rows correspond to a specific Product Type (Product, Sensor, Mission, Processing level… see Metrics Copernicus Product Types) or coherent collections of them. • Columns represent configurable pre-defined geographic areas or time spans.

- Each cell of the matrix has a value that ranges from 0 (= no item available in this class) to 1 (same number of items as the Open Access Hub for this class).

	Europe	Africa	......	Last month	Last 12 months
Product Type 1	*0 to 1*	*0 to 1*	*...*	*0 to 1*	*0 to 1*
...	*...*	*...*	*...*	*...*	*...*
Product Type N	*0 to 1*	*0 to 1*	*...*	*0 to 1*	*0 to 1*

Dependencies and Variability	When metadata available in the results feed of the target site.
Limitations / Other comments	N/A
Test Categories	Dataset Completeness
Test Cases	**Identifier** / **Interpretation**
	TC501 / [Array] Data coverage per data collection division

Metric #M016	**dataCollectionDivision**
Data Collection Division	This metric reports the data collection subset search during the test case.
Measurement Unit	string
Range values	N/A
Measurement Strategy	This is a vector of string described all the searches performed during the test case
Dependencies and Variability	N/A
Limitations / Other comments	N/A
Test Categories	Search, Dataset Completeness
Test Cases	**Identifier** / **Interpretation**
	TC20X, TC21X, TC30X, TC31X / [Array] Random Data search description
	TC50X, TC60X / [Array] Data coverage per data collection division

Metric #M017	**offlineDataAvailabilityLatency**
Offline Data Latency	This metric reports the time spent for an offline product to become available for download from the moment it is requested
Measurement Unit	minutes
Range values	10 to 10000
Measurement Strategy	Time is measured from the first web request to download the data until it is downloading the first byte
Dependencies and Variability	N/A
Limitations / Other comments	N/A
Test Categories	Download
Test Cases	Identifier / Interpretation
	TC304 / Time for download available

Metric #M018	**maxDataOperationalLatency**
Max Data Operational Latency	This metric reports maximum latency of the availability of the data with respect to the sensing time of the product.
Measurement Unit	minutes

Range values	N/A
Measurement Strategy	An average time is computed from the 20 latest products publication time on the target site then the average of the sensing end time is computed. The maximum time difference is reported.
Dependencies and Variability	When metadata available in the results feed of the target site.
Limitations / Other comments	N/A
Test Categories	Dataset Completeness

Test Cases	Identifier	Interpretation
	TC601	[Array] Data operational maximum latency per data collection division

Metric #M019	maxDataAvailabilityLatency
Max Data Availability Latency	This metric reports maximum latency of the availability of the data with respect to the availability on the reference target site
Measurement Unit	Minutes
Range values	N/A
Measurement Strategy	An average time is computed from the 20 latest products publication time on the target site then the average of the same 20 products publication time on the reference target site (scihub). The maximum time difference is reported.
Dependencies and Variability	When publication metadata available in the results feed of the target site.
Limitations / Other comments	N/A
Test Categories	Dataset Completeness

Test Cases	Identifier	Interpretation
	TC602	[Array] Data availability maximum latency per data collection division

Metric #M020	totalValidatedResults
Total Validated Results Count	This metric reports the total number of valid results retrieved. Beware this is different from #M010 (totalResults).
Measurement Unit	Integer number
Range values	0 to #M010 (totalResults).
Measurement Strategy	When a search query is performed, retrieved results items are validated against the search filter. The valid items are counted and are summed up as the test case result metric.
Dependencies and Variability	N/A
Limitations / Other comments	N/A
Test Categories	Search & View

Test Cases	Identifier	Interpretation
	TC60X	Valid results retrieved

Metric #M021	totalWrongResults
Total Wrong Results Count	This metric reports the total number of wrong results retrieved.
Measurement Unit	Integer number
Range values	0 to #M010 (totalResults). More than 0 is not good.
Measurement Strategy	When a search query is performed, retrieved results items are validated against the search filter. The wrong items are counted and are summed up as the test case result metric.

Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Search & View	
Test Cases	**Identifier**	**Interpretation**
	TC20X, TC21X	Wrong results retrieved

Metric #M022	**totalReferenceResults**	
Total Online Results	This metric reports the total number of products in the reference site catalogue for a given data collection.	
Measurement Unit	Integer number	
Range values	N/A	
Measurement Strategy	A search for all available products is performed on the reference site and the returned total is read.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Dataset Completeness	
Test Cases	**Identifier**	**Interpretation**
	TC501, TC502, TC503	How many online results in the catalogue

Metric #M023	**dataCoverage**	
Online Data Rate	This metric reports for a collection the ratio of products in the target site catalogue that are locally managed and thus immediately available for download wrt to the same collection in the reference site.	
Measurement Unit	Integer number	
Range values	0 to 100%. The higher the better.	
Measurement Strategy	A ratio of Metric #M025 totalResults on #M022 totalReferenceResults is calculated	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Dataset Completeness	
Test Cases	**Identifier**	**Interpretation**
	TC502	How large is the coverage of online results in the catalogue

Metric #M024	**dataOfferConsistency**	
Online Data Rate	This metric reports for a set of collection defined by the service provider as the "data offer", the ratio of products in the target site catalogue that are locally managed and thus immediately available for download with respect to to the same collection set and corresponding timespans and geographic coverages in the reference site.	
Measurement Unit	Integer number	
Range values	0 to 100%. The higher the better.	
Measurement Strategy	A ratio of Metric #M025 totalResults on #M022 totalReferenceResults is calculated	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Dataset Completeness	
Test Cases	**Identifier**	**Interpretation**

	TC503	How consistent is the coverage of the data offer declared.

Metric #M025	totalResults	
Online Data Rate	This metric reports the total number of products available in the target site for a specific collection.	
Measurement Unit	Integer number	
Range values	N/A	
Measurement Strategy	A search query is performed and the total number of items available in the target site is reported	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Dataset Completeness	
Test Cases	**Identifier**	**Interpretation**
	TC501, TC502, TC503	Number of items available in the target site for the searched collections.

Metric #M026	totalSize	
Max Size	This metric reports the total size of data volume transferred during a test case	
Measurement Unit	Byte number (long)	
Range values	N/A	
Measurement Strategy	Total volume of transferred data for downloaded/uploaded products, it is the sum of the sizes of the product files.	
Dependencies and Variability	Search results and thus downloaded files may largely differ according to the performed query.	
Limitations / Other comments	Most of the tests cases make a random selection in the data chosen to be searched and/or downloaded. Thus this metric may be important to weight other metrics (e.g. throughput may largely differ if only small data files are downloaded than larger files)	
Test Categories	Search & View, Download/Upload	
Test Cases	**Identifier**	**Interpretation**
	TC301, TC302, TC303, TC311, TC312	Total size of all downloaded products files.

Metric #M027	exception	
Max Size	This metric reports eventual exceptions that occurred during an action. It gives information on the nature of the caused error.	
Measurement Unit	Text	
Range values	N/A	
Measurement Strategy	error catching on service api call	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Search & View, Download/Upload	
Test Cases	**Identifier**	**Interpretation**
	TC602	used to report the type of issue on a target site service.

Metric #M041	copernicusCoreServices	
Description	This metric reports the completeness of the Copernicus Core Services data complementary offer on the provider, as ratio between positive answered questions over the total from the Test Procedure.	
Measurement Unit	%	
Range values	0-100	
Measurement Strategy	Add all positive answers to a set of predefined questions and then compute the ratio to the total number of questions.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP13	Review complementary offer on the provider website.

Metric #M042	otherData	
Description	This metric reports the completeness of the non-Copernicus data (only EO data) complementary offer on the provider, as ratio between positive answered questions over the total from the Test Procedure.	
Measurement Unit	%	
Range values	0-100	
Measurement Strategy	Add all positive answers to a set of predefined questions and then compute the ratio to the total number of questions.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP13	Review complementary offer on the provider website.

Metric #M043	apiCompleteness	
Description	This metric reports the completeness of the available APIs on the provider, as ratio between positive answered questions over the total from the Test Procedure.	
Measurement Unit	%	
Range values	0-100	
Measurement Strategy	Add all positive answers to a set of predefined questions and then compute the ratio to the total number of questions.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP13	Review complementary offer on the provider website.

Metric #M044	cloudServices	
Description	This metric indicates the availability of a cloud environment on the provider, where users can create and manage virtual machines. The metric only evaluates the presence of basic cloud services so it can only have values YES (=100) or NO (=0).	
Measurement Unit	%	
Range values	0 or 100	
Measurement Strategy	Inspection of the provider offer.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	

Test Procedures	Identifier	Interpretation
	#TP13	Review complementary offer on the provider website.

Metric #M045	otherServices	
Description	This metric reports the availability of other services not taken into account in other metrics, such as a Marketplace, or consulting, as ratio between positive answered questions over the total from the Test Procedure.	
Measurement Unit	%	
Range values	0-100	
Measurement Strategy	Add all positive answers to a set of predefined questions and then compute the ratio to the total number of questions.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	Identifier	Interpretation
	#TP13	Review complementary offer on the provider website.

Metric #M046	devTools	
Description	This metric reports the completeness of the development tools complementary offer on the provider, as ratio between positive answered questions over the total from the Test Procedure.	
Measurement Unit	%	
Range values	0-100	
Measurement Strategy	Add all positive answers to a set of predefined questions and then compute the ratio to the total number of questions.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	Identifier	Interpretation
	#TP13	Review complementary offer on the provider website.

Metric #M047	devServices	
Description	This metric reports the availability of services oriented at supporting application development, e.g. Docker or Kubernetes, as ratio between positive answered questions over the total from the Test Procedure.	
Measurement Unit	%	
Range values	0-100	
Measurement Strategy	Add all positive answers to a set of predefined questions and then compute the ratio to the total number of questions.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	Identifier	Interpretation
	#TP13	Review complementary offer on the provider website.

Metric #M048	eoTools	
Description	This metric reports the availability of EO-specific tools in the provider offering, e.g. SNAP or Sen2Cor, as ratio between positive answered questions over the total from the Test Procedure.	
Measurement Unit	%	
Range values	0-100	

Measurement Strategy	Add all positive answers to a set of predefined questions and then compute the ratio to the total number of questions.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	Identifier	Interpretation
	#TP13	Review complementary offer on the provider website.

Metric #M101	avgProvisioningLatency	
Average Provisioning Latency	This metric reports the time for provisioning one or more virtual machine in from a cloud service provider	
Measurement Unit	milliseconds	
Range values	Typical values range from < 60.000 millisecond (very good) to > 3.600.000 seconds (very bad).	
Measurement Strategy	An average time is computed if several machines are requested simultaneously (#TS12) otherwise (#TS11), the unique provisioning time is taken.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Cloud Services	
Test Cases	Identifier	Interpretation
	TC41X	Measure of the time for provisioning virtual machines

Metric #M110	cost	
Cost	This metric reports the cost of the services for executing the test on a target site.	
Measurement Unit	euros	
Range values	The values depend on the QoE Indicator under examination.	
Measurement Strategy	The cost is calculated based on the billing information provided by the target site. If a calculator is available through the Cloud Services API, it is used. Otherwise, a calculation is based on the customer information provided.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Cloud Services	
Test Cases	Identifier	Interpretation
	TC41X	Cost of provisioning Virtual Machines and their uptime.

Metric #M111	dataSummaryRun
Summary for individual run	This value is an array containing identifiers for each individual execution of the test case sequence on a virtual machine. The size of the array corresponds to the number of virtual machines that are instantiated.
Measurement Unit	string
Range values	N/A
Measurement Strategy	N/A
Dependencies and Variability	N/A
Limitations / Other comments	This is not a measurement, but reported along with the actual metrics.
Test Categories	Cloud Services

Test Cases	Identifier	Interpretation
	TC41X	Identifiers of test runs (reference only).

Metric #M112	flavorName	
Flavour name	This value is an array containing the names of the virtual machine configurations (flavours) for each individual execution of the test case sequence on a virtual machine. The size of the array corresponds to the number of virtual machines that are instantiated.	
Measurement Unit	string	
Range values	N/A	
Measurement Strategy	N/A	
Dependencies and Variability	N/A	
Limitations / Other comments	This is not a measurement, but reported along with the actual metrics.	
Test Categories	Cloud Services	
Test Cases	Identifier	Interpretation
	TC41X	Names of VM flavours used for test runs (reference only).

Metric #M113	costHour	
Hourly cost of VM	This value is an array containing the hourly cost of each virtual machine that is temporarily used for the execution of the test case sequence. The size of the array corresponds to the number of virtual machines that are instantiated. As different flavours may be used in the same test scenario execution, the values may vary.	
Measurement Unit	Euros	
Range values	N/A	
Measurement Strategy	N/A	
Dependencies and Variability	N/A	
Limitations / Other comments	This is not a measurement, but reported along with the actual metrics.	
Test Categories	Cloud Services	
Test Cases	Identifier	Interpretation
	TC41X	Hourly cost of VMs used for test runs (reference only).

Metric #M114	costMonth	
Hourly cost of VM	This value is an array containing the monthly cost of each virtual machine that is temporarily used for the execution of the test case sequence. The size of the array corresponds to the number of virtual machines that are instantiated. As different flavours may be used in the same test scenario execution, the values may vary.	
Measurement Unit	Euros	
Range values	N/A	
Measurement Strategy	N/A	
Dependencies and Variability	N/A	
Limitations / Other comments	This is not a measurement, but reported along with the actual metrics.	
Test Categories	Cloud Services	
Test Cases	Identifier	Interpretation
	TC41X	Monthly cost of VMs used for test runs (reference only).

Metric #M115	duration	
Duration of VM	This metric is an array reporting the lifetimes of the virtual machines created temporarily for the purpose of individual test executions. The size of the array corresponds to the number of virtual machines that are instantiated.	
Measurement Unit	milliseconds	
Range values	The values typically range from 300,000 to over 600,000, but could also be significantly higher, depending on the nature of the test (e.g. download only or processing of downloaded data).	
Measurement Strategy	The time that passes between the request for creating the virtual machine and its confirmed deletion is measured for each individual execution on a virtual machine and placed in the value array.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Cloud Services	
Test Cases	Identifier	Interpretation
	TC41X	Lifetime of VMs used for test runs.

Metric #M116	processDuration	
Process duration on VM	This metric is an array reporting the effective duration of the test executions on the virtual machines created temporarily for the purpose of individual test executions. The size of the array corresponds to the number of virtual machines that are instantiated.	
Measurement Unit	milliseconds	
Range values	The values typically range from 60,000 to 300,000, but could also be significantly higher, depending on the nature of the test (e.g. download only or processing of downloaded data).	
Measurement Strategy	The time that passes between the start of the processing command, such as the instantiation of the Docker container, and the completion of the command is measured for each individual execution on a virtual machine and placed in the value array.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Cloud Services	
Test Cases	Identifier	Interpretation
	TC41X	Effective duration of test executions on VMs.

Metric #M117	totalDuration	
Total test duration	This metric is an the sum of total lifetimes of the virtual machines created temporarily for the purpose of individual test executions.	
Measurement Unit	milliseconds	
Range values	The values typically range from 300,000 to over 600,000 for each run, but could also be significantly higher, depending on the nature of the test (e.g. download only or processing of downloaded data). Given that it is the sum of all several VMs' durations, the value is a multiple of that and depends on the number of parallel tests.	
Measurement Strategy	The time that passes between the request for creating the virtual machine and its confirmed deletion is measured for each individual execution on a virtual machine and added to the total.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Cloud Services	

Test Cases	Identifier	Interpretation
	TC41X	Total lifetime of VMs used for test runs. It corresponds to the hypothetical duration of the test if VMs were used sequentially rather than in parallel.

Metric #M118	avgProcessDuration	
Average process duration on VM	This metric is an array reporting the average effective duration of the test executions on the virtual machines created temporarily for the purpose of individual test executions. This is relevant for test cases where several serial processes of the same kind are executed on the same virtual machine. The size of the array corresponds to the number of virtual machines that are instantiated.	
Measurement Unit	milliseconds	
Range values	The values typically range from 60,000 to 300,000, but could also be significantly higher, depending on the nature of the test (e.g. download only or processing of downloaded data).	
Measurement Strategy	The time that passes between the start of the processing command, such as the instantiation of the Docker container, and the completion of the command is measured for each individual execution on a virtual machine, and the averages per virtual machine and placed in the value array.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Cloud Services	
Test Cases	Identifier	Interpretation
	TC41X	Effective duration of test executions on VMs.

Metric #M119	processCount	
Average process duration on VM	This metric is an array reporting the number of serial processes of the same kind, e.g. data transformations of a series of products, that are executed on the same virtual machine. The size of the array corresponds to the number of virtual machines that are instantiated.	
Measurement Unit	no unit	
Range values	The values range from 1 to low two-figure values	
Measurement Strategy	The value is a simple count.	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Cloud Services	
Test Cases	Identifier	Interpretation
	TC41X	Number of serial process within test executions on VMs.

Metric #M201	registrationTimeSpan
Description	Time to get a free account
Measurement Unit	minutes
Range values	From a few minutes to hours/days
Measurement Strategy	Register for a free account

Dependencies and Variability	N/A
Limitations / Other comments	N/A
Test Categories	Manual Procedures
Test Procedures	**Identifier**	**Interpretation**
	#TP01	Register for a free account

Metric #M202	subscriptionDocCompleteness	
Description	This metric provides an indication of the documentation completeness as ratio between positive answered questions over the total on the #TP02	
Measurement Unit	Counts	
Range values	From a few to several units	
Measurement Strategy	Add all positive answers to a set of predefined questions (see TP)	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP02	Review Subscription documentation

Metric #M203	subscriptionSupportAnswerTime	
Description	Time for getting an acceptable answer from the provider's help-desk for a question relevant to the subscription	
Measurement Unit	minutes	
Range values	From a few minutes to hours/days	
Measurement Strategy	Request support for subscription	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP03	Request support for subscription

Metric #M204	subscriptionSupportThreadLength	
Description	Number of messages exchanged between the user and the help-desk to get an acceptable answer	
Measurement Unit	Counts	
Range values	From a few units to several	
Measurement Strategy	Request support for subscription	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP03	Request support for subscription

Metric #M205	subscriptionSupportAppreciation

Description	Answers general appreciation	
Measurement Unit	Counts	
Range values	From a few units to several	
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP03	Request support for subscription

Metric #M206	subscriptionTimeSpan	
Description	Time to get a commercial account	
Measurement Unit	minutes	
Range values	From a few minutes to hours/days	
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP04	Subscribe for a commercial account

Metric #M207	subscriptionPaymentMethodPrioNumber	
Description	Priority order of the payment method chosen	
Measurement Unit	Number	
Range values	#1 Paypal #2 Credit Card #3 Bank Transfer (predefined ceiling) #4 Bank Transfer (no roof)	
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP04	Subscribe for a commercial account

Metric #M208	subscriptionFailures	
Description	Number of execution the subscription procedure that did not get a commercial account properly	
Measurement Unit	Counts	
Range values	A few units	
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	

Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP04	Subscribe for a commercial account

Metric #M209	**integrationToolsAdequacy**	
Description	Sum of the scores corresponding to an available tool from a list of expected tools with regard to user's skills	
Measurement Unit	Counts	
Range values	From a few to several	
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP05	Review application integration service offer

Metric #M210	**integrationEnvSetupTimespan**	
Description	Elapsed Time to setup the priviledged development environment	
Measurement Unit	minutes	
Range values		
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP06	Setup Development Environment

Metric #M211	**integrationCompleteness**	
Description	Application Integration Achievement	
Measurement Unit	%	
Range values	0 - 100	
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP07	Perform Application Integration

Metric #M212	**integrationBlockingCause**	
Description	Type of blocking cause of the application integration	
Measurement Unit	string	

Range values	Support ticket identifier	
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP07	− Setup Development Environment - Perform Application Integration

Metric #M213	**integrationSupportAnswerTime**	
Description	Time for getting an acceptable answer from the provider's help-desk for a question relevant to the application integration	
Measurement Unit	minutes	
Range values		
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP08	Request support for application integration

Metric #M214	**integrationSupportThreadLength**	
Description	Number of messages exchanged between the user and the help-desk to get an acceptable answer	
Measurement Unit	Count	
Range values		
Measurement Strategy	Number of iterations (number of reply) metric	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP08	Request support for application integration

Metric #M215	**integrationSupportAppreciation**	
Description	Level of satisfaction with respect to the received answers	
Measurement Unit	Rank	
Range values	1 poor − 5 efficient	
Measurement Strategy	Number of iterations (number of reply) metric	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP08	Request support for application integration

Metric #M216	storageSetupTimeSpan	
Description	Elapsed Time to setup the user storage	
Measurement Unit	minutes	
Range values		
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP09	Setup User Storage

Metric #M217	storageCostPerGB	
Description	Cost of a Gigabyte of persistent storage	
Measurement Unit	euro	
Range values		
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	Setup User Storage	

Metric #M220	integrationCost	
Description	cost of the application integration covering all the operations from the procedures	
Measurement Unit	euro	
Range values		
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	Setup User Storage	

Metric #M301	dataQueryFiltersAdequacy	
Description	Adequacy of the data query filters when searching for data for processing	
Measurement Unit	%	
Range values		
Measurement Strategy	% of available and effective filters	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**

	#TP11	Review Catalogue Data Access Adequacy

Metric #M219	appStorageAvailability	
Description	Availability of a storage for the integrated application	
Measurement Unit	Rank	
Range values	1 poor − 5 efficient	
Measurement Strategy		
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP10	Store Application Container

Metric #M501	dataExploitationToolsAdequacy	
Description	Adequacy of the data query filters when searching for data for processing	
Measurement Unit	%	
Range values		
Measurement Strategy	% of available and effective filters	
Dependencies and Variability	N/A	
Limitations / Other comments	N/A	
Test Categories	Manual Procedures	
Test Procedures	**Identifier**	**Interpretation**
	#TP11	Review Catalogue Data Access Adequacy