Métricas de Calidad Interna y Externa para Servicios Cloud: Un Mapeo Sistemático

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Apéndice 1. Clasificación de las métricas de calidad encontradas en el mapeo sistemático

Leyenda	
Criterios de Extracción de datos	Posibles respuestas para cada criterio de extracción
Característica	AF = Adecuación Funcional, ED = Eficiencia de desempeño, CO = Compatibilidad, US = Usabilidad, FI =Fiabilidad, SE =Seguridad, MA = Mantenibilidad, PO = Portabilidad
Métrica	Nombre de la métrica
Fase del ciclo de vida	Req. = Requisitos, Adq. =Adquisición, Des. = Desarrollo, Int = Integración, Ope. = Operación , Ret = Retiro
Artefacto de software	Esp. = Especificación del servicio cloud, Arq. = Arquitectura del servicio cloud, Ser. =Servicio cloud
Tipo de servicio	SaaS= Software como servicio, PaaS = Plataforma como servicio, IaaS= Infraestructura como servicio
Punto de vista	CSP = Proveedor del servicio, CSC = Consumidor del servicio, CSF = Facilitador del servicio, CSD = Desarrollador del servicio, CF= Cliente final
Procedimiento de validación	A.A. = Aproximación axiomática, A.T.M = Aproximación basada en la Teoría de la Medición,C.E. = Caso de estudio, E. = Encuesta, E.C. = Experimento Controlado, N.V. = No validada, P.C. = Prueba de concepto

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
AF	Accuracy	Accuracy frequency(φs)		x							x	x			x		x								x		S21
AF	Accuracy	Pertinence value(πs)		x							x	x			x		x								x		S21
AF																											
AF	Accuracy	Accuracy frequency		x							x			x	x										x		S17
AF		Suitability of non-essential features		x							x			x	x										x		S17
AF	Accuracy	Accuracy expected					x				x	x			x											x	S47
AF	Accuracy	Accuracy value		x							x			x	x										x		S17
AF	Capacity	Computing Capacity of the Resource					x				x		x		x											x	S47
AF		Total Completeness					x				x	x			x											x	S47
AF		Defects/CS					x				x	x			x											x	S47
AF		Consistency Across Several Instances	x	x							x			x		x	x								x		S50

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
																				Validación Teórica		Validación Empírica			No validada		
AF		Consistency Over a Period of Time	x	x							x			x		x	x								x		S50
AF		PSNR		x			x				x			x	x	x	x						x				S80
AF		SSIM		x			x				x			x	x	x	x						x				S80
AF		Distortion in Interval (DIV)		x			x				x			x	x	x	x						x				S80
ED	Capacity	Bandwidth availability					x				x	x					x									x	S02
ED	Capacity	Bandwidth blocking rate					x				x	x					x									x	S02
ED	Capacity	Page download rate(Rate)					x				x	x	x	x	x				x							x	S04
ED	Capacity	CPU capacity metric(cpu)	x	x							x		x	x	x	x									x		S05
ED	Capacity	Memory capacity metric(mem)	x	x							x		x	x	x	x									x		S05
ED	Capacity	Storage capacity metric(sto)	x	x							x		x	x	x	x									x		S05
ED	Capacity	Network capacity metric(BW)	x	x							x		x	x	x	x									x		S05
ED	Capacity	Capacity of service provider(capacityi)	x	x							x		x	x	x	x									x		S05
ED	Capacity	Throughput of a service provider(Thrapp)	x	x							x				x	x									x		S05
ED	Capacity	Bandwidth					x			x					x	x									x		S10
ED	Capacity	Number of Packet losses					x			x					x	x									x		S10
ED	Capacity	Total Throughput of a Cloud service		x							x				x		x								x		S17
ED	Capacity	Net job rejection rate(ρreject)					x				x				x		x									x	S20
ED	Capacity	Mean number of jobs in RPDE (Erpde)					x				x				x		x									x	S20
ED	Capacity	Capacity of a service(ξ)		x							x	x					x	x								x		S21
ED	Capacity	Average of free CPU capacity of all running hosts(Dyn)		x							x	x					x	x									x	S21
ED	Capacity	Maximum queries processed per second			x						x	x							x				x					S23
ED	Capacity	Throughput					x				x	x		x			x	x							x		S26
ED	Capacity	Service throughput					x				x	x				x	x								x		S29
ED	Capacity	Number of CPU cores(CPU_cores)					x				x				x	x	x									x	S37
ED	Capacity	CPU Performance Coefficient(CPU-PC)					x				x				x	x	x									x	S37
ED	Capacity	Data transmission speed achieved					x				x	x					x								x		S45
ED	Capacity	Network Bandwidth					x				x	x					x									x	S47
ED	Capacity	Variable Computing Load					x				x	x					x									x	S47

			Fase del Ciclo de vida							Artefacto software		Tipo de Servicio				Punto de vista				Procedimiento de validación								
Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
ED	Capacity	Change in Load Balancing(ΔLB)					x				x	x		x											x		S47
ED	Capacity	System overhead rate(SOR)					x				x			x	x										x		S56
ED	Capacity	Rejection probability(RJ)					x				x				x			x							x		S56
ED	Capacity	Disk input output (I/O) performance		x							x				x		x								x		S60
ED	Capacity	Memory performance		x							x				x		x								x		S60
ED	Capacity	CPU			x		x			x	x			x	x		x	x							x		S75
ED	Capacity	CPU Frequency			x		x			x	x			x	x		x	x							x		S75
ED	Capacity	RAM size			x		x			x	x			x	x		x	x							x		S75
ED	Capacity	Storage size			x		x			x	x			x	x		x	x							x		S75
ED	Capacity	Replication			x		x			x	x			x	x		x	x							x		S75
ED	Capacity	Storage device capacity			x		x			x	x			x	x		x	x							x		S75
ED	Capacity	Permissible storage changes to increased workloads			x		x			x	x			x	x		x	x							x		S75
ED	Capacity	Number of replicas			x		x			x	x			x	x		x	x							x		S75
ED	Capacity	Application capacity			x		x			x	x	x			x		x	x							x		S75
ED	Capacity	Disk read					x				x			x	x	x										x	S70
ED	Capacity	Disk write					x				x			x	x	x										x	S70
ED	Capacity	Load average					x				x			x	x	x										x	S70
ED	Capacity	Flow out					x				x			x	x	x										x	S70
ED	Capacity	Flow in					x				x			x	x	x										x	S70
ED	Capacity	TCP connections			x	x	x				x			x	x	x										x	S70
ED	Capacity	Total processes number					x				x			x	x	x										x	S70
ED	Capacity	Monitored process number	x				x				x			x	x	x										x	S70
ED	Capacity	New connections		x			x				x			x	x	x										x	S70
ED	Capacity	Packets in					x				x			x	x	x										x	S70
ED	Capacity	Packets out					x				x			x	x	x										x	S70
ED	Capacity	Active connections					x				x			x	x	x										x	S70
ED	Capacity	Inactive connections					x				x			x	x	x										x	S70
ED	Capacity	rx_bytes					x			x	x			x	x											x	S76
ED	Capacity	rx_packets					x			x	x			x	x											x	S76
ED	Capacity	tx_bytes					x			x	x			x	x											x	S76

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Fase del Ciclo de vida							Artefacto software		Tipo de Servicio			Punto de vista					Validación Teórica		Validación Empírica			No validada		Ref. Artículo
			Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	
ED	Capacity	tx_packets					x			x	x		x			x										x	S76
ED	Capacity	Efficiency		x			x				x		x				x							x				S71
ED	Capacity	Storage Capacity					x				x						x							x				S71
ED	Capacity	Content					x				x			x	x												x	S74
ED	Capacity	Capacity minimum		x			x				x			x	x		x									x		S82
ED	Capacity	Capacity provisioned		x			x				x			x	x		x									x		S82
ED	Capacity	Excess capacity		x			x				x			x	x		x									x		S82
ED	Capacity	Shortage capacitty		x			x				x			x	x		x									x		S82
ED	Capacity	Agility manteined		x			x				x			x	x		x									x		S82
ED	Capacity	CPU capacity					x				x			x	x		x									x		S78
ED	Capacity	Memory capacity					x				x			x	x		x									x		S78
ED	Capacity	Storage capacity					x				x			x	x		x									x		S78
ED	Capacity	Bandwidth capacity					x				x			x	x		x									x		S78
ED	Capacity	Group of Pictures (GOP)		x			x				x			x	x	x	x							x				S80
ED	Capacity	Capacity					x				x				x	x	x											S87
ED	Fineness	Impact energy (E)					x				x				x			x									x	S59
ED	Fineness	Impact power(P)					x				x				x			x									x	S59
ED	Fineness	Fineness of multiplexing(F)					x				x				x			x									x	S59
ED	Latency	Buffer Access Latency (BAL)					x				x		x				x	x									x	S14
ED	Resource utilization	Efficiency of a service provider(Eapp)	x	x							x				x		x									x		S05
ED	Resource utilization	Storage cost					x				x				x	x											x	S07
ED	Resource utilization	Utilization		x	x						x				x	x	x	x									x	S08
ED	Resource utilization	System efficiency		x							x						x									x		S17
ED	Resource utilization	Data communication		x							x						x									x		S17
ED	Resource utilization	Storage		x							x						x									x		S17
ED	Resource utilization	Compute usage		x							x						x									x		S17
ED	Resource utilization	SLA violation(SLAV)					x				x	x					x	x									x	S18
ED	Resource utilization	Performance Degradation due to Migrations (PDM)					x				x	x					x	x									x	S18
ED	Resource utilization	Turnaround efficiency (TE)					x				x	x	x	x			x										x	S19
ED	Resource utilization	Energy Cost(P)		x							x	x		x			x										x	S21
ED	Resource utilization	Average number of queries			x						x	x										x			x			S23
ED	Resource utilization	Power consumed by the CPU		x							x			x			x									x		S25
ED	Resource utilization	Total energy consumption(E)		x							x			x			x									x		S25

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
ED	Resource utilization	Energy efficiency at node level for IaaS providers					x				x			x			x									x	S27
ED	Resource utilization	Energy efficiency at infrastructure level for IaaS providers					x				x			x			x									x	S27
ED	Resource utilization	Energy efficiency at VM level for IaaS providers					x				x			x			x									x	S27
ED	Resource utilization	Energy efficiency at service level for SaaS providers					x				x	x					x									x	S27
ED	Resource utilization	Resource Utilization(U)					x				x			x	x			x							x		S28
ED	Resource utilization	Service use rate					x				x	x				x	x								x		S29
ED	Resource utilization	Mean queue length (MQL)					x				x			x	x											x	S30
ED	Resource utilization	Packet loss probability					x				x			x	x										x		S31
ED	Resource utilization	Resource Utilization (RU)		x							x	x			x										x		S32
ED	Resource utilization	Efficiency		x							x	x			x										x		S32
ED	Resource utilization	Overall Efficiency(eff)	x	x							x	x			x	x									x		S33
ED	Resource utilization	Mean Number of requests(q)				x					x			x									x			x	S35
ED	Resource utilization	Actual unavailability time of the CPU(CPU_unavailable)					x				x			x	x		x									x	S37
ED	Resource utilization	Utilization of Resource (UoR)					x				x	x			x										x		S38
ED	Resource utilization	Efficiency of a service					x				x	x			x										x		S38
ED	Resource utilization	Video Quality Score(VQS)					x				x	x						x							x		S46
ED	Resource utilization	Quality shifting frequency(QSF)					x				x	x						x							x		S46
ED	Resource utilization	Mean buffering duration (MBD)					x				x	x						x							x		S46
ED	Resource utilization	Re-buffering frequency (RBF)					x				x	x						x							x		S46
ED	Resource utilization	Database Backup for every CS					x				x	x			x											x	S47
ED	Resource utilization	User Self Service Rate					x				x		x		x											x	S47
ED	Resource utilization	Performance-Cost Normalization (PCN)	x	x							x			x		x	x								x		S50
ED	Resource utilization	Performance (P)	x	x							x			x		x	x								x		S50
ED	Resource utilization	Total Cost(C)	x	x							x			x		x	x								x		S50
ED	Resource utilization	Energy consumption(E)					x				x			x	x		x								x		S55
ED	Resource utilization	Cost(C)					x				x			x	x		x								x		S55
ED	Resource utilization	Utility of performance for request(Pi)					x				x			x	x		x								x		S55

| | | | Fase del Ciclo de vida | | | | | | | Artefacto software | | Tipo de Servicio | | | | Punto de vista | | | | Procedimiento de validación | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | Validación Teórica | | Validación Empírica | | | No validada | | |
Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
ED	Resource utilization	Utilization					x				x	x	x	x	x		x								x		S58
ED	Resource utilization	Variability through relative standard deviation (RSD)		x							x			x			x									x	S60
ED	Resource utilization	Permissible changes to increased workloads			x		x			x	x			x	x		x		x						x		S75
ED	Resource utilization	Permissible capacity fluctuations to workloads			x		x			x	x			x	x		x		x						x		S75
ED	Resource utilization	CPU utilization					x				x			x	x		x										x	S70
ED	Resource utilization	Disk utilization					x				x			x	x		x										x	S70
ED	Resource utilization	Memory utilization					x				x			x	x		x										x	S70
ED	Resource utilization	Connections utilization			x		x				x			x	x		x										x	S70
ED	Resource utilization	performance VM					x				x			x	x			x								x	S77
ED	Resource utilization	Effective arrival					x				x			x	x			x								x	S77
ED	Resource utilization	cpu_usage					x			x	x		x		x											x	S76
ED	Resource utilization	memory_usage					x			x	x		x		x											x	S76
ED	Resource utilization	blkio_io_bytes_read					x			x	x		x		x											x	S76
ED	Resource utilization	blkio_io_bytes_write					x			x	x		x		x											x	S76
ED	Resource utilization	cpuUsedPercent					x			x	x			x	x											x	S76
ED	Resource utilization	memUsed					x			x	x			x	x											x	S76
ED	Resource utilization	memUsedPercent					x			x	x			x	x											x	S76
ED	Resource utilization	diskFree					x			x	x			x	x											x	S76
ED	Resource utilization	diskUsed					x			x	x			x	x											x	S76
ED	Resource utilization	Power Demand					x				x		x		x		x							x			S71
ED	Resource utilization	Content_cc					x				x			x	x												x	S74
ED	Resource utilization	resource allocation					x			x	x	x			x												x	S65
ED	Resource utilization	Average Energy Consumption per Request (AECpR)					x				x	x			x		x										x	S69
ED	Resource utilization	Energy efficiency	x	x			x				x			x	x		x										x	S66
ED	Resource utilization	Power		x			x				x			x	x		x									x		S82
ED	Resource utilization	Density VM					x				x			x	x		x									x		S82
ED	Resource utilization	Density App					x				x		x		x		x									x		S82
ED	Resource utilization	Density User					x				x	x			x		x									x		S82
ED	Resource utilization	Variability					x				x	x	x	x	x		x									x		S82
ED	Resource utilization	Latency					x				x			x	x		x									x		S82
ED	Resource utilization	Total Energy consumption					x				x			x	x		x										x	S83
ED	Resource utilization	VM Migrations					x				x			x	x		x										x	S83
ED	Resource utilization	Resource Utilization					x				x			x	x		x										x	S83
ED	Scalability	Throughput					x			x	x	x			x		x										x	S81

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Fase del Ciclo de vida							Artefacto software		Tipo de Servicio			Punto de vista					Procedimiento de validación — Validación Teórica		Validación Empírica			No validada		Ref. Artículo
			Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	
ED	Scalability	Capacity ratio			x		x			x	x	x			x		x									x	S81
ED	Scalability	Number of tenants	x	x			x			x	x	x			x		x									x	S81
ED	Time behaviour	Performance utility function					x				x			x	x											x		S03
ED	Time behaviour	Data centre metric	x	x							x				x	x	x								x		S05
ED	Time behaviour	Number of data centres	x	x							x				x	x	x								x		S05
ED	Time behaviour	Distance between location of data centre and expected service location	x	x							x				x	x	x								x		S05
ED	Time behaviour	Response Time	x	x							x				x	x	x								x		S05
ED	Time behaviour	Data Transfer Time				x					x			x	x		x										x	S07
ED	Time behaviour	Execution Time				x					x			x	x		x										x	S07
ED	Time behaviour	Expected Service Time (S)			x	x					x			x	x		x						x				x	S08
ED	Time behaviour	Availability at time t (A(t))			x	x					x			x	x		x						x				x	S08
ED	Time behaviour	Instant service probability at time t (I(t))			x	x					x			x	x		x						x				x	S08
ED	Time behaviour	Waiting time(W)			x	x					x			x	x		x						x				x	S08
ED	Time behaviour	Jitter				x				x				x	x		x									x		S10
ED	Time behaviour	Delay				x				x				x	x		x									x		S10
ED	Time behaviour	Weight by user's preference				x				x	x								x								x	S11
ED	Time behaviour	Recommended Service Response Time(RSRT)		x						x	x			x			x										x	S12
ED	Time behaviour	Execution time				x				x	x							x							x		S13
ED	Time behaviour	Time delay(Tws)				x				x	x							x							x		S16
ED	Time behaviour	Average Response Time		x							x			x			x									x		S17
ED	Time behaviour	Maximum Response Time		x							x			x			x									x		S17
ED	Time behaviour	Response Time Failure		x							x			x			x									x		S17
ED	Time behaviour	SLA Violation Time per Active Host (SLATAH)					x			x	x						x	x									x	S18
ED	Time behaviour	Execution Time (Treq,sex)		x						x	x			x			x									x		S21
ED	Time behaviour	Latency(l)		x						x	x			x			x									x		S21
ED	Time behaviour	Average Response Time(Tavg)		x						x	x			x			x										x	S21
ED	Time behaviour	Maximum Response Time(Tmax)		x						x	x			x			x										x	S21
ED	Time behaviour	Response Time Failure(σrep)		x						x	x			x			x										x	S21
ED	Time behaviour	Response Time(Trep)		x						x	x			x			x										x	S21
ED	Time behaviour	Throughput(β)		x						x	x			x			x									x		S21
ED	Time behaviour	Main Loop Iteration Time (MLIT)			x	x				x		x	x	x	x				x							x		S22
ED	Time behaviour	Time Spent with Physics (TSP)			x	x				x		x	x	x	x				x							x		S22

Column groups: **Fase del Ciclo de vida** (Req., Adq., Des., Int., Ope., Ret., Esp.) · **Artefacto software** (Arq., Ser.) · **Tipo de Servicio** (SaaS, PaaS, IaaS) · **Punto de vista** (CSP, CSF, CSC, CF, CSD) · **Procedimiento de validación** — Validación Teórica (A.A, A.T.M.), Validación Empírica (E.C., C.E., E.), No validada (N.V., P.C.)

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
ED	Time behaviour	Time Spent with Rendering (TSR)			x	x				x		x	x	x	x			x							x		S22
ED	Time behaviour	Response time			x						x	x						x					x				S23
ED	Time behaviour	Response time				x					x	x		x				x							x		S26
ED	Time behaviour	Response Time(R)				x					x			x	x			x							x		S28
ED	Time behaviour	Response time				x					x	x				x	x								x		S29
ED	Time behaviour	Jitter				x					x			x	x										x		S31
ED	Time behaviour	Delay				x					x			x	x										x		S31
ED	Time behaviour	Time Behaviour (TB)		x							x	x			x										x		S32
ED	Time behaviour	Response time efficiency of a SaaS provider(rtEff)	x	x							x	x			x					x					x		S33
ED	Time behaviour	Mean response time(r)			x						x			x								x				x	S35
ED	Time behaviour	Behavior of Time (BoT)				x					x	x	x		x										x		S38
ED	Time behaviour	Jitter(J)				x					x	x	x		x										x		S39
ED	Time behaviour	Throughput				x					x	x	x		x										x		S39
ED	Time behaviour	Delay				x					x	x	x		x										x		S39
ED	Time behaviour	Ending Time(Te)				x					x	x	x					x								x	S40
ED	Time behaviour	Gap Time(Tg)				x					x	x	x					x								x	S40
ED	Time behaviour	Interval Time (Ti)				x					x	x	x					x								x	S40
ED	Time behaviour	Preparing Time(Tp)				x					x	x	x					x								x	S40
ED	Time behaviour	Transcoding Jitter Probability(ε)				x					x	x	x		x										x		S41
ED	Time behaviour	Delay				x					x	x	x		x										x		S45
ED	Time behaviour	Initial Buffering Time (IBT)				x					x	x	x					x							x		S46
ED	Time behaviour	Latency				x					x	x	x		x											x	S47
ED	Time behaviour	No. of commits per second				x					x		x		x											x	S47
ED	Time behaviour	MB per second				x					x		x		x											x	S47
ED	Time behaviour	No. of new orders per second				x					x		x		x											x	S47
ED	Time behaviour	No. of actions per minute				x					x		x		x											x	S47
ED	Time behaviour	No. of accesses per second				x					x		x		x											x	S47
ED	Time behaviour	Persistence				x					x	x	x	x	x											x	S47
ED	Time behaviour	Service performance utility		x							x	x	x	x	x		x								x		S48
ED	Time behaviour	Time slot utility function		x							x	x	x	x	x			x							x		S48

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
ED	Time behaviour	Response Time					x				x		x		x										x		S49
ED	Time behaviour	User rating					x				x	x	x	x				x							x		S51
ED	Time behaviour	Gaming Response Time(RT)					x				x	x						x								x	S53
ED	Time behaviour	Round-trip reaction delay (RTRD)					x				x	x							x							x	S54
ED	Time behaviour	Waiting time(T)					x				x			x	x		x								x		S55
ED	Time behaviour	Expected Request completion time(E(RCT))					x				x			x				x							x		S56
ED	Time behaviour	SLA response time					x				x			x	x	x									x		S57
ED	Time behaviour	Response Time					x				x	x	x	x	x	x										x	S58
ED	Time behaviour	The percentile of response time					x				x	x	x	x	x			x								x	S58
ED	Time behaviour	Throughput					x				x	x	x	x	x	x									x		S58
ED	Time behaviour	CPU performance		x							x			x			x									x	S60
ED	Time behaviour	Mean Response time (MRT)		x							x			x			x									x	S60
ED	Time behaviour	Provisioning time		x							x			x			x									x	S60
ED	Time behaviour	Instance mean starting time			x	x				x	x			x	x		x	x							x		S75
ED	Time behaviour	Instance standard deviation starting time			x	x				x	x			x	x		x	x							x		S75
ED	Time behaviour	Response mean time (synchronous operation)			x	x				x	x			x	x		x	x							x		S75
ED	Time behaviour	Response standard deviation time (synchronous operation)			x	x				x	x			x	x		x	x							x		S75
ED	Time behaviour	Completion mean time (asynchronous task)			x	x				x	x			x	x		x	x							x		S75
ED	Time behaviour	Completion standard deviation time (asynchronous task)			x	x				x	x			x	x		x	x							x		S75
ED	Time behaviour	Bandwidth			x	x				x	x			x	x		x	x							x		S75
ED	Time behaviour	throughput			x	x								x	x		x	x							x		S75
ED	Time behaviour	Delay			x	x				x	x			x	x		x	x							x		S75
ED	Time behaviour	jitter			x	x								x	x		x	x							x		S75
ED	Time behaviour	IOPS	x				x				x			x	x		x									x	S70
ED	Time behaviour	Delay Time					x				x			x	x		x									x	S70
ED	Time behaviour	performance					x				x			x	x			x								x	S77
ED	Time behaviour	service time of the task					x				x			x	x			x								x	S77

Agrupaciones de cabecera: **Fase del Ciclo de vida** (Req. Adq. Des. Int. Ope. Ret. Esp.) · **Artefacto software** (Arq. Ser.) · **Tipo de Servicio** (SaaS PaaS IaaS CSP) · **Punto de vista** (CSF CSC CF CSD) · **Procedimiento de validación**: Validación Teórica (A.A, A.T.M.), Validación Empírica (E.C., C.E., E.), No validada (N.V., P.C.)

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
ED	Time behaviour	Throughput					x					x	x		x											x	S72
ED	Time behaviour	Latency Read					x					x	x		x											x	S72
ED	Time behaviour	Latency Update					x					x	x		x											x	S72
ED	Time behaviour	requestCount					x					x	x		x											x	S76
ED	Time behaviour	processingTime					x					x	x		x											x	S76
ED	Time behaviour	requestThroughput					x					x	x		x											x	S76
ED	Time behaviour	readLatency					x					x	x		x											x	S76
ED	Time behaviour	writeLatency					x					x	x		x											x	S76
ED	Time behaviour	netPacketsIn					x			x		x		x	x											x	S76
ED	Time behaviour	netPacketsOut					x			x		x		x	x											x	S76
ED	Time behaviour	netBytesIn					x			x		x		x	x											x	S76
ED	Time behaviour	netBytesOut					x			x		x		x	x											x	S76
ED	Time behaviour	Response Time	x	x			x					x			x		x			x					x		S67
ED	Time behaviour	ProcessingTime	x	x			x					x			x		x			x					x		S67
ED	Time behaviour	Throughput	x	x			x					x			x		x								x		S67
ED	Time behaviour	Data transfer rate	x	x			x					x			x		x			x					x		S67
ED	Time behaviour	Latency					x					x			x		x								x		S67
ED	Time behaviour	Timeliness	x	x			x					x			x		x								x		S67
ED	Time behaviour	Delay Time	x	x			x					x			x		x								x		S67
ED	Time behaviour	Location	x	x		x				x		x	x	x	x	x	x								x		S67
ED	Time behaviour	Execution time		x			x			x		x	x	x	x		x						x				S71
ED	Time behaviour	Speed		x			x			x		x		x	x		x						x				S71
ED	Time behaviour	Speedup		x			x					x	x	x	x		x						x				S71
ED	Time behaviour	Latency					x					x		x	x		x						x				S71
ED	Time behaviour	Throughput					x					x	x		x		x						x				S71
ED	Time behaviour	Bandwidth					x					x		x	x		x						x				S71
ED	Time behaviour	Productivity	x	x			x					x	x		x		x						x				S71
ED	Time behaviour	Time					x					x				x	x									x	S74
ED	Time behaviour	TGuard					x					x				x	x									x	S74
ED	Time behaviour	Reset state					x					x				x	x									x	S74
ED	Time behaviour	performance					x					x				x	x									x	S74

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
ED	Time behaviour	Conference start time					x			x	x	x			x											x	S65
ED	Time behaviour	Participant joining time					x			x	x	x			x											x	S65
ED	Time behaviour	Response Time					x					x	x		x		x									x	S69
ED	Time behaviour	Workload arrival rate					x					x	x		x		x									x	S69
ED	Time behaviour	Average Response time	x	x			x					x		x	x		x									x	S66
ED	Time behaviour	Response time		x			x					x		x	x		x								x		S82
ED	Time behaviour	Throughput		x			x					x		x	x		x								x		S82
ED	Time behaviour	Service Response time	x	x			x					x	x		x		x									x	S79
ED	Time behaviour	data center metric	x	x			x		x			x	x	x	x	x	x								x		S78
ED	Time behaviour	Response Time					x					x		x	x		x								x		S78
ED	Time behaviour	Throughput service provider					x					x		x	x		x								x		S78
ED	Time behaviour	efficiency					x					x		x	x		x								x		S78
ED	Time behaviour	Latency					x					x		x	x	x	x							x				S80
ED	Time behaviour	Delta		x			x					x		x	x	x	x							x				S80
ED	Time behaviour	Jitter					x					x		x	x	x	x							x				S80
ED	Time behaviour	Skew		x			x					x		x	x	x	x							x				S80
ED	Time behaviour	BandWidth		x			x					x		x	x	x	x							x				S80
ED	Time behaviour	StreamEye		x			x					x		x	x	x	x							x				S80
ED	Time behaviour	Response time		x			x					x	x	x	x		x											S85
ED	Time behaviour	Throughput		x			x					x	x	x	x		x											S85
ED	Time behaviour	Delay time					x					x		x	x		x									x		S84
ED	Time behaviour	Response Time					x					x		x	x		x											S87
ED	Time behaviour	Latency					x					x		x	x		x											S87
ED	Time behaviour	Service Response time					x					x	x	x	x		x								x			S73
ED	Time behaviour	Throughput					x					x	x	x	x		x								x			S73
ED	Turnaround Efficiency	Turnaround efficiency of a resource Rk (TE)		x								x	x	x	x		x								x			S36
ED		Internet Accessibility Radio (IA)					x					x	x		x											x	S47
ED		correlation performance security					x					x		x	x			x								x	S77
CO	Interoperability	Interoperability		x			x					x	x	x	x		x											S85
CO	Interoperability	Interoperability		x								x			x		x								x			S17
CO		Service Modularity(SM)					x					x	x		x										x			S38
CO	Interoperability	Service Interoperability(SF)					x					x	x		x										x			S38
CO		Composability					x					x	x		x										x			S38
CO		User rating					x					x	x	x	x		x								x			S51

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
															Punto de vista					Validación Teórica		Validación Empírica			No validada		
US	Installability	Average time experienced by the previous users to install		x							x				x		x	x							x		S17
US	Learnability	Average time experienced by the previous users to learn		x							x				x		x	x							x		S17
US	Learnability	Usability	x	x			x				x			x	x		x									x	S66
US	Understandability	Average time experienced by the previous users to understand		x							x				x		x								x		S17
US	Usability	Usability		x			x				x	x			x		x									x	S79
US	Operability	Average time experienced by the previous users to operate		x							x				x		x	x							x		S17
US		Learnability					x				x	x			x											x	S47
US	Operability	Success ratio					x				x	x			x											x	S47
US		User rating					x				x	x	x	x				x							x		S51
US		Usability (USAB-CQ)			x		x				x	x	x	x	x		x	x								x	S61
US		Usability (USAB)				x	x				x	x	x	x	x		x	x								x	S62
FI	Availability	Availability(Av)					x				x	x	x	x	x		x								x		S04
FI	Availability	Availability % up to Nth minute					x				x				x		x									x	S06
FI	Availability	Availability of the Composite Service C up to Nth minute					x				x			x	x											x	S06
FI	Availability	Availability					x				x	x			x										x		S09
FI	Availability	Availability(Av)		x							x	x			x		x								x		S21
FI	Availability	Availability of resource Rk(AV)		x							x	x	x	x	x		x								x		S36
FI	Availability	Downtime					x				x	x			x										x		S09
FI	Availability	Availability (AVAL-CQ)					x				x	x	x				x									x	S61
FI	Availability	Availability (AVAL)					x				x	x	x				x									x	S62
FI	Availability	Uptime percentage					x				x	x	x	x			x									x	S63
FI	Availability	Percentage of service uptime			x		x			x	x	x			x	x	x					x				x		S75
FI	Availability	Duration of a single outage			x		x			x	x	x			x	x	x					x				x		S75
FI	Availability	VM available probability					x				x			x	x		x								x	S77
FI	Availability	security metric					x				x			x	x			x								x	S77
FI	Availability	Uptime					x				x			x	x		x								x		S67
FI	Availability	Uptime percentage					x				x			x	x		x						x				S71
FI	Availability	Availability					x				x			x	x		x								x		S74
FI	Availability	Availability	x	x			x				x			x	x		x									x	S66
FI	Availability	Availability		x			x				x			x	x		x								x		S82
FI	Availability	Availability	x	x			x				x	x		x	x		x									x	S79
FI	Availability	Availability	x	x			x				x	x	x	x	x	x	x								x		S78

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
FI	Availability	Reliability			x		x				x	x	x	x	x		x										S85
FI	Availability	Availability			x		x				x	x	x	x	x		x										S85
FI	Availability	Instantaneous Availability					x				x			x	x		x								x		S86
FI	Availability	Mean Availability					x				x			x	x		x								x		S86
FI	Availability	Steady-state availability					x				x			x	x		x								x		S86
FI	Availability	Operational availability					x				x			x	x		x								x		S86
FI	Availability	Availability					x				x			x	x		x						x				S73
FI	Continuity	Incidence of accidents (IoA)					x				x	x	x	x			x									x	S63
FI	Continuity	Repair rate of accidents (RRoA)					x				x	x	x	x			x									x	S63
FI	Continuity	Readiness of emergency preparedness for key businesses (RoEPKB)	x						x		x	x	x					x							x	S63
FI	Fault tolerance	Fault tolerance(FTs)		x							x	x			x		x								x		S21
FI	Fault tolerance	Mean Time between Failures(MTBF)					x				x	x			x											x	S47
FI	Fault tolerance	Mean Time to Failure(MTTF)					x				x	x			x											x	S47
FI	Fault tolerance	Functioning duration between failure (MTTF)		x							x	x			x		x								x		S21
FI	Fault tolerance	Mean time between failures (MTBF)					x				x	x	x	x	x		x								x		S62
FI	Fault tolerance	Mean Time between Failures(MTBF)					x				x	x		x	x											x	S47
FI	Fault tolerance	Mean time to failure (MTTF)					x				x	x	x	x	x		x								x		S62
FI	Fault tolerance	Mean Time to Failure(MTTF)					x				x	x		x	x											x	S47
FI	Fault tolerance	Mean Time between Failures(MTBF)	x	x							x			x		x	x								x		S05
FI	Fault tolerance	Time between consecutive service failures			x		x			x	x	x		x	x		x			x					x		S75
FI	Fault tolerance	Reliability	x	x			x				x			x	x		x								x		S67
FI	Fault tolerance	Uptime	x	x			x				x			x	x		x									x	S66
FI	Fault tolerance	Uptime		x			x				x			x	x		x								x		S82
FI	Fault tolerance	mean time between failures		x			x				x			x	x		x								x		S82
FI	Fault tolerance	MTBF					x				x	x		x	x		x								x		S78

Grupos de columnas: **Fase del Ciclo de vida** (Req. Adq. Des. Int. Ope. Ret. Esp.) · **Artefacto software** (Arq. Ser.) · **Tipo de Servicio** (SaaS PaaS IaaS) · **Punto de vista** (CSP CSF CSC CF CSD) · **Procedimiento de validación** — Validación Teórica (A.A, A.T.M) / Validación Empírica (E.C., C.E., E.) / No validada (N.V., P.C.)

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
FI	Fault tolerance	I-Frame Loss Rate (IFLR)	x				x				x			x	x	x	x					x					S80
FI	Fault tolerance	Reliability Importance					x				x				x	x	x								x		S86
FI	Fault tolerance	MTBF					x				x				x	x	x										S87
FI	Fault tolerance	MTBF					x				x	x	x	x	x		x								x		S73
FI	Maturity	Bigdata Analytics					x				x	x	x		x		x							x				S71
FI	Maturity	Accuracy	x				x				x	x	x	x	x		x										S85
FI	Recoverability	Mean time to recover					x				x	x				x	x								x		S29
FI	Recoverability	Mean Time to Repair (MTTR)					x					x	x		x	x										x	S47
FI	Recoverability	Time to switchover from a failure		x			x				x	x	x		x	x		x							x		S75
FI	Recoverability	Time to a complete recovery from a service failure		x			x				x	x	x		x	x		x							x		S75
FI	Recoverability	Recoverability					x				x				x		x							x			S71
FI	Recoverability	Downtime	x				x				x				x		x								x		S82
FI	Recoverability	Durability	x				x				x				x		x								x		S82
FI	Recoverability	Data loss	x				x				x				x		x								x		S82
FI	Recoverability	Packet Loss Rate (PLR)	x				x				x				x	x	x						x				S80
FI	Recoverability	Packet Loss Distribution (PLD)	x				x				x				x	x	x						x				S80
FI	Recoverability	Recovery point objective (RPO)					x				x				x		x								x		S86
FI	Recoverability	Recovery time objective (RTO)					x				x				x		x								x		S86
FI	Recoverability	MTTR					x				x				x		x										S87
FI	Recoverability	MTTR					x				x	x	x	x	x		x								x		S73
FI	Reliability	Reliability(Re)	x								x	x			x		x								x		S21
FI	Reliability	Reliability of resource Rk(RE)	x								x	x	x	x	x		x								x		S36
FI	Reliability	Reliability (REL-CQ)					x				x	x	x	x	x									x		x	S61
FI	Reliability	Reliability (REL)					x				x	x	x	x											x	x	S62
FI	Resiliency	Degradation time (Tdeg)	x	x							x				x		x	x								x	S08

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
FI	Resiliency	Recovery time(Trec)		x	x						x			x	x		x	x								x	S08
FI	Resiliency	Maximum performance loss(MPL)		x	x						x			x	x		x	x								x	S08
FI	Robustness	Robustness(Rob)		x							x	x			x		x									x	S21
FI	Time behaviour	Reliability state					x				x			x	x											x	S74
FI		Accuracy of service(AoS)					x				x	x			x										x		S38
FI		Availability Efficiency of a SaaS provider (avEff)	x	x							x	x			x	x									x		S33
FI	Availability	Availability rate					x				x			x	x		x									x	S07
FI		Completeness of variant set(CoM)					x				x	x			x										x		S38
FI		Dependability(Ds)			x						x	x		x				x							x		S42
FI		Flexibility of service(FOS)					x				x	x			x										x		S38
FI		Mean Number of PMs in active mode(Npm)					x				x			x	x										x		S44
FI		Ratio of available VMs to accepted VM requests(Rava)					x				x			x	x										x		S44
FI		Reliability Efficiency of a SaaS provider (rlEff)	x	x							x	x			x	x									x		S33
FI		Settling Time (Tset)					x				x			x			x									x	S20
FI		Peak Overshoot or Undershoot (PO)					x				x			x			x									x	S20
FI		Peak Time (Tpeak)					x				x			x			x									x	S20
FI		Percentile Time (Tpercentile)					x				x			x			x									x	S20
FI		Response time					x				x	x		x											x		S38
FI		Robustness of Service(ROS)		x							x	x		x											x		S32
FI	Availability	Availability(A)		x	x						x			x	x		x	x								x	S08
FI	Availability	Availability(Aws)					x				x	x					x								x		S16
FI	Availability	Availability		x							x			x			x								x		S17
FI	Availability	Availabity(AV)					x				x	x	x	x			x									x	S19
FI	Availability	Service Availability		x							x	x	x	x	x		x	x							x		S24
FI	Availability	Availability					x				x	x				x	x								x		S29
FI	Availability	Availability of web service					x				x	x			x										x		S38
FI	Availability	Availability					x				x	x			x											x	S47
FI	Availability	Service availability		x							x	x		x	x		x								x		S48
FI	Availability	Availability (Av)	x	x							x	x	x	x		x	x								x		S52
FI	Availability	Availability					x				x	x	x	x	x			x								x	S58
FI	Availability	Availability		x							x			x			x									x	S60
FI		Mean queue length (MQL)					x				x			x	x											x	S30

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Fase del Ciclo de vida							Artefacto software		Tipo de Servicio			Punto de vista					Procedimiento de validación							Ref. Artículo
			Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	
FI		User rating					x				x	x	x	x	x			x							x		S51
FI		Weight by user's preference					x				x	x	x					x								x	S11
FI	Fault tolerance	Fault Tolerance (FT)					x				x	x	x				x								x		S38
FI	Recoverability	Failure Recovery (FR)					x				x	x	x				x								x		S38
FI	Recoverability	Coverage of Failure Recovery (CFR)		x							x	x	x				x								x		S32
FI	Fault tolerance	Coverage of Fault Tolerance (CFT)		x							x	x	x				x								x		S32
FI		Reliability(R)	x	x							x	x				x	x								x		S05
FI		Reliability(Relws)				x					x	x	x				x								x		S16
FI		Reliability		x							x	x		x			x								x		S17
FI		Reliability(RE)				x					x	x	x	x	x		x									x	S19
FI		Reliability		x							x	x	x				x								x		S32
FI		Reliability of web service					x				x	x	x				x								x		S38
FI		Reliability					x				x	x	x		x	x										x	S47
FI		Service reliability		x							x	x	x		x	x	x								x		S48
FI		Service Accuracy (SA)		x							x	x	x		x										x		S32
FI		User rating					x				x	x	x	x	x				x							x		S51
FI		Weight by user's preference					x				x	x	x					x								x	S11
FI		Serviceability					x				x	x			x	x										x	S47
FI		Reliability of processor					x				x			x	x		x								x		S15
FI		Server reliability					x				x			x	x		x								x		S15
FI		Reliability of Links					x				x			x	x		x								x		S15
FI		System reliability					x				x			x	x		x								x		S15
FI		Defective Operations Per Millon attemps (DPM)					x				x	x			x		x	x						x			S64
FI		Reliability					x				x	x			x		x								x		S78
FI	Availability	Availability					x				x	x			x		x										S87
FI	Fault tolerance	MTTF					x				x	x	x	x	x		x							x			S73
SE	Authenticity	Ac_state					x				x				x	x										x	S74
SE	Authenticity	Authenticity					x				x				x	x										x	S74
SE	confidentiality	Probability an APT accessed					x				x				x	x	x									x	S68
SE	Confidentiality	Certification	x	x			x	x			x	x	x	x	x	x	x	x				x			x		S78
SE	Data Integrity	Data Integrity of resource Rk(DI)		x								x	x	x	x		x								x		S36
SE	integrity	Probability the APT detected					x				x				x	x	x									x	S68
SE	Integrity	Integritymetrics					x				x				x	x										x	S74

Column groups: **Fase del Ciclo de vida** (Req., Adq., Des., Int., Ope., Ret., Esp.) · **Artefacto software** (Arq., Ser.) · **Tipo de Servicio** (SaaS, PaaS, IaaS) · **Punto de vista** (CSP, CSF, CSC, CF, CSD) · **Procedimiento de validación**: Validación Teórica (A.A, A.T.M.), Validación Empírica (E.C., C.E., E.), No validada (N.V., P.C.)

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
SE	integrity	Ac_trans					x					x		x	x										x		S74
SE	Privacy	Privacy					x					x		x	x										x		S74
SE	Security	Security (SECY)					x					x	x	x	x			x							x		S62
SE	Security	Security (SECY-CQ)					x					x	x	x	x			x							x		S61
SE	Security	Security Management		x			x					x			x		x								x		S79
SE	integrity	Data Integrity(DI)					x					x	x	x	x		x								x		S19
SE		Integrity					x					x	x		x										x		S47
SE		Weight by user's preference					x					x	x					x							x		S11
SE		Number of Fake alarms monitored by Corporate Security					x					x	x		x										x		S47
SE		Number of ineffectual service responses to the issues identified by the Security as control weaknesses					x					x	x		x										x		S47
SE		Number of safety hazards proactively identified					x					x	x		x										x		S47
SE		Percentage of dangerous data resources residing on systems					x					x	x		x										x		S47
SE		Security cost					x					x	x		x										x		S47
SE		Weight by user's preference					x					x	x					x							x		S11
SE		Security index value (Iv)		x								x	x	x	x			x							x		S43
SE		SLA/Security	x	x			x					x		x	x	x	x					x					S71
SE		secure					x					x		x	x										x		S74
SE	integrity	Integrity					x					x		x	x										x		S74
SE		Security	x	x	x	x	x		x			x	x	x	x	x	x									x	S78
SE		Security					x					x		x	x		x										S87
MA	Analysability	MTTD					x					x	x	x	x		x								x		S73
MA	Analysability	MTTE					x					x	x	x	x		x								x		S73
MA	Modifiability	Mean Time to Change with respect to particular Cloud Service(MTTC)					x					x	x		x										x		S47

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Fase del Ciclo de vida							Artefacto software		Tipo de Servicio			Punto de vista					Procedimiento de validación							Ref. Artículo
																				Validación Teórica		Validación Empírica			No validada		
			Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	
MA	Modifiability	Number of dynamic changes in a Cloud service with respect to a workload (Nd)					x				x	x			x											x	S47
MA	Modifiability	Number of static changes in a Cloud service with respect to a workload (Ns)					x				x	x			x											x	S47
MA	Modifiability	Customizability					x				x	x			x											x	S47
MA	Modifiability	Stability		x							x			x			x								x		S17
MA	Modifiability	Stability(St)					x				x	x			x		x								x		S21
MA	Modifiability	Stabilize rate					x				x	x			x		x									x	S69
MA	Modifiability	Flexibility	x	x			x				x			x	x		x									x	S66
MA	Modifiability	Stability	x	x			x				x			x	x		x									x	S66
MA	Modifiability	Flexibility		x			x				x	x			x		x									x	S79
MA	Reusability	Non Functional Commonali-ty(NFC)		x			x				x	x			x	x									x		S73
MA	Reusability	Functional Commonality(FC)		x			x				x	x			x	x									x		S73
MA	Reusability	Coverage of variability		x			x				x	x			x	x									x		S73
MA		Awarability of Service(AoS)					x				x	x			x										x		S38
MA		Commonality feature(CF)					x				x	x			x										x		S38
MA		Coverage of Variability(CV)		x							x	x			x										x		S32
MA		Coverage of Variability(CoV)					x				x	x			x										x		S38
MA		User rating					x				x	x	x	x				x							x		S51
MA		Functional Commonality(FC)		x							x	x			x										x		S32
MA		Maintenance reliability					x				x			x	x											x	S34
MA		Non-functional Commonali-ty(NFC)		x							x	x			x										x		S32
MA		Reusability		x							x	x			x										x		S32
MA		Reusability					x				x	x			x										x		S38
MA		Testing time					x				x		x		x											x	S47
MA		Understandability of Service (UoS)					x				x	x			x										x		S38
PO	Adaptabillity	Software Tooling		x	x	x	x				x	x	x	x	x		x							x			S71
PO	Elasticity	Under-provisioning(UDPRdt)		x							x			x		x										x	S01
PO	Elasticity	Over-provisioning(OVPRdt)		x							x			x	x											x	S01
PO	Elasticity	Allocation reactivity(Al)		x							x			x	x			x								x	S01
PO	Elasticity	Release reactivity(Re)		x							x			x	x			x								x	S01

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Fase del Ciclo de vida — Req.	Adq.	Des.	Int.	Ope.	Ret.	Artefacto software — Esp.	Arq.	Ser.	Tipo de Servicio — SaaS	PaaS	IaaS	CSP	Punto de vista — CSF	CSC	CF	CSD	Validación Teórica — A.A	A.T.M.	Validación Empírica — E.C.	C.E.	E.	No validada — N.V.	P.C.	Ref. Artículo
PO	Elasticity	Elasticity	x	x							x			x		x	x								x		S05
PO	Elasticity	Mean time taken to expand or contract the service capacity		x							x			x			x								x		S17
PO	Elasticity	Maximum capacity of service		x							x			x			x								x		S17
PO	Elasticity	Reactivity(Ra)		x							x	x			x		x								x		S21
PO	Elasticity	Elasticity (ELAS-CQ)					x				x	x	x	x	x		x									x	S61
PO	Elasticity	Elasticity (ELAS)					x				x	x	x	x	x		x									x	S62
PO	Elasticity	Overprovisioning resource					x				x			x	x		x									x	S70
PO	Elasticity	Underprovisioning resource					x				x			x	x		x									x	S70
PO	Elasticity	Average Overprovisioning resource (AVEs)					x				x			x	x		x									x	S70
PO	Elasticity	Average Underprovisioning resource (AVEd)					x				x			x	x		x									x	S70
PO	Elasticity	resource (r)					x				x			x	x		x									x	S70
PO	Elasticity	service (s)					x				x			x	x		x									x	S70
PO	Elasticity	Cost (c)					x				x			x	x		x									x	S70
PO	Elasticity	Elasticity					x				x			x	x		x									x	S70
PO	Elasticity	Cloud elasticity					x			x	x			x	x		x								x		S67
PO	Elasticity	Elasticity					x				x		x	x	x	x	x							x				S71
PO	Elasticity	Agility		x			x				x			x	x		x								x		S82
PO	Elasticity	Elasticity					x				x			x	x		x								x		S78
PO	Installability	Virtual Systems	x			x	x			x	x	x	x	x	x		x								x		S67
PO	Installability	Operating systems support	x	x	x	x	x	x			x	x	x	x	x	x	x	x							x		S78
PO	Installability	Platform support	x	x	x	x	x	x			x		x			x	x	x							x		S78
PO	Installability	Virtualization measure	x	x	x	x	x	x			x	x	x	x	x	x	x	x							x		S78
PO	Scalability	Coverage of Scalability		x							x			x				x								x		S01
PO	Scalability	Deployment latency	x	x							x			x		x	x								x		S50
PO	Scalability	Scalability(S)		x							x	x			x		x								x		S21
PO	Scalability	average delay time at scaling up (AVTu)					x				x			x	x		x									x	S70
PO	Scalability	average delay time at scaling down (AVTd)					x				x			x	x		x									x	S70
PO	Scalability	average cost of scaling up (AVCu)					x				x			x	x		x									x	S70
PO	Scalability	average cost of scaling down (AVCd)					x				x			x	x		x									x	S70
PO	Scalability	Scalability Time					x				x			x	x		x								x		S67
PO	Scalability	coverage of scalability					x			x	x			x	x		x								x		S67
PO	Scalability	Scalability					x			x	x	x	x	x	x	x	x						x				S71
PO	Scalability	Scalability		x			x				x	x	x	x	x		x										S85

Característica Calidad	Subcaracterística (interna/externa)	Métrica	Req.	Adq.	Des.	Int.	Ope.	Ret.	Esp.	Arq.	Ser.	SaaS	PaaS	IaaS	CSP	CSF	CSC	CF	CSD	A.A	A.T.M.	E.C.	C.E.	E.	N.V.	P.C.	Ref. Artículo
																Fase del Ciclo de vida → Artefacto software → Tipo de Servicio → Punto de vista → Validación Teórica → Validación Empírica → No validada											
PO	Scalability	Scalability					x				x			x	x		x										S87
PO		Adaptability		x							x			x			x								x		S17
PO		Adaptability					x				x	x			x										x		S38
PO		Completeness of variant set(CoM)					x				x	x			x										x		S38
PO		Coverage of Variability(CoV)					x				x	x			x										x		S38
PO		Portability of service					x				x	x			x											x	S47
PO		Coverage of Scalability (COS)		x							x	x			x										x		S32
PO		Coverage of Scalability(CoS)					x				x	x			x										x		S38
PO		Horizontal Cloud scalability		x							x			x			x								x		S17
PO		Scalability					x				x	x				x	x								x		S29
PO		User rating					x				x	x	x	x				x							x		S51
PO		Vertical Cloud scalability		x							x			x			x								x		S17
PO		Weight by user's preference					x				x	x						x								x	S11