



Quantitative Clustering of Cloud Computing Projects for Better Standards Profiling



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Authors

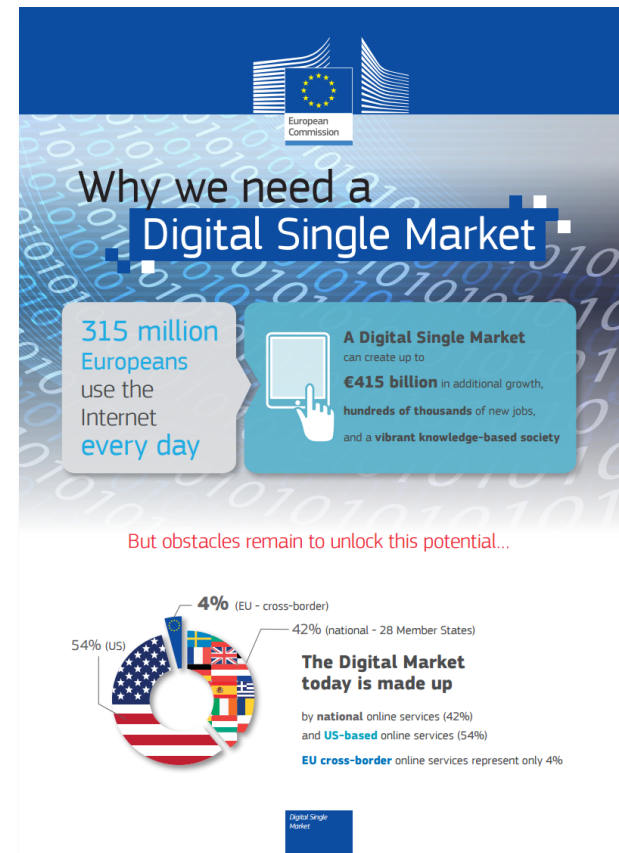
- ◆ Neil Caithness University of Oxford
- ◆ Michel Drescher European Grid Infrastructure
- ◆ Peter Deussen Fraunhofer FOKUS
- ◆ David Wallom University of Oxford





Background

- ◆ We support the European Commission's vision of a digital single market.
- ◆ Standardisation is perceived as a strong enabler.
- ◆ We support over 70 EC-funded projects who generally all have standardisation and interoperability as an objective.
- ◆ **How can we help them?**
- ◆ **We provide a repeatable methodology for cloud standards profiling.**
- ◆ Contributing to the standards landscape: IEEE P2301, ETSI CSC2, ISO/IEC JTC1/SC38





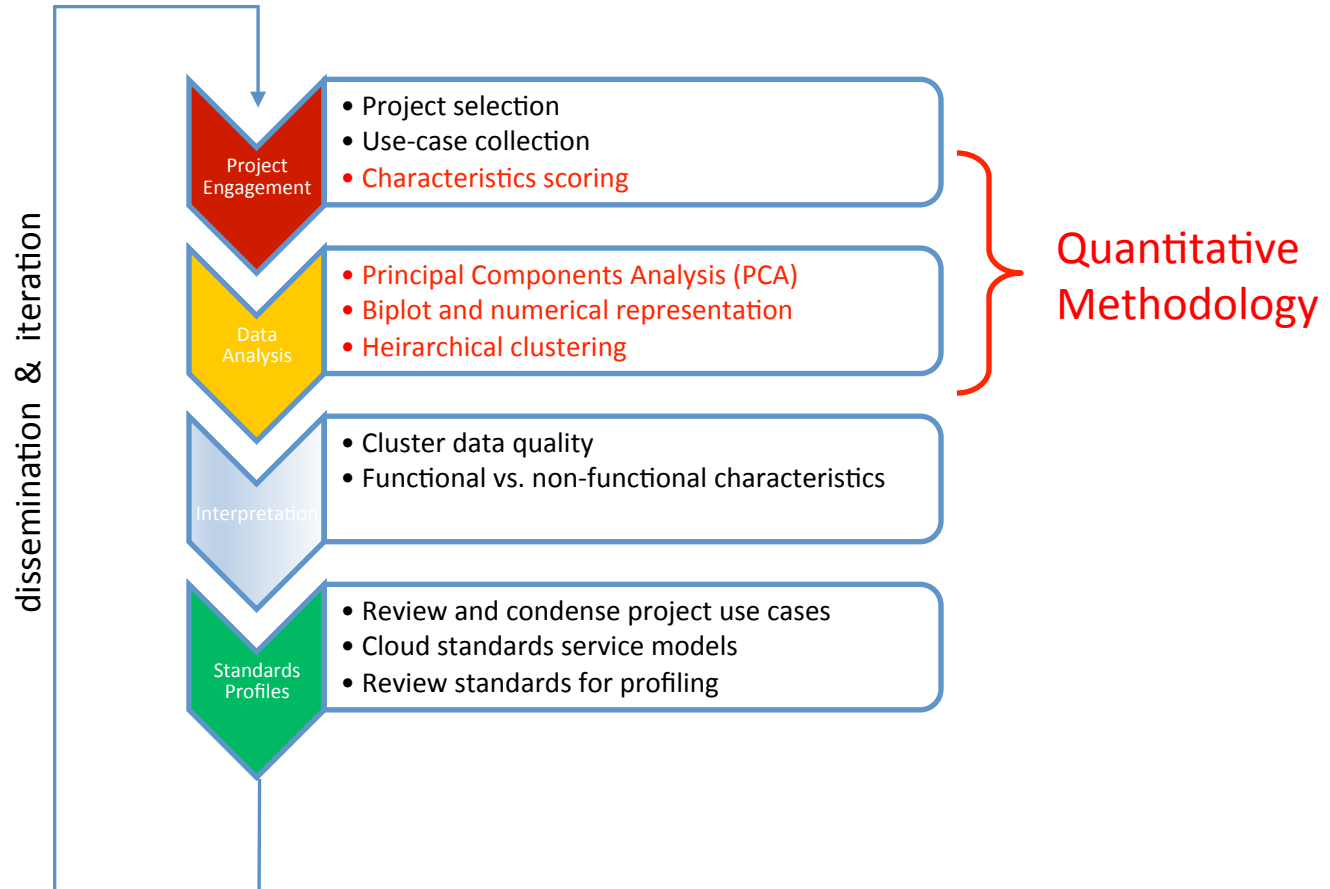
Our major outputs

- ◆ Set of common standards profiles based on clustering of initiatives on the NIST cloud definition characteristics.
- ◆ Increasing awareness of security certification and legal issues with practical recommendations.
- ◆ Set of practical tools to support cloud adoption for SMEs and Public Administrations.





Workflow





Defining characteristics of cloud computing

NIST special Publication 800-145 [NIST-800-145]

Essential Characteristics

- On-demand self service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

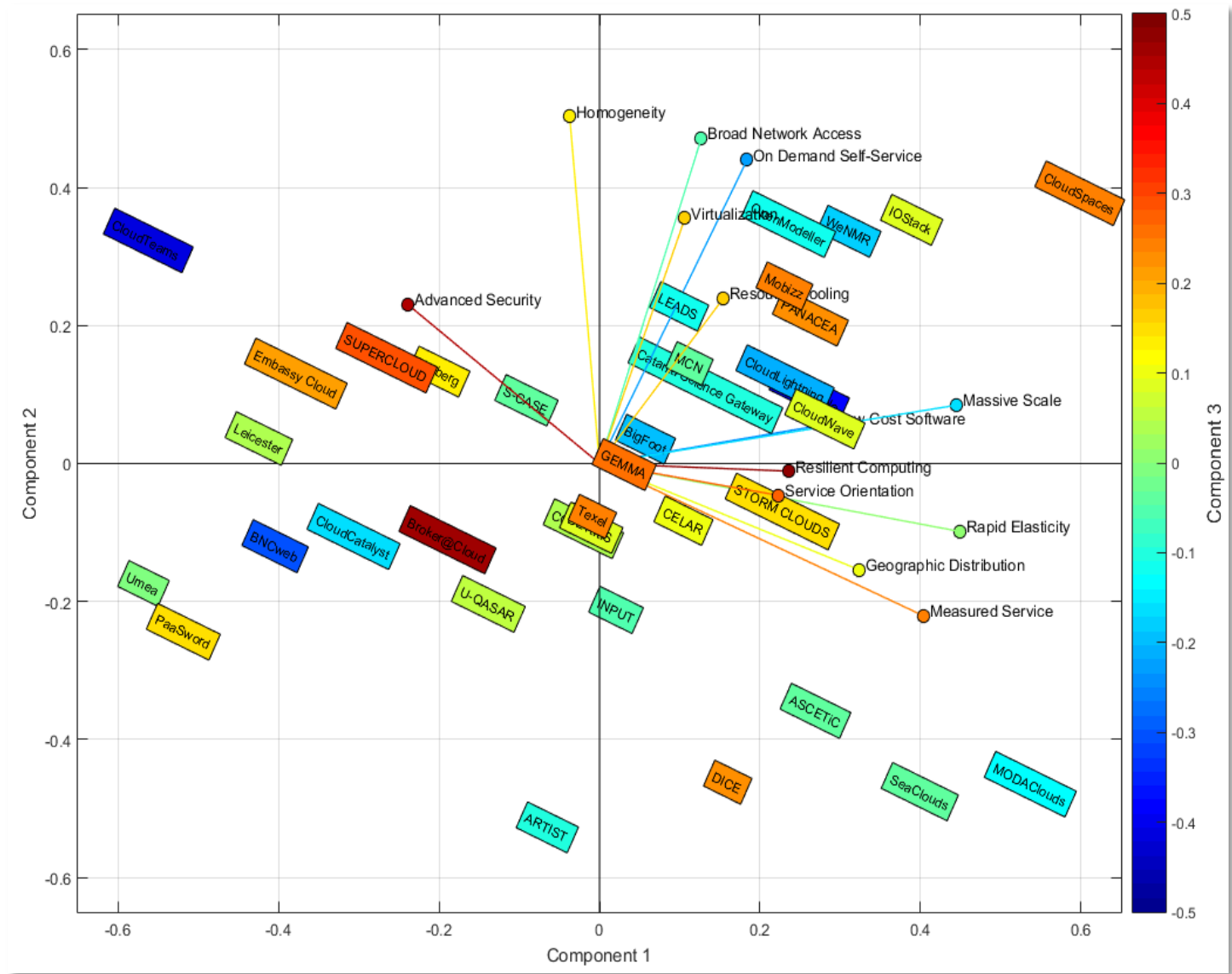
Common Characteristics

- Massive Scale
- Homogeneity
- Virtualization
- Low Cost Software
- Resilient Computing
- Geographic Distribution
- Service Orientation
- Advanced Security



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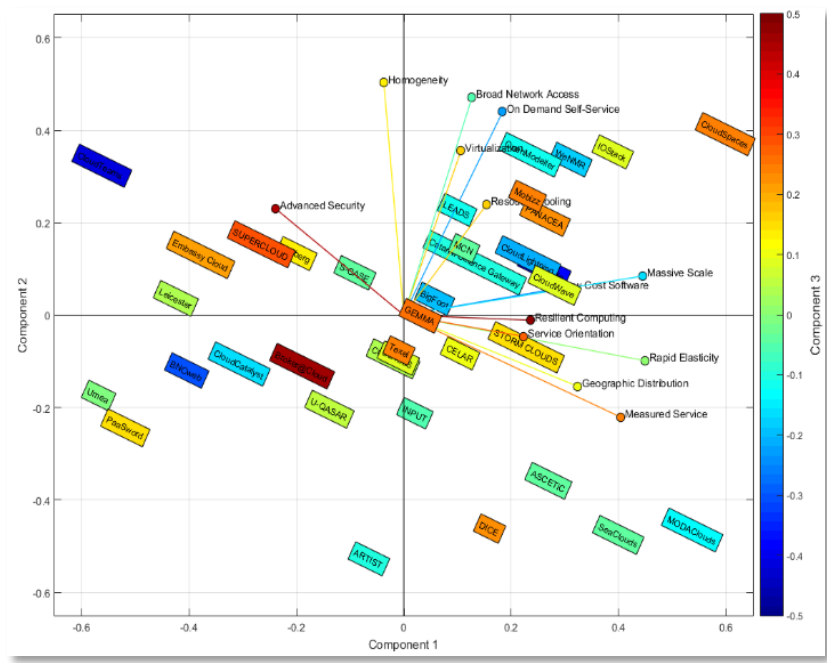
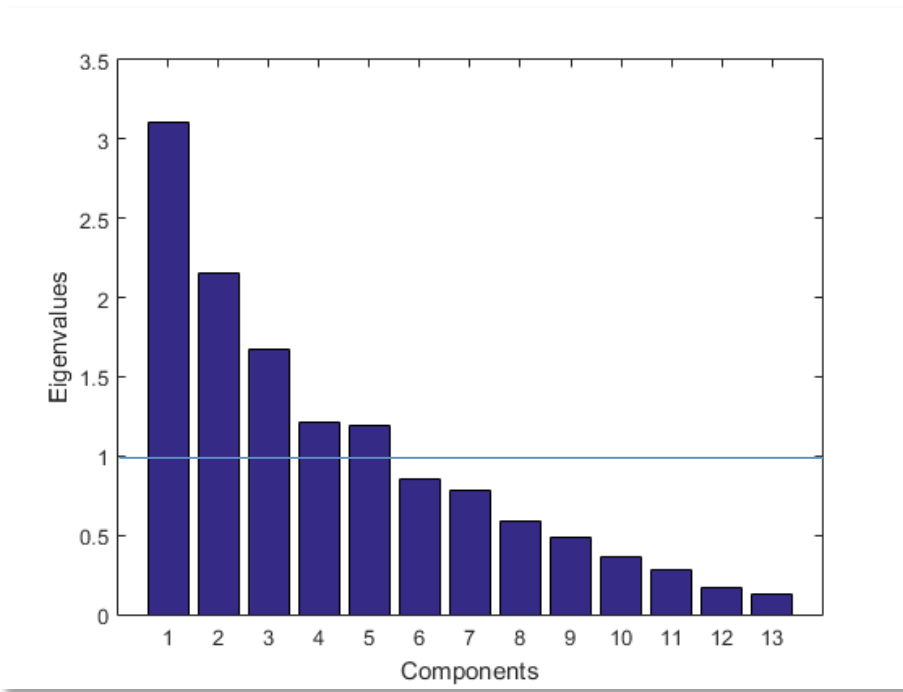
	On Demand Self-Service	Broad Network Access	Resource Pooling	Rapid Elasticity	Measured Service	Massive Scale	Homogeneity	Virtualization	Low Cost Software	Resilient Computing	Geographic Distribution	Service Orientation	Advanced Security
ARTIST	3	5	8	7	8	2	1	1	6	1	7	7	3
ASCETiC	7	2	5	7	9	7	3	5	7	8	7	6	2
BETaaS	7	8	6	7	6	4	3	4	2	7	6	7	5
BigFoot	9	4	9	9	1	9	1	9	1	6	4	4	1
BNCweb	7	4	4	3	2	4	5	3	5	2	1	7	2
Broker@Cloud	3	4	7	4	7	2	8	7	2	8	5	9	7
Catania Science Gateway	8	6	6	7	5	6	6	8	7	5	6	5	5
CELAR	8	4	7	9	5	2	4	7	5	9	6	7	3
CloudCatalyst	6	6	6	4	1	1	1	6	8	4	4	6	5
CloudLightning	9	7	8	7	6	9	5	5	6	5	5	5	3
CloudScale	9	9	6	9	6	9	3	6	7	1	1	9	1
CloudSpaces	9	9	9	9	9	9	7	9	9	9	7	9	9
CloudTeams	9	9	7	2	1	1	7	1	8	1	2	1	7
CloudWave	8	8	8	8	9	4	3	7	8	7	3	9	5
COMPOSE	7	4	6	7	6	2	4	7	7	6	2	9	4
DICE	2	2	7	8	8	6	2	6	8	9	7	6	6
Embassy Cloud	7	7	2	1	6	3	6	8	3	8	1	7	9
GEMMA	8	7	8	8	7	3	3	4	3	8	5	8	9
INPUT	7	5	5	8	6	4	2	8	2	5	8	5	2
IOWStack	9	9	9	8	8	7	7	9	6	9	2	9	2
LEADS	9	8	2	4	3	7	7	8	8	8	5	9	3
Leicester	6	6	5	5	3	2	7	3	4	5	2	6	8
MCN	9	9	5	1	5	9	2	8	5	5	9	9	6
Mobizz	9	7	9	7	7	6	8	4	6	9	7	8	9
MODAClouds	8	4	5	9	9	9	1	1	8	8	8	9	1
OpenModeller	9	7	8	7	3	7	8	8	9	4	7	8	5
PaaSword	7	1	7	1	1	3	1	3	1	5	4	9	9
PANACEA	8	9	8	8	6	6	5	7	5	8	7	9	8
S-CASE	9	7	7	3	3	5	3	3	7	6	4	9	7
SeaClouds	7	3	3	9	9	7	2	4	7	8	9	8	2
SeaClouds	8	4	5	9	9	9	1	1	8	8	8	9	1
STORM CLOUDS	6	7	8	8	9	6	3	6	6	4	7	8	9
SUPERCLOUD	8	2	7	4	2	3	8	8	2	9	7	5	9
Texel	5	8	7	7	8	4	4	4	4	8	3	8	7
Umea	5	3	3	2	2	2	4	6	4	3	3	7	7
U-QASAR	5	7	6	7	7	2	2	5	4	4	4	7	6
Varberg	8	7	8	5	4	3	4	5	3	6	3	8	8
WeNMR	9	8	8	9	5	7	9	8	7	3	9	6	3





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- ◆ PCA
- ◆ Biplot
- ◆ How many components to keep?
Scree plot & Kaiser-Guttman criterion

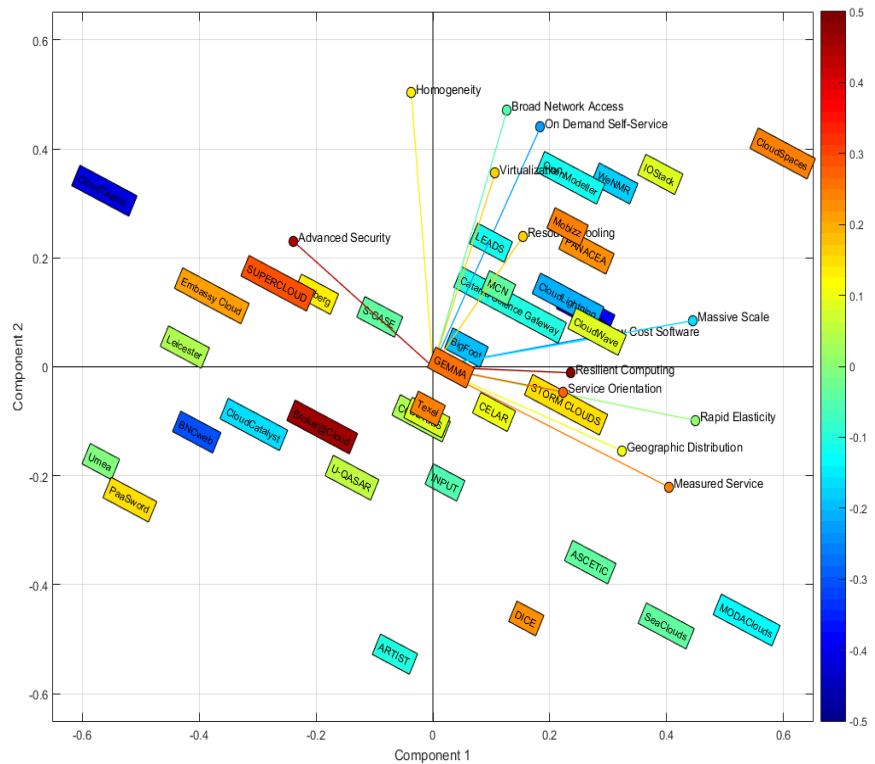




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◆ Projection (heat map)

Numerical representation of the biplot



	On Demand Self-Service	Broad Network Access	Resource Pooling	Rapid Elasticity	Measured Service	Massive Scale	Homogeneity	Virtualization	Low Cost Software	Resilient Computing	Geographic Distribution	Service Orientation	Advanced Security
ARTIST	-2.9954	-0.8551	0.9328	1.3410	1.3491	-1.8087	-3.2776	-3.6273	0.4696	-2.0489	-0.1213	-0.7875	-0.6271
ASCETIC	-0.4722	-1.8513	-0.8811	1.2014	0.8952	1.3890	-1.8344	-0.0846	0.0811	0.7540	2.0358	0.0100	-1.8942
BETaaS	-0.7266	-0.3648	0.2336	0.1141	0.2694	-0.5393	-0.3033	-0.2654	-0.4488	0.1692	0.1366	-0.0399	0.3495
BigFoot	1.1965	-1.6288	0.7691	1.2799	-1.9822	1.1492	0.3388	1.7470	-1.2443	-0.4724	2.1119	-3.2468	-1.9038
BNCweb	0.0259	-0.4727	-2.0241	-2.3917	-2.2835	-1.0584	-0.9349	-1.3439	0.1190	-2.2685	-2.2252	-0.7711	-0.9742
Broker@Cloud	-2.0893	-1.1106	0.1715	-1.0155	0.4313	-2.1618	0.4470	0.4842	-2.5252	1.9505	-0.0510	0.7493	2.5777
Catania Science Gateway	1.2651	0.1457	0.3532	0.3559	-0.9535	0.8382	0.7983	1.0049	0.0198	-0.3164	0.4615	-1.0802	-0.6798
CELAR	-0.2592	-1.0799	0.3376	0.7646	0.1295	0.3291	-0.0760	0.8158	-0.9381	0.8968	1.4144	-0.5715	-0.2167
CloudCatalyst	-0.5473	-0.3247	-0.5660	-1.2998	-1.5179	-1.4286	-0.6548	-1.2186	-0.3112	-1.8249	-1.5250	-1.0527	-0.2068
CloudLightning	1.4880	0.7337	0.8833	1.2601	-0.4083	1.3493	0.3935	0.3891	1.0533	-0.9748	0.6186	-1.1765	-1.2822
CloudScale	1.9797	2.0256	-0.4147	0.4614	0.1139	1.8418	-0.3243	-1.0548	3.1877	-1.9778	-0.9368	0.3953	-1.8993
CloudSpaces	1.8672	2.4549	1.8844	2.0025	2.1668	2.1580	2.3344	1.9247	1.4163	2.0438	1.2758	1.6719	1.0479
CloudTeams	0.9489	1.9138	1.0331	-1.8256	-3.6417	-2.3564	1.1492	-1.4084	0.3033	-4.5192	-3.6219	-2.9830	0.3201
CloudWave	0.2214	1.5556	0.7880	0.9109	1.6521	0.5579	0.2398	-0.4433	1.4367	0.2748	-0.0952	1.3291	0.4924
COMPOSE	-0.4289	-0.0656	-0.6234	-0.5898	0.2058	-0.3474	-0.3856	-0.4873	0.0872	0.0553	-0.5118	0.6606	0.2003
DICE	-2.4634	-2.1765	0.4663	1.6661	1.8870	-0.4034	-2.0910	-0.7530	-1.1132	1.2840	2.1592	0.0407	-0.1941
Embassy Cloud	0.0224	-0.1069	-2.0646	-3.5440	-1.5898	-1.5095	1.4730	0.9870	-1.5482	0.9988	-2.1735	1.3067	1.9674
GEMMA	-1.1218	0.3671	1.2406	0.4541	1.0871	-1.0695	0.3563	-0.1787	-0.6006	0.7580	0.0458	0.5081	1.6476
INPUT	-0.3368	-2.0570	-0.1658	0.7153	-0.7088	0.3965	-0.9107	0.5158	-1.1649	0.1164	1.6618	-1.6245	-1.3610
IOStack	1.9657	2.0047	1.0047	1.0332	0.9510	1.7972	1.9365	1.5370	1.2805	1.0582	0.5311	1.0270	0.4310
LEADS	2.5906	0.7243	-2.5570	-1.8621	-1.0080	2.0437	1.2571	1.6188	1.0922	0.7336	-0.7811	1.5565	-0.8481
Leicester	-0.8243	0.0918	-0.2013	-1.9673	-1.4988	-2.3130	0.4160	-0.6665	-1.1140	-1.0405	-2.0606	-0.5290	1.3991
MCN	1.6190	0.5261	-1.4291	-0.9154	-0.3684	1.4114	0.8168	1.0733	0.7557	0.6343	-0.2919	1.0840	-0.4875
Mobizz	0.5033	1.4190	1.6616	0.9659	1.1297	0.2974	1.6928	1.1023	0.0891	1.2561	0.4643	0.7260	1.5314
MODAClouds	-0.3712	-0.8924	-1.1554	1.9806	2.5261	2.3864	-2.8478	-1.3194	2.1242	0.4593	1.9446	1.4238	-2.6507
OpenModeller	2.3437	1.6662	0.7801	0.5852	-0.5552	1.5504	1.7479	1.3063	1.1314	-0.3310	0.0507	-0.4046	-0.4109
PaaSword	-2.1409	-1.8578	-1.2892	-2.4625	-1.4285	-2.8167	-0.6832	-0.6881	-2.4485	-0.0785	-1.3696	-0.3675	1.2823
PANACEA	0.5907	1.2474	1.2112	0.8431	1.1588	0.5710	1.4591	1.0798	0.2479	1.3326	0.5189	0.9395	1.2100
S-CASE	0.3764	1.1640	-0.6036	-1.2043	-0.2961	-0.4174	0.3568	-0.6105	0.8173	-0.7106	-1.6861	0.8198	0.4762
Se2Clouds	-0.6257	-1.9163	-1.5754	1.3280	1.8011	1.9739	-2.5365	-0.4830	0.7682	1.1746	2.2379	1.0577	-2.3056
Se2Clouds	-0.3712	-0.8924	-1.1554	1.9806	2.5261	2.3864	-2.8478	-1.3194	2.1242	0.4593	1.9446	1.4238	-2.6507
STORM CLOUDS	-0.8468	0.6826	1.4517	1.3743	1.6876	-0.2684	-0.2421	-0.6938	0.4527	0.2928	0.4480	0.5216	0.7485
SUPERCLOUD	-0.0938	-1.6926	0.3439	-1.1500	-2.1322	-1.2256	2.0121	2.7227	-3.5858	1.6068	0.7062	-1.6446	1.5831
Texel	-1.4464	0.4409	0.6938	0.0730	1.3458	-1.2556	-0.1984	-0.8857	-0.1841	0.5092	-0.4677	1.0686	1.5665
Umea	-1.2092	-1.5321	-2.0850	-3.0878	-2.2272	-2.2873	-0.5992	-0.6935	-1.7809	-0.8083	-1.9859	-0.4646	0.5160
U-QASAR	-1.6621	-0.2714	0.3322	-0.1633	0.3675	-1.5994	-1.0425	-1.5616	-0.3221	-0.7178	-0.6984	-0.0865	0.6192
Varberg	-0.4006	0.6717	0.5855	-0.9433	-0.5190	-1.5074	0.9917	-0.0228	-0.7373	-0.1765	-1.2361	-0.0336	1.6534
WeNMR	2.4287	1.3137	1.6331	1.7313	-0.5620	1.9470	1.5730	1.5009	1.0101	-0.5523	1.0614	-1.4556	-1.0268

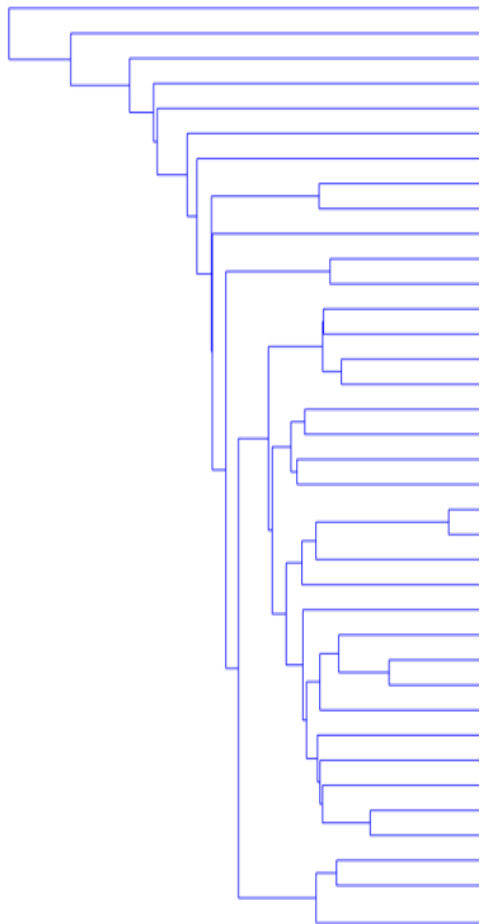


- ◆ Signal μ
- ◆ Noise σ
- ◆ SNR

	On Demand Self-Service	Broad Network Access	Resource Pooling	Rapid Elasticity	Measured Service	Massive Scale	Homogeneity	Virtualization	Low Cost Software	Resilient Computing	Geographic Distribution	Service Orientation	Advanced Security
ARTIST	-2.9954	-0.8551	0.9328	1.3410	1.3491	-1.8087	-3.2776	-3.6273	0.4696	-2.0489	-0.1213	-0.7875	-0.6271
ASCETIC	-0.4722	-1.8513	-0.8811	1.2014	0.8952	1.3890	-1.8344	-0.0846	0.0811	0.7540	2.0358	0.0100	-1.8942
BETaaS	-0.7266	-0.3648	0.2336	0.1141	0.2694	-0.5393	-0.3033	-0.2654	-0.4488	0.1692	0.1366	-0.0399	0.3495
BigFoot	1.1965	-1.6288	0.7691	1.2799	-1.9822	1.1492	0.3388	1.7470	-1.2443	-0.4724	2.1119	-3.2468	-1.9038
BNCweb	0.0259	-0.4727	-2.0241	-2.3917	-2.2835	-1.0584	-0.9349	-1.3439	0.1190	-2.2685	-2.2252	-0.7711	-0.9742
Broker@Cloud	-2.0893	-1.1106	0.1715	-1.0155	0.4313	-2.1618	0.4470	0.4842	-2.5252	1.9505	-0.0510	0.7493	2.5777
Catania Science Gateway	1.2651	0.1457	0.3532	0.3559	-0.9535	0.8382	0.7983	1.0049	0.0198	-0.3164	0.4615	-1.0802	-0.6798
CELAR	-0.2592	-1.0799	0.3376	0.7646	0.1295	0.3291	-0.0760	0.8158	-0.9381	0.8968	1.4144	-0.5715	-0.2167
CloudCatalyst	-0.5473	-0.3247	-0.5660	-1.2998	-1.5179	-1.4286	-0.6548	-1.2186	-0.3112	-1.8249	-1.5250	-1.0527	-0.2068
CloudLightning	1.4880	0.7337	0.8833	1.2601	-0.4083	1.3493	0.3935	0.3891	1.0533	-0.9748	0.6186	-1.1765	-1.2822
CloudScale	1.9797	2.0256	-0.4147	0.4614	0.1139	1.8418	-0.3243	-1.0548	3.1877	-1.9778	-0.9368	0.3953	-1.8993
CloudSpaces	1.8672	2.4549	1.8844	2.0025	2.1668	2.1580	2.3344	1.9247	1.4163	2.0438	1.2758	1.6719	1.0479
CloudTeams	0.9489	1.9138	1.0331	-1.8256	-3.6417	-2.3564	1.1492	-1.4084	0.3033	-4.5192	-3.6219	-2.9830	0.3201
CloudWave	0.2214	1.5556	0.7880	0.9109	1.6521	0.5579	0.2398	-0.4433	1.4367	0.2748	-0.0952	1.3291	0.4924
COMPOSE	-0.4289	-0.0656	-0.6234	-0.5898	0.2058	-0.3474	-0.3856	-0.4873	0.0872	0.0553	-0.5118	0.6606	0.2003
DICE	-2.4634	-2.1765	0.4663	1.6661	1.8870	-0.4034	-2.0910	-0.7530	-1.1132	1.2840	2.1592	0.0407	-0.1941
Embassy Cloud	0.0224	-0.1069	-2.0646	-3.5440	-1.5898	-1.5095	1.4730	0.9870	-1.5482	0.9988	-2.1735	1.3067	1.9674
GEMMA	-1.1218	0.3671	1.2406	0.4541	1.0871	-1.0695	0.3563	-0.1787	-0.6006	0.7580	0.0458	0.5081	1.6476
INPUT	-0.3368	-2.0570	-0.1658	0.7153	-0.7088	0.3965	-0.9107	0.5158	-1.1649	0.1164	1.6618	-1.6245	-1.3610
IOStack	1.9657	2.0047	1.0047	1.0332	0.9510	1.7972	1.9365	1.5370	1.2805	1.0582	0.5311	1.0270	0.4310
LEADS	2.5906	0.7243	-2.5570	-1.8621	-1.0080	2.0437	1.2571	1.6188	1.0922	0.7336	-0.7811	1.5565	-0.8481
Leicester	-0.8243	0.0918	-0.2013	-1.9673	-1.4988	-2.3130	0.4160	-0.6665	-1.1140	-1.0405	-2.0606	-0.5290	1.3991
MCN	1.6190	0.5261	-1.4291	-0.9154	-0.3684	1.4114	0.8168	1.0733	0.7557	0.6343	-0.2919	1.0840	-0.4875
Mobizz	0.5033	1.4190	1.6616	0.9659	1.1297	0.2974	1.6928	1.1023	0.0891	1.2561	0.4643	0.7260	1.5314
MODAClouds	-0.3712	-0.8924	-1.1554	1.9806	2.5261	2.3864	-2.8478	-1.3194	2.1242	0.4593	1.9446	1.4238	-2.6507
OpenModeller	2.3437	1.6662	0.7801	0.5852	-0.5552	1.5504	1.7479	1.3063	1.1314	-0.3310	0.0607	-0.4046	-0.4109
PaaSword	-2.1409	-1.8578	-1.2892	-2.4625	-1.4285	-2.8167	-0.6832	-0.6881	-2.4485	-0.0785	-1.3696	-0.3675	1.2823
PANACEA	0.5907	1.2474	1.2112	0.8431	1.1588	0.5710	1.4591	1.0798	0.2479	1.3326	0.5189	0.9395	1.2100
S-CASE	0.3764	1.1640	-0.6036	-1.2043	-0.2961	-0.4174	0.3568	-0.6105	0.8173	-0.7106	-1.6861	0.8198	0.4762
SeaClouds	-0.6257	-1.9163	-1.5754	1.3280	1.8011	1.9739	-2.5365	-0.4830	0.7682	1.1746	2.2379	1.0577	-2.3056
SeaClouds	-0.3712	-0.8924	-1.1554	1.9806	2.5261	2.3864	-2.8478	-1.3194	2.1242	0.4593	1.9446	1.4238	-2.6507
STORM CLOUDS	-0.8468	0.6826	1.4517	1.3743	1.6876	-0.2684	-0.2421	-0.6938	0.4527	0.2928	0.4480	0.5216	0.7485
SUPERCLOUD	-0.0938	-1.6926	0.3439	-1.1500	-2.1322	-1.2256	2.0121	2.7227	-3.5858	1.6068	0.7062	-1.6446	1.5831
Texel	-1.4464	0.4409	0.6938	0.0730	1.3458	-1.2556	-0.1984	-0.8857	-0.1841	0.5092	-0.4677	1.0686	1.5665
Umea	-1.2092	-1.5321	-2.0850	-3.0878	-2.2272	-2.2873	-0.5992	-0.6935	-1.7809	-0.8083	-1.9859	-0.4646	0.5160
U-QASAR	-1.6621	-0.2714	0.3322	-0.1633	0.3675	-1.5994	-1.0425	-1.5616	-0.3221	-0.7178	-0.6984	-0.0865	0.6192
Varberg	-0.4006	0.6717	0.5855	-0.9433	-0.5190	-1.5074	0.9917	-0.0228	-0.7373	-0.1765	-1.2361	-0.0336	1.6534
WeNMR	2.4287	1.3137	1.6331	1.7313	-0.5620	1.9470	1.5730	1.5009	1.0101	-0.5523	1.0614	-1.4556	-1.0268
Signal	0	0	0	0	0	0	0	0	0	0	0	0	0
Noise	1.4156	1.3247	1.1789	1.5196	1.5084	1.5856	1.4493	1.2712	1.3789	1.3186	1.4479	1.2071	1.3691
SNR	0	0	0	0	0	0	0	0	0	0	0	0	0



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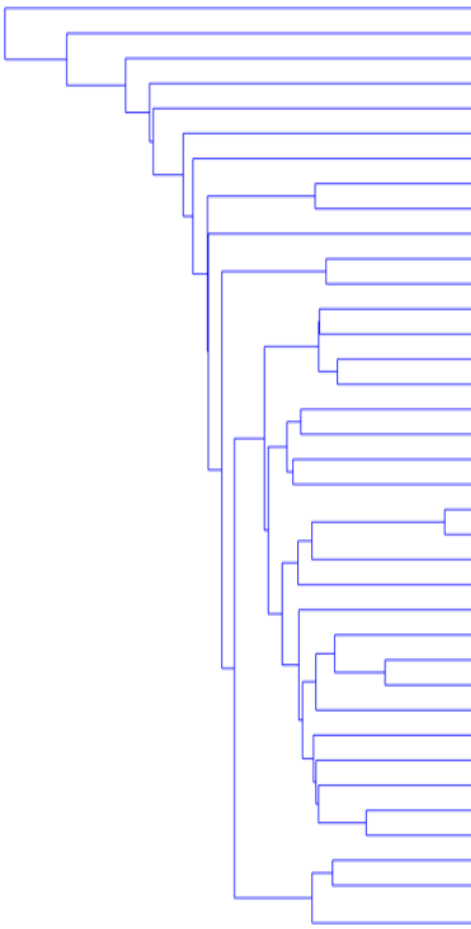


	On Demand Self-Service	Broad Network Access	Resource Pooling	Rapid Elasticity	Measured Service	Massive Scale	Homogeneity	Virtualization	Low Cost Software	Resilient Computing	Geographic Distribution	Service Orientation	Advanced Security
WeNMR	2.4287	1.3137	1.6331	1.7313	-0.5620	1.9470	1.5730	1.5009	1.0101	-0.5523	1.0614	-1.4556	-1.0268
OpenModeller	2.3437	1.6662	0.7801	0.5852	-0.5552	1.5504	1.7479	1.3063	1.1314	-0.3310	0.0607	-0.4046	-0.4109
CloudLightning	1.4880	0.7337	0.8833	1.2601	-0.4083	1.3493	0.3935	0.3891	1.0533	-0.9748	0.6186	-1.1765	-1.2822
Catania Science Gateway	1.2651	0.1457	0.3532	0.3559	-0.9535	0.8382	0.7983	1.0049	0.0198	-0.3164	0.4615	-1.0802	-0.6798
Signal	1.8814	0.9648	0.9124	0.9832	-0.6198	1.4212	1.1282	1.0503	0.8036	-0.5436	0.5506	-1.0292	-0.8500
Noise	0.5910	0.6678	0.5324	0.6294	0.2335	0.4612	0.6404	0.4857	0.5249	0.3070	0.4137	0.4458	0.3829
SNR	3.1834	1.4448	1.7136	1.5622	-2.6540	3.0813	1.7616	2.1622	1.5309	-1.7706	1.3308	-2.3087	-2.2198



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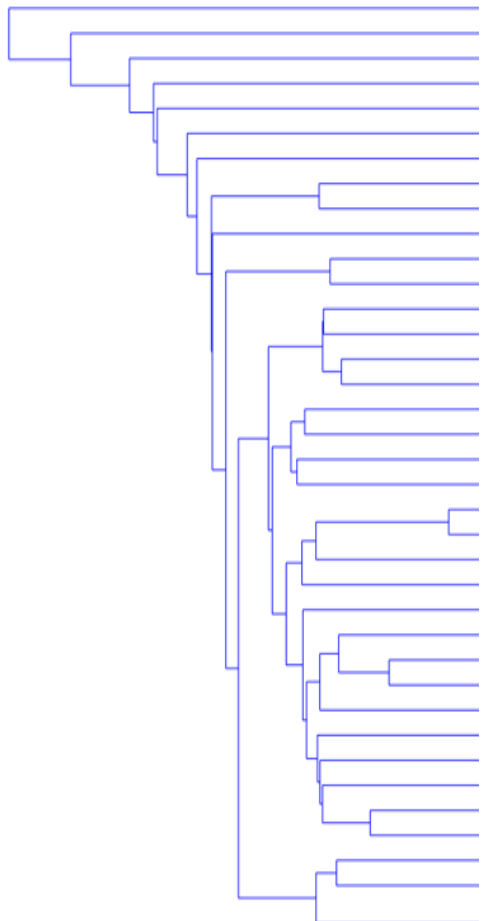
	On Demand Self-Service	Broad Network Access	Resource Pooling	Rapid Elasticity	Measured Service	Massive Scale	Homogeneity	Virtualization	Low Cost Software	Resilient Computing	Geographic Distribution	Service Orientation	Advanced Security
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INPUT	-0.3368	-2.0570	-0.1658	0.7153	-0.7088	0.3965	-0.9107	0.5158	-1.1649	0.1164	1.6618	-1.6245	-1.3610
STORM CLOUDS	-0.8468	0.6826	1.4517	1.3743	1.6876	-0.2684	-0.2421	-0.6938	0.4527	0.2928	0.4480	0.5216	0.7485
Texel	-1.4464	0.4409	0.6938	0.0730	1.3458	-1.2556	-0.1984	-0.8857	-0.1841	0.5092	-0.4677	1.0686	1.5665
GEMMA	-1.1218	0.3671	1.2406	0.4541	1.0871	-1.0695	0.3563	-0.1787	-0.6006	0.7580	0.0458	0.5081	1.6476
CloudWave	0.2214	1.5556	0.7880	0.9109	1.6521	0.5579	0.2398	-0.4433	1.4367	0.2748	-0.0952	1.3291	0.4924
CELAR	-0.2592	-1.0799	0.3376	0.7646	0.1295	0.3291	-0.0760	0.8158	-0.9381	0.8968	1.4144	-0.5715	-0.2167
S-CASE	0.3764	1.1640	-0.6036	-1.2043	-0.2961	-0.4174	0.3568	-0.6105	0.8173	-0.7106	-1.6861	0.8198	0.4762
U-QASAR	-1.6621	-0.2714	0.3322	-0.1633	0.3675	-1.5994	-1.0425	-1.5616	-0.3221	-0.7178	-0.6984	-0.0865	0.6192
COMPOSE	-0.4289	-0.0656	-0.6234	-0.5898	0.2058	-0.3474	-0.3856	-0.4873	0.0872	0.0553	-0.5118	0.6606	0.2003
BETaaS	-0.7266	-0.3648	0.2336	0.1141	0.2694	-0.5393	-0.3033	-0.2654	-0.4488	0.1692	0.1366	-0.0399	0.3495
Signal	-0.6231	0.0371	0.3685	0.2449	0.5740	-0.4214	-0.2206	-0.3795	-0.0865	0.1644	0.0247	0.2585	0.4523
Noise	0.6693	1.0627	0.7032	0.7648	0.8255	0.7255	0.4814	0.6754	0.8032	0.5369	0.9887	0.8726	0.8562
SNR	-0.9310	0.0350	0.5240	0.3202	0.6954	-0.5808	-0.4582	-0.5619	-0.1076	0.3062	0.0250	0.2963	0.5282



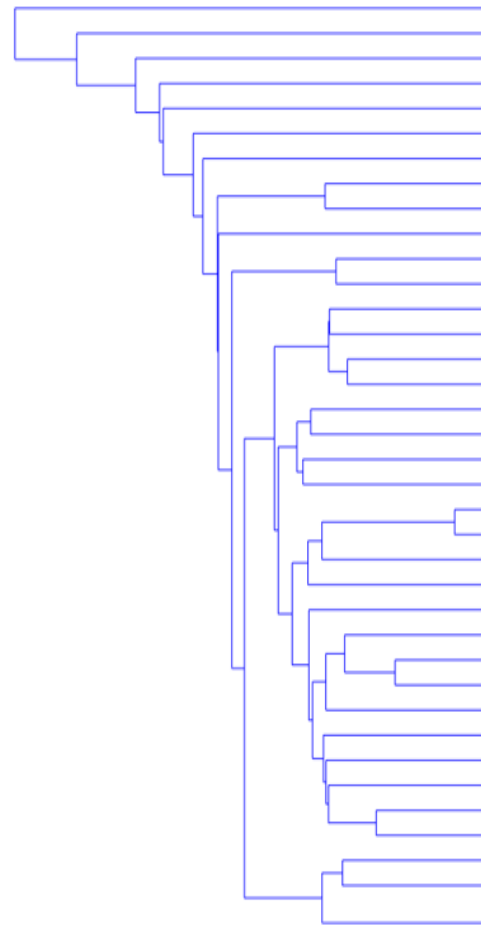
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	On Demand Self-Service	Broad Network Access	Resource Pooling	Rapid Elasticity	Measured Service	Massive Scale	Homogeneity	Virtualization	Low Cost Software	Resilient Computing	Geographic Distribution	Service Orientation	Advanced Security
STORM CLOUDS	-0.8468	0.6826	1.4517	1.3743	1.6876	-0.2684	-0.2421	-0.6938	0.4527	0.2928	0.4480	0.5216	0.7485
Texel	-1.4464	0.4409	0.6938	0.0730	1.3458	-1.2556	-0.1984	-0.8857	-0.1841	0.5092	-0.4677	1.0686	1.5665
GEMMA	-1.1218	0.3671	1.2406	0.4541	1.0871	-1.0695	0.3563	-0.1787	-0.6006	0.7580	0.0458	0.5081	1.6476
CloudWave	0.2214	1.5556	0.7880	0.9109	1.6521	0.5579	0.2398	-0.4433	1.4367	0.2748	-0.0952	1.3291	0.4924
Signal	-0.7984	0.7616	1.0436	0.7031	1.4432	-0.5089	0.0389	-0.5504	0.2762	0.4587	-0.0173	0.8568	1.1137
Noise	0.7227	0.5462	0.3620	0.5636	0.2827	0.8302	0.3035	0.3069	0.8867	0.2262	0.3783	0.4090	0.5801
SNR	-1.1047	1.3942	2.8830	1.2475	5.1057	-0.6130	0.1281	-1.7931	0.3115	2.0281	-0.0456	2.0947	1.9200



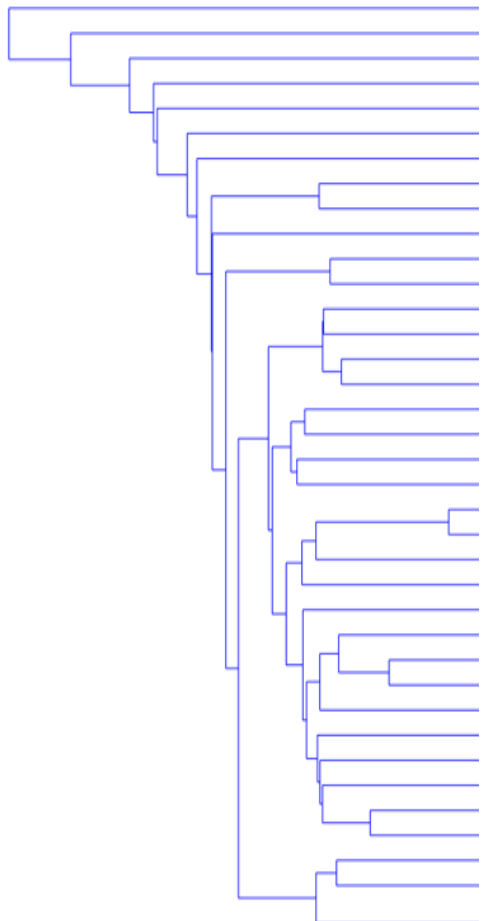
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	On Demand Self-Service	Broad Network Access	Resource Pooling	Rapid Elasticity	Measured Service	Massive Scale	Homogeneity	Virtualization	Low Cost Software	Resilient Computing	Geographic Distribution	Service Orientation	Advanced Security
WeNMR	2.4287	1.3137	1.6331	1.7313	-0.5620	1.9470	1.5730	1.5009	1.0101	-0.5523	1.0614	-1.4556	-1.0268
OpenModeller	2.3437	1.6662	0.7801	0.5852	-0.5552	1.5504	1.7479	1.3063	1.1314	-0.3310	0.0607	-0.4046	-0.4109
CloudLightning	1.4880	0.7337	0.8833	1.2601	-0.4083	1.3493	0.3935	0.3891	1.0533	-0.9748	0.6186	-1.1765	-1.2822
Catania Science Gateway	1.2651	0.1457	0.3532	0.3559	-0.9535	0.8382	0.7983	1.0049	0.0198	-0.3164	0.4615	-1.0802	-0.6798
STORM CLOUDS	-0.8468	0.6826	1.4517	1.3743	1.6876	-0.2684	-0.2421	-0.6938	0.4527	0.2928	0.4480	0.5216	0.7485
Texel	-1.4464	0.4409	0.6938	0.0730	1.3458	-1.2556	-0.1984	-0.8857	-0.1841	0.5092	-0.4677	1.0686	1.5665
GEMMA	-1.1218	0.3671	1.2406	0.4541	1.0871	-1.0695	0.3563	-0.1787	-0.6006	0.7580	0.0458	0.5081	1.6476
CloudWave	0.2214	1.5556	0.7880	0.9109	1.6521	0.5579	0.2398	-0.4433	1.4367	0.2748	-0.0952	1.3291	0.4924



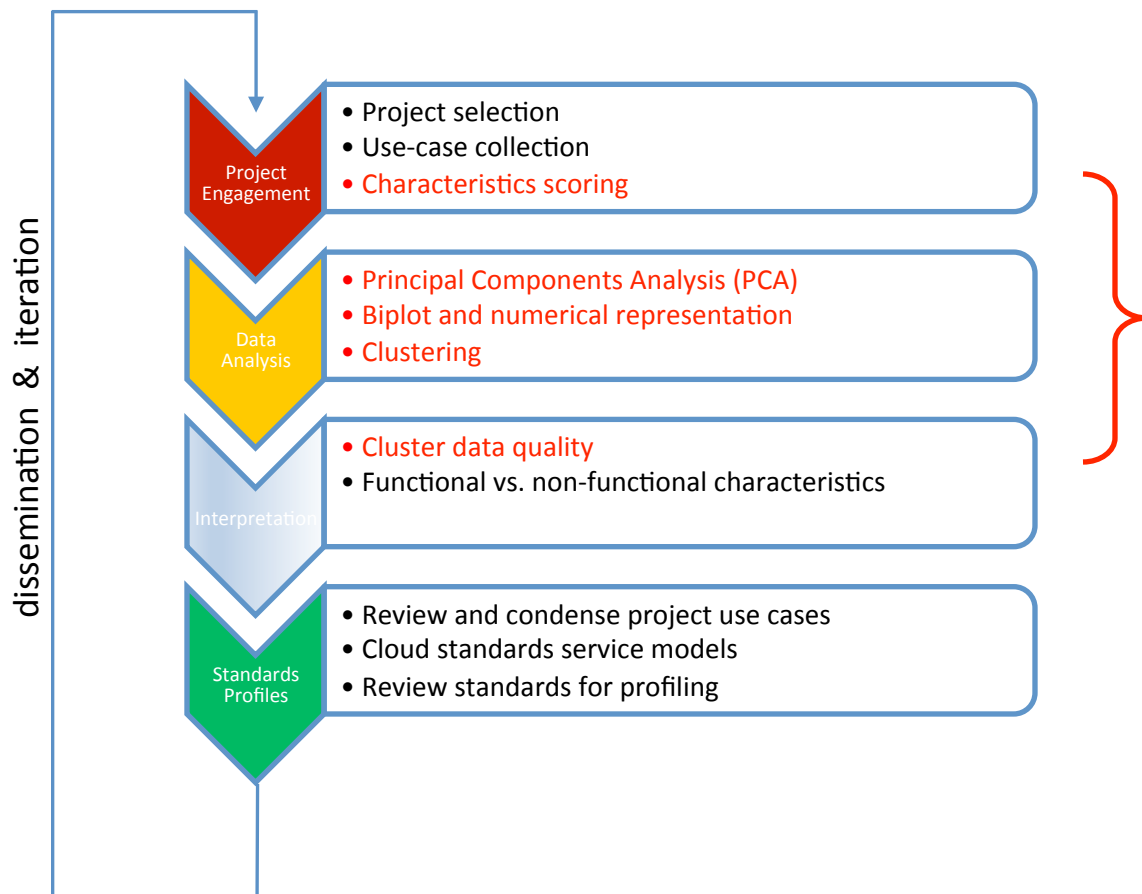
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	On Demand Self-Service	Broad Network Access	Resource Pooling	Rapid Elasticity	Measured Service	Massive Scale	Homogeneity	Virtualization	Low Cost Software	Resilient Computing	Geographic Distribution	Service Orientation	Advanced Security
WeNMR	2.4287	1.3137	1.6331	1.7313	-0.5620	1.9470	1.5730	1.5009	1.0101	-0.5523	1.0614	-1.4556	-1.0268
OpenModeller	2.3437	1.6662	0.7801	0.5852	-0.5552	1.5504	1.7479	1.3063	1.1314	-0.3310	0.0607	-0.4046	-0.4109
CloudLightning	1.4880	0.7337	0.8833	1.2601	-0.4083	1.3493	0.3935	0.3891	1.0533	-0.9748	0.6186	-1.1765	-1.2822
Catania Science Gateway	1.2651	0.1457	0.3532	0.3559	-0.9535	0.8382	0.7983	1.0049	0.0198	-0.3164	0.4615	-1.0802	-0.6798
STORM CLOUDS	-0.8468	0.6826	1.4517	1.3743	1.6876	-0.2684	-0.2421	-0.6938	0.4527	0.2928	0.4480	0.5216	0.7485
Texel	-1.4464	0.4409	0.6938	0.0730	1.3458	-1.2556	-0.1984	-0.8857	-0.1841	0.5092	-0.4677	1.0686	1.5665
GEMMA	-1.1218	0.3671	1.2406	0.4541	1.0871	-1.0695	0.3563	-0.1787	-0.6006	0.7580	0.0458	0.5081	1.6476
CloudWave	0.2214	1.5556	0.7880	0.9109	1.6521	0.5579	0.2398	-0.4433	1.4367	0.2748	-0.0952	1.3291	0.4924
SeaClouds	-0.6257	-1.9163	-1.5754	1.3280	1.8011	1.9739	-2.5365	-0.4830	0.7682	1.1746	2.2379	1.0577	-2.3056
ASCETIC	-0.4722	-1.8513	-0.8811	1.2014	0.8952	1.3890	-1.8344	-0.0846	0.0811	0.7540	2.0358	0.0100	-1.8942
SeaClouds	-0.3712	-0.8924	-1.1554	1.9806	2.5261	2.3864	-2.8478	-1.3194	2.1242	0.4593	1.9446	1.4238	-2.6507
MODAClouds	-0.3712	-0.8924	-1.1554	1.9806	2.5261	2.3864	-2.8478	-1.3194	2.1242	0.4593	1.9446	1.4238	-2.6507



Workflow





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