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### Scientific Information Management in Collaborative Experimentation Environments

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## Appendix C

# Comparison of Related Support Environments

This Appendix contains the evaluation results for the studied systems, based on the criteria defined and described in Section 3.2. Please refer to Figure 3.4 for an overview of the criteria used for evaluation. Tables in this Appendix outline the requirements identified/mentioned by each system and functionalities provided by each system. Furthermore, evaluation results of development/implementation related issues are also presented in the remaining tables, including the enabling technologies, paradigms and standards.

Due to space limitations, a number of abbreviations are used in the tables. First, these abbreviations are provided in Table C.1.

Acc. hetero. data	Accessing heterogeneous data sources
Authent./author.	Authentication/authorization
CLRC Data P.	CLRC Data Portal
Collab. mgmt.	Collaboration management
Collab.	Collaboration
Descriptive inf.	Descriptive information
Disc. alloc. sched.	Discovery/allocation/scheduling
Dist. inf. mgmt. sys.	Distributed information management systems
Exec. mode	Execution mode
Hist. of activities	History of activities
Im.	Implementation
Inf. Mgmt.	Information Management
Inf. models and stds.	Information models and standards
Interf.	Interface
mgmt.	Management
Prg. Lang.	Programming languages
R.Fast	Remote FAST
Res. Mgmt.	Resource Management
Resource mgmt. tech.	Resource management technologies
SW	Software
Script Lang.	Scripting languages
The Virt.Lab.	The Virtual Laboratory
V.Geo.Lab.	Virtual Geotechnical Lab
Virt. NMR F.	Virtual NMR Facility
Virt. organizations	Virtual organizations
Virt.Lab.	Virtual Lab
Web tech.	Web technologies
Workflow mgmt. sys.	Workflow management systems

Table C.1: Abbreviations used in the evaluation tables (Tables C.2 to C.7)

Identified/Mentioned Requirements - I																					
System	General VL Requirements								Inf. Mgmt. Requirements												
	Infrastructure				Interf.				Functionality				Im.				Inf. Mgmt.				
	Storage	Computing	Networking	Instrumentation	SW environment	User interface	API	Experiment mgmt.	Information mgmt.	Resource mgmt.	User mgmt.	Collaboration	Security	Implementation	Modelling	Storage	Manipulation	Collaboration	Security	Interoperability	Implementation
Zoo	X	X	X	X	✓	✓	✓	✓	X	X	X	X	X	✓	✓	✓	✓	X	X	✓	✓
PELLPACK	X	X	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	X	X	✓	✓
SoftLab	X	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	X	X	✓	✓
Sieve, Symphony	✓	✓	X	X	✓	✓	✓	✓	X	✓	✓	✓	✓	X	✓	✓	✓	✓	X	✓	✓
OPM	✓	X	X	X	✓	✓	✓	✓	X	✓	✓	✓	✓	X	✓	✓	✓	✓	X	✓	✓
Gateway	X	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
UNICORE	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
SCIRun	X	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
BioPSE	X	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Uintah	X	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Cactus	X	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
ASC	X	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Ecce	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
The Virt.Lab.	X	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
FAST, R.Fast	X	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓

Table C.2: Evaluation of related work with respect to the identified/mentioned requirements

Identified/Mentioned Requirements - II																					
System	General VI Requirements										Inf. Mgmt. Requirements										
	Infrastructure				Interf.		Functionality				Im.	Inf Mgmt.									
	Storage	Computing	Networking	Instrumentation	SW environment	User interface	API	Experiment mgmt.	Information mgmt.	Resource mgmt.	User mgmt.	Collaboration	Security	Implementation	Modelling	Storage	Manipulation	Collaboration	Security	Interoperability	Implementation
Virt. NMR F.	X	X	X	✓	X	✓	✓	X	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	X	X
Virt.Lab.	X	X	X	✓	X	✓	X	✓	X	✓	✓	X	✓	X	X	X	X	X	X	X	X
V.Geo.Lab.	X	X	X	✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Remote Lab	X	X	X	✓	✓	✓	X	X	X	✓	X	X	X	✓	X	X	X	X	X	X	X
Tele-Actor	X	X	X	✓	X	✓	X	X	X	✓	X	✓	X	X	X	X	X	X	X	X	X
VCLab	X	✓	X	✓	✓	✓	X	X	X	✓	X	✓	X	✓	X	X	X	X	X	X	X
CLRC Data P.	✓	X	X	X	X	✓	X	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SRB	✓	X	X	X	X	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chimera	✓	X	X	X	X	X	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	X	X	X
MCS	✓	X	X	X	X	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X
MDMS	✓	X	X	X	X	X	✓	X	✓	✓	✓	X	✓	✓	✓	✓	✓	X	X	X	X
Virt.Sky	✓	✓	✓	X	X	✓	X	X	✓	X	X	✓	X	X	X	✓	X	✓	X	X	X
EnterTheGrid	X	X	X	X	X	X	X	X	X	X	X	✓	X	X	X	X	X	X	X	X	X
VLAM-G/VIMCO	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table C.3: Evaluation of related work with respect to the identified/mentioned requirements

System		Provided functionality - I																							
		Experiment Management						Data/Inf. Mgmt.						Res. Mgmt.				User		Collab.		Security			
Template	Design	Metadata	Execution	Hist. of activities	Assistance	Session	File mgmt.	Data/inf. mgmt.	Query	Acc. hetero. data	Integration	Version mgmt.	Replication	Disc. alloc. sched.	Descriptive inf.	Exec. mode	Monitoring	Account mgmt.	Roles mgmt.	Res. sharing	Cooperative work	Collab. mgmt.	Authent./author.	Single sign-on	Access rights mgmt.
Zoo	✓	✓	✓	✓	✓	-	X	✓	✓	✓	X	X	X	X	X	X	✓	-	-	X	X	X	-	-	-
PELLPACK	✓	-	✓	✓	✓	✓	✓	✓	X	X	X	X	X	✓	✓	-	✓	-	-	-	X	X	-	-	-
SoftLab	✓	-	✓	✓	✓	-	X	✓	✓	X	X	X	X	X	X	X	X	X	-	-	✓	X	X	-	-
Sieve, Sym-phony	✓	✓	✓	✓	✓	✓	X	✓	✓	X	X	X	X	-	-	-	-	✓	✓	-	✓	X	-	-	-
OPM	✓	✓	X	✓	✓	X	X	✓	✓	✓	✓	X	X	X	X	X	X	X	-	-	✓	X	-	-	-
Gateway	X	X	✓	X	X	✓	X	X	X	X	X	X	X	✓	✓	✓	✓	✓	-	-	✓	X	✓	✓	X
UNICORE	X	X	✓	X	X	-	✓	✓	X	X	X	X	X	✓	✓	✓	✓	✓	✓	X	X	X	✓	✓	X
SCIRun	X	X	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	X	X	-	-	-
BioPSE	X	X	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	✓	X	-	-	-
Uintah	X	X	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	X	X	-	-	-
Cactus	X	X	✓	X	X	X	✓	✓	X	X	X	X	X	-	-	-	✓	✓	-	-	✓	X	-	-	-
ASC	X	X	✓	✓	✓	-	✓	X	X	X	X	X	X	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓
Ecce	✓	✓	✓	✓	✓	-	✓	✓	✓	X	X	-	X	✓	✓	-	✓	✓	✓	-	✓	X	✓	✓	-
The Virt.Lab.	X	✓	✓	✓	✓	✓	X	X	X	X	X	X	X	✓	✓	✓	✓	✓	✓	-	✓	X	✓	✓	-
FAST, R.Fast	X	X	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	✓	✓	✓	-	-	✓	✓	✓	✓	-

Table C.4: Evaluation of related work with respect to the provided functionality

System	Provided Functionality - II																									
	Experiment Management						Data/Inf. Mgmt.				Res. Mgmt.			User		Collab.		Security								
	Template	Design	Metadata	Execution	Hist. of activities	Assistance	Session	File mgmt.	Data/inf. mgmt.	Query	Acc. hetero. data	Integration	Version mgmt.	Replication	Disc. alloc. sched.	Descriptive inf.	Exec. mode	Monitoring	Account mgmt.	Roles mgmt.	Res. sharing	Cooperative work	Collab. mgmt.	Authent./author.	Single sign-on	Access rights mgmt.
Virt. NMR F.	X	X	✓	✓	X	✓	✓	✓	✓	-	X	X	X	X	✓	X	X	✓	✓	-	✓	✓	X	X	✓	-
Virt. Lab.	X	✓	X	✓	✓	X	✓	X	X	X	X	X	X	X	✓	X	X	-	✓	✓	X	✓	X	X	✓	-
V. Geo. Lab.	X	X	X	✓	X	✓	X	X	✓	X	X	X	X	X	X	X	X	✓	✓	X	X	X	X	X	✓	X
Remote Lab	X	✓	X	✓	X	✓	✓	X	X	X	X	X	X	X	X	X	X	✓	-	-	✓	✓	X	X	-	-
Tele-Actor	X	X	X	✓	X	X	✓	X	X	X	X	X	X	X	X	X	X	✓	-	-	✓	✓	X	X	-	-
VCLab	X	X	X	✓	X	✓	-	X	X	X	X	X	X	X	X	X	X	✓	-	-	✓	✓	X	X	-	-
CLRC Data P.	X	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	✓	X	X	✓	✓
SRB	X	X	✓	✓	X	X	✓	✓	✓	✓	✓	✓	X	-	✓	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓
Chimera	X	X	✓	✓	X	✓	✓	✓	✓	✓	X	X	-	-	✓	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓
MCS	X	X	✓	✓	X	✓	✓	✓	✓	✓	X	X	X	X	✓	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓
MDMS	X	X	✓	✓	X	✓	✓	✓	✓	✓	X	X	X	X	✓	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓
Virt. Sky	X	X	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	-	-	✓	✓	✓	-	-
EnterTheGrid	X	X	X	X	X	X	X	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	X	X	✓	✓	✓	X	X
VIAM-G/VIMCO	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓

Table C.5: Evaluation of related work with respect to the provided functionality

Applied Enablers					
System	Inf. models & stds.	Dist. inf. mgmt. sys.	Resource mgmt. tech.	Workflow mgmt. sys.	Virt. organizations
Zoo	X	X	X	X	X
PELLPACK	X	X	X	√	X
SoftLab	X	X	X	X	X
Sieve, Symphony	√	X	X	√	X
OPM	X	X	X	X	X
Gateway	X	X	√	√	X
UNICORE	X	X	√	X	X
SCIRun	X	X	√	√	X
BioPSE	X	X	√	√	X
Uintah	X	X	√	√	X
Cactus	X	X	√	X	X
ASC	X	X	√	X	√
Ecce	√	X	√	X	X
The Virt.Lab.	X	X	√	X	X
FAST, R.Fast	X	X	X	X	X
Virt. NMR F.	X	X	X	X	X
Virt.Lab.	X	X	X	X	X
V.Geo.Lab.	X	X	X	X	X
Remote Lab	X	X	X	X	X
Tele-Actor	X	X	X	X	X
VCLab	X	X	X	X	X
CLRC Data P.	√	√	X	X	X
SRB	√	√	√	X	X
Chimera	X	X	√	X	X
MCS	X	X	√	X	X
MDMS	X	X	X	X	X
Virt.Sky	X	√	√	X	X
EnterTheGrid	X	X	X	X	X
VLAM-G/VIMCO	√	√	√	√	X

Table C.6: Evaluation of related work with respect to the applied enabling technologies, standards, and paradigms (enablers)



Employed Implementation Technologies													
System	Platforms			Prg. Lang.				Internal DBMS				Other	
	Unix	Linux	Windows	C/C++	Java	Fortran	Script Lang.	Relational	Object	Native XML	File-based	Web tech.	XML
Zoo	✓	X	X	✓	X	✓	-	✓	X	X	X	X	X
PELLPACK	✓	-	-	✓	X	✓	✓	X	X	X	-	✓	X
SoftLab	-	-	-	-	-	-	-	-	X	X	-	X	X
Sieve, Symphony	-	-	-	-	✓	-	-	✓	X	X	X	-	✓
OPM	✓	X	X	✓	X	X	-	✓	X	X	X	X	X
Gateway	✓	-	-	-	✓	-	✓	X	X	X	X	✓	✓
UNICORE	✓	-	-	-	✓	-	-	X	X	X	X	✓	-
SCIRun	-	-	-	✓	✓	✓	✓	-	-	-	-	-	X
BioPSE	-	-	-	✓	✓	✓	✓	-	-	-	-	-	X
Uintah	-	-	-	✓	✓	✓	✓	-	-	-	-	-	X
Cactus	✓	✓	✓	✓	X	✓	✓	X	X	X	X	-	-
ASC	✓	✓	✓	✓	-	✓	-	✓	X	X	X	✓	-
Ecce	✓	-	-	-	✓	X	✓	X	X	X	✓	✓	✓
The Virt.Lab.	✓	✓	-	-	-	-	-	X	X	X	✓	X	X
FAST, R.Fast	✓	-	-	-	-	-	-	X	X	X	✓	X	X
Virt. NMR F.	✓	X	-	-	-	-	-	-	-	-	-	X	X
Virt.Lab.	-	-	-	X	✓	X	X	✓	X	X	X	✓	X
V.Geo.Lab.	-	-	-	-	-	-	-	-	-	-	-	-	-
Remote Lab	✓	-	-	✓	✓	-	✓	X	X	X	X	✓	-
Tele-Actor	✓	-	-	-	-	-	-	-	-	-	-	-	-
VCLab	✓	-	-	✓	✓	-	✓	X	X	X	X	✓	-
CLRC Data P.	-	-	-	-	-	-	-	-	-	✓	-	✓	✓
SRB	✓	-	-	✓	-	-	-	✓	X	X	✓	✓	-
Chimera	✓	-	-	-	-	-	-	-	-	-	-	-	✓
MCS	✓	-	-	✓	X	X	X	✓	X	X	X	✓	X
MDMS	✓	X	X	✓	X	X	X	✓	✓	X	X	X	X
Virt.Sky	-	-	-	-	-	-	-	-	-	-	✓	-	-
EnterTheGrid	-	-	-	-	-	-	-	-	-	-	-	✓	-
VLAM-G/VIMCO	✓	✓	✓	✓	✓	X	X	X	✓	X	X	✓	✓

Table C.7: Evaluation of related work with respect to the employed implementation technologies