

Appendix A Tools

Tool	Type	Description	Training Materials Currently Available?
AGI STK	COTS	Systems Tool Kit (STK) is a free 2D and 3D modeling environment for evaluating system performance.	Yes
AGI Viewer	COTS	AGI Viewer is a free interactive 3D viewer of STK analysis that increases workplace coordination and productivity by allowing sharing and interacting with STK scenarios.	No
Analysis Tool Set (ATS)	Custom	ATS is an Eclipse based analysis environment that supports importing mission artifacts and performing IV&V method based analysis activities.	Yes
Beyond Compare	COTS	Tool for comparing files and folders on Windows or Linux system.	No
COMPASS	Custom	Custom developed tool that encompasses library of IV&V analysis methods; generates Project specific Technical Scope and Rigor documentation.	Yes
Confluence	COTS	Team collaboration software that allows for the creation of rich web pages and blogs with links, media, images, and documents. IV&V Solution also has various plug ins being utilized.	Yes
Eclipse	COTS	Software development environment comprising an integrated development environment (IDE) and an extensible plug-in system.	No
Emacs for Windows	COTS	Advanced text editor that provides syntax highlighting/code formatting.	Yes

Tool	Type	Description	Training Materials Currently Available?
Enterprise Architect	COTS	Trace high-level specifications to analysis, design, implementation, test and maintenance models using UML, SysML, BPMN and other open standards.	Yes
Espresso	COTS	Development environment for the experienced programmer or web designer.	No
FLEXlm	COTS	Software license management tool.	N/A
GIMP	COTS	GNU Image Manipulation Program.	No
GMAT	COTS	Open source trajectory design and optimization system developed by NASA and private industry.	No
GUESS	COTS	Exploratory data analysis and visualization tool for graphs and networks.	No
Integrity (ORBIT)	COTS	Issue Tracking System that is out of maintenance and currently only supported for access to heritage data.	Yes
ISS Tool	GOTS	Simulation tool for the International Space Station.	No
JIRA	COTS	Database Tool utilized to file, manage, and report Issues. IV&V Solution also has various plug ins being utilized.	Yes
MagicDraw	COTS	Visual UML, SysML, BPMN, and UPDM modeling tool with team collaboration support.	Yes
MATLAB	COTS	Programming environment for algorithm development, data analysis, visualization, and numerical computation.	Yes
MATRIXx	COTS	Model-based design, simulation, and embedded code generation.	No

Tool	Type	Description	Training Materials Currently Available?
MinGW	COTS	Minimalist development environment for native Microsoft Windows applications.	Yes
PITS	Custom	Issue Tracking System that is out of maintenance and currently only supported for access to heritage data.	Yes
PFM	Custom	Program Financial Management Tool for tracking and managing IV&V Program financials.	Yes
PMERT	Custom	Performance Monitor Evaluation & Reporting Tool – custom developed tool to capture and report performance evaluation reports for contracts over multiple periods of performance.	Yes
PUI Finder	COTS	Find and collate information associated with a particular release of a Standard-Out (Std-Out) set of files.	No
Python		Develop scripts to automate repetitive actions required for analysis or to process data.	No
Rational ClearQuest	COTS	Bug tracking system that offers flexible defect and change tracking.	No
Rational Real Time Studio	COTS	User interface that supports C, C++ test and analysis tools.	No
Rational RequisitePro	COTS	Requirements and use case management tool for project teams.	No
Rational DOORS	COTS	Dynamic Object Oriented Repository System utilized for viewing and managing requirements.	No

Tool	Type	Description	Training Materials Currently Available?
Rational Rhapsody	COTS	Understand and elaborate requirements, abstract complexity visually using industry standard languages (UML, SysML, AUTOSAR, DoDAF, MODAF, UPDM), and validate functionality early in development.	Yes
RCAT	GOTS	Analysis of anomalies, close calls, and accidents and the identification of appropriate corrective actions to prevent recurrence.	Yes
Resolve	Custom	Custom developed tool currently utilized to track issues identified during IV&V analysis.	Yes
RiskManager	Custom	Custom developed tool currently utilized to track NASA IV&V internal/external project and Program risks as well as OSMA level risk reporting activities.	Yes
StateRover	COTS	Plug-in for Eclipse and is used to perform assertion based testing on model driven development.	No
SVN	COTS	Code repository application.	No
Together	COTS	Modeling tool no longer supported for general usage – only for heritage artifact access.	No Longer Supported
Windchill (Relex)	COTS	Systematically identify the potential failure modes of a system.	No
WinMerge	Open Source	Open Source differencing and merging tool for Windows.	Yes
WinPlot	COTS	General-purpose plotting utility, which can draw (and animate) curves and surfaces presented in a variety of formats.	Yes
Xming	Open Source	X Window System Server for Microsoft Windows.	No

Tool	Type	Description	Training Materials Currently Available?
Kali Linux	Open Source	Penetration testing tool	Yes; online and some custom training
Redseal Networks	COTS	Models networks and does threat visualization	Yes; vendor provided
Nessus	COTS	Vulnerability Scanner	Yes; online and some custom training
Wireshark	Open Source	Network packet capture and analysis	Yes; online
Network Miner	COTS	Network packet capture and analysis	Yes; online
Burp Suite Pro	COTS	Web application penetration testing	Yes; online
VMware (vCloud, workstation, ESXi, vSphere)	COTS	VMware suite of products to virtualize infrastructure	Yes; vendor provided
HP WebInspect	COTS	Dynamic Web application scanner	Yes; vendor provided
Metasploit Express/Pro	COTS	Penetration testing	Yes; online
BlackDuck Hub	COTS	SW supply chain management where it scans for known vulnerabilities when using open source software	Yes; vendor provided
Sonatype	COTS	SW supply chain management where it scans for known vulnerabilities when using open source software	Yes; vendor provided
OWASP Dependency Check	Open Source	SW supply chain management where it scans for known vulnerabilities when using open source software	Yes; online
Simics	COTS	HW emulation	Yes; vendor provided and custom
QEMU	Open Source	HW emulation	Limited
Bamboo	COTS	Build Server	Yes, vendor provided
VxWorks	COTS	Real-Time Operating System	Yes, vendor provided
VxWorks 653	COTS	Real-Time Operating System	Yes, vendor provided
RTEMS	Open Source	Real-Time Operating System	Yes, online
Crucible / Fisheye	COTS	Code Review & Code Visualization	Yes, vendor provided

Appendix B Static Code Analysis Tools

Static Code Analysis Tool	Type	Description	Training Materials Currently Available?
CodePeer	COTS	CodePeer is a Ada source code analyzer that detects run-time and logic errors.	Yes
CodeSonar	COTS	Identifies bugs that can result in system crashes, memory corruption, and other problems.	Yes
CodeSurfer	COTS	Code browser that understands pointers, indirect function calls, and whole-program effects.	No
FlexeLint	COTS	Checks C/C++ source code and find bugs, glitches, inconsistencies, non-portable constructs and redundant code.	Yes
HP Fortify	COTS	Identifies bugs that can result in system crashes, memory corruption, and other problems	Yes; vendor provided
Klocwork Insight	COTS	Enables early detection of a wide range of critical coding issues.	Yes
PolySpace Prover	COTS	Formal methods driven tool to detect and prove the absence of overflow, divide-by-zero, out-of-bounds array access and other run-time errors in source code.	Yes
PolySpace BugFinder	COTS	Higher level application used to detect and prove the absence of overflow, divide-by-zero, out-of-bounds array access and other run-time errors in source code.	Yes
Understand	COTS	Mostly used to reverse engineer, automatically document, and calculate code metrics for projects with large code-bases.	Yes

Appendix C Simulation Software

Software	Type	Description	Training Materials Currently Available?
Space Launch System Software-Only Simulator (S3)	Custom	Software only simulation environment that includes emulation of flight computers (Simics models), high fidelity dynamics, actuator, and sensor models provided by the Ares Real-Time Environment for Modeling, Integration, and Simulation (ARTEMIS) software, Managed Automation Environment for Simulation, Test, and Real-Time Operations (MAESTRO) test conductor, and flight software	Yes
JWST Integration Simulation and Test (JIST)	Custom	Software only simulation environment that includes Vehicle Dynamics Simulator, ECLIPSE Common Command Telemetry System (CCTS) ground system software, emulations of the spacecraft and instrument flight hardware (Simics models), flight software binaries, science instrument simulators	Yes
42	Open Source	A general-purpose multi-body, multi-spacecraft simulation software	Yes
SoftSim	COTS	Software only simulation environment (VxSim-based) utilized to support Lockheed Martin product line missions (e.g. OSIRIS-Rex, MAVEN)	Yes
SOCRRATES (Software Only Crew Exploration Vehicle Risk Reduction Analysis Test Environment Simulation) and Partition Level Application Test for Orion (PLATO)	GOTS	Simics-based software only simulation environments utilized for software independent testing Purpose Crew Vehicle (MPCV)	Yes

Software	Type	Description	Training Materials Currently Available?
NASA Operational Simulator (NOS) Engine	Custom	Simulation middleware utilized for custom simulations developed by JSTAR team	Yes
Core Flight System (CFS) Build Server	Custom	Builds and runs GSFC CFS build verification tests automatically	Yes
QEMU RAD750 model	Custom	Software model of BAE Systems RAD750 computer	No