Stephen L Arnold

Systems Engineer/Architect and Applied Earth Scientist

Address: USA (Santa Maria, CA) **Phone**: +01 (805) 863-8299 **Email**: stephen.arnold42@gmail.com	**Degrees**: Geophysics **Language**: English	

Education

1995-Present:	Graduate/short courses in Toxic Risk Assessment, C, Ada, Zope, Doppler and Polarimetric Weather Radar, 595th TEG Test and Evaluation Course, AMS Faculty Workshop, AHC Professional Development courses.
1990:	MS Degree in Geophysics, San Diego State University. Thesis topic:
	Atmospheric Resonance Waves Over the Sea of Cortés: An Experimental Case Study
1986:	BS Degree in Geophysics, San Diego State University.

Technical skills

CS/SE:	Strong knowledge of programming languages and tools, system performance, design, testing, and administration, as well as the software lifecycle, CI, software processes, requirements engineering, and system architecture, CyberSecurity
Operating Systems:	Unix/Linux/Embedded (Gentoo, OE, RHEL, Debian/Ubuntu), Android
Project Management:	Planner, OpenAdams, SCM tools, Make/Autotools, trac/git, doxygen, TaskWarrior
DataBase:	SQL, Postgres/spatial, sqlite, redis/nosql
Software:	Libre/Open office tools, docutils, graphviz, Dia, Inkscape
Embedded Systems:	Gentoo, OpenEmbedded, Android, design/build/deployment of applications for ARM and other embedded systems, Android, debian/Ubuntu

Languages

English:	Native
Spanish:	Conversational(-ish)
Applied Math:	Fluent
Programming:	Python, Ada, Bash/POSIX Shell, C, Java, C++, Perl, js, AWK, FORTRAN
Markup:	reStructuredText, HTML, DTML, XML, Markdown
Architectures:	x86/x86_64, ARM/AVR, Sparc, PowerPC, MIPS
Engineering:	IV&V, OOD/P, UML, DoDAF, 2167/498/12227, toolchains/SDKs, CI/Agile, jenkins/apache/trac/svn/git workflows, open document production

Recent Work Experience

2014 - Present: Principal Scientist, Systems Architect, Business Development - VCTLabs, Inc - Goleta, CA. VCT Product/Project management, conferences/expos, open source outreach & education. IV&V, Range Meteorology, and Hazard/Risk Modeling Subject Matter Expert (SME), education & training instructor. Systems Architecture and CyberSecurity (specializing in Gentoo, OpenEmbedded, RHEL, and Debian/Ubuntu, Linux development, build, and deployment testing. Linux kernel/u-boot and software testing on various ARM devices (Gentoo Linux, OE). Business/community development (event support, outreach, presentations, proposals).

2004 - Present: Startup / Tech Mentor - Technology and Open Source adviser, Santa Maria Startup Weekend and other local meetups and user groups. Open source presentations, technology training, demos.

2011 - 2014: SynergyHD3 - Senior Software Engineer - Arthrex California Technology, Inc. - Goleta, CA. DevOps, software/systems engineering, CM/QA, test & integration. Agile infrastructure & CI process implementation, Jenkins build/test/deployment automation. Linux OS/Distribution engineering, software and manufacturing process validation.

2009 - 2011: Staff Scientist, IV&V / Systems Engineering and Architecture Support - ENSCO, Inc. - VAFB, CA. Subject Matter Expert – Range Meteorological Systems, Flight Safety, Instrumentation. Launch Range Enterprise Architecture analysis (supersystem, subsystem, product). Safety-critical systems IV&V (Flight Termination, Range Timing). Range Architecture Model VV&A, model evaluation, code analysis, and test engineering. Software process, internal SCM and IV&V tool engineering.

2006 - 2009: Staff Scientist, System Performance Evaluation and Validation - ENSCO, Inc. - VAFB, CA. Performance analysis and verification & validation of Weather, Flight Operations, TEMS/Timing and Infrastructure products for new Mission Flight Control Center. Responsible for Weather, Infrastructure, and Data Handling subsystems; technical IA and System Security/Accreditation support.

2002 - 2006: Senior Scientist, Meteorological And Range Safety System (MARSS), Instrumentation and Infrastructure - ENSCO, Inc. - Santa Maria & VAFB, CA. RSA-MARSS and INF system design and requirements engineering, user training. Model evaluation and localization, integration with MM5/AWIPS, range instrumentation integration and test support.

1999 - 2009: Associate Faculty, Dept of Geography - Allan Hancock College, Santa Maria, CA. Senior instructor for physical geography and meteorology courses (also taught Human Geography). Curriculum review, course development, technology insertion, conference presentations.

1997 - 2002: Senior Scientist - Independent Verification & Validation - ENSCO, Inc. - VAFB, CA. IV&V of Launch & Test Range Meteorological and Flight Safety Systems, Range engineering and test support to AFOTEC and 17th Test Squadron.

1991 - 1997: Senior Systems Engineer, IV&V Task Lead on Meteorological Range Safety Systems - Geodynamics Corp - VAFB, CA. Requirements/code analysis, windfield, dispersion, & hazard model evaluation, algorithm & performance analysis, instrumentation and data quality analysis.

1990 - 1991: Applied earth science & software consultant, San Diego, CA. Air toxics risk assessment modeling studies, sensitivity studies, environmental assessments, cost-benefit analyses, bug-fixes and model enhancements (IWG Corp), geophysical data acquisition (JR & Assoc), database design/implementation (SDSU Instructional Media Center).

Recent FOSS Experience

2015 - Present: Co-maintainer of imx233-olinuxino boards for the FSL Community BSP (tested with Yocto/OpenEmbedded and meta-fsl*).

2014 - Present: Founding member Central Coast Open Source Solutions Exchange, an open source technology-focused meetup.

2012 - Present: Contributing developer - OpenEmbedded and Yocto.

2003 - Present: Senior Developer - Gentoo Linux. Maintainer of developer tools, GIS/scientific libraries, mentor of new developers, currently primary maintainer of Gentoo ARM overlay and my own dev overlay.

2000 - Present: Upstream developer and/or maintainer of several tools and utility libraries for source code metrics, graphics, science, and education. See the maintenance release page and the individual github project sites for more information.

Recent Education Experience

1999 - 2009: Associate Faculty - Allan Hancock College (senior geography and meteorology instructor). Taught Physical and Human Geography courses and ocassional technology courses, updated official geography course outlines, created new introductory meteorology course.

2014 - Present: Volunteer Instructor/Mentor - Google Summer of Code, Computer Science Education Week, and Open Document Foundation's Document Freedom Day.

- GSoC mentor for BeagleBoard.Org: BeagleSat project.
- Computer Science Education Week: Python Intro to CS course.
- ODF contributor, Document Freedom Day: Open Document Workshop.

Selected Projects

- Maintainer of GNU Winds On Critical Streamline Surfaces (GWOCSS) diagnostic windfield model.
- Senior Developer, Gentoo Linux. Maintainer of gentoo-embedded arm overlay, developer tools, gnat-gcc, other.
- Project lead, Open Source Weather Station - Raspberry Pi weather sensors and display software, arduino lightning detector (AMS WeatherFest demo).
- Embedded OS build, test, deployment, validation. SynergyHD3 embedded surgical camera project, Arthrex California Technology.
- Lead Systems Engineer, Subject Matter Expert for Meteorological And Range Safety System (MARSS), VAFB. Model evaluation and localization, integration with MM5/AWIPS and local instrumentation, forecaster/maintainer training.
- Test Director, test tool development, and scientific & engineering support, RSA Weather and Range Safety Systems, AFOTEC and 17TS.
- IV&V of MARSS, REEDM, and meteorological data systems, 30th Space Wing, VAFB.
- Volunteer user group leader, technical support, and PoP maintenance, RAIN (non-profit ISP).
- Maintenance Development and Modeler, Air Emissions Risk Assessment Model (AERAM). Air toxics risk assessment modeling, sensitivity studies, control trade-offs. Added "batch" mode for large model runs, fixed bugs.
- Research Assistant, Data Analyst, Scientific Programmer on Marginal Seas Experiment, 1984/85.
- Research Assistant, Gibraltar Experiment, 1986.
- Research Assistant, Shelf MIxed-Layer Experiment (SMILE), 1989.

Selected Publications

Open Data Standards and Open Source Modeling Tools: The GPL'd Release of Winds On Critical Streamline Surfaces (GWOCSS) (2015) S. L. Arnold, presented at the 31st Conference on Environmental Information Processing Technologies, Open Data Standards and Sharing track (95th Annual AMS Meeting, 2015).

Incorporating the AMS Online Weather Studies Resources In the Design of a New Meteorology Course (2007) S. L. Arnold, presented at the Educational Initiatives Poster Session, 17th Symposium on Education (88th Annual AMS Meeting, 2008).

Open Source Technologies in Science Education: What's Your Geek IQ? (2004) S. L. Arnold, presented at the Joint Session on Cyberinfrastructure to Support Atmospheric and Oceanic Education: Examples and Strategies, 14th Symopsium on Education (85th Annual AMS Meeting, 2005)

The Meteorological And Range Safety Support (MARSS) System: a GIS-based Tool for Launch Area Hazard Prediction and Visualization (2004) S. L. Arnold, A. Dianic, and E. Magnuson, presented at the 21st Int Conf on Interactive Information Processing Systems (IIPS) for Meteorology, Oceanography, and Hydrology (85th Annual AMS Meeting, 2005)

An Operational System for Real-time Lightning Display and Resource Protection (2004) E. Magnuson, S. L. Arnold, and A. Dianic, presented at the Conference on Meteorological Applications of Lightning Data (85th Annual AMS Meeting, 2005)

A Minimum Variance Approach to Estimating Wind Direction Statistics (2001) S. L. Arnold, presented at the 18th Int Conf on Interactive Information Processing Systems (IIPS) for Meteorology, Oceanography, and Hydrology (82nd Annual AMS Meeting, 2002)

Physical & Thermodynamic Properties of Hypergolic Propellants: A Review and Update. (1999) S. L. Arnold, Presented at the 1999 JANNAF Inter-agency Propulsion Committee PD&CS and S&EPS Joint Meeting, San Diego, CA

Professional

Affiliations: American Meteorological Society, American Geophysical Union, Assoc. for Computing Machinery, Computer Science Teachers Assoc, American Federation of Teachers

Interests: Earth Science Education, Computer Literacy/Fluency, Privacy and Security, Linux and Open Source, Environmental Risks and Hazards, Space Exploration and Technology

Personal

Home sites: http://www.gentoogeek.org and https://www.linkedin.com/pub/steve-arnold/3/172/427

Repositories: https://github.com/sarnold and https://github.com/VCTLabs

Publications: http://www.researchgate.net/profile/Stephen_Arnold4

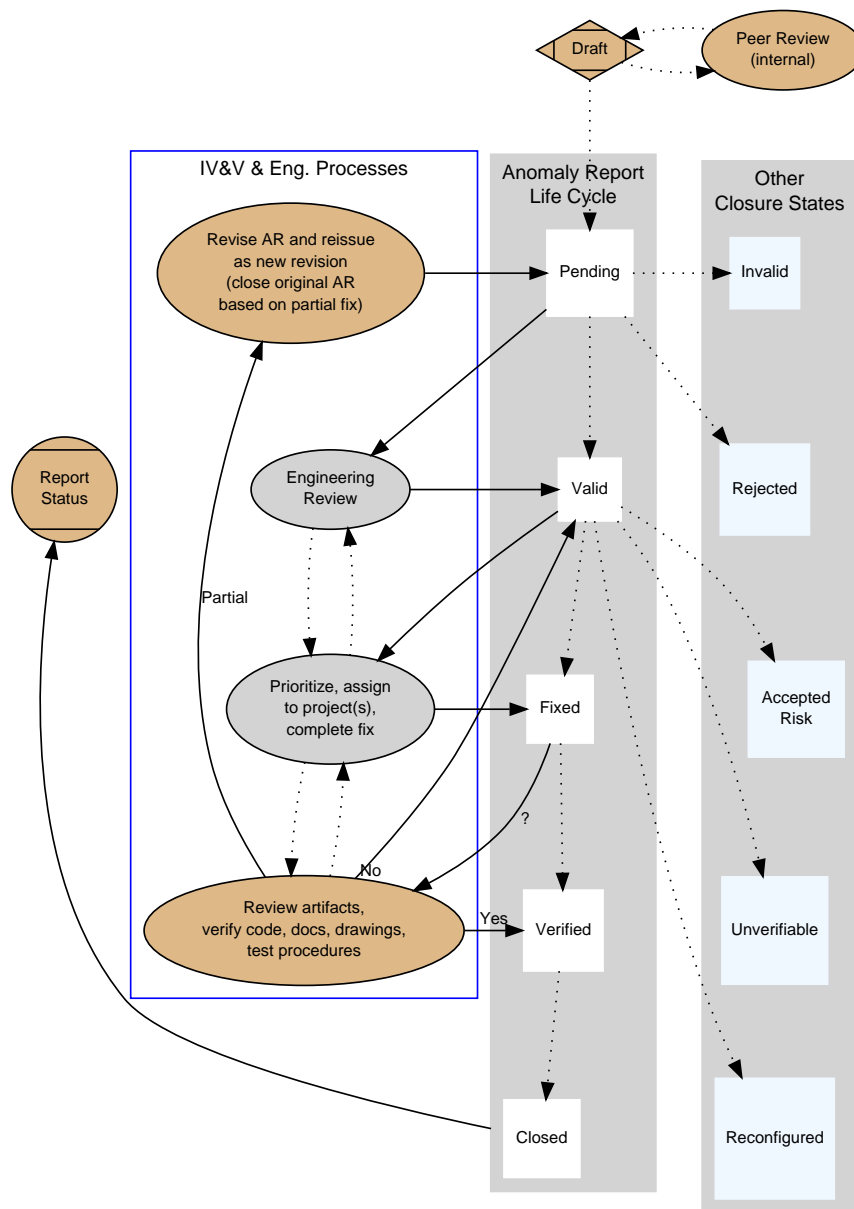**Interests:** Guitar/Bass/Pecussion, Science Fiction, Open Source

Appendix A

Example of open source use in engineering; graphviz diagrams and IV&V.

Overall IV&V and Engineering Processes

- Revise: Problem described in AR was partially fixed but needs additional work; a new revision of an AR has been written.
- Validate: Developer/customer validates ARs in the Pending state.
- Prioritize: Developer/customer prioritizes ARs and assign to project(s).
- Verify: IV&V verifies ARs declared fixed by the developer. Partial fixes generate a revision of the original AR (the latter is closed based on the partial fix).
- Report: IV&V reports AR State changes and status of open ARs.

AR States and Status

- Draft State: Anomaly Reports begin in a draft status for IV&V peer review; refined drafts may be circulated outside IV&V if warranted.

  - Draft Status: IV&V peer review of potential anomalies results in publication of draft AR.
- Open State: Open ARs begin with a status of "Pending" when an approved draft AR is published. Engineering review leads to the next status change, typically "Valid". Valid ARs are prioritized and assigned to an appropriate project; when engineering considers the problem fixed, the AR status is changed to "Fixed". Fixed ARs are verified by IV&V, and their status changed to "Verified" if the problem was fixed. In the case of a "partial" fix, a the original AR is declared "Verified" and closed based on the fix, and a new revision of the AR is written to describe any remaining issues.

  - Pending Status: An original or revised AR is generated, entered in the database, and delivered to project distribution list.
  - Valid Status: Developer (or customer) validates that AR identifies an error or problem condition that must be fixed.
  - Fixed Status: Problem described in AR is considered fixed by developer but has not been verified by IV&V.
  - Verified Status: Problem has been fixed by developer and IV&V has verified the fix.
- Closed state: Typically closed ARs have the status "Verified" (verified by IV&V), however, there are several other potential status flags for closed ARs, depending on the circumstances (see below).

  - Invalid Status: AR is considered technically inaccurate and does not describe an error.
  - Rejected Status: AR is technically accurate but the problem will not be fixed due to non-technical reasons.
  - Accepted Risk Status: Cost/benefit ratio does not justify fixing the problem.
  - Unverifiable Status: Original problem cannot be recreated in order to verify fix, and there is no other recourse.
  - Reconfigured Status: System has changed such that the original problem no longer applies.

Draft

Peer Review
(internal)

IV&V & Eng. Processes

Revise AR and reissue
as new revision
(close original AR
based on partial fix)

Report
Status

Engineering
Review

Partial

Prioritize, assign
to project(s),
complete fix

No

Review artifacts,
verify code, docs, drawings,
test procedures

?

Yes

Anomaly Report
Life Cycle

Pending

Valid

Fixed

Verified

Closed

Other
Closure States

Invalid

Rejected

Accepted
Risk

Unverifiable

Reconfigured

Anomaly Report And Tracking State Diagram

The Dot source code for the graphviz diagram is included below.

```
1 digraph G {
2   node [shape=doublecircle];
3       draft [label="Draft", style=filled, fillcolor=burlywood];
4
5   node [shape=ellipse];
6       peer_review [label="Peer Review\n(mostly internal)", style=filled, fillcolor=burlywood];
7
8   node [shape=rectangle];
9       pending [label="Pending"];
10
11  node [shape=ellipse];
12      dev_review [label="Engineering Review\n(and/or customer)", style=filled, fillcolor=grey89];
13
14  node [shape=rectangle];
15      valid [label="Valid"];
16
17  node [shape=rectangle];
18      invalid [label="Invalid"];
19
20  node [shape=ellipse];
21      prioritize [label="Prioritize, assign\nto project,\ncomplete fix", style=filled, fillcolor=grey89];
22
23  node [shape=rectangle];
24      fixed [label="Fixed"];
25
26  node [shape=ellipse];
27      verify [label="Review artifacts,\nverify code, docs,\drawings, test\nprocedures", style=filled, fillcolor=burlywood];
28
29  node [shape=ellipse];
30      revise [label="Revise AR and reissue\nas new revision\n(close original AR\nbased on partial fix)", style=filled, fillcolor=burlywood];
31
32  node [shape=rectangle];
33      verified [label="Verified"];
34
35  node [shape=ellipse];
36      report_verified [label="Report verified status", style=filled, fillcolor=burlywood];
37
38  node [shape=rectangle];
39      closed [label="Closed"];
40
41  node [shape=doublecircle];
42      report_closed [label="Report newly\nclosed ARs and\ntrack totals", style=filled, fillcolor=burlywood];
43
44  ranksep=.75;
45
46  { rank = same; "draft"; "peer_review"; };
47  { rank = same; "fixed"; "revise"; };
48  { rank = same; "closed"; "report_closed"; };
49
50  draft -> peer_review [label="iterative"];
51  peer_review -> draft;
52  draft -> pending [label="Official release to distro"];
53  pending -> dev_review [label="Valid?"];
54  dev_review -> valid [label="Yes"];
55  dev_review -> invalid [label="No"];
56  valid -> prioritize;
57  prioritize -> fixed [label="Yes"];
58  fixed -> verify [label="Fixed?"];
59  verify -> valid [label="No"];
60  verify -> verified [label="Yes"];
61  verify -> revise [label="Partial"];
62  revise -> pending;
63  verified -> report_verified;
64  report_verified -> closed;
65  closed -> report_closed;
66 }
67
```