

# Stephen L Arnold

## Systems Engineer/Architect and Applied Earth Scientist

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## 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, Maxima, Octave
- 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 (linear systems, differential equations, functional analysis, non-linear dynamics, math modeling, statistical methods)
- 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 - [Vanguard Computer Technology Labs, 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.
- 1997 - 2002:** Senior Scientist - Independent Verification & Validation - [ENSCO, Inc.](#) - VAFB, CA. IV&V of Launch & Test Range Meteorological and Flight Safety Systems, Range meteorologist and engineering 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/risk [model evaluation](#), dense gas hazard analysis, developed new [statistical estimation algorithm](#) for processing time-averaged wind data without access to the raw samples. Also performed real-time range safety 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).
- 1984 - 1990:** Research Assistant, Coastal and Boundary Layer Meteorology - SDSU and Scripps Center For Coastal Studies, San Diego, CA. Field observations, data collection, analysis, post-processing for 3 major field programs, scientific programming, custom instrumentation development (tethered sounding gear, kite and balloon platforms).

## 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 occasional 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 arm overlay](#), developer tools, gnat-gcc, misc.
- 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 and [model evaluation](#) of energy-balance evaporative source strength model for hypergolic propellant/oxidizer spills.
- Volunteer user group leader, technical support, and PoP maintenance, RAIN.
- 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, 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 Symposium 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](http://www.researchgate.net/profile/Stephen_Arnold4)

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

# Appendix A

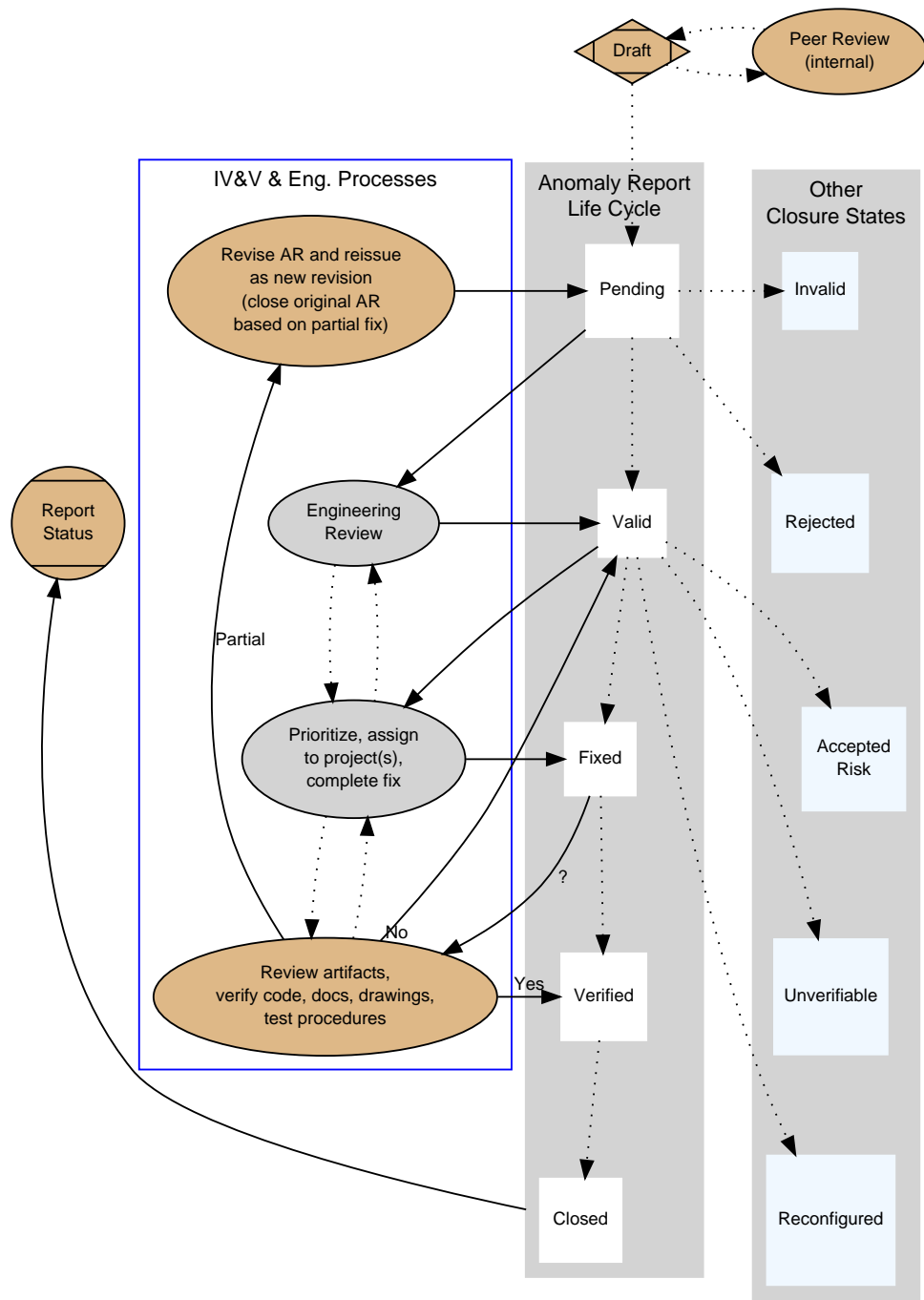
Example of open source use in engineering; graphviz diagrams and IV&V.

## Overall IV&V Engineering Process for Tracking Anomaly Reports

- 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.



*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,\ndrawings, 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
```