

# ***Andy Carol***

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Andrew Carol was born in New York, but as the son of an Army NCO, he grew up in three different states with two tours in Germany. He graduated high school in San Antonio Texas. Andrew spent ten years enlisted the Air Force, the first six maintaining mainframe computers. While stationed at Elmendorf AFB Alaska, he stumbled into an opportunity to help develop 3DS (Digital Decision Display System) for the AC2SMAN system.

Software that started as a personal project in the dormitory grew into a full featured Graphical Command and Control System, replacing a million-dollar project contracted to Digital Equipment Corp. It became part of a widely networked, award winning system that exceeded the capabilities of systems costing many 10's of millions of dollars and ran on inexpensive off-the-shelf computers.

Over the next six years he experienced Guerrilla Development in the trenches. The idea that sometimes an underfunded, local group that's very close to the problem can develop higher quality software that's better tuned to actual users needs. Developers going into the field with users and rapidly turning new versions can shave years off of development of complex systems. This can result in systems that are better tuned to actual field requirements, with substantial cost and time savings.

After leaving military service he joined Apple as a senior software engineer where he was a small part of a big effort to develop software running on hundreds of millions of devices, accumulating a dozen patents along the way Andrew's hobby is building hand cranked computing machines using LEGOs. These machines have no computers or motors, being purely turned by hand. Examples are a working three digit Babbage Difference Engine, an Antikythera mechanism that can accurately calculate the dates and times of solar and lunar eclipses, and an Automaton, a hand cranked machine that can write messages and draw pictures with a pen.

Participation in the development of the 3DS/AC2SMAN/CTIS system led to the following awards:

- Co-recipient of the M.I.T. Brunel Award for Macro Engineering
- Meritorious Service Medal
- Air Force Achievement Medal (Oak Leaf Cluster)
- Secretary of Defense Productivity Excellence Award (for documented savings of over \$1 million)
- Office of the Secretary of Defense Certificate of Appreciation
- Armed Forces Communications and Electronics Association Medal of Merit