

CMU SEI Research Review 2018

# Mission-capable Quantum Computing for Software Verification and Validation (VV)

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This material is based upon work funded and supported by the Department of Defense under Contract No. FA8702-15-D-0002 with Carnegie Mellon University for the operation of the Software Engineering Institute, a federally funded research and development center.

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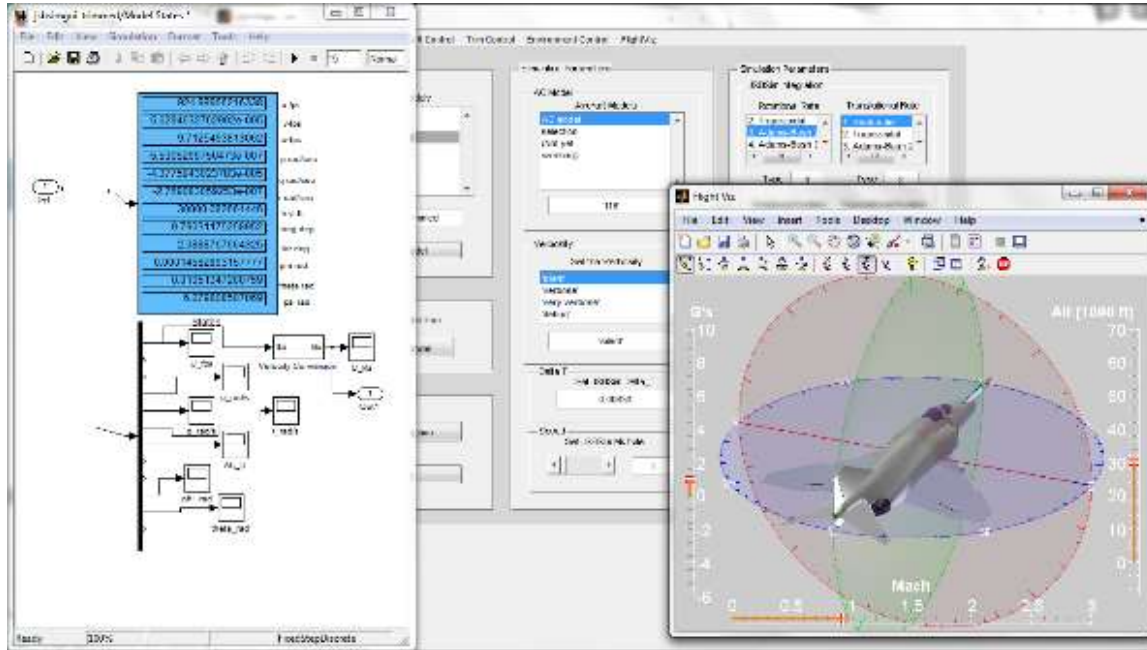
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DM18-1241

# Why is Software VV important (and HARD) for DoD?

“...on average, half the **cost** of creating [complex software] is on **VV**.”

— C. Elliott, Safe & Secure Systems & Software Symposium 2016.



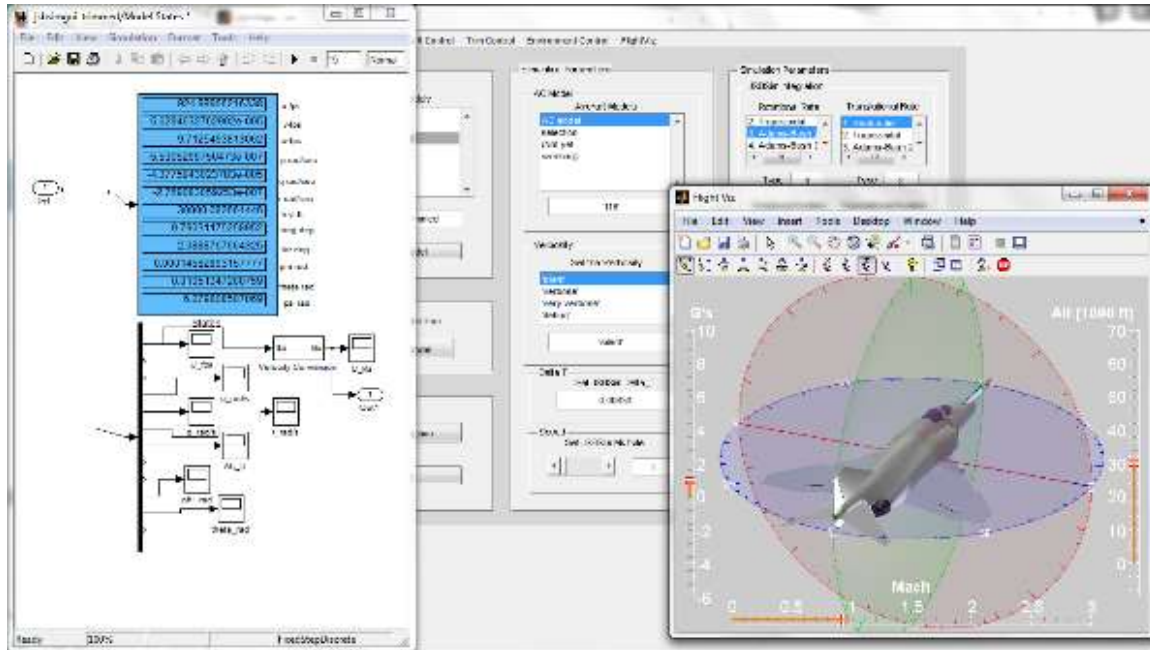
[github.com/esp8266/Arduino](https://github.com/esp8266/Arduino)

**Computational Cost ~ exp(size)**

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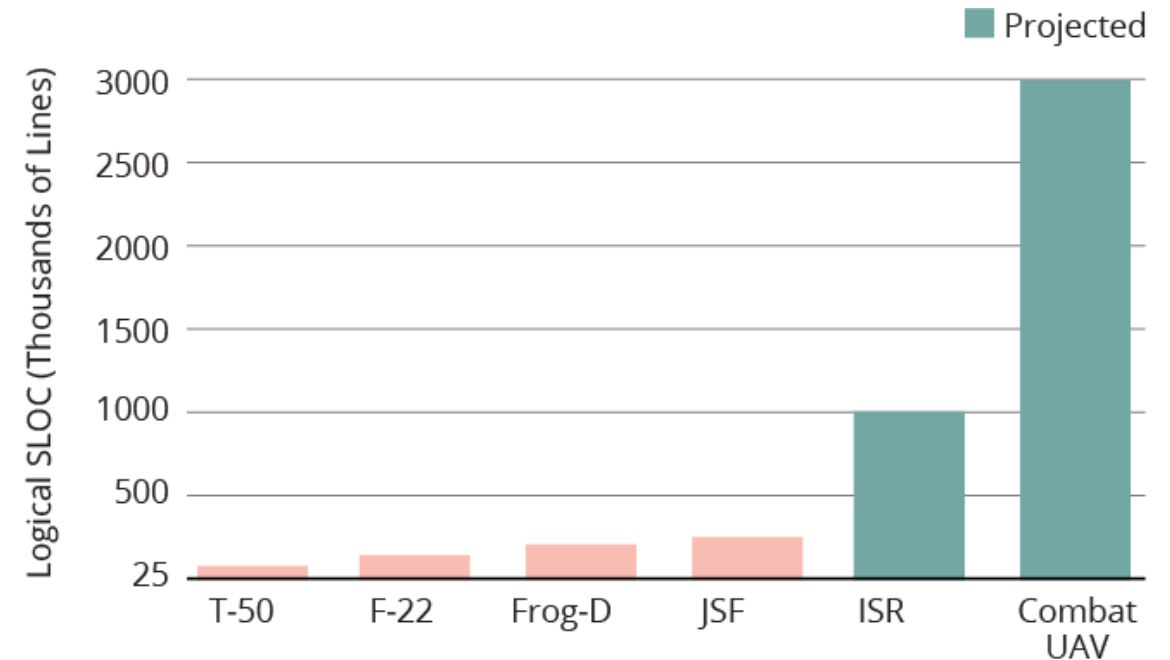
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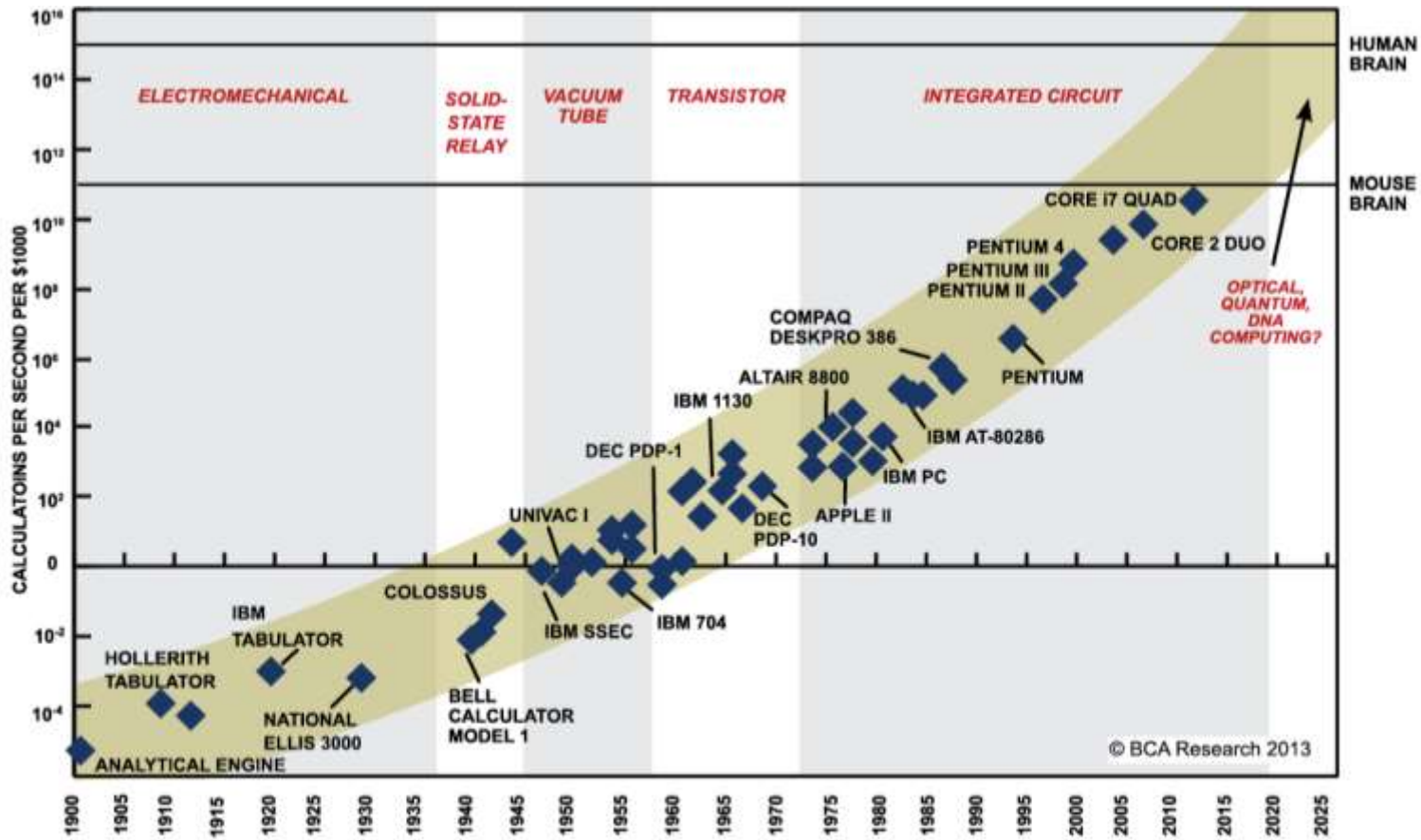
**And this cost is increasing...**



“next generation **Software VV** will require **new computing paradigm...**”

T. Belote, C. Elliott, Safe & Secure Systems & Software Symposium 2014.

# Is Quantum Computing the next major Paradigm?



SOURCE: RAY KURZWEIL, "THE SINGULARITY IS NEAR: WHEN HUMANS TRANSCEND BIOLOGY", P.67, THE VIKING PRESS, 2006. DATAPPOINTS BETWEEN 2000 AND 2012 REPRESENT BCA ESTIMATES.



# Is Quantum Computing the next major Paradigm? What is the path to mission-capability...

## Quantum Software Engineering

