



DEPARTMENT OF THE NAVY

CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE INDIANA 47522-5001

IN REPLY REFER TO:

J&A Number 11-046.1

Code CMXQ

N00164-11-R-GM23

CLASS JUSTIFICATION AND APPROVAL
FOR USE OTHER THAN FULL AND OPEN COMPETITION

1. Contracting Activity.

The Naval Sea Systems Command, Naval Surface Warfare Center, Crane Division

2. Description of the Action Being Approved.

The purpose of this addendum is to change the document from a J&A to a Class J&A. The Class J&A supports the award of a basic ordering agreement on a sole source basis for electronic design automation (EDA) software tool licenses to Cadence Design Systems, Inc., 2655 Seely Avenue, San Jose, CA 95134. Authority to act under this CJ&A expires 30 September 2016. All other aspects of the document remain unchanged.

3. Description of supplies/services.

The requirement is for the continued use of commercial license and maintenance agreements for electronic design automation (EDA) Cadence software tools. The software tools include digital design verification tools, analog tools and physical verification tools; and are used in design, evaluation, verification, and debugging of analog, mixed signal, and digital integrated circuits. The Cadence tools are used by NSWC Crane, as well as other sites supporting Strategic Systems Programs (SSP) work for the TRIDENT MK6LE Guidance System.

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Specifically, the program office - SSP requirements include a schematic capture tool, simulation environment, transistor level simulator, mixed mode simulator, behavioral simulator, physical layout tool, place and route tool, limited digital synthesis and implementation tool, design rule check tool, layout vs. schematic check tool, parasitic extraction tool, and a formal (logic

equivalency) verification tool. Cadence tools that meet SSP requirements are the Virtuoso suite of analog/mixed signal tools, Assura physical verification tools, QRC extraction tool, Encounter Conformal logical equivalency tool, Incisive Desktop manager tool, and Incisive Specman tool.

This will be a five year contract for Cadence EDA tool term based lease licenses and maintenance agreements. The total estimated cost (with options included) is \$7,399,348. A projection of the proposed contract utilization by funding type is as follows:

Estimated Dollar Value

Type of Funds	FY11	FY12	FY13	FY14	FY15	Total
WPN	\$1,429,750	\$1,416,294	\$1,465,864	\$1,517,170	\$1,570,270	\$7,399,348

The Government's minimum needs have been verified by the certifying technical and requirements personnel.

4. Statutory Authority Permitting Other Than Full and Open Competition.

10 U.S.C. 2304(c)(1), only one responsible source and no other type will satisfy the needs of the agency.

5. Rationale Justifying Use of Cited Statutory Authority.

Cadence Design Tools have been used for analog, mixed signal, and digital tasking for strategic systems programs for about 13 years at NSWC Crane. They were obtained by SSP via two of their prime contractor - DRC and Draper Laboratories. Historically, these contractors purchased tools for use within the program, and Crane was the centralized host for tool licenses.

Ten analog/mixed signal integrated circuits (ICs), utilizing three semiconductor manufacturers and four semiconductor processes, and twelve digital application specific integrated circuits (ASICs), utilizing one semiconductor manufacturer and two semiconductor processes, were developed for the Trident Life Extension program using Cadence tools. SSP requires continued support of these parts, and compatibility with the historical data developed. The design databases for the parts are in Cadence proprietary formats, developed at the contractor's expense and are not available for sale to the Government. Use of alternate EDA software would require each design database to be converted at a cost of manpower and schedule. In addition, design kits that provide models, symbols, layout cells, verification decks, and other process information for each

semiconductor manufacturer's process would need to be obtained and/or converted (at a cost of manpower and schedule) to compatible formats for alternate tools. The following tool justifications give a more in depth estimate to the duplication of costs. Present and future tasking for research and development of integrated circuits also drives the requirements for the needed functionality of Cadence tools.

Cadence® Incisive® and Cadence Encounter Conformal tools:

Cadence® Incisive® Enterprise Specman Elite® is the tool used for the Trident program since 2004. Existing parts have been verified using these tools and their associated programming languages. No other vendor has implemented the 'e' language (IEEE standard 1647-2008). Long term production support for these ASICs will require the ability to run new simulations on these designs using the same tool set and test-bench as was used during development with new tests for Failure Analysis, or will require complete re-characterization of each ASIC using an alternate tool. Based on analysis, understanding, and indepth involvement in coding in both the IEEE 1647-2008 'e' language and the IEEE 1800 System Verilog language, NSWC Crane engineering estimates conversion of present test scripts for use on a different tool would take 11.5 man years at a cost of \$2.25M. Schedule would be affected by about 3 years.

	<u>Cost</u>	<u>Time</u>
Process Development	\$147k	3 people @ 3months
Conversion of Data	\$784k	4 people @ 1 year
Testing	\$1.176M	4 people @ 1.5 year
Training	\$147k	3 people @ 3months
Total (minimum)	\$2.254M	11.5 manyears

NSWC Crane is tasked to bring the Defense Advanced Research Projects Agency (DARPA) "Trust in Semiconductors" workload in-house to support future ASIC and Field Programmable Gate Array (FPGA) development and analysis of existing designs. This ties directly into DoD's Trusted Electronics thrusts. The Conformal tool is required for this flow. SSP would be unable to assure the trustworthiness of system ASICs and FPGA designs without this tool. This could add lengthy delays to program schedule as well as potential failure to field these parts.

Cadence® Incisive Design Team Manager has been in use for managing verification activity for the Trident program since 2007. The input and output file formats are unique to this tool and it would take substantial effort to translate to any other tool, approximately 3.75 man years at a cost of \$735k as well as schedule delays. The table below shows the minimum estimated duplication of costs and delays associated with utilizing a different source.

	<u>Cost</u>	<u>Time</u>
Process Development		
Conversion of Data	\$294k	3 people @ 6 months
Testing	\$294k	3 people @ 6 months
Training	\$147k	3 people @ 3months
<u>Total (minimum)</u>	<u>\$735k</u>	<u>3.75 manyears</u>

Long term production support for these ASICs will require the ability to run new simulations on these designs using the same tool set and test-bench as was used during development with new tests for Failure Analysis.

Cadence® Virtuoso tools:

Cadence Virtuoso tools are the tools utilized by semiconductor foundries for custom integrated circuit layout and analog/mixed signal design. The utilized tools are published online (www.mosis.com). The Government requires compatibility with design kits issued by semiconductor foundries. Based on analysis, understanding, and indepth involvement in analog and mixed signal parts development, NSWC Crane engineering estimates the selection of a different set of tools would require 2 man years of work to convert the design portion of foundry issued design kits to a different tool and to verify the kit. Support of legacy designs would be lost and porting those design databases to a new set of tools would require 4 man years of work. The schedule to convert design kits and legacy designs for a different tools would be 1.5 years and would delay program schedules for any fleet parts requiring support. Labor cost would be \$1.176M.

	<u>Cost</u>	<u>Time</u>
Process Development		
Conversion of Data	\$784k	4 people @ 1 year
Testing	\$196k	4 people @ 3

Training	\$196k	4 people @ 3months
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Total (minimum)	\$1.176M	6 manyears

Cadence® Assura and QRCX tools:

Cadence Assura and QRCX are required for present research and design efforts, as well as support of fielded parts. These tools are also used by the semiconductor foundries, and the Government requires compatibility with the semiconductor foundry design kits. Based on analysis, understanding, and indepth involvement in analog and mixed signal parts development, NSWC Crane engineering estimates the selection of a different set of tools would require 4.5 man years of work at a cost of \$882k to convert the physical verification portion of foundry issued design kits to a different tool and to verify the kit. Design kit verification rule conversion would require a schedule of 1.5 years.

	<u>Cost</u>	<u>Time</u>
Process Development Conversion of Data	\$588k	3 people @ 1 year
Testing	\$147k	3 people @ 3 months
Training	\$147k	3 people @ 3months
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Total (minimum)	\$882k	4.5 manyears

Semiconductor foundries require verification checks to be completed using the verification rules issued by them. Alteration of a foundry design kit to enable use of a different tool would void these rule checks. Therefore, the foundries would not accept risk responsibility during manufacturing. Present costs for a mid-grade technology manufacturing run are more than \$10M. The program would have to assume all risk for error, due to not using the foundry accepted verification tool, and a 2nd manufacturing run would be necessary if errors were found. Redesign and remanufacture of parts would add 6-12 months on to program schedules.

The following schedule impacts must also be considered:

- Rising costs and program schedule delays will be incurred the Government does not continue licensing for Cadence software. Delays in support of program electronics add both costs and schedule delays to the program. This software is required to continue support of strategic systems electronics without delay.

- Impact to IOC and Fleet availability and the DoD's ability to provide a strategic Deterrence
- Impacts to the Ohio Replacement program which would result in further Fleet DoD impacts in out years.

6. Description of Efforts Made to Solicit Offers from as Many Offerors as Practicable.

A synopsis was issued on 09 May 2011 as required by FAR 5.202, via posting on the Federal Business Opportunities (FEDBIZOPPS) website. To date, no inquiries have been made. Market research was conducted to locate alternate software tools that could meet the Government's requirement. Market research efforts included researching alternate technologies via internet searches, internal knowledge of the industry, knowledge of the proprietary information of the semiconductor foundries, and knowledge obtained from conference attendance related to the integrated circuit industry. Through these market research efforts, the Government technical activity has determined that Cadence is the only source that can provide the software tools with all of the required capabilities as described in Section 3 above.

7. Determination of fair and reasonable costs.

The Contracting Officer has determined that the anticipated cost to the Government for the supplies/services covered by the J&A will be fair and reasonable. It is anticipated that this determination will be based on historical pricing and/or market pricing data for same/similar supplies.

8. Actions to Remove Barriers to Future Competition.

For the reasons set forth in Paragraph 5, NSWC Crane Division has no plans at this time to compete future contracts for these items. If another source(s) becomes qualified before the next procurement action, competition is possible. However, no funding or plans are currently in place to undertake efforts to qualify a new source.

CERTIFICATIONS AND APPROVAL

TECHNICAL/REQUIREMENTS CERTIFICATION (FAR 6.303-2(b))

I certify that the facts and representations under my cognizance, which are included in this justification and its supporting acquisition planning data, except as noted herein, are complete and accurate to the best of my knowledge and belief.

TECHNICAL COGNIZANCE:

[Redacted signature block]

Signature Name (Print) and Title (Code) Phone No. Date

REQUIREMENTS COGNIZANCE:

[Redacted signature block]

Signature Name (Print) and Title (Code) Phone No. Date

LEGAL SUFFICIENCY REVIEW (NMCARS 5206.303(90))

I have determined this justification is legally sufficient.

[Redacted signature block]

Signature Name (Print) and Title (Code) Phone No. Date

CONTRACTING OFFICER CERTIFICATION (FAR 6.303-2(a)(12))

I certify that this justification is accurate and complete to the best of my knowledge and belief.

[Redacted signature block]

Signature Name (Print) and Title (Code) Phone No. Date

APPROVAL BLOCK (FAR 6.304 for Approving Official)

Upon the basis of the above justification, I hereby approve, as Competition Advocate for the Procuring Activity, the solicitation of the proposed procurement described herein using other than full and open competition, pursuant to the authority of 10 U.S.C. 2304(c)(1).

CRANE DIVISION COMPETITION ADVOCATE APPROVAL:

[Redacted signature block]

KELLY SIFFIN

Name (Print)

9/9/11

Date