09:05:56 OCA PAD AMENDMENT - PROJECT HEADER INFORMATION |10/05/95

Active

Project #: E-16-X85 Cost share #: Rev #: 2
Center # : 10/24-6-R8620-0A0 Center shr #: OCA file #:
Work type : RES
Contract#: 353-4148 Mod #: 1 Document : SUBCONT
Prime #: NAS1-20478 Contract entity: GTRC

Subprojects ? : N CFDA: NA
Main project #: PE #: NA

Project unit: AERO ENGR Unit code: 02.010.110
Project director(s):
CRAIG J S AERO ENGR (404)894-3042
SCHRAGE D P AERO ENGR (404)-

Sponsor/division names: SYRACUSE UNIVERSITY / SYRACUSE, NY
Sponsor/division codes: 409 / 152

Award period: 950525 to 951031 (performance) 951130 (reports)

Sponsor amount	New this change	Total to data
Contract value	0.00	28,810.00
Funded	0.00	28,810.00
Cost sharing amount		0.00

Does subcontracting plan apply ?: N

Title: AFFORDABLE SYSTEM OPTIMIZATION PROCESS (ASOP) PROJECT

PROJECT ADMINISTRATION DATA

OCA contact: Ina R. Lashley 894-4820

Sponsor technical contact	Sponsor issuing office
GEOFFREY FOX	DIRECTOR
(000)000-0000	(000)000-0000
SYRACUSE UNIVERSITY	SYRACUSE UNIVERSITY
NORTHEAST PARALLEL ARCHITECTURES CTR	OFFICE OF SPONSORED PROGRAMS
111 COLLEGE PLACE, ROMM 3-217	113 BOWNE HALL
SYRACUSE, NY 13244-4100	SYRACUSE, NY 13244-1200

Security class (U,C,S,TS) : U ONR resident rep. is ACO (Y/N): N
Defense priority rating : NA NA supplemental sheet
Equipment title vests with: Sponsor X GIT
PER SUBCONTRACT, ARTICLE X, P.5
Administrative comments -
MOD 1 AUTHORIZES ONE-MONTH EXTENSION.

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

NOTICE OF PROJECT CLOSEOUT

SR 3-14

Closeout Notice Date 01/02/96

Project No. E-16-X85 Center No. 10/24-6-R8620-0A0

Project Director CRAIG J I School/Lab AERO ENGR

Sponsor SYRACUSE UNIVERSITY/SYRACUSE, NY

Contract/Grant No. 353-4148 Contract Entity GTRC

Prime Contract No. NAS1-20478

Title AFFORDABLE SYSTEM OPTIMIZATION PROCESS (ASOP) PROJECT

Effective Completion Date 951031 (Performance) 951130 (Reports)

Closeout Actions Required:	Y/N	Date Submitted
Final Invoice or Copy of Final Invoice	Y	
Final Report of Inventions and/or Subcontracts	Y	
Government Property Inventory & Related Certificate	Y	
Classified Material Certificate	N	
Release and Assignment	Y	
Other	N	

Comments

Subproject Under Main Project No.

Continues Project No.

Distribution Required:

Project Director	Y
Administrative Network Representative	Y
GTRI Accounting/Grants and Contracts	Y
Procurement/Supply Services	Y
Research Property Managment	Y
Research Security Services	N
Reports Coordinator (OCA)	Y
GTRC	Y
Project File	Y
Other	N
	N

NOTE: Final Patent Questionnaire sent to PDPI.

GEORGIA INSTITUTE OF TECHNOLOGY
School of Aerospace Engineering
Aerospace Systems Design Laboratory

Final Report

ASOP - Affordable System Optimization Process

Phase 1: Definition of Requirements

for an

Affordable Systems Optimization Process Implementation on the NII

- Concurrent Engineering Framework Requirements Team -

Submitted to

MADIC Team 2
Northeast Parallel Architectures Center
111 College Place, Room 3-217
Syracuse University
Syracuse, NY 13244-4100

November 1995

Final Report

Summary

This report summarizes the participation of Georgia Tech, Aerospace Systems Design Laboratory, in the ASOP Phase 1 - Requirements Definition. The report presents a concise summary of the contributions by Georgia Tech but does not repeat the material that has already been incorporated in previous ASOP presentations, workshop proceedings, and formal briefing documentation. The initial efforts by Georgia Tech were as participants in the framework specification for the requirements definition. More detailed contributions were provided to support the ASOP System Infrastructure on the NII requirements definition.

Introduction

As a result of previous participation in the development by the Rockwell International, North American Aircraft, of the original Affordable Systems Optimization Process proposal to NASA, Georgia Tech was a participant in the Phase 1 effort funded by NASA Langley Research Center through the Multidisciplinary Analysis and Design Industrial Consortium (MADIC). This final report summarizes our participation in the Phase 1 effort funded from May 25, 1995 to October 31, 1995. Throughout this report, the term, ASOP, will be used to identify this effort. The term, ASOP management, will be used to refer to the project management team led by Bob Schwanz of Rockwell, Peter Finnigan of GE and Bob Olson of MADIC. All of the material in this report has previously been transmitted to ASOP management in response to specific requests or as part of presentations and workshops for the NASA sponsors.

This final report is organized into sections that begin with a concise statement of the work to be performed by Georgia Tech and conclude with a summary of results for each of the major items in the work statement. In the interest of brevity and conciseness, only a few of the many figures and illustrations that have already appeared in workshop proceedings or other ASOP presentations will be repeated in this report.

Statement of Work

The following statement of work was submitted to Syracuse University as part of the proposed MADIC prime contract with NASA/Langley Research Center. The proposed period of performance was stated as March 1, 1995 through December 31, 1995.

1. Participate in the development of the requirements for a concurrent engineering software framework that can be used by the aerospace industry to simultaneously design product requirements, the product, and the associated manufacturing and support processes through the conceptual, preliminary and detailed design levels. Existing prototype frameworks such as FIDO, ENGINEOUS and NPSS would be examined to determine their potential for serving as starting points for the development of the more comprehensive framework envisioned.

2. Attend two (2) two-day workshops to be held at a central location within the US for the purpose of discussing the framework requirements referred to in Item 1 above.

Requirements Definition Workshop - May 22-23, 1995

The first of two workshops, this one held in Dallas, TX, May 22-23, 1995, was structured to set the tasks to be accomplished in completing the Phase 1 ASOP Requirements Definition effort. The key presentations were made by the ASOP management team and by principals from Rockwell, GE and from Northrup Grumman. The other ASOP participants contributed to the discussions and

participated as members of the three workgroups that addressed specific areas of the requirements definition. These were:

Workgroup A: System Infrastructure (Mike Less)
Workgroup B: Concurrent Engineering Framework (Pete Finnigan)
Workgroup C: Simulation Codes (Bob Melnik)

Georgia Tech attendees included: Jim Craig, Mark Hale, Eric Stephens, and Bill Marx. Jim Craig contributed to Workgroup A while Mark Hale,. Bill Marx, and Eric Stephens participated in Workgroup B. The Requirements Definition Workshop results contributed by Georgia Tech were incorporated into the draft Requirements Definition document, dated June 15, 1995.

Requirements Implementation Workshop - July 26, 1995

The second workshop to present draft requirements and to discuss the requirements implementation effort was held at NASA Langley Research Center, July 26, 1995 (following a MADIC Team 1 - Simulation Codes for Design Workshop). Georgia Tech participants included, Dan Schrage, Jim Craig, Eric Stephens, and Mark Hale. Georgia Tech contributed the portion of the System Infrastructure presentation dealing with Object Backplane requirements. Copies of the visual material used in the presentation were included in the Workshop Vugraphs document issued by MADIC and dated July 26, 1995.

NASA Briefing - September 25, 1995

A formal briefing for Lee Holcomb at NASA Headquarters titled, *Implementation of Affordable Systems Optimization Process (ASOP) on NII - Requirements Overview and Recommendations*, was presented on September 25, 1995. Dan Schrage attended this presentation. Georgia Tech provided contributions in several areas but did not participate directly in the presentation. The results are documented in the presentation materials.

Plans for ASOP Phase 2

In response to a request from the ASOP management team in late August 1995, Georgia Tech submitted the following outline of recommended Georgia Tech activities to support ASOP Phase 2 efforts. The outline is organized as responses to specific questions posed by ASOP management as follows:

WHAT TECHNOLOGY DOES GEORGIA TECH WANT/EXPECT TO GET FROM ASOP?

We would like to get the complete prototype ASOP software system into our Lab for further testing and development work. We hope to be contributing to key areas, but we'd like to get the complete system. Of course, we realize that much of ASOP will be distributed, so what we're referring to is the basic ASOP kernel, utilities, browsers, NII software, development tools and databases. We also expect that the software will be in rough prototype form so actual implementation will require considerable adaptation to our local environment and organization.

We also want to get the documented results of the test cases which we hope will include a good description of the ASOP methodology (as it is now posed and as it will actually be executed...).

IN WHAT TECHNOLOGY ASOP AREAS WOULD GEORGIA TECH LIKE TO BE INVOLVED?

Basically, we hope to be able to contribute to the development of the ASOP software infrastructure including the Object Backplane and the NII tools, etc. We think we have a lot to contribute based on our LEGEND/IMAGE/DREAMS work. We also would like to contribute some our uncertainty-based design methodology (being developed by Dr. Mavris and his students), but of

course, there must be in the ASOP context. Finally, we would like to contribute to the development of the cost modeling toolkits. This would be based on our research in integrating process-based cost models into a hierarchical life-cycle cost framework.

Some specific areas in which we would like to make contributions are:

1. Identification and development of a suite of tools for making resources into agents: We will have to integrate a lot of software, proprietary and nonproprietary, in several participating MADIC firms, and it will be important to formally categorize integration strategies and begin to assemble a generic tool suite. Such a suite might contain: Pre & post processors (includes things such as formatted, unformatted, and namelist processors); Resource interpreters (this is a generic toolkit for encapsulating resources, and it includes links to execs, sockets, threads, function calls, etc.); Modeling language (a language for writing models)(process and integration).

2. Background and survey work to better develop a good foundation for a "design-oriented" integration protocol: Much has been said about pro's and con's of KQML, but there is little good evidence of it's utility. However, the importance of protocols has not been fully addressed in our work. One example area that has come up in discussions at NASA about wrapping NASTRAN is the idea of a command language for agents. This protocol should be developed independently of data encapsulation methods (OLE, CORBA, PDES/STEP, IGES, etc.).

3. Explore means for storing design information in a common product data model: We've already done a lot with the Form-Function-Process-Model structure originally proposed and demonstrated by Eric Stephens in LEGEND. Mark Hale will continue this work but he will not even begin to completely assess to the capabilities of this paradigm to support the modeling and unambiguous exchange of data describing complex systems. The limitations of STEP/PDES are not fully understood, yet they must be considered.

4. WWW technology: We have a lot to contribute to the area of WWW (Web) technology and much of it is consistent with Geoffrey Fox's vision. In fact, we've actually built some of the things he was talking about at the ASOP workshop. We used Web publishing 3 years ago in our early infrastructure work with LEGEND and have continued with these activities. Eric Stephens at InSITE Designs, Inc. has continued this work since graduating and would be a key contributor to such efforts. He has played and implemented Dynamic HTML™ and has developed a generic Web Deployed™ interface. The potential of JAVA has yet to be scratched, and we have a lot of ideas about using JAVA with, for example, CORBA and VMRL, for Web browsing in the ASOP design and information spaces.

5. Uncertainty-based design methodology: We'd like to contribute and further develop some of our uncertainty-based methodology, process-based cost modeling, IPPD methodology, and producibility methods to the ASOP program. Much of the basic ASOP technology has been demonstrated by Rockwell in their early studies, but we think we can contribute to the extension of the process to the larger scale envisioned for our MADIC project.

6. Integration of technology into ENGINEOUS: Finally, we would like to be involved in the integration of these technologies into ENGINEOUS (or vice versa, depending on our ultimate point of view!). We do have some limited experience with ENGINEOUS, as one of our NASA fellows spent his summer internship at Rockwell NAA evaluating ENGINEOUS. We hope to be able to work with a restricted-access copy in our lab and help in the development of the cost modeling toolkit. We propose to demonstrate some very key concepts and processes that others will be able to implement in the full prototype ASOP system.

One point of concern must be made, however. Due to the very unstructured but highly creative academic workforce we naturally work with all the time, we do not think it prudent to be put us directly in the critical path for ASOP, especially as it concerns deliverables that other will need at key points. We think our best role is to serve as a testbed and to provide concepts and prototype implementations for others with better software engineering organizations to implement.