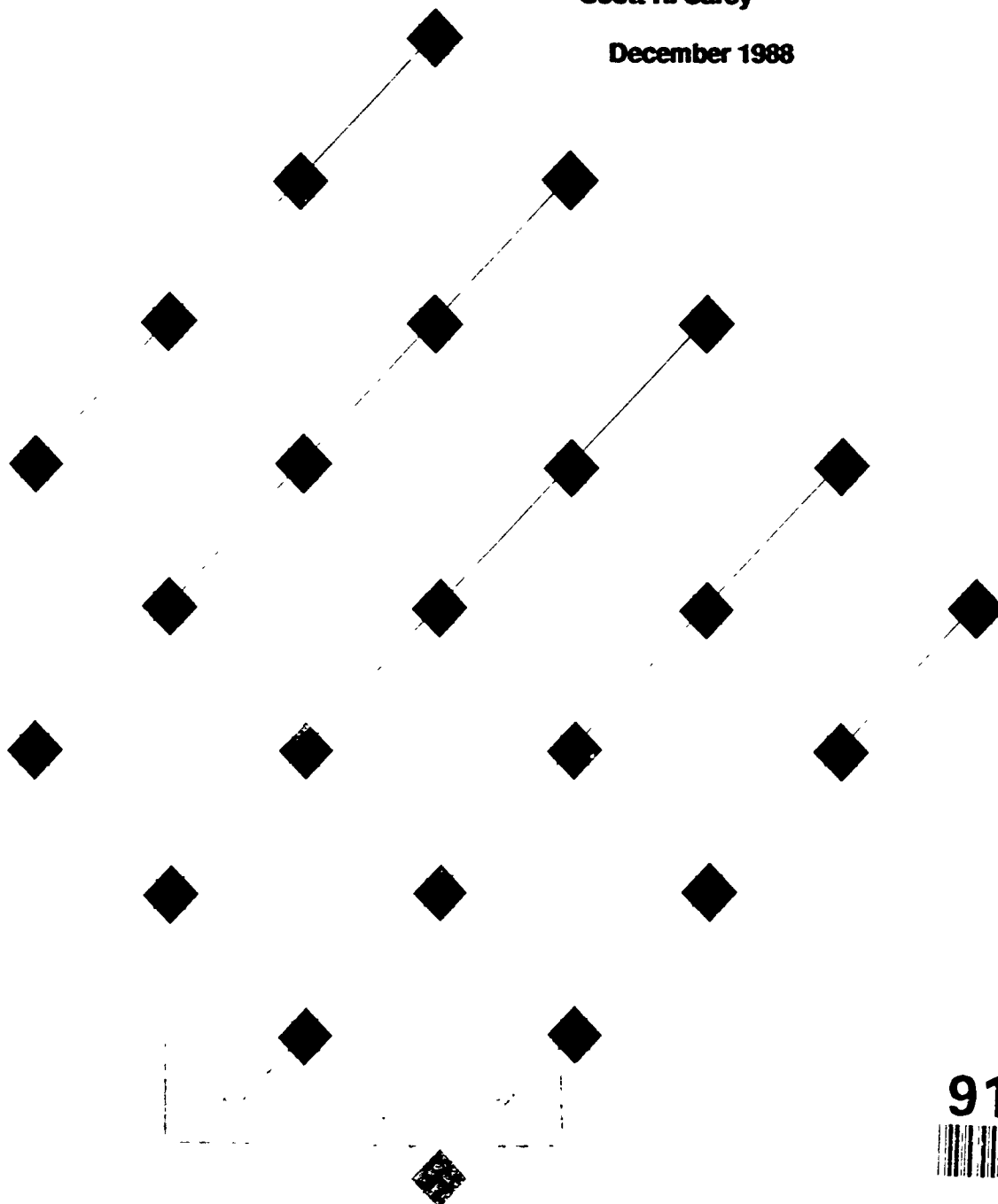


②

1. The first step in the process is to identify the problem or issue that needs to be addressed. This involves gathering information and understanding the context of the problem.

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Transition Plan

SEI-TP-88-1

ESD-TR-88-42

December 1988

Distributed Ada Real-Time Kernel (DARK)



Scott R. Carey

Technology Transition

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This transition plan was prepared for the

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The ideas and findings in this plan should not be construed as an official DoD position. It is published in the interest of scientific and technical information exchange.

Review and Approval

This plan has been reviewed and is approved for publication.

FOR THE COMMANDER


Karl H. Shingler
SEI Joint Program Office

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Technology Transition Plan

Distributed Ada Real-Time Kernel (DARK)

Version 1.0

5 October 1988

Scott R. Carey

This work was sponsored by the Department of Defense.

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TRANSITION PLAN HISTORY

Primary Author Scott R. Carey

Sources SEI Program Plans, DARK CDR Presentation; DARK Project Plan; Kernel Facilities Definition; DARK Software Development Plan; Westinghouse DARK Transition Plan

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Preface

This plan describes the project objectives and progress of the Distributed Ada Real-Time Kernel (DARK) Project in order to effectively plan and execute appropriate technology transition activities. The information contained within the document was gathered from sources listed in the plan history.

Transition planning is a process for gathering and disseminating information. The process produces approaches to transitioning the products and deliverables of SEI projects. Based on project status, product characteristics, resource constraints, and various other factors, transition engineers, transition managers, the project leader, the project team, resident affiliates (if applicable), and the program manager select transition approaches through a process of negotiation and consensus development.

Once the approaches are selected, Technology Transition personnel work with the project to execute the planned tasks, accessing and deploying resources from across the Institute.

1 BACKGROUND INFORMATION

Project Title	Distributed Ada Real-Time Kernel (DARK)
Program Area	Software Systems Program
Project Type	Software Development
Project Start Date	1 October 1987
Project Status	Active
Project Leader	Robert Firth
Project Team	
Current	Judy Bamberger Timothy Coddington Daniel Klein Roger Van Scoy Dave Stinchcomb (Industry Resident Affiliate) James Withey (Quality Assurance) Lorraine Nemeth (Secretary)
Former	Linda Slusarz (Librarian) Currie Colket (Navy Resident Affiliate)
Transition Managers	Clyde Chittister (SEI) Peter Zwerling (Westinghouse)
Transition Engineer	Scott Carey
TPA	Bill Edwards

1.1 Problem Statement

This project was initiated to demonstrate the feasibility of developing Ada applications — of acceptable quality and performance — for real-time distributed systems. One of the most persistent problems with the transition to Ada is the suitability of the Ada runtime system operating in environments that use tasking with distributed systems. Many users feel forced to create their own solutions to the constraints of Ada definition and implementation in real-time distributed systems. This project intends to produce a generic solution in the form of a software artifact that can meet the needs of most Ada real-time distributed users. This artifact is called the Distributed Ada Real-Time Kernel (DARK).

1.2 Summary of Activities

The DARK Project objective is two-pronged. First the project will replace the standard Ada tasking mechanism with a software artifact (that it develops) that can meet the needs of the mission critical

computer resource (MCCR) community. Second, it will transition this artifact to the MCCR community. To date, the project has developed detailed requirement and design specifications to (1) ensure that the product is properly developed and (2) to allow the MCCR community to review the requirements, design, implementation, and testing.

The transition strategy for DARK consists of two parts. Activities under the first part of the strategy constitute a proof of concept program to demonstrate the usability of the Kernel with the goal of it being adopted by one of the acceptor sites. The proof of concept program supports the second part of the DARK transition strategy by demonstrating the usability of the Kernel and by developing a potential market for a commercial version of the Kernel.

The first part involves the transfer of the Kernel to a number of acceptor sites. These acceptor sites may be SEI industrial affiliates, government agencies, or any other organization interested in using and reporting on the Kernel. Initially, these sites will be involved only in testing and evaluating the Kernel. Eventually, they may use the Kernel in their own applications. One acceptor site, Westinghouse Electric Corporation, has assigned a resident affiliate to the SEI to work with the DARK project team. Their affiliate will learn about the Kernel and take that information back to Westinghouse after leaving the SEI. A goal for Westinghouse is to use the Kernel in one of their applications.

The acceptor sites will receive two versions of the Kernel for the first target and one version of the Kernel for the second target. (Target describes a specific hardware computer architecture.) The first version of the Kernel for the first target, the beta version, will be released as soon as system acceptance testing is completed. There are two purposes for this beta version release (1) to introduce the Kernel to interested users and (2) to obtain feedback from Kernel users at an early stage.

The second version of the Kernel for the first target, the official version, will be distributed after the formal demonstration of the Kernel is complete. The official version of the Kernel will correct errors and deficiencies found both in preparing for formal demonstration and in beta release feedback.

The Kernel for the second target will be released in one beta version. This beta version will be released after testing and benchmarking are completed on the second target.

The second part of the DARK transition strategy focuses on the recruitment and selection of one or more product affiliates to take the Kernel and turn it into a commercial product. Companies that the SEI determines to have the necessary experience and knowledge will be recruited to become potential product affiliates for DARK. Of those recruited, the SEI will select a few companies to become product affiliates. The number of product affiliates will be based on the SEI's ability to provide active support to each of the affiliates. The product affiliates will then be expected to execute their best effort to develop, market, support, and enhance the Kernel. The SEI will provide direct support to these product affiliates for six months.

Major Milestones:

Project Plan approved	24 Nov 87
Critical Design Review (CDR) conducted	24 May 88
Kernel coding implementation complete	17 Oct 88
System acceptance testing begun	13 Dec 88
Beta version release for the first target completed	01 Feb 89
Official version release for the first target completed	08 Mar 89
Announcement of product development opportunity (APDO)	15 Mar 89
Product affiliate workshop conducted	30 Mar 89
Beta version for the second target testing begun	19 Apr 89
Beta version release for the second target completed	17 May 89
Product affiliates selected	17 Jul 89
Final Report completed	26 Jul 89
Support to product affiliates ended	17 Jan 90

1.3 Contract Deliverables

The official project deliverables are:

- Kernel implementation report (renamed the Final Kernel Acquisition Report and User Manual)
- Final report

While the DARK Project is not a project documented in accordance with formal government standards (i.e., MIL-STD-2167A), it does intend to produce an artifact, support software, and a set of documentation that could be turned into a supportable product. The items are as follows:

Artifact and Support Software

- Kernel software.
- Kernel Test Software. This software includes:
 1. Processor integrity test suite (PITS)
 2. Network integrity test suite (NITS)
 3. Kernel integrity test suite (KITS)
 4. Application integrity test suite (AITS). The AITS is the Inertial Navigation System (INS) distributed across a network and modified to report performance data. The INS was originally developed by the Real-Time Embedded Systems Testbed Project (REST) and will be modified for DARK.
- Tool Interface. This allows building tools that interface directly to DARK.

Internal Documentation

- DARK Project Plan. Overall description of project. (Completed, subject to revision.)
- DARK Software Development Plan (SDP). Describes the methodologies, practices and schedule for developing software for the DARK Project. (Completed, subject to revision.)
- DARK Technology Transition Plan. This plan. (Available for distribution 30 Sep 89.)
- Kernel Specification (KS). Presents the compiled Ada specifications for the Kernel primitives defined in the Kernel Facilities Definition. (Completed, subject to revision.)
- Kernel Architecture Model (KAM). Contains the detailed design description of the Kernel. This document presents the algorithms and data structures needed to implement the functionality defined in the Kernel Facilities Definition. (Completed, subject to revision.)
- DARK Critical Design Review Charts. Charts presented at the DARK CDR on 24 May 1988. (Completed)
- Minutes from the DARK Critical Design Review (CDR). Contains comments and responses from the DARK CDR held on 24 May 88. (Completed)
- Acceptance Test Plan and Procedure (ATP). This document is the component and system level test plan and procedures for the Kernel. (Available for distribution 17 Oct 88.)
- Implementation Style Guide. Describes the coding and style practices used in building the Kernel. (In progress.)
- Kernel Extensibility Report. Describes the functions considered for the Kernel but not implemented. This document will eventually be combined into the Final Kernel Acquisition Report and User Manual. (Available for distribution 26 Apr 89.)
- Kernel Performance Report. Describes the performance characteristics of the Kernel. This document will eventually be produced as the Final Kernel Acquisition Report and User Manual. (Available for distribution 3 May 89.)
- Tool Report. Describes the tool interface to the Kernel. This document will eventually be produced as the Final Kernel Acquisition Report and User Manual. (Available for distribution 1 Aug 89.)
- Kernel Portability Assessment. Describes the process by which the Kernel can be ported from one target computer architecture to another. This document will eventually be produced as the Final Kernel Acquisition Report and User Manual. (Available for distribution 17 May 89.)
- Evaluation Guide. Describes the process and the criteria by which Product Development Proposals submitted by potential product affiliates in response to the Announcement of Product Development Opportunity will be evaluated. (In progress.)

External Documentation

- Distributed Ada Real-Time Kernel. Describes overall rationale, system model, and summary description of the DARK Kernel. (Completed.)
- Kernel Facilities Definition (KFD). Defines the conceptual design of the Kernel by specifying:
 - The underlying models, assumptions, and restrictions that govern the design and implementation of the Kernel.
 - The behavioral and performance requirements to which the Kernel is built.

This document is the requirements and top-level design document for the Kernel (Completed, subject to revision.)

- Kernel User Manual (KUM). This document is the user manual and also the version

description document (VDD) for the Kernel. It will be issued for each major release of the Kernel. (Available for distribution on 1 Feb 89., with updates 22 Feb 89 and 31 May 89.)

- Final Kernel Acquisition Report and User Manual. This document describes the findings of implementing the Kernel on two hardware targets. Final notes to Kernel users are also contained in the document. (Available for distribution on 28 Jun 89.)
- Announcement of Product Development Opportunity. Describes the Kernel and the desire of the SEI to accept Product Development Proposals (PDP's) from potential product affiliates to develop and market the Kernel. (Available for distribution 15 Mar 89.)
- Final Report. Describes the final results of the DARK Project. (Available for distribution 26 Jul 89.)

All preceding materials, except the Evaluation Guide, will be made available to all acceptor sites and potential product affiliates involved with the project.

1.4 Additional Products and Outcomes

1. Papers presented at or published in:

- NAECON '88 (May 1988)
- Electronics Magazine (May 1988)
- Second International Workshop on Real-Time Issues (June 1988)
- Ada-Jovial User's Group (July 1988)
- SigAda (August 1988)
- Ada UK Conference (September 1988)
- Tri-Ada (October 1988)

2. Presentations made at:

- Advanced Tactical Fighter System Program Office (ATF SPO)
- Lockheed
- Raytheon
- Smith's Industries
- Westinghouse

2 TRANSITION STRATEGY

2.1 State of the Practice

Ada is now mandated for a large number of DoD development projects as the sole programming language. Many of these projects are building distributed real-time systems. Many project managers and contractors are anxious to support this effort, to reap the advantages of Ada, and to use the newer techniques of software engineering that Ada can support. However, this transition has not always been smooth, and some serious problems have surfaced.

One of the most persistent and worrying problems is the suitability of the Ada runtime system, most notably the tasking features, on distributed systems. There are also issues concerning functionality, amply documented by the Ada Real-Time Environment Working Group (ARTEWG); issues of customization; issues of tool support, especially target debuggers and performance monitors; issues of inter-process communication and code distribution; and perhaps, most intractable, issues of efficiency in execution time.

Most organizations are on the brink of deciding how to take to solve these problems. They have a number of choices: they can try to develop their own solution to this problem; they can try to buy a solution from a third party company; or they can try to postpone the decision until Ada 9X is released. Ada 9X is the proposed revision to Ada which may or may not include new features. As such, Ada 9X may contain some solutions to the distributed and real-time problems. However, Ada 9X will not be available until at least the mid 1990s, so only the first two are viable near term options.

2.2 Transition Objective

The transition objective of the DARK Project's is to reduce the risks for the MCCR community in adopting Ada for real-time distributed systems by providing them with a proven software Kernel that could be used as a focus for discussion of technical issues, as a basis for an individual MCCR community member's own distributed application, or as a product distributed and maintained by a product affiliate.

2.3 Potential Impact

There are at least three potential impacts of the DARK Project.

1. The use of the process of designing, reviewing, implementing, testing, and evaluating DARK as a focus for discussion of technical issues. This discussion could lead to other solutions of the Ada distributed/tasking problem. While DARK is not to be viewed as the only answer, its development can contribute to the process of solving Ada's distributed/tasking problems.
2. The savings in development costs that can be realized when members of the MCCR community use the Kernel as a basis for their own implementations.
3. The overall development and maintenance costs for the MCCR community can be reduced for many users if the Kernel is taken over and maintained by a product affiliate. The later impacts are more difficult, but will also produce a greater reward

2.4 Expected Results

The DARK artifact will provide individual users one way to produce reliable and efficient real-time distributed systems written in Ada. Several results are possible from this project. On the near end of the spectrum, the DARK Project could result in increased discussions of Ada on real-time distributed systems. In the middle of the spectrum, the DARK Project can result in the adoption of all or portions of the Kernel in a contractor's actual delivered system. On the far end, the DARK Artifact can continue to exist as an independent entity maintained by product affiliates. All of these are positive contributions toward solving Ada's distributed/tasking problems.

2.5 Transition Mechanisms

- **Demonstration (proof of concept).** The SEI proves the validity of the design by implementing the Kernel on two targets.
 - **Distributed 68020 target.** The SEI is currently developing the Kernel to run on a system of distributed 68020 microprocessors.
 - **Distributed RISC processor target.** The SEI plans to port to this additional target once development on the first 68020 target is completed. Westinghouse and the SEI will select the processor for this port jointly, as stated in the SEI/Westinghouse memorandum of understanding (MOU). Westinghouse will assume the leading role, with the goal of achieving mutual benefit from the selection.

This mechanism is the responsibility of the DARK project team.

- **Publications.** These include conference papers and magazine articles both in professional journals such as *Ada Letters (SigAda)* and in trade journals such as *Electronics*, *Defense Computing*, and *Defense Electronics*. This mechanism is the responsibility of the DARK transition engineer with support from the DARK project team.
- **Document Review.** The DARK project team and the DARK transition engineer will encourage review and comment by knowledgeable people both inside and outside the SEI. This not only develops the community's awareness of DARK but also provides important feedback to the project. However, to be credible, the project team must be willing to respond to the comments, including the effort to actually change the Kernel or its documentation.
- **Education.** As one of the first software development projects at the SEI, the DARK project team has spent considerable effort developing proposed generic software development plans, design/coding style guides, and other basic development documentation. The DARK project team and Transition Training can set up courses to teach the methodology and standards developed by DARK for use on other projects. This also can increase DARK's visibility within the SEI.
- **Announcement.** The DARK transition engineer sends announcements of Kernel availability and results to a large body of users via electronic mail and standard mail and to publication media via press releases. All press releases will be cleared through the SEI JPO before distribution.
- **Workshop.** The DARK transition engineer and the DARK project team will conduct a workshop on details of implementation results for interested parties.
- **Recruitment and selection.** The DARK transition engineer, with support from the DARK project team, will recruit companies to become potential product affiliates. Through a structured evaluation process the DARK transition engineer and the DARK project team will select one or more companies to become product affiliates to take over long-term DARK support. The number of product affiliates selected will be based on the SEI's ability to provide active support to each.
- **Software Distribution.** Actual distribution of the software artifact to various organizations for

examination and trial will do much to increase DARK's visibility. Good reports from these organizations will also increase DARK's credibility. The software distribution will be conducted by the DARK project team.

2.6 Target Clients

The following organizations sent representatives to the DARK Critical Design Review (CDR):

AFWAL/AAAF-3	Wright-Patterson AFB, Ohio
AMSA-W	St. Louis, Mo.
Grumman Aircraft Systems Division	Bethpage, N.Y.
Grumman-Melborne Systems	Melbourne, Fla.
Honeywell	Clearwater, Fla.
Intermetrics	Cambridge, Mass.
Lockheed Missiles and Space Co.	Sunnyvale, Calif.
Naval Weapons Center	China Lake, Calif.
Raytheon	Sudbury, Mass.
TRW	Wayland, Mass.
Westinghouse Electric Corporation	Baltimore, Md.

All of these organizations are considered potential acceptor sites. The DARK transition engineer has the responsibility to remain in contact with these organizations.

Appendix 2 is a list of all the organizations to whom DARK documents have been sent for review. All of the organizations above and those in the appendix should be informed and invited to all DARK activities. This is the task of the DARK transition engineer.

Third party software houses that should also be encouraged by the DARK Transition Engineer to become potential product affiliates:

Alcyon	San Diego, Calif.
Andyne Computing	Kingston, Ontario
Ready Systems	Palo Alto, Calif.
Boston Systems Office	Waltham, Mass.
Computer Technology Associates	Englewood, Colo.
DDC-I	Phoenix, Ariz.
Diab Systems	Foster City, Calif.
DY-4 Systems	Nepean, Ontario
EVB Software	Gaithersburg, Md.
Industrial Programming Inc.	Jerico, N.Y.
Intel	Hillsboro, Ore.
JM: Software Consultants	Spring House, Pa.
Microware Systems	Des Moines, Iowa
Software Components Group	Santa Clara, Calif.
TASC	Arlington, Va.
Technical Systems Consultants	Chapel Hill, N.C.
Tiburon Systems Inc.	San Jose, Calif.
Whitesmiths	Westford, Mass.
Wind River Systems	Emeryville, Calif.

This list was compiled from resources in Technology Transition and from the article, "Developers Target Unix and Ada with Real-time Kernels", in the 1 April 1988 issue of *Computer Design*¹.

¹Falk, Howard, "Developers Target Unix and Ada with Real-time Kernels," *Computer Design*, April 1, 1988, p. 55

A general request for potentially interested parties in real-time Ada kernels on the SEI bulletin board is expected to bring in additional contacts. Presentation at additional conferences, especially ones emphasizing Ada, may bring in additional contacts. The DARK transition engineer should conduct market analysis, with support from the DARK project team, to determine who are the most likely acceptor sites (those who may use the Kernel in their systems) or product affiliates (those who may wish to market DARK as an independent entity) in the group, and the transition effort should concentrate on them. These parties and all other interested parties will receive all announcements and requests for reviews concerning DARK.

2.7 Context Analysis

MCCR Community

There are a number of companies in the MCCR community who are attempting to deal with some part or all of the Ada real-time distributed problem. The SEI's effort is unique in that it is a fresh look at the problem which attempts to incorporate the best thinking on the subject. The SEI is also unique in that it is not constrained by needing to be compatible with an existing product. Therefore, the SEI can develop an independent solution that can be suitable for many users.

A critical problem is the lack of long-term support for DARK. The SEI currently has no plans to support DARK as a long-term, maintained, configuration-controlled item. However, most potential users have stated that without this long-term support, they cannot justify using DARK. Unless the SEI is able to find at least one product affiliate to take over the support of DARK, it is unlikely to have long-term success.

Another perceived problem is the need for fault-toleration and dynamic reconfiguration support. This issue was raised at the CDR. This support is beyond the scope of the DARK Project, except for some investigation of the problem as mentioned in the DARK Project Plan. A follow-on project by any party will have to include this support. Although, technically, providing this support is a difficult problem.

The lack of any support for data reliability or data security in the Kernel is another problem. This is a critical need of users in the MCCR community. Product development of the Kernel would have to meet this need.

The entire process of designing and implementing an important piece of software like DARK, with participation of the MCCR community, is a valuable exercise. It has provided a forum in which to discuss a wide variety of technical issues relating to Ada tasking, distribution, and scheduling. This important contribution deserves special attention.

SEI

While the transition of this project to the MCCR community is this plan's primary concern, the benefits that the SEI receives cannot be overlooked. DARK is the first software development project performed at the SEI that has gone through, or will go through, all the stages of requirements analysis, design, implementation, testing, and installation. Documents and practices resulting from DARK may be of value to other SEI software development projects.

Westinghouse

Westinghouse will take the lead in selecting the RISC processor for the second target, and assist in getting the DARK Artifact and the sample application, the Inertial Navigation System (INS), operating on that target at the SEI. This is only to be a demonstration system. The use of the Kernel on any real programs will depend on how well DARK performs, how well suited it is for Westinghouse applications, and how well it is sold. Publicity efforts within Westinghouse are crucial.

Emphasis must be placed on ensuring that enough of the information derived from Westinghouse is available to publicize DARK to the MCCR community. Details will be required if any other organization is expected to accept the results. Westinghouse must commit to allowing their evaluations of both the 68020 and RISC ports at the SEI to be publicly available.

Product Affiliates

The question for the product affiliate will be, "why spend resources on developing DARK when anyone can get the SEI version for free?" The answer comes from experience with government provided software packages. A government funded Jovial J73 compiler has been available from the Embedded Computer System Program Office at Wright-Patterson AFB for some time. Yet most major programs have chosen to purchase a compiler from a commercial software house. These software houses use the government funded compiler as a base then add their own special features and provide support. It is the extra value added by the software houses that makes the compiler truly useable. This will be true for DARK as well. Companies will purchase DARK from a product affiliate because of the extra features added and the support provided.

2.8 Success Criteria

This project will be a success if DARK helps the MCCR community find ways to solve its current difficulties with distributed real-time systems using Ada. One measure of success will be that at least two contractor/users adopt and use the Kernel in a system. (These contractor/users will first be acceptor sites, and then actually use DARK in a real application.) Another measure will be that at least one product affiliate adopt the Kernel, turn it into a product, and market it to the MCCR community. A third measure will be that a contractor/user adopt all or portions of DARK in an actual delivered system. A fourth measure will be if the general discussion of the issues brought up by DARK leads to other solutions to the problems. A final measure will be that some of the features of DARK find their way into the Ada 9X considerations. All of these outcomes can help solve the original problem.

Also as mentioned in section 2.7, the mere act of going through the process of developing the Kernel with MCCR community cooperation is of benefit to the MCCR community and the SEI. The MCCR community will have a clearer sense of the technical issues involving the Ada real-time distributed systems.

The progress of the technology transition to Westinghouse will be measured at three- and six-month points from the beginning of the schedule in Figure 2. The effectiveness of the overall technology transition will also be measured. This information will be used to modify the execution of this technology transition plan.

2.9 Risk Analysis

MCCR Community

There are two ways the MCCR community comes in contact with DARK. The first contact is participating in the review and discussion of the DARK project. There are no risks from this level of involvement. The second contact is attempting to use DARK in an application. The major risk from this contact is that DARK becomes unsupported by the SEI and no other organization is set up to provide support. A company would be forced either to abandon its investment in DARK or pick up the support itself.

The risk reduction strategy for the MCCR community is for the SEI to recruit, select, and support one or more product affiliates to provide long term support for DARK. Unless long-term support is available, no member for the MCCR community will take the risk of using DARK in an application.

SEI

The risk to the SEI is that DARK turns out not to be an effective solution to the Ada real-time distributed problem. This risk is reduced by extensive MCCR community reviews and commitment by the DARK Project Team to fully evaluate the DARK design at each stage of the development process.

Westinghouse

The risk to Westinghouse is that they will not be able to use DARK in any of their applications and therefore will have gotten little return from their investment of sending a resident affiliate to the SEI. The risk reduction strategy for this problem is to find a Westinghouse application candidate as soon as possible. The early identification will allow DARK's implementation to be influenced by the selected application and increase the probability that the application and DARK will be compatible.

Product Affiliate

The first risk to the product affiliate is that once they have invested the time and effort in making DARK a supportable product, potential customers will go to the SEI and get the DARK Kernel for free. This, however, is not a serious risk since it is unlikely that any member of the MCCR community could make use of DARK in an unsupported state.

The second risk is that too many of product affiliates are selected by the SEI and the market for the DARK Kernel cannot support the number of vendors. This risk is real but will be reduced by the fact that the SEI can provide direct support to a limited number of product affiliates due to the SEI's resource constraints.

3 TRANSITION PLAN - General Transition Efforts

3.1 Transition Activities

1. Conduct the proof of concept program internally, with Westinghouse and other acceptor sites. This will include the distribution of all versions of the DARK Kernel. These are the beta and official versions of the Kernel for the first target and the beta version of the Kernel for the second target. The detailed schedule for Kernel releases is contained in the project schedule, Appendix I.

Data will be collected from that program to evaluate the performance of the Kernel. The evaluation of the data will be used to support the continuation of the DARK Project, to validate the transition approach, and to support presentations to other organizations.

The DARK project team, the DARK transition engineer, and the Westinghouse resident affiliate will perform this activity. The actual release and distribution of versions of the DARK Kernel are the responsibility of the DARK project team. This activity includes all the activities of section 4.1.

2. Continue to publicize the activities of the DARK Project through reviews of its documents and announcements of its results. Invite interested parties to formal reviews and demonstrations as if they were a paying customer. This is a continuing activity whose intermediate milestones are undetermined, and is the responsibility of the transition engineer with support from the DARK project team.
3. Make an industry-wide announcement about the availability of the Kernel toward the end of system integration testing. Potential interested parties can attend the formal demonstration. This is a way to solicit both potential acceptor sites and product affiliates. This activity is the responsibility of the transition engineer, and this task is dependent on completion of the final acceptance review.
4. Write and release an "announcement of product development opportunity" (APDO) package to allow potential product affiliates to submit a Product Development Proposal to be a SEI-supported product affiliate. This activity is the responsibility of the transition engineer with support from the DARK project team. The package will be released when the first target demonstration is complete and, when the SEI JPO approves this transition plan and the APO package.
5. Prepare and conduct a workshop on the details of the design, implementation, testing, and results of the DARK Project. Work at bringing the largest possible number of potential users to the workshop. Especially concentrate on potential product affiliates. The technical content of this workshop is the responsibility of the DARK Project Team. The logistics of the workshop is the responsibility of the Transition Engineer. The workshop will occur after the APO package is released.
6. Write an evaluation guide to describe and control the process of evaluating and selecting at least one product affiliate. The transition engineer will perform this task.
7. Potential product affiliates will prepare bids in the form of Product Development Proposals to be a product affiliate.
8. Select at least one SEI-supported product affiliate via a criteria-based formal evaluation process. The transition engineer will have responsibility for this task. The DARK project team, SEI Business Services and SEI Technology Transition will provide support.
9. Work with the selected product affiliates to take over the Kernel and make it a commercial product. These affiliates will receive support from SEI until the transition point. The SEI support will consist of the equivalent of one person half-time to aid the product affiliates.

understanding of the details of the Kernel. Once the transition point is reached, the product will be the responsibility of the product affiliate. The DARK project team and the transition engineer will share responsibility for this task.

3.2 Schedule

See Figure 1. For complete DARK Project Team schedule, see appendix 1.

3.3 Resources Required

This portion of the plan requires one third of a member of the Technology Transition staff to perform the activities in Figure 1 during the period from May 23, 1988 to January 15, 1990. Support from the DARK project team is required, in addition to their activities scheduled already, to support transition to the product affiliate. The loading from the DARK project team to support this portion of the technology transition plan is one-half of a person from approximately July 12, 1989 to January 15, 1990.

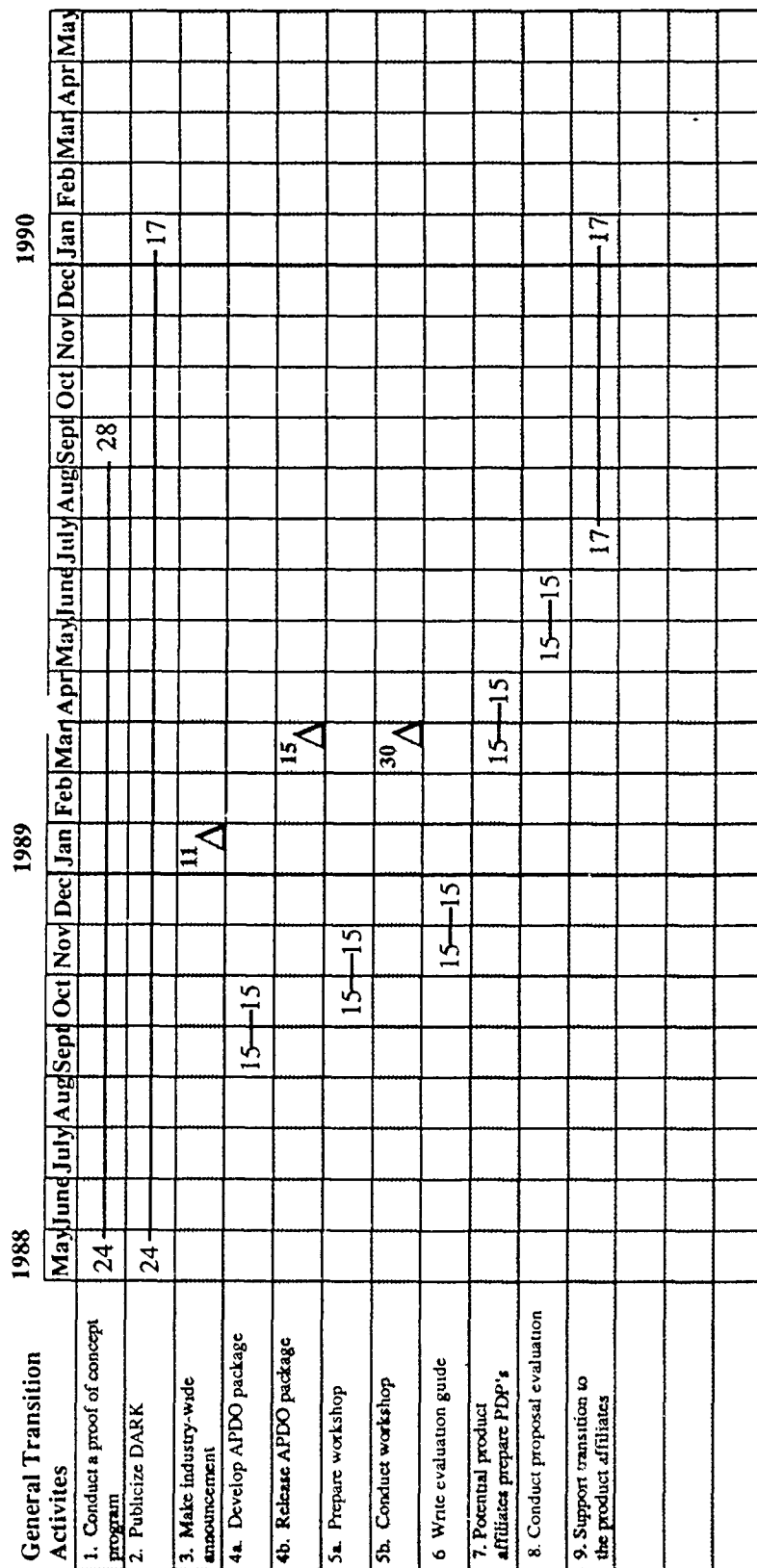


Figure 1: General Transition Activities Schedule

4 TRANSITION PLAN - Westinghouse

4.1 Transition Activities

1. SEI will provide all current DARK documentation to Westinghouse to distribute to interested parties at their Baltimore site and throughout Westinghouse. This task will be performed throughout the project.
2. The Westinghouse resident affiliate will write a memo for broad distribution within Westinghouse, advertising future availability of the Kernel. The memo will request interested parties contact the Westinghouse resident affiliate for more detailed information. The DARK project team, and SEI Technology Transition will coordinate on the drafting of the Westinghouse memo.
3. From list of interested parties and other potential projects within Westinghouse, the market will be analyzed to determine the most likely users of the Kernel. Analysis will be conducted by the Westinghouse resident affiliate, Westinghouse management, the DARK project team, and SEI Technology Transition.
4. A briefing about DARK will be given by the DARK project team, the Westinghouse resident affiliate, and SEI Technology Transition to likely DARK users at Westinghouse. Potential users will be asked to comment on materials received and the briefing. Technical interchanges will be conducted between potential users and the DARK project team to determine strengths and weaknesses of the Kernel's design, with potential impact on further Kernel design and implementation.
5. Both parties will jointly review the progress of the transition activity at the three- and six-month points from the start of this transition plan. The subject of the review will be the technical progress and the progress of the technology transition for the DARK Project.
6. Westinghouse and the SEI will select the second target according to the understandings in the SEI/Westinghouse MOU. The SEI will then procure the hardware and the Ada compiler. Westinghouse will procure or produce a hardware system with the same processor as that in the SEI procured hardware.
7. The DARK project team will transfer the beta release of the first target of the Kernel to Westinghouse. The packaging of this release is the responsibility of the DARK project team and must include a current KUM.
8. The DARK project team with the support of the Westinghouse resident affiliate, will port the Kernel and the INS to the second target.
9. Once the first DARK formal demonstration is completed, the DARK project team will transport demonstration equipment to Westinghouse site for an in-house demonstration. The Westinghouse resident affiliate will encourage participation of potential users.
10. The DARK project team will transfer the Kernel and the INS to Westinghouse once testing of the second target is completed. The release packaging is the responsibility of the DARK project team. The packaging must include an updated KUM.
11. Westinghouse and the SEI will prepare and conduct a formal demonstration at Westinghouse of the RISC-based system when the implementation is completed.
12. Westinghouse will evaluate the second target and write a report, with SEI technical support, to assess the Kernel's portability, functionality, efficiency, hardware independence, compiler independence, documentation quality, and lessons learned. Westinghouse will distribute test results and reports to potential Westinghouse users and to SEI for further distribution.
13. Westinghouse will adapt or develop an application that uses the Kernel, assuming a positive assessment of the Kernel port to the second target. This task will be governed by Westinghouse discretion, adaptability of Westinghouse applications, and funding

constraints. Ideally, performing this task as early as possible is a more successful result of the SEI/Westinghouse affiliation. A Westinghouse application will be searched for once the beta release of the first target is released.

4.2 Schedule

See figure 2.

4.3 Resources Required

A resident affiliate from Westinghouse is required to execute this plan. The resident affiliate will be part-time (2 days, every other week) from June 1988 to September 1988. From September 1988 to September 1989, the resident affiliate will be full-time.

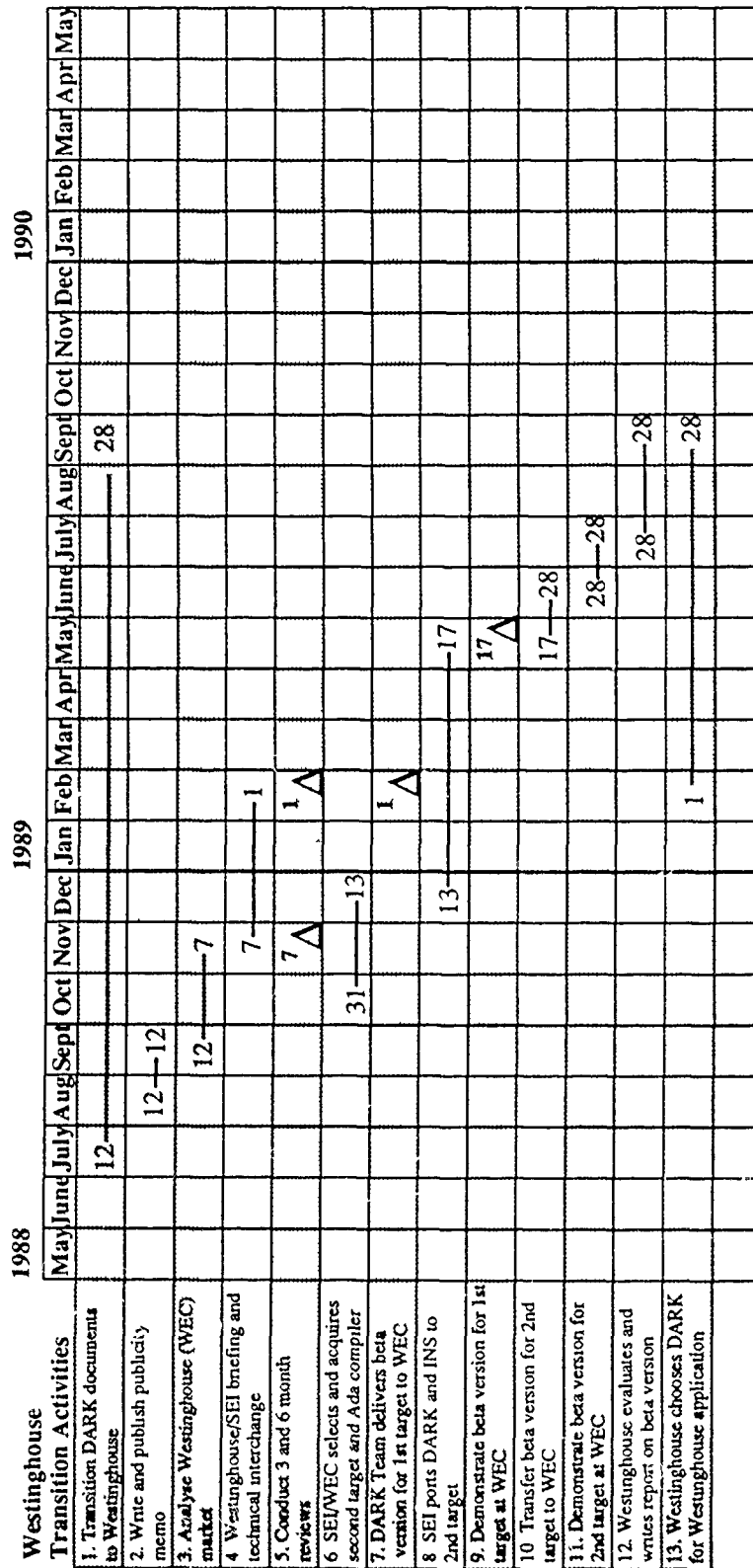


Figure 2: Westinghouse Transition Activities

I. DARK Project Team Schedule

Version 4.2
30 Sep 88

key

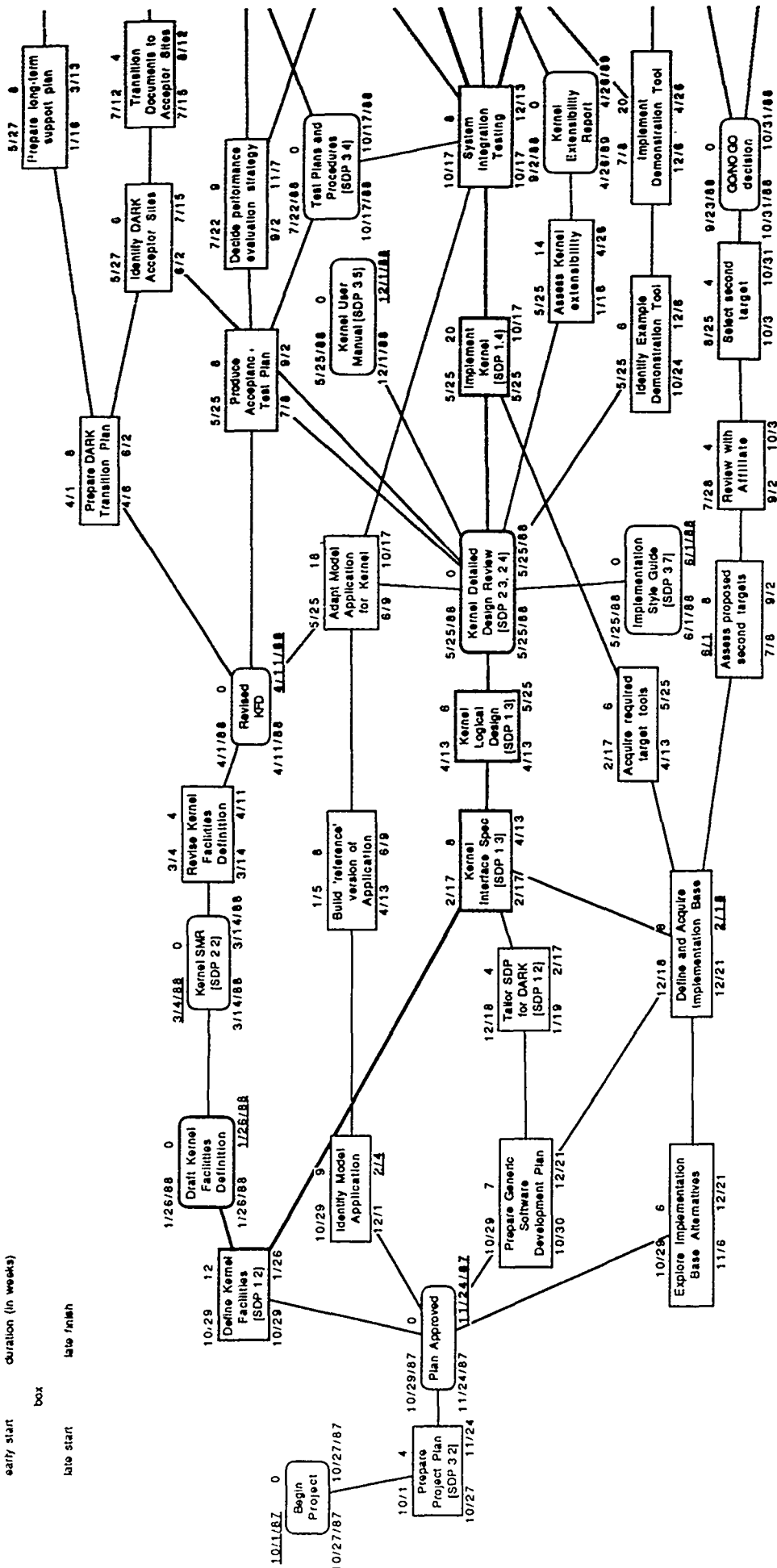
early start

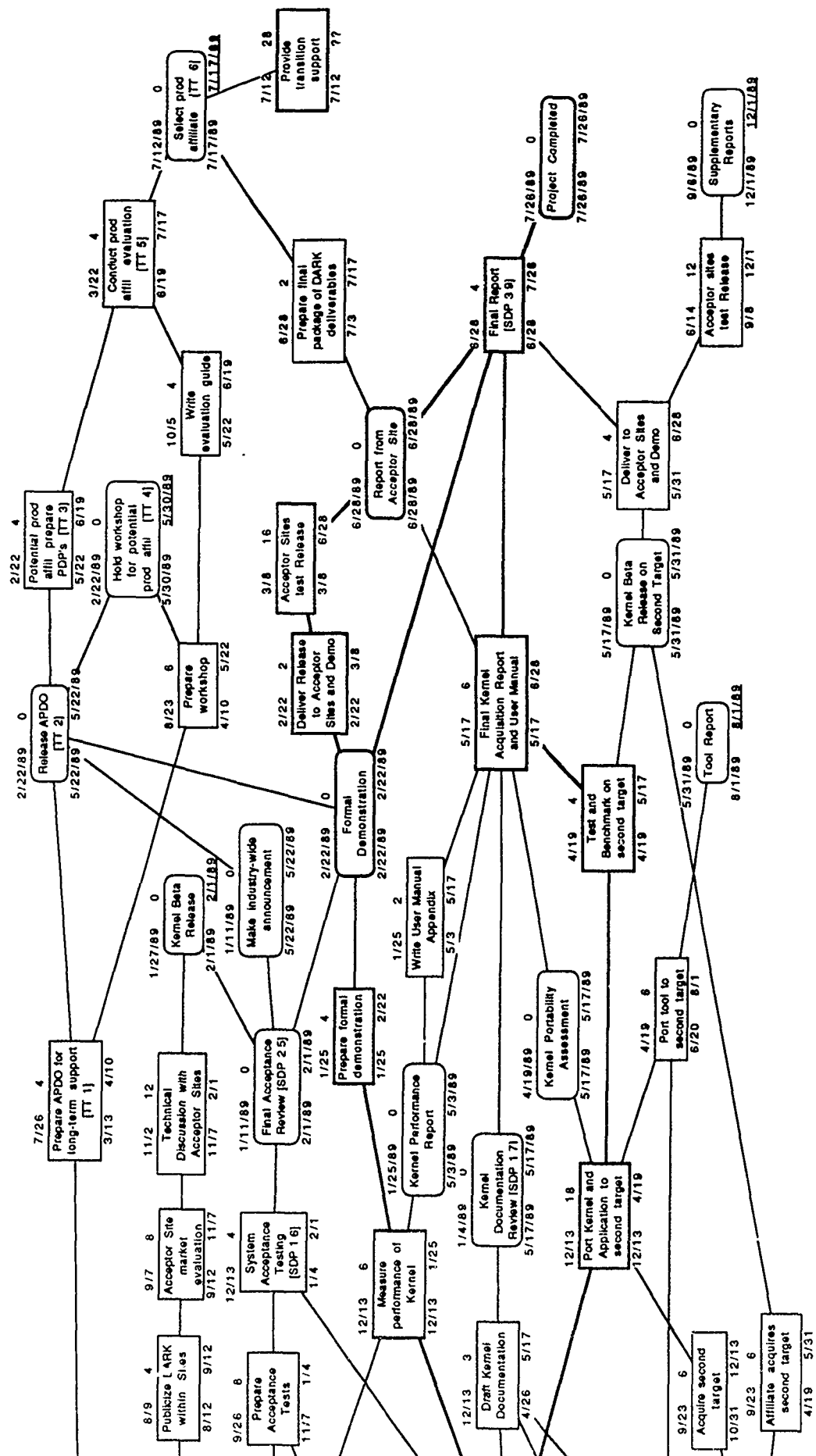
duration (in weeks)

box

late start

late finish





II. List of External Reviewers and Interested Parties

LJN 10/10/88 9:00

DARK External Reviewers as of 10/10/88

First	Last	Company	Address	City	State	Zip	Phone
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Rami	Bayan	GSI-TECSI	6 Cours Michelet 92064 Paris La Defense Cedex				33-1-47-78-1530
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Lowell	Benson	Sperry	Sperry Park, P.O. Box 64525 MS U1H14	St. Paul	MN	55164-0525	
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S Y.	Wong		5200 Topeka Drive	Tarzana	CA	91356	
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THIS PLAN DESCRIBES THE PROJECT OBJECTIVES AND PROGRESS OF THE DISTRIBUTED ADA REAL-TIME KERNEL (DARK) PROJECT IN ORDER TO EFFECTIVELY PLAN AND EXECUTE APPROPRIATE TECHNOLOGY TRANSITION ACTIVITIES. THE INFORMATION CONTAINED WITHIN THE DOCUMENT WAS GATHERED FROM SOURCES LISTED IN THE PLAN HISTORY.					
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