FINAL PROJECT PLAN FOR
RSX-11M RELEASE 3

Doc: 130-951-049-01

Date: 15-APR-76

Project: P2009153

Product: QJ620

FINAL PROJECT PLAN FOR

RSX-11M RELEASE 3

Submitted By: Howard Lev

Approved By: Frank Hassett
(Software Development Manager)

Howard Lev
(Software Development Supervisor)

Clay Neal
(Marketing Product Manager)

Revision History

26-FEB-76

PRESRV will be deemphasized due its problem with bad bad block support and will being replaced by VOLUTIL which is a Files-11 backup program which takes into account bad blocks on the new volume.

DCU is being delayed and will not be available in R3 due to man-power limitations in developing VOLUTIL.

05-MAR-76

Support of the DV11 as a 11M driver is dropped. This device will be supported as a DECNET drivers only. And will be released as part of DECNET R2.

Also the DA11-B, DL11-E, DU11, DP11, and DQ11 will be supported only as QIO level drivers in R3 since the DECNET inteface to DDCMP will be changed. The DECNET versions of these drivers will be distributed with DECNET R2.

22-MAR-76

Release of RSX-11S is added due to the fact that system data structure changes affect the privileged tasks used by RSX-11S. These include BASIC MCR, OTL and SIP.

Since VOLUTIL will not support CASSETTE, DECTAPE or FLOPPY disk as back up media, the RK06 minimum configuration requires either a second RK06 drive or a magtape drive. PRESRV cannot be used since it does not take into account the bad blocks on the target disk. As a purely practical matter backing up an RK06 disk on Cassette, DECtape or Floppy disk is totally unreasonable since it will require approximately 80 cassettes, 50 dectapes or 55 floppy disks.

1.0 EXECUTIVE SUMMARY

1.1 Project Abstract

RSX-11M Release (R3) is an updated and enhanced version of the disk based RSX-11M operating system. The main purpose of the project is to provide, in a timely manner, reliability enhancements and increased functionality to extend our realtime product offering. Features will be added which extend the system to fill the gap between RSX-11M release 2 and IAS. In addition support for features needed by in-house projects such as the Front End Project, IDMS-11 and TPM-16 will be added. Any item that compromises RSX-11M's goal of maintaining the fast response that is characteristic of a real time system will be considered only as a SYSGEN option and must be made by the RSX-11M group. In line with company policy, we will set an

aggressive schedule in an attempt to deliver these products as soon as possible. However, the additional features are deemed more important than quick delivery.

An aggressive schedule is very dependent upon obtaining adequate hardware resources and document preparation services. Insufficient resources in either of these areas will adversely affect the schedule and cause slippage.

The design and implementation of ICLS, BATCH and spooling will be broken off as a subproject working in parallel with R3 development. This will then merge back with RSX-11M R4 development. This project will mainly lay the ground work for a full scale implementation as soon as R3 is complete.

1.2 Summary of Goals

The goal of RSX-11M R3 is to provide increased functionality for the low to middle sized PDP-11 System.

1.3 Summary of Costs and Work Plan

The RSX-11M group has been working on Release 3 since 22-OCT-75. The group consists of 4 programmers and 1 supervisor. Man-power and date person began working on RSX-11M R3.

Clark D'Elia	22-OCT-75
Manny Gonsalves	15-DEC-75 to 22-JAN-76
Jo Ann Kasson	11-FEB-76
Howard Lev	22-OCT-75
Tom Miller	22-OCT-75
Chuck Monia	22-OCT-75

Total cost to date have been 15 man months.

1.4 Summary of schedule and Milestones

The development of RSX-11M R3 will be done in stages. The completion of each stage will be marked by the combination of all new software into a Base level upon which the next stage of development will be done. Base levels will be spaced at approximately 2 month intervals.

The suggested schedule for RSX-11M R3 is for first customer shipments to begin Nov 29, 1976. In this time frame the following is scheduled:

Feb 2, 1976	Base level 13
April 19, 1976	Base level 14
May 31, 1976	Base level 15
July 12, 1976	Base level 16
Aug 30, 1976	Base level 17
Sept 27, 1976	Base level 18
Oct 18, 1976	Submission to SDC
Nov 29, 1976	First Customer Shipments

2.0 DESCRIPTION OF PRODUCT

2.1 Problem Statement

RSX-11M R3 is designed to add increased functionality to the RSX-11M product so as to maintain our typical real time customers and expand into the gap between RSX-11M R2 and IAS.

The main purposes of RSX-11M R3 is to provide enhancement of functionality including:

1. Bug fixes and reliability enhancements
2. New device support
3. New executive features
4. Extensions to the Program Logical Address Space
5. ANSI Magtape support
6. New features in the Utility Programs (e.g. MACRO CRF)
7. Enhancements to the executive to support TPM and the Front End (DCOPS).

Fixing of all known bugs should maintain customer confidence and prove the viability of update services. It should also help to create an even better customer image as to the quality (and our dedication to that quality) of the RSX-11M product.

Additional peripheral device support broadens the market in which RSX-11M R3 can be sold and provides the capability to offer a larger spectrum of competitive configurations.

New executive functions will increase the size of the system Dynamic Storage Region, remove drivers from the exec space, allow drivers to be loaded, allocate checkpoint space dynamically, and provide additional multi-user protection. These features will allow the system to be used more effectively in multi-user environments and allow the development of large RSX-11M systems.

The extensions to the Program Logical Address Space will strengthen the system by getting around one of the PDP-11's basic weaknesses: the 32K virtual address space. These features will allow users to create tasks and data areas larger than 32K and thus to make better use of the large memories available on mapped systems (e.g. 11/70).

ANSI magtape support fills a gap in the RSX-11M system by providing support for a file structure on magtape which is industry standard. Also allows use of COBOL.

The new features of the utility routines provide increased usability of our software products. MACRO-CREF is a long sought feature. PATCH and Module extraction from libraries enhance our capability to fix bugs in the field. Task builder speed improvements increase system throughput.

Since the RSX-11M executive has been selected as a base for TPM and DCOPS, features will be added as sysgenable options to support these systems.

2.2 Product Definition

2.2.1 New Features

RSX-11M R3 is meant to be a feature update of RSX-11M whose goal is to provide increased functionality without sacrificing RSX-11M's response to real time stimuli:

Proposed enhancements are:

1. Improve speed of Task builder in symbol table searching for overlaid tasks.

2. Modify SLP (Source Language Input Processor) to add identification labels to all changed lines thus improving its capabilities for maintenance of source code.

3. Modify the MACRO-11 assembler to use a completely virtual symbol table, thus allowing the assembly of any source module in 8K of memory

4. Add support for ANSI magtape including an ANSI ACP and necessary modifications to MCR, and FCS.

5. Change the checkpointing algorithm to dynamically allocate checkpoint space rather than the current scheme of allocating checkpoint space at the beginning of the task file. This change provides easier support of multi-user tasks, rollin-rollout and task extension.

6. Add device allocation commands and public/private devices to prevent users from destructively interfering with each other

7. Add multi-user protection support including HELLO/BYE and an account file maintenance program

8. Additional device support for

   RK06 including ECC and offset positioning

   DZ-11 driver MCR terminals

   DMC-11

   DUP-11

   VT61 support for X-ON/X-OFF and ESCape sequences

   VT11 support (VS60?)

9. Provide support of COBOL

10. Provide support of BASIC

11. Provide modifications to FCS and F11ACP to support multi-header files and truncate function. The 2K FCP will not support these features. However the 4K BIGFCP and a 2.5K small FCP will support these features.

12. Provide CRF support for MACRO-11

13. Change the executive so that drivers are mapped dynamically into the executive at call or interrupt service time thus moving them to map through APR 6 and 7. Doing this provides 20K for the executive and dynamic storage region thereby substantially increasing the maximum available dynamic memory space from 6K to 16K in large systems.

14. Provide support for loadable drivers in conjunction with 13 above

15. Provide extend directive to allow tasks in system controlled partitions to increase their size dynamically (Requires implementation of 5)

16. Add shutdown command to MCR which will log all user's off the system, dismount all mounted volumes and halt the processor.

17. Add new directives to allow dynamic creation and deletion of

partitions.

18. Add new directives to allow dynamic mapping and unmapping of partitions.

19. Provide support of memory resident overlays in task builder and overlay run-time system which provides fast efficient use of more than 32K of memory (Requires 17 and 18)

20. Allow the ability to specify an AST for CTRL/C at attach time for terminals, thereby providing tasks such as BASIC and the RT11 simulator to be interruptible by the user.

21. Add Alter priority directive so that tasks may dynamically alter their priority.

22. Provide support of the RK06 as systems device and distribution medium.

23. Provide new utility (VOLUTIL) which is able to copy Files-11 volume from disk to disk or disk to tape to disk retaining the Files-11 structure but not the block for block correspondence of PRESRV (work being done by Files-11 group).

24. Add MOU command to VMR to mount communication devices for Network RSX-11S systems.

25. Provide bug fixes and reliability enhancements as needed.

26. Write Error Logging Manual (to be released as soon as available)

27. Support of error logging for 11/70 CPU error registers and PDQ error registers (but not the console instruction)

28. Support PDQ WCS at level 0

29. Support read reverse on the TU16 and TU45

30. QIO and wait directive

31. New FCS record type - numbered records (for SOS support)

32. Modify BASIC MCR, OTL and SIP to run with new data structures.

2.2.2 Additional Items to do if Time and Man-power Permit

1. Provide support for shared tasks

2. Add support for time-sharing partition in which tasks are round-robin scheduled and swapped to disk

3. Add user mode diagnostic support to all device drivers

4. Add error logging for magtapes (TU10,TS03,TU16,TU45)

5. Add multi-processor support

6. Make RUNOFF a standard product - produce documentation.

7. Make the DH11 DMA driver a standard part of the system.

8. Provide Disk Compression Utility (DCU)

2.2.3 Supplied Software - RSX-11M

The RSX-11M R3 System in addition to Executive Services, MCR Services, and I/O Drivers is supplied with the following software components:

1. A Files-11 Compatible File System (F11ACP)

2. A subset MACRO-11 assembler (MAC)

3. A full MACRO-11 assembler containing all features including floating point and Cross-Reference support* (14K)** (BIGMAC)

4. Task Builder with Global Cross Reference support (TKB)

5. Interactive Editor (EDI)

6. Source Language Input Program (SLP)

7. Online Debugging Tool (ODT)

8. Executive Debugging Tool (XDT)

9. Post Mortem and Snap Shot Dump Program (PMD)

10. System Generation (SGN)

11. Bad Block Locator Program (BAD)

12. Disk Structure Verification Program (VFY)

13. File Exchange Utility (FLX)

14. Peripheral Interchange Program (PIP)

15. Librarian (LBR)

16. File Dump Utility (DMP)

17. Task Image Patch Utility (ZAP)

18. Test Routines For Executive Checkout**

19. Volume Utility (VOLUTIL)***

20. Cross Reference Program (CRF)

21. ANSI Magtape Support (MTACP)***

22. HELLO/BYE - multi-user protection*

23. ALL/DEA - device allocation*

24. Multi-user support utilities (ACCOUNT,SHUTUP,BROADCAST)*

25. Object Module Patch Program (PAT)*

26. PRESRV - volume Preservation Program - (for RK distribution only)

2.3 Product Audience

Release 3 of RSX-11M is targeted to the current users of RSX-11M (Runtime, process control and Communications Networks) as well as sophisticated users who wish to operate a multi-user system for program development and running of applications.

2.4 Comparison With The Competition

Competitive data is available from Product Management.

2.5 Product Evaluation Strategy

See Phase review process as defined by Product Management.

3.0 PROJECT GOALS

3.1 Functional Goals

Release 3 goal is to increase the functionality of RSX-11M by adding the ANSI magtape to support COBOL and to add features which will

---

* Support added in RSX-11M R3.

** Distributed only to Software Support Specialists.

*** Support added in R3 and being done by Files-11 group.

support RMS-11 and DBMS-11 as well as BASIC and BASIC+II. Additionally, the executive is to be used as the kernel for TPS-11 and DCOPS.

3.2 Performance Goals

The performance of RSX-11M R3 will equal or surpass that of RSX-11M R2. The performance of RSX-11M R2 equals or surpasses that of RSX-11D V6B in most categories on comparable configurations (possible exception is TKB no longer applicable assembly speed).

3.3 Configuration Goals

3.3.1 Hardware Configurations - RSX-11M

All RSX-11M R3 minimum hardware configurations include a PDP-11 processor (all except LSI-11 or 11/03), a console terminal (LA30 S/P, LA36, VT05/VT5X/VT6X or ASR/KSR 33/35), a realtime clock (KW11-L, KW11-P or DL11-W), and a Bootstrap loader (BM792-YB, MR11-DB, BM873-YB or M9301-YX). Additional hardware needed to complete a minimum configuration includes memory, a distribution medium, and a system device. The following minimum configurations are supported:

1. RK05 system device - RK05 distribution

   16K memory

   RK11 controller and one RK05 drive

   and

   One additional RK05 drive or,

   RX11 controller and dual RX01 floppy disk drives or,

   TC11 controller and dual DECtape drives or,

   TA11 controller and dual tape cassette drives.

2. RK05 system device - Magtape distribution

   24K memory

   RK11 controller and one RK05 drive

   and

TM11 controller and one TU10 or TS03 drive or,

RH/TM02 controller and one TU16 or TU45 drive.

3. RK06 system device - RK06 distribution

   16K of memory

   RK611 controller and one RK06 drive

   and

   one additional RK06 drive

   Although the recommended configuration is a second RK06 drive for backup purposes, the RX01, TU56 and TU60 will be supported in the SYSGEN procedure.

4. RK06 system device - Magtape distribution

   24K memory

   RK611 controller and one RK06 drive

   and

   TM11 controller and one TU10 or TS03 drive or

   RH/TM02 controller and one TU16 or TU45 drive

5. RP02/RP03/RP04/RP05/RP06 system device - Magtape distribution

   24K memory

   and

   RP11C controller and one RP02/RP03 drive or,

   RH controller and one RP04/RP05/RP06 drive.

   and

   TM11 controller and one TU10 or TS03 drive or,

   RH/TM02 controller and one TU16 or TU45 drive.

RSX-11M R3 will provide support for the following processor options, real time clocks, and peripheral devices.

Processors and Processor Options:

All PDP-11 Processors*

KT11 Memory Management Unit**

28K Memory (without KT11)

124K Memory (with KT11)

1024K Memory on 11/70

Parity Memory (all stack sizes)

Cache Parity Memory on 11/70 and PDQ

Extended Arithmetic Element (11/10 EAE)

Extended Instruction Set (11/40 EIS)

Floating Point Instruction Set (11/40 FIS)

Floating Point Processor (FP11-B, FP11-C, PDQ and 11/34)

PDQ with WCS (level 0)***

Realtime Clocks:

KW11-L Line Frequency Clock

KW11-P Programmable Clock

KW11-Y Watchdog Timer

DL11-W Asynchronous interface and line clock

Peripheral Devices:

AD01-D Analog To Digital Converter

AFC11 Analog To Digital Converter

---

* The LSI-11 or 11/03 is supported under RSX-11S only.

** All systems with the KT11 memory management unit require a minimum of 24K of memory.

*** Support added in Release 3.

AR11 Laboratory Peripheral System (with and without DR11-K)

CR/CM11 Card Reader

DA11-B Unibus Link

DH11-DM11BB Asynchronous Communication Line Interface Multiplexor

DJ11 Asynchronous Communication Line Interface Multiplexor

DL11-A/B/C/D/E/W Asynchronous Communication Line Interface

DP11 Synchronous Communication Line Interface

DQ11 Synchronous Communication Line Interface

DU11 Synchronous Communication Line Interface

DUP11 Synchronous Communication Line Interface**

DMC11 Interprocessor Link**

DZ11-DM11BB Asynchronous Communications line Multiplexor*

DRS/DSS Industrial Control System Modules

ICR/ICS Industrial Control System Local and Remote

LP11 Line Printer (all models including LS/LV11/LA180)

LPS11 Laboratory Peripheral System

PC11 Paper tape reader and punch

PR11 Paper tape reader

RF11 - RS11 Fixed Head Disk (File Structured - System Device)

RK11 - RK03/05 Cartridge Disk (File Structured - System Device)

RK611-RK06 Cartridge Disk (File Structured - System Device)*

RP04/05/06 Pack Disk (File Structured - System Device)

---

* Support added in RSX-11M R3.

** Support added in RSX-11M R3 and being done by the Networks group.

RS03/04 Fixed Head Disk (File Structured - System Device)

RP11C - RP02/03 Pack Disk (File Structured - System Device)

RX11 Floppy Disk (File Structured - System Device)

TA11 Tape Cassette (Non File Structured)
Standard DEC Format Supported Via FLX

TC11 DECtape (File Structured - System Device
or Non File Structured)
DOS and RT-11 Format Supported Via FLX

TU16/TU45** Magtape (ANSI File Structured)*
DOS Format Supported Via FLX

TU10/TS03 Magtape (ANSI File Structured)*
DOS Format Supported Via FLX

UDC11 Universal Digital Controller
(also capable of supporting local ICS)

VT11/V960 Graphics display processor and scope***

Terminals:

ASR 33/35 Teletype (no paper tape reader/punch support)

KSR 33/35 Teletype

LA30-S/P DECwriter

LA36 DECwriter

VT05(B) Alphanumeric Display Terminal

VT50 Alphanumeric Display Terminal

VT50H Alphanumeric Display Terminal with Copier

VT52 Alphanumeric Display Terimal

VT55 Alphanumeric Display Terminal with Copier

VT61 Alphanumeric Display Terminal*

---

* Support added in RSX-11M R3

** Support of Read Reverse added in Release 3.

*** Driver being written by LDP marketing group.

RT02 Alphanumeric Display Terminal

RT02-C Alphanumeric Display Terminal and Badge Reader

Note

Terminals may be interfaced via the DH11-DM11BB, DJ11, DL11-A/B/C/D or DZ11-DM11BB and may run at any speed supported by the individual terminals. Support of X-ON/X-OFF and ESCape Sequences is included.

3.4 Support Cost Goals

Support costs goals are supplied in the Support Plans and will not be included here.

3.5 Reliability Goals

Release 3 will support error logging of device errors for all disks and tapes as well as logging of CPU errors on the 11/70 and PDQ. These features should improve the reliability of the total system by catching devices as they begin to fail. Total system uptime should be increased. The software systems goal is to be at least as reliable as previous versions of RSX-11M.

3.6 Other Goals

It is a goal of RSX-11M R3 that all programs written to run on R1 or R2 of RSX-11M of R1 or RSX-11S will run on R3 by only rebuilding the task image. Tasks written for any version of RSX-11M or RSX-11S will run on RSX-11D V6B or IAS Version 2 by rebuilding the task.

VAX Compatibility is ill-defined at this time.

3.7 Trade off of Priorities

The goal of RSX-11M is to provide increased functionality in a timely manner. Key items in order of decreasing importance are the following:

1. Reliability of Software
2. Support of RK06

3. Support of PDQ

4. Support of DZ11

5. Support of PLAS extensions

6. VT61 support

7. Support of ANSI Magtape.

Time will be traded off against the inclusion of the above features, however, the system will not be released until we are satisfied with its reliability.

4.0 RELATIONSHIP TO OTHER PRODUCTS

4.1 Relationship to Other System Projects

4.1.1 RSX-11S/RSX-11M R3/RSX-11D V6B/IAS Relationship

A significant amount of functional overlap (about 80%) will exist between RSX-11M R3 and RSX-11D V6B. RSX-11M R3 requires significantly less memory (approximately one half) and, with the exception of the CD11 card reader, supports more peripheral devices.

RSX-11M R3 will compete best in situations where:

1. A specific job is to be accomplished,
2. The lowest possible price is important, or
3. Realtime response and/or network throughput is essential.

4.1.2 RSX-11S/RSX-11M R3/RT11-F/B Relationship

RT11-F/B is targeted toward single (one-at-a-time) task operation with parallel program development in the background. As such, an overlap with RSX-11M R3 exists, but this overlap is minimal and will allow our customers to make trade-offs (single user vs. multi-programming, smaller executive size vs. RSX-11 compatibility, etc.) within a range of DEC products rather than buy from our competitors. RT11-F/B has no core only counterpart and thus no overlap exists with RSX-11S.

4.1.3 RSX-11S/RSX-11M R3/RSX-11A,B,C Relationship

The RSX-11S/RSX-11M R3 combination will completely alleviate the need for the RSX-11A, B, and C systems.

4.1.4 RSX-11S/RSX-11M R3/DOS Relationship

RSX-11M R3 will impact the sales of DOS systems which are related to program development support of application software for RSX-11A systems (RSX-11M R1 impacted such sales for RSX-11C and B systems).

4.2 RSX-11M R3 Dependence on Other Projects

RSX-11M R3 is dependent upon Ed Quiet's group (Reliability and

Serviceability) for maintenance and enhancement of the error logging tasks (ERL, ERF, SYE and PSE).

R3 is dependent on the Files-11 group for maintenance and implementation of multi-header files, ANSI Magtape ACP, FCS extensions for ANSI Magtape, VOLUTIL the volume backup program and DCU the disk compression utility.

Other than machine time requirements (see 9.4), no other external dependencies exist. Development of the RK06, DZ11, DRIVERS AND PDQ error logging is dependent upon timely delivery of working hardware. The VT11 support is dependent on receiving a working driver from the LDP group.

4.3 Dependence Of Other Projects on This Project

TPM-16
IDMS-11
DCOPS
COBOL V3

4.4 Relation to Applications Software

Applications software consisting of nonprivileged tasks which were developed for RSX-11M R1 or RSX-11M R2 will continue to operate under RSX-11M R3 following a task build. Privileged tasks which interface to system data structures will have to be modified.

5.0 APPLICABLE STANDARDS

The following approved standards are supported:

PDP-11 Macro Coding Standard

DEC 125 Cassette Format
DEC 051 Coded Character Sets
DEC 112 Data Format for Output
DEC 109 Drive Selection
DEC 110 Escape Sequences
DEC 111 Terminal Synchronization

Non-approved standards may not be supported, although a reasonable attempt will be made to comply with anticipated standards.

PDP-11 Macro Coding Standard

6.0 DEVELOPMENT REVIEW BOARD

Clay Neal - Product Mgt
Frank Hassett - Software Manager
Howard Lev - Software Supervisor
Frank Garabo - HOSS

7.0 PLAN TO REDUCE SUPPORT COSTS

To be supplied.

8.0 COMPONENT PLANS

Being a mature product, RSX-11M work will be mostly involved in modifying the existing software. For interfaces, see RSX-11M R2 release documentation set.

9.0 DEVELOPMENT STAFFING AND WORK PLAN

9.1 Staffing Plan

9.1.1 Programmers/Designers

Name	Principal Function
Clark D'Elia*	Programming and Design
Howard Lev*	Programming and Design
Tom Miller*	Programming and Design
Charles Monia*	Programming and Design
Jo Ann Kesson	Programming and Design
Eric Beatz	Programming and Design

---

* Although considered on the project full time these people have a commitment to ongoing RSX-11M R2 maintenance and bug fixing. It is estimated that this will consume 10% of their time throughout the entire project. An additional 50% of Howard Lev's time will be absorbed by project administration.

9.1.2 Project Leader

Howard Lev*

9.2 Software Development Strategy

The design for RSX-11S and RSX-11M R3 is by definition complete. Both systems are compatible members of the RSX-11 family of operating systems and, as such, share the user, operator, and system interface with RSX-11M R2 and RSX-11D V6B.

The design effort for RSX-11M R3 will concentrate on two areas:

1. Addition of features without impacting size or performance while maintaining absolute internal and external compatibility with RSX-11M R2

2. Providing increased functionality for larger configurations.

9.2.1 Mandatory Tasks

1. RK06 support as Files-11 device and system device

2. Program Logical Address Space extensions including resident overlay support.

3. Multi-header files

4. Dynamic allocation of checkpoint space

5. Loadable device drivers

6. Allow extension of exec size to 20K

7. DZ11 support

8. Support ESCape sequences and block mode I/O for terminals

9. AST on receipt of CTRL/C from terminal

10. 11/70 and PDQ CPU error logging

11. Support of PDQ level 0 WCS

12. ANSI magtape

13. Support for VOLUTIL Files-11 Volume Utility

14. Multi-user protection

15. Object module patching facilities (PATCH, LIBRARY, Module

Extraction)

16. VT11 (VS60) Graphic Support

17. Macro CRF

18. DMC11 and DUP11 support

19. Modify OTL, SLP and BASIC MCR for RSX-11S

9.2.2 Optional Additional Tasks

1. Make RUNOFF a standard product

2. Add multi-processor support.

3. Support for Disk Compression Utility

9.2.3 Summary of Tasks Added Since Original Commitment

None.

9.3 Code Review

9.3.1 Code Review Plan

Most members of the RSX-11M team are professionals who have worked on the project from 1.5 to 2.5 years. As such they are expected to produce high quality code. Spot checks on the quality will be made by Howard Lev to ensure that this quality level is upheld. Newer members of the group will be subject to more intensive supervision and code reviews.

9.3.2 Code Reviews

Code will be reviewed by the senior members of the 11M team. These reviews will be entirely internal to the RSX-11M group.

9.4 Hardware Requirements

9.4.1 Development Configurations

As much development as possible will be done on SYSTEM #219 which contains all the master source and runs the most recent base level of RSX-11M. This machine will be used for editing source modules, assembling and linking and testing of all nonprivileged tasks. As such this project requires

Closed shop multi user system
11/45 or 11/70 124K processor
16 comm lines - 4 dial up
High speed upper/lower case Line Printer
300,000 blocks on-line storage on 2 spindles
12 terminals - (2 handcopy, 10 video)
RK05/6 drives
Fixed head disk
Magtape, DECtape

9.4.2 Debugging Configurations

For debugging of privileged tasks and drivers, stand-alone time will be required on appropriate configurations of hardware.

9.4.3 Where located

All machines must be located in the Software Development Machine facility room in ML5-5, or equivalently, close to any future relocation of the RSX-11M development group.

9.4.4 Funding Source and Schedule

Funding will be supplied from PL20 for all development except VT61 support which is funded from PL98. Design and coding will occur from Oct 1975 through code freeze July 12, 1976. See Section 1.4 for Base Level Scheduler. SDC submission is Oct 18, 1976 and First Customer Ship date is Nov 29, 1976.

9.4.5 Machine Time Needs During Each Phase

Machine #219 must be available a minimum of 5 hours per day during prime time and on demand for non-prime time. For the 5 base levels, this machine must be available 24 hrs a day for the week preceding the scheduled completion date. In addition, this machine must be available 24 hrs a day 7 days a week for the two weeks preceding submission to the SDC.

Other machine utilization will average approximately 2 hrs a day of prime time. For the two weeks preceding submission to SDC, during the checkout of the packaging, we will require approximately 12 hrs a day

of prime time on various configurations.

9.4.6 Special Hardware Required and Dates

RK06 running and available in 5-5 machine room by April 19, 1976

DZ11 running and available in 5-5 machine room by April 19, 1976

PDQ running and available in 5-5 machine room by May 31, 1976

9.5 Implementation Plan

9.5.1 Major Activities and Gating Factors

Successful project completion depends upon meeting machine configuration/time requirements set forth and timely delivery of related software components. In particular, all sysgen inputs must be received by May 1 for evaluation and inclusion. This includes Network-specific inputs from the Network group. In addition all drivers must be received by May 31. Supported languages must produce evidence of QA tests prior to the inclusion in the RSX11M SPD for unbundled products, and prior to Aug 30, 1970 for bundled products.

9.5.2 Major Milestones

The major milestones for RSX-11M R3 will be the completion of the base levels on time. The contents of each Base level is as follows:

Base level 13 Feb 2, 1976

Extended Executive to 20K

Librarian module extension

Disk Compression Utility Support

MACRO - CREF

Faster Task Builder

MACRO completely virtual symbol table

SLIPR modifications

Device allocation - Public/Private volumes

Multi-user protection support

HELLO/BYE - commands

Account file maintenance program

SHUTUP, BROADCAST - utility programs

Multi-header Files, Truncate function

QIO and Wait Directive

Read reverse for TU16 and TU45

Base level 14 April 19, 1976

Loadable device drivers LOA/UNL MCR commands

ANSI Magtape Support (MCR) and ACP

FCS support for ANSI tape and numbered records.

PLAS executive directives

Base level 15 May 31, 1976

RK06 support as Files-11 device and system device

Extend Task Directive

TKB changes for resident overlays

DZ11 support as MCR terminal

VT11 (VS60) support

AST at CTRL/C for attached terminals

ESCape sequence support in TTDRV

Base level 16 July 12, 1976

Alter Priority Directive

Dynamic Checkpoint Space Allocation

CPU error logging for 11/60 and 11/70

11/60 Level 0 support for WCS

Comm drivers for DMC11 and DUP11

Base level 17 Aug 30, 1976

In house test system

Base level 18 Sept 27, 1976

Release system

9.5.3 Risks and Contingency Plans

There is no alternate plan being pursued as a contingency. This is an aggressive schedule with meaningful milestones (Base levels). Unanticipated delays will be immediately flagged when they become evident. Reasonable risk is assumed in the schedule and plans.

9.5.4 PERT and Milestone Techniques

PERT will not be used. Detailed monthly reports will be prepared listing milestones met and missed, work in progress, work completed, and work planned for succeeding month by individual.

10.0 DOCUMENTATION STAFFING AND WORK PLAN

10.1 Writers

The RSX-11M group and Technical Writing will be responsible for all RSX-11M R3 documentation.

10.2 Documentation Strategy

The documentation strategy for RSX-11M R3 is to print only those manuals which are new or have undergone sufficient change to justify a new edition. The remaining documentation will be issued as replacement pages to existing RSX-11M manuals.

We will also attempt to improve the quality of existing manuals, specifically, the Executive Reference Manual and Operators Procedures Manual.

10.3 Documents: Type, Size, Production Method, Dates, Quantity

The following documents are planned for RSX-11M R3

1. RSX-11M Guide To Writing An I/O Driver (15 pages) addendum
2. RSX-11M System Generation Manual (300 pages)
3. IAS/RSX-11 MACRO-11 Reference Manual (15 pages) addendum

4. RSX-11M Operator's Procedures Manual (50 pages) supplement

5. RSX-11M Utilities Procedures Manual (50 pages) supplement

6. RSX-11M Task Builder Reference Manual (300 pages)

7. RSX-11M I/O Drivers Reference Manual (50 pages) supplement

8. RSX-11M R3 Release Notes (20 pages)

9. RSX-11M Executive Reference Manual (100 pages)

10. IAS/RSX-11 I/O Operations Reference Manual (50 pages) supplement

11. RSX-11M Error Logging Reference Manual (50 pages)

12. RSX-11M Documentation Directory (20 pages)

13. RSX-11S System Generation and Installation Guide (150 pages)

All manuals will be standard size and produced via RUNOFF. The reproduction copy will be printed on a DIABLO printer with a special MYLAR ribbon. Print dates are keyed to product release.

10.4 Documentation Reviews

Manual review is a serious undertaking. We will provide two weeks for review and construe lack of written comment as agreement that the quality of the manual is, from the reviewers point of view, up to DEC's high standards.

Two reviews will be conducted with the first considered the most critical. This review will occur at the completion of the intial draft and has a wider distribution. The second review has limited distribution and incorporates reviewer comments and will be the signoff copy.

Initial reviews will be conducted by:

1. All RSX-11M Team members

2. A Software Support representative

3. A Training representative

4. A Software Writing representative

5. A Software Quality Engineering representative

6. A Marketing representative

7. A Product Management representative

8. A Software Development Management representative

9. An RSX-11D/IAS representative

10. A Network representative

11. A Central-11 Hardware Engineering representative

10.5 Documentation Reviewers

Hal Berman	(HOSS)
Frank Garabo	(HOSS)
Martha Keramaty	(Training)
Norm Brimhall	(Tech Writing)
Sandy Briggs	(Software Quality Engineering)
John Gorczyca	(LDP Marketing)
Bernie LaCroute	(IPG Marketing)
Pete Kilbourn	(OEM Marketing)
Ted Zajdel	(OEM Marketing)
Herb Shanzer	(DCM Marketing)
Clay Neal	(Software Product Management)
Frank Hassett	(Software Development Management)
John Levy	(RSX-11D)
Norm Samuels	(Networks)
Frank Infante	(COBOL-11)
Bruce Delagi	(Central-11 Engineering)
Craig Mudge	(Central-11 Engineering)

10.6 Machine Time

Machine time requirements for writers will be determined by the Documentation group and described in their detailed plans.

11.0 QUALITY ASSURANCES PLAN

11.1 Test Developers

Test will be developed by the RSX-11M group, with the exception of UETP which will be developed by the SQM group.

11.2 Unit Test Strategy

The test strategy for RSX-11M R3 will be the same as that for RSX-11M R2. All RSX-11M personnel will be responsible for the quality of their work and as such must conduct exhaustive testing to insure its correctness before integration with other system components. After integration, which will be done in a series of base levels, extensive testing will be performed to insure that the system function properly. The main emphasis will be on quality "insurance" rather than quality "assurance".

11.3 System Test Strategy

Each new base level will be installed on the RSX-11M group development machine (219) as well as the open shop multi-user RSX-11M system (880) and the VAX development system (144). The heavy use of these systems should be able to uncover most bugs not found in unit testing.

11.4 In-house Strategy

See item 11.3.

11.5 Field Test

Due to the tight schedule of this project, no formal field test will be conducted. However, Base levels will be made available to internal groups to use as well as one or two selected Software Specialists with customers who are willing to test the new executive features (especially PLAS).

11.6 Demonstration Sites

System demos are not planned for this project.

12.0 RELEASE PLAN

12.1 General

The RSX-11M team will work closelywith Release engineering to produce the kits necessary for SDC submission. The following kits must be built and tested as a mimimum for adequate assurance.

RK05-RK05	unmapped
RK05-DECtape	mapped
RK05-Floppy	unmapped
RK05-Cassette	mapped
RK05-Magtape	mapped
RK06-RK06	mapped
RK06-Magtape	mapped
RP02-Magtape	unmapped
RP03-Magtape	mapped
RP04-Magtape	mapped
RP06-Magtape	unmapped

The system will be considered releasable if it passes the D'Elia/Miller tests, performs all functions properly, documentation is available. We will also hold the system back from general release until the RSX-11M Team is satisfied with both software and documentation quality.

13.0 DISTRIBUTION PLAN

13.1 Release Packages

RSX-11M R3 will be distributed on:

1. Five RK05 disk cartridges (RK05-RK05)
2. Five RK05 disk cartridges and ten blank DECtapes (RK05-TU56)
3. Five RK05 disk cartridges and twenty blank tape cassettes (RK05-TU60)
4. One RK06 disk cartridge (RK06-RK06)
5. Two 600 foot 9 track 800 BPI Magtapes (RK06-TU10/TS03/TU16/TU45)
6. Five RK05 disk cartridges and 10 blank Floppy disks (RK05-RX01)
7. Three 600-foot 9-track Magtapes (RK05-TU10/TS03/TU16/TU45)

8. Two 600 foot 9 track 800 BPI Magtapes (RP02/03-TU10/TU16/TU45/TS03)

9. Two 600 foot 8 track 800 BPI Magtapes (RP04/05/06-TU10/TU16/TU45/TS03)

Each RSX-11M R3 distribution kit contains a bootstrappable system capable of running on the minimum configuration for which it is intended. All system components required to run and generate custom tailored RSX-11M R3 systems are also included in the kit.

The software kit provided with each RSX-11M R3 system contains both source and binary modules (source is provided to enable the requisite conditional assemblies which minimize the size of the executive). The software kit includes:

Source Modules

1. Executive (includes Executive Debugging Tool)

2. I/O Drivers

3. File system (FCP)

4. MCR routines (MCR)

Binary Modules

1. MACRO-11 Assembler (subset and full)

2. Task Builder (TKB)

3. Interactive Editor (EDI)

4. Source Language Input Program (SLP)

5. Peripheral Interchange Program (PIP)

6. File Exchange Utility (FLX)

7. Disk Structure Verification Program (VFY)

8. File Dump (DMP)

9. Online Debugging Technique (ODT)

10. Object Module Patch Program (PAT)

11. System Generation (SGN)

12. Librarian (LBR)

13. Test Routines For Executive Checkout*

14. Post Mortem and Snap Shot Dump Program (PMD)

---

* Test routines are supplied only to manufacturing and software

15. Bad Block Locator Program (BAD)

16. Task Image Patch Utility (ZAP)

17. Volume Backup Utility (VOLUTIL)

18. Global Cross Reference Program (CRF)

19. ANSI magtape system (MTACP)

20. Multi-user Protection Programs (ACCOUNT, SHUTUP, BROADCAST)

The documentation kit includes:

1. Introduction to RSX-11M

2. RSX-11M Executive Reference Manual

3. IAS/RSX-11 I/O Operations Reference Manual

4. RSX-11M Utilities Procedures Manual

5. RSX-11M Task Builder Reference Manual

6. RSX-11M Operator's Procedures Manual

7. IAS/RSX-11 MACRO-11 Reference Manual

8. IAS/RSX-11 ODT Manual

9. RSX-11M Guide to Writing an I/O Driver

10. RSX-11M System Generation Manual

11. RSX-11M I/O Drivers Reference Manual

12. RSX-11M/RSX-11S Release Notes

13. RSX-11M/RSX-11S Documentation Directory

14. RSX-11S System Generation and Installation Guide

15. RSX-11M Error Logging Reference Manual

13.3 Pre-Release Policy

Due to the aggressive delivery schedule, there will be no pre-releases of this product without corresponding schedule slippage.

13.4 Subsequent Release Prices And Policies

To be supplied as part of business plan.

13.5 Software Support Distribution Package

Software support's automatic distribution system will be utilized in distributing software kits to specialists.

14.4.1 Software Support Training

Minimal software support training should be required for RSX-11M R3 beyond that already provided for RSX-11M R2. A two or three day seminar covering RSX-11M R3 enhancements and new facilities should be sufficient. Key development personnel will be available for consultation and initial presentations.

14.4.2 Customer Training

The existing RSX-11M course will be adaptable to RSX-11M R3 with minimum effort.

16.0 MAINTENANCE PLAN

16.1 SPR Plan

SPRs for Release 2 will be supported for 3 months after the release of version 3 from SDC. After that time, only R3 will be supported.

16.2 Maintenance Release Plan

No maintenance Releases are anticipated at this time due to the current plans for R4.

17.0 POST RELEASE PLAN

17.1 Post Partum Review

There is no planned Post Partum Review for this project.

17.2 Product Evolution Strategy

Product Evolution Strategy is as outlined in the Real Time section of the Family Plan.

17.3 Obsolesence Plan

Product Obsolesence Plan will be produced in subsequent updates to the Family Plan.

17.4 Follow on Plans

Follow-on plans are outlined in the Family Plan.