BOOTSTRAP PLANNING DOCUMENT

Working Draft

Important Note: The following prototype business plan was developed and ratified by an industry stakeholder committee for launching a multi-corporate *Bootstrap Initiative*. With a few modifications, this plan can be readily adapted to other scenarios, including: (a) a single organization, where the Members would be stakeholders from various divisions, departments, and programs; or, (b) an existing consortium, association, or other mission-oriented community. In this document, the Bootstrap Institute staff would play a central role, providing vision, direction, and operational support for the distributed Project team. In other scenarios, the operational support might be provided by the Members, and the Project team might be co-located. Communities can be international, rather than limited to US and Canada, and the Project could well extend beyond a year, depending on the resources available.

This document includes plans for a research prototype open hyperdocument system (OHS-2), which would be only the first in a succession of evolving proto- types (i.e. OHS-3, OHS-4, etc.). Please also note that the term *Handbook Cycle* is synonymous with the alternate term *CODIAK* (COncurrent Development, Integration, and Application of Knowledge).

—Doug Engelbart 3/10/92

<AUGMENT,132806,>

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Note: The numbering to the right of each paragraph on the following pages is for easy reference during discussion. It is assumed that such dialog will be ongoing, and that this document will be revised accordingly, even after the Project is officially launched and the Advisory Council convenes.

TABLE OF CONTENTS

EXECUTIVE OVERVIEW 1

BACKGROUND 3
CONTENT 5
1. A framework for distributed knowledge development 5
2. An Open Hyperdocument System (OHS) 7
   - OHS-1 Pilot Exploration 8
   - OHS-2 Implementation Plan 8
   - Preliminary OHS-2 Requirements 8
   - Implications for Industry Standards 9
3. Methods for online collaborative knowledge development 9
4. Deployment strategies 10
5. Special application areas 11
6. A strategic framework for organizational improvement 12
   - A-B-C Model 12
   - Co-Evolution and Augmentation 13

APPROACH 14
1. Intensive pilot usage for balanced co-evolution 14
2. Intensive member participation 14
3. Detailed scenarios of future member pilots 14
4. Lessons learned 15
5. Ongoing extensive surveys 15
6. Ongoing recorded dialog 15
7. Explicit strategy for results transfer 16
8. Comprehensive framework for strategic investment 16

MEMBER PARTICIPATION 17
Executive Liaison 17
Internship Program 17
Intern Alternatives 18
Supporting Services 19

DELIVERABLES 20
Summary of Deliverables 20
Reports and Briefings 20
Operational Deliverables 21
Knowledge Products 22

FIGURE-1. PROJECT OVERVIEW 23

BENEFITS 24
Offsetting Costs 24
Leveraged Investment 25
Competitive Positioning 25
Continuous Organizational Improvement 26
New Vendor-User Paradigm 26
Extra Leverage for Vendors/Consultants 27
Visibility 27
Timing 27
Comparing Other Activities 28

ORGANIZATION 29

COSTS 30
Full Membership 30
Associate Membership 31
Membership Manpower Commitment 31
Exceptions 32
APPENDIX-A BI Management 33
APPENDIX-B References and Articles 36

PROPOSED PROJECT ON
Collaborative Knowledge Development

EXECUTIVE OVERVIEW

The complexity and urgency facing today's organizations will increase exponentially as we move into the next century. Unless organizations quickly learn to grow increasingly faster and smarter, they will soon surpass their ability to cope. Decades of unprecedented investment in change should be anticipated, where subtle differences in investment strategy will put some organizations far ahead of others in capability and effectiveness.

Project Concept: Early strategic focus on improving tools and methods for collaborative knowledge development in complex projects offers a special investment leverage toward continuous, compounded improvement. Heterogeneous project teams which can coordinate their work online using highly effective tools and methods would be faster and smarter at identifying needs and opportunities, designing and deploying solutions, and incorporating lessons learned -- regardless of geographical distance. Applied in both the product-related activities and the improvement efforts of the enterprise, these breakthroughs could dramatically reduce both the product cycle time and the improvement cycle time, while increasing first-time quality.

These generic capabilities would also provide a powerful infrastructure to support other key improvement efforts, such as total quality, enterprise integration, concurrent engineering, CASE, groupware, decision analysis, issue management, online document delivery, integrated CAD/CAM/CALS architectures, and multi-corporate collaboration.

Content: A one-year Project is proposed to explore how knowledge workers can work together more effectively in a distributed online environment -- across application domains, vendor platforms, organizational boundaries, time and space. The primary task is two-fold: (1) to develop an implementation plan to fund the procurement of an "open hyperdocument system" research prototype (OHS) to support wide-area collaboration; and, (2) to produce plans for a follow-on multi-year Initiative. Toward this goal, the team will study and refine the strategic framework driving this work, the methods for online collaboration, application scenarios for future member pilots, and strategies for deployment and migration of results.

Approach: The Project Approach will emphasize relevance and accessibility of the results to maximize transferability to member organizations. Full-time member Interns will work with the Project staff from their home offices as a prototype distributed project team. Drawing from extensive prior work, the Project staff will establish an advanced pilot environment of existing mainframe OHS-1 software and methods to support the Project team's own collaborative knowledge development process. The Project team will advance the OHS-2 tool and method design work concurrently through intensive OHS-1 usage experience and application scenarios based on projected member usage, and through a synthesis of extensive intelligence surveys, input from industry experts, dialog, lessons learned, and the evolving strategic framework.

Deliverables: 1f

Quarterly
- Status reports
- Briefings
- Live demos

Operational Deliverables
- Advanced pilot environment
  - . prototype software
  - . prototype methods
  - . transfer methodologies
- Internship program
  - . unique pilot experience
  - . intensive training
  - . interns produce results
  - . interns transfer results

Knowledge Products
- Multi-year Initiative plan
- OHS-2 requirements/specs
- OHS-2 implementation plan
- Methods requirements/specs
- Deployment strategies
- Strategic framework for organizational improvement
- Framework for collaborative knowledge development
- Application scenarios
- Extensive intelligence base
- Recorded dialog
- Lessons learned
- Recommended standards

Launching: Stakeholders representing 10-12 companies have been working with the Project Director this past year to formulate the business plans for the Project/Initiative, with initial "seed" support from Motorola, McDonnell Douglas, Mitchell Kapor, Apple, Sun, and Steelcase. The Project will run for one year. The cost of the one-year membership depends on size in revenues: $100,000 if larger than $1 Billion, and $35,000 if smaller than $1 Billion. Members will also contribute an Executive Liaison person to serve on the Board of Advisors, and one or two full-time Interns, reporting to the Project from their home office (interns are optional for $35K-level members, although not placing an intern will reduce the benefits of participation). Membership is open to any organization based in the U.S. and Canada. 1g

Leadership: This Project is motivated by the extensive prior research and experience of Dr. Douglas C. Engelbart, visionary and pioneer of integrated information systems and organizational augmentation. Well-known contributions include the mouse, display editing, multiple windows, outline and idea processing, hypertext, hypermedia, and groupware, with early prototypes in full operation under the NLS/AUGMENT system as early as 1968. After 20 years directing his own lab at SRI, 6 years at Tymshare (information systems vendor), and 5 years at McDonnell Douglas (large end-user org with complex project work), Engelbart founded the Bootstrap Institute, where he is working closely with industry stakeholders to launch the Project and Initiative. He is invited to speak internationally on many related topics, often as keynote speaker, has received awards for outstanding lifetime achievement and ingenuity, and is an associate at Stanford's Center for Design Research where he conducts the 3-day management seminar *"Bootstrapping Organizations into the 21st Century"*. 1h

BACKGROUND 2

The complexity and urgency facing today's organizations will increase exponentially as we move into the next decade and beyond. Organizations of tomorrow will look dramatically different, operating with an effectiveness that is well beyond what we know today. One obvious challenge will be the complete integration of information systems across every facet of organizational life, as well as a complete rethinking of organizational structure, methods, and procedures. This Project is a means for bringing advanced, highly effective capabilities to organizations much sooner and more effectively than the current marketplace might provide. 2a

An important first step toward such "quantum leap" effectiveness would be to improve the coordination capability among knowledge workers. A comprehensive approach to improving this collaborative knowledge development capability will provide significant benefits, such as supporting and integrating the following types of improvement efforts which are recently attracting much attention: 2b

- enterprise integration 2b1
- total quality requirements for close coordination across departments, customers, and suppliers 2b2
- cross-enterprise collaboration via joint ventures and consortia 2b3
- distributed business teams 2b4
- groupware, or computer-supported cooperative work (CSCW) 2b5
- computer-aided software engineering (CASE) 2b6
- concurrent engineering 2b7
- online document delivery (e.g. the DoD CALS requirement) 2b8
- CAD/CAM/CAE/CALS integrated architectures 2b9

Many vendors and consultants are already forging ahead with point-solution products and services to address specific isolated applications. Sizable projects have also been launched to address distributed network interoperability. 2c

However, it is not enough to simply link everyone's terminals and workstations together. Considerably more groundwork must be laid before diverse knowledge workers can flexibly coordinate their work online through shared files and shared screens, across application domains, vendor platforms, organizational boundaries, time and space. 2d

For the marketplace to deliver effective solutions quickly, end-user organizations will have to become much more pro-active. End-user organizations will face unprecedented challenges and expense in learning how to evaluate, integrate, apply, and deploy these new capabilities. They will need first-hand real-use experience via intensive pilot operations in which to evolve and refine the associated work methods, procedures, conventions, skills, and roles. This valuable experience will be a critical factor in determining the usage requirements for future information systems products and services. 2e

Decades of unprecedented investment and change should be anticipated. Assuming that the rate of return on wiser investments would be compounded, subtle differences in strat-

egy will put some organizations far ahead of others in capability and effectiveness. Where will your organization stand? 2f

Early strategic focus on improving collaborative knowledge development offers a special strategic investment leverage. A well-coordinated enterprise would be faster and smarter at identifying needs and opportunities, designing and deploying solutions, and incorporating lessons learned. Applied in both the product-related activities and the improvement efforts of the enterprise, these breakthroughs could dramatically reduce both the *product cycle time* and the *improvement cycle time,* while increasing *first-time quality.* 2g

Considering the rapidly shifting challenges facing today's organizations, and the restricted resources for coping with those challenges, this strategic approach will be critical to an organization's survival and success, offering compounded leverage for *"bootstrapping organizations into the 21st century".* 2h

CONTENT 3

A one-year Project is proposed to explore how knowledge workers can tackle complex projects more effectively within a distributed, online environment -- across application domains, vendor platforms, organizational boundaries, time and space. 3a

This work is motivated by a larger "bootstrapping strategy" for organizational improvement, which offers strategic choices in developing and deploying emergent information technology. The "bootstrapping" refers to investments in capabilities which provide extra leverage for future improvement, with a special emphasis on a "co-evolution" approach for developing new tools and methods concurrently. Early investment in the co-evolution of tools and methods that improve collaborative knowledge work offers special compounded leverage toward building increasingly faster and smarter organizations. Employed within complex projects, and also within the organizational improvement process, these new capabilities can reduce both the *product cycle time* and the *improvement cycle time*, while increasing *first-time quality*. 3b

The primary objective of this Project will be to develop the requirements and specifications for a research prototype "open hyperdocument system" in support of distributed collaborative knowledge development, and to formulate plans for a follow-on multi-year Initiative. The major component activities listed below are vital to these primary endeavors. Drawing from significant research experience, practical applications in industry and government, and an early prototype "open hyperdocument system", we will explore and refine: 3c

1. A framework for collaborative knowledge development 3c1
2. An Open Hyperdocument System (OHS) 3c2
   - OHS-1 Pilot Exploration 3c3
   - OHS-2 Implementation Plan 3c4
   - Preliminary OHS-2 Requirements 3c5
   - Implications for Industry Standards 3c6
3. Methods for *online* collaborative knowledge development 3c7
4. Deployment strategies 3c8
5. Special application areas (e.g. total quality, concurrent engineering) 3c9
6. A strategic framework for organizational improvement 3c10

All of these pursuits are completely interdependent, and also heavily influenced by the special Project process (see section on <Approach>). The experience and understanding gained in each area will offer substantial and invaluable grist to the whole. Following is a detailed description of the Project Content. 3d

1. A framework for distributed knowledge development (Handbook Cycle): 3e

Undertaking to specify tools and methods aimed at improving group knowledge work requires in-depth understanding of what knowledge workers generally need to do within the organization, and what would be profitable to improve. The following basic model, developed by Project Director Dr.Douglas Engelbart, will be used as a basis for evolving the Project's guiding framework. 3e1

In the face of increasing complexity and urgency, organizations must quickly learn to: 3e

- find better solutions to problems 3e2a
- solve problems more quickly 3e2b
- solve more complex problems 3e2c
- find solutions to problems that were previously not solvable 3e2d

To achieve these goals will require dramatic and continuous improvements in how organizations perform knowledge work within complex projects. This process can be analyzed in terms of three interdependent and highly dynamic functions of continuously updated, integrated project knowledge: 3e3

- *Intelligence Collection:* Gathering and analyzing external information or reference material relevant to the project, including market surveys, competition, emerging technologies and techniques, customer profiles, and industry trends -- extracted from reports, articles, books, interviews, conference proceedings, etc. 3e3a

- *Dialog:* including memoranda, meetings, discussions, arguments, resolutions, lessons learned, exceptions, emerging issues, needs and possibilities, design rationale, abandoned approaches, change requests, etc. ("dialog" includes synchronous and asynchronous, face-to-face and remote). 3e3b

- *Project-State "Handbooks":* The dynamic knowledge products representing the project state, including plans, proposals, budgets, timelines, milestones, contracts, status reports, design specs, production specs, test results, manuals, field service logs, etc. -- continuously updated through a synthesis of intelligence and dialog. 3e3c

For lack of a better term, Engelbart uses "Handbook" to refer to the project-state knowledge products at any given stage of development, and "Handbook Cycle" or "collaborative knowledge development" to refer to the continuous process of creating, capturing, analyzing, distilling, updating, exchanging, and re-using these knowledge elements throughout the life of the project. 3e4

It is important to note that almost every effort in the organization is heavily immersed in, or impacted by, an ongoing Handbook Cycle. And each project's knowledge process and knowledge products must somehow tie in to many other efforts within and even outside of the organization. This is especially true where close coordination is required, as in concurrent engineering, or total quality management. 3e5

In the complex project environment of a large matrix organization, knowledge workers from many functional domains will contribute to selected areas within many different projects' Handbook Cycles, with each project resulting in massive volumes of documentation. For example, it is estimated that the documentation required to create and maintain an airplane may well outweigh the product. This documentation is developed by thousands of diverse knowledge workers, thousands of suppliers, numerous contractors, countless exchanges, countless revisions, all needing to be carefully coordinated over the life of the project (10-30 years). 3e6

As important as this documentation is, what is generally not documented, such as all the decision trails and intelligence collections, is often just as crucial to the success of the project. 3e7

Even minor inadequacies in the Handbook Cycle process can be very costly in terms of: 3e8

- Slip-ups in version control, such as when the engineering team is somehow working from out-of-date specifications; 3e8a
- slip-ups in the project "memory", as when a design team fixes a design flaw without access to the original design intent, and unwittingly follows the exact same dead-end path that was aborted 2 years earlier for well-documented (and forgotten) reasons. 3e8b

Often even more costly to the corporation are lost opportunities from: 3e9

- not having access to important intelligence information 3e9a
- less than adequate collaboration on important design issues 3e9b

Even in a relatively small, short-term project, the Handbook Cycle process is increasingly crucial to the success of the organization. Products are increasingly complex, and at the same time there is tremendous pressure for reduced product cycle time, requiring that more and more work be done concurrently. This in turn requires unprecedented coordination across the project functions and organizational boundaries. 3e10

There should be a tremendous strategic advantage in boosting the Handbook Cycle capabilities in our organizations. Dramatic improvements in how they create and manage the enterprise knowledge must be engineered, to transform knowledge domain islands into highly coordinated, sharable, well developed, interoperable Handbook Cycles. Such improvements can be realized by dramatically improving both the information-system tools and accompanying human processes and methods through a special "co-evolution" process of advanced exploration. 3e11

2. An Open Hyperdocument System (OHS): 3f

The Project team will study and define usage requirements and specifications for an Open Hyperdocument System (OHS), and produce an implementation plan to fund the development of a research prototype for subsequent use in member pilots (OHS-2). 3f1

Many vendors and consultants are beginning to develop products and services to address specific isolated application areas within the Handbook Cycle, such as groupware, or CASE. But as more and more of an organization's Handbook Cycle work moves online, and more of the work is done concurrently using a hodge-podge of workstations, networks, application packages, and utilities, they will be faced with a whole new set of challenges for coordinating the enterprise knowledge. 3f2

A central focus of this Project is the design and intensive use of a prototypical "Open Hyperdocument System" (OHS) as a potential strategic solution to these challenges. The "Open" refers to an integrated "seamless" multi-vendor architecture, where distributed heterogeneous knowledge workers can share files and share screens regardless of each worker's particular hardware/software configuration. The "Hyperdocument" refers to mul-

timedia files which support many object types, including hypertext links, hypertext publishing, and hypertext mail, designed to enable flexible collaborative creation, manipulation, study, and re-use online. (See Preliminary OHS-2 Requirements below <3F10>.) 3f3

OHS-1 Pilot Exploration: An advanced research prototype OHS will be used to support the distributed Project team's own knowledge development process, and to create an exploratory pilot environment within which the associated work methods can be concurrently developed. The resulting environment and experience base would then serve as a model for subsequent member pilots. 3f4

The "AUGMENT" system was selected for initial use in the Project as the only suitable advanced integrated OHS prototype available to support wide-area collaborative knowledge development. AUGMENT (OHS-1) was developed at SRI and is now owned by McDonnell Douglas, who will make the source code fully available to the Project. OHS-1 has been proven over the last decade in significant operational pilot trials in government and aerospace. It is extremely useful for demonstrating the integrated capabilities required in an OHS, and for the real-use experience base needed for designing the next-generation prototype. (An earlier version of this system was recently recognized with the "Software System Award" by ACM, a long-established association of computer professionals.) However, OHS-1 cannot be easily extended or supported. The code is in a non-standard language, runs under an obsolete operating system and mainframe hardware, and does not support a modern graphic user interface. (See Appendix-B References <OHS-1> for a description of its features.) 3f5

Therefore, it is vital to the Project goals, both to extend its own "living prototype" environment and to plan for member pilots, to build or buy a modern OHS prototype (OHS-2) as quickly as possible to run on modern workstation platforms and support emerging graphical interface standards. 3f6

OHS-2 Implementation Plan: An implementation plan will be proposed mid-year to fund the procurement of an OHS-2 research prototype, with targeted implementation completed early in the follow-on Initiative to expedite launching member pilots. This plan would be based on the usage requirements and system specification developed by the Project team of staff and member interns. Procurement alternatives will be evaluated to determine the most cost-effective approach for building an OHS-2: 3f7

- in-house development 3f7a
- contract development 3f7b
- purchase and modify 3f7c

The Advisory Council of member representatives will work with the Project team to decide the best approach in light of technology, timing, and budgetary options at the time. A separate call for funds may be initiated at that time to cover the costs of implementation. 3f8

Given this plan, the coalition of Project members would then have a unified front, backed by real-use experience, to stimulate the commercial production of open hyperdocument systems and associated applications, utilities, and consulting services to support subsequent wide-scale deployment within member organizations. 3f9

Preliminary OHS-2 Requirements: A great deal of preliminary work has already been done by the Project Director and staff, and by McDonnell Douglas personnel, to define the functional requirements of an OHS-2 prototype (see Appendix-B <OHS-2>). This work is the re-

sult of long-term analysis of complex Handbook Cycle requirements, and from operational usage of OHS-1 in significant pilot trials. 3f10

These preliminary OHS requirements are recommended as a baseline starting point only. There is much more to be learned about the rigorous use of an OHS in a wide-area, distributed Handbook Cycle process. The human-system elements -- all the methods, procedures, conventions, skills, etc. -- must be highly developed, in close association with the further evolution of OHS requirements. To launch this co-evolution, intensive and purposeful exploratory pilot environments must be established. The first such will be with OHS-1 in the Project. 3f11

Project members will work together to refine (or redefine) the requirements and specifications for OHS-2, using the Project's OHS-1 pilot environment as a point of reference and experience base. Members will develop usage scenarios for prospective member pilots, collect and analyze an extensive survey of related activities, products, and services, with synthesis through intensive dialog among member participants (see section on <Approach> for more details). 3f12

Implications for Industry Standards: Technically speaking, an OHS in the commercial world will not be a software package, but rather a set of standards and protocols which software developers would follow so that a heterogeneous user population can create and exchange Handbook Cycle elements interoperably, regardless of preferences for applications, utilities, workstation platforms, and networks. 3f13

Understanding the requirements for these standards and protocols can only be accomplished through close cooperation among vendors and user organizations, and through extensive real-use experience. The "living prototype" workmode of the Project and subsequent pilot trials of the members will provide an extremely valuable fertile environment for discovering and evaluating these requirements. 3f14

Note that the Project will not itself be setting standards; it will rather publish well-documented recommendations to be presented by member companies to existing standards groups. 3f15

3. Methods for online collaborative knowledge development: 3g

The Project team will study and define methods for online collaborative knowledge development, resulting in usage requirements and guidelines for member application. 3g1

The Handbook Cycle processes used to collect and analyze intelligence, record dialog, and develop project-state "handbooks" will be very different in the online world from those used in the "paper world". Careful evaluation and development of methods, procedures, conventions, skills, and organizational roles for facilitating the online Handbook Cycle need to be accomplished before members attempt to take the technologies in-house. 3g2

For example, if users do not apply some formal process and discipline to the structure and format of their sharable documents and intelligence databases, or to the assignment of keywords, or file-naming conventions, how will anyone find what they need among the thousands of Handbook Cycle elements under continuous development? What are the protocols for making changes in a shared file? How do you keep track of thousands, or tens-of-thousands of important documents, with previous versions of each for the record, and

still have a handle on the project state? Who will be responsible for distilling the knowledge and organizing it online? What will the job description be, and how will you groom someone for that role? How would you run an OHS-supported meeting? Which existing practices and attitudes within your company would need adjustment to get the most out of these new capabilities, and how would this be tackled? How would you effectively harness "smart-agent processes" from the artificial intelligence realm? 3g3

These issues are all a critical part of the equation for dramatically improving the collaborative knowledge development process, and for effectively introducing and harnessing the technology within member pilots. And these methods must not be developed simply as a parallel effort to the tool development -- rather the new tools and methods must be developed hand-in-hand. Otherwise the tools will simply automate existing outdated practices, or the methods will be adapted to existing inadequate technologies. What is needed is a tightly knit co-evolution of tool/method prototypes within exploratory pilots. In addition, extensive ongoing surveys of existing methods, services, and practices will be conducted to avoid re-inventing the wheel. For example, what is already known about cataloging intelligence data? How are current groupware products affecting meeting-room dynamics? (See section on <Approach> for more details.) 3g4

This body of data would then be analyzed in terms of applicability within an advanced, fully-integrated online OHS environment, and also mapped against application scenarios of prospective member pilots. The Project team would also be experimenting with applicable methods in their own online Handbook Cycle work, with lessons learned feeding directly back into the tool requirements. 3g5

Different procedures or conventions will be appropriate to different work styles and environments. However, there is much commonality regardless of the particular situation, because the bulk of the exploratory work is in understanding all the related issues, where the methods and conventions might be needed most, what the available options are, and how well they have worked for others in similar situations. 3g6

4. Deployment strategies: 3h

The Project team will study and define the strategic deployment and migration of the Project results within member organizations, as well as applying the results to boost the results-transfer process. 3h1

Planning for strategic deployment of results from the Project (and later Initiative) within the Members' organizations is an integral part of the Project Approach. 3h2

Most organizations need to overhaul the way they identify, select, and transfer new technologies or methods into the organization. Often the tools or methods selected do not adequately address the requirements, they do not integrate well, or they are not introduced well. Improvement projects will only get more and more complex, the requirements for improvement will shift more and more rapidly, and the opportunities for improvement will increase exponentially. The way an organization assesses needs and opportunities, designs and deploys solutions, and incorporates lessons learned, will be increasingly critical to its survival and success. One of the goals of the multi-year Initiative is to dramatically improve the "improvement cycle time" as well as the "product cycle time" within member organizations, using the same tools and methods that support Handbook Cycles within complex projects. 3h3

The one-year Project is designed to give members a head start in the improvement transfer process by preparing the member participants, as well as the tools and methods, for the follow-on member pilots. The unique approach for designing and co-evolving the tools and methods, with intensive hands-on participation of end-user groups, will maximize the applicability and transferability of the results (see section on <Approach> for more details). Member interns will be tasked with developing application scenarios within prospective member pilots to lay the groundwork for the detailed pilot-project plans, as well as driving the design work. Member liaisons will be tasked with positioning their organizations to prepare for the pilot selection and planning. 3h4

In addition, the Project team will be operating within a "living prototype" of co-evolving tools and methods, continuously subjecting themselves to improvements on all fronts. Where possible, formal notes will be kept on the lessons learned which, combined with intelligence data on existing technology transfer methods, will form the basis for a new "handbook" on pilot projects (this will be extended considerably during the Initiative phase). 3h5

In the multi-year Bootstrap Initiative, a key activity will be the detailed planning and launching of member pilots. These pilots will serve as an important extension of the Project pilot exploration, as well as providing a mechanism for the transfer of Project results. Many pilots should be launched -- some for furthering the advanced exploration, some to give elite project teams the experimental advanced capabilities, and some to give the "regular" workers a "taste" of what is to come. 3h6

5. Special application areas: 3i

The Project team will study and define commonalities among, and implications within, special application areas. 3i1

If the tools and methods for improved distributed knowledge development, or Handbook Cycle work, are to be truly applicable within complex projects, the design must be driven by usage requirements. The interns will be tasked with developing detailed scenarios of prospective member pilots to address a wide range of group knowledge-work domains, such as enterprise integration, concurrent engineering, total quality management, CASE and software effectiveness, and CALS. Using the Project tools and methods, member interns will collect intelligence and consult with experts in the given application areas, exchange dialog, and map the applicability of the generic Project work within these special-purpose domains, to identify the commonalities among them. This is extremely important for pursuing effective Handbook Cycle interoperability across knowledge domains. The results will feed directly back into the requirements definition of OHS-2. 3i2

In addition, the results will be used to evaluate how the functional requirements of these application domains would be affected by an OHS-2. In other words, how much of what is currently programmed into a software package for CASE, or decision analysis, or meeting facilitation, is already supported by the OHS-2, or, given OHS-2, what special-purpose functionality would the packages then need to consist of? Embedding the basic generic functionality within the OHS will maximize the open interoperability factor, while minimizing the cost of creating, learning, and supporting the various specialized software applications. 3i3

And, finally, the results of this task will be used as a basis for planning member pilots. 3i4

6. A strategic framework for organizational improvement:

This Project and follow-on Initiative are motivated by a comprehensive strategic framework for continuous, accelerated, compounded organizational improvement. Refinement of this strategy will receive much more consideration in the follow-on Initiative. This work will focus on effective ways to identify, define, integrate, and transfer new process and tool improvements within a rapidly shifting operational environment. An important part of this work is the process of launching, managing, and evaluating exploratory pilots, as well the use of special High Performance Support Teams (professional teams specially trained and equipped to support operational activities with advanced capabilities). 3j1

A-B-C Model: As a starting point, the Project team will work with Dr. Engelbart's "A-B-C Model of Organizational Improvement", which depicts two functional levels of improvement activity within an organization: 3j2

A = The Product-Producing Activity (e.g. manufacturing airplanes, conducting medical research, management consulting, passing legislation) 3j2a

B = Improving A Activity (e.g. introducing CAD, email, upgrading quality processes, developing a new training program) 3j2b

C = Improving B Activity (e.g. learning more effective ways to research available options, to integrate and transfer solutions, to develop project knowledge) 3j2c

Most organizations do not have any recognized C Activity, and their B Activity is generally adhoc, often left to the individual worker or group to figure out. Even when well supported, the B Activities are usually fragmented -- i.e. the tools are developed to automate existing (obsolete) methods, and vice versa. These activities are typically chartered to introduce a one-time change. 3j3

If organizations are going to get faster and smarter, they have to get much much better at improving themselves. They need an explicit C Activity to turn their B Activities into a highly coordinated, highly skilled, highly effective, and coherent improvement process. 3j4

The Project and Initiative represent a formal C Activity, and were specifically designed to support, improve, and integrate the B Activities within the member organizations. The same tools and methods resulting from this Project and subsequent Initiative can also be readily applied to C and B work, as well as much of the A work, for: 3j5

- recognizing opportunities 3j5a
- identifying requirements 3j5b
- designing and deploying solutions 3j5c
- incorporating lessons learned 3j5d

This is where the "bootstrapping leverage" comes in. The "bootstrapping" refers to a process of continuously boosting an effort using the results of its own work. In this case, the iterative results of the Project will be used to keep boosting the Project's effectiveness, as well as boosting the work of the respective member B Activities, and their respective A "clients". The pursuits of the Project were specifically selected for this strategic compounding effect. 3j

During the Project, interns will be trained in this A-B-C bootstrapping model, and oriented to think of their work as C Work, supporting and improving the B Activities in their home organizations. Their work developing application scenarios will involve heavy collaboration with member B Activities which are already planning and implementing programs in total quality, concurrent engineering, or CASE. The extensive intelligence collections and intensive dialog from the Project on related activities, tools, methods, improvement transfer techniques, products, and services, will be extremely valuable to the existing B Activities, as will be the lessons learned from the Project. At the conclusion of the Project, the interns will be expected to take positions back in the member B Activity to begin transferring the tool/method prototypes within pilot operations in the B, and later the A Activities. 3j7

Given this A-B-C improvement model as a starting point, the multi-year Initiative will further evolve and refine a strategic framework for organizational improvement. 3j8

Co-Evolution and Augmentation: Another key element of the strategic framework has to do with targets for improvements, or augmentation. Each target capability is deeply embedded in the fabric of human/tool culture within an organization. In recent centuries, this fabric has remained largely intact, with the ripple effect from spurts of innovation making quiet adjustments over several decades. Now, with the explosion of the information age and its accompanying computer revolution, the speed of technological innovation is increasing exponentially, leaving the human side of the equation -- the methods, procedures, conventions, etc. -- seriously obsolete. 3j9

Now there is less and less time for the intricate fabric of the organization to adjust and evolve naturally. It is now necessary to engineer changes on the human side, in close association with the tool side, to avoid becoming seriously out of synch with one another. This "co-evolution" approach to human-tool augmentation will become increasingly important as the rate and scale of change continue to increase. 3j10

Considering the rapidly increasing complexity and urgency facing today's organizations, and the restricted resources for coping, reducing the *improvement cycle time* will be just as critical to an organization's survival and success as reducing the *product* cycle time. This dual-result approach offers compounded leverage for *"bootstrapping organizations into the 21st century"*. 3j11

APPROACH 4

It is impossible to predict exactly what will be required by the organization of the future. The best we can do is adopt a pragmatic strategy for creating faster and smarter organizations, by improving the exploration process that will eventually enable them to steer and maneuver with greater and greater efficiency. The Project Approach is to do just that. By launching and accelerating the continual co-evolution of tools and work methods for collaborative knowledge development, the Project will establish a highly collaborative, steadily improving, advanced exploration process, including: 4a

1. Intensive pilot usage for balanced co-evolution 4a1
2. Intensive member participation 4a2
3. Detailed scenarios of future member pilots 4a3
4. Lessons learned 4a4
5. Ongoing extensive surveys 4a5
6. Ongoing recorded dialog and exchange 4a6
7. Explicit strategy for results transfer 4a7
8. Comprehensive framework for strategic investment 4a8

This approach is designed to maximize relevance and transferability, while serving as a unique new model for collaborative research and improvement transfer. Following is a detailed description of this approach. 4b

1. Intensive pilot usage for balanced co-evolution: 4c

The "living prototype" environment will provide first-hand experience for member designers and implementers, and an industry focus for standards requirements related to special application domains. Beginning with OHS-1 and a starting state set of methods provided by the Project staff, team members will actively use and evolve the online Handbook Cycle methodologies in close coordination with the OHS-2 design work, and weave the lessons learned back into the design process. The resulting successive prototypes will support the Project Approach, as well as the Project Content work. (This process of employing the successive results of the Project within its own knowledge development process is a key element in the bootstrapping strategy described in Item 6 under Content <3J>.) 4c1

2. Intensive member participation: 4d

Members will participate extensively through an "Executive Liaison" person, and one or more "Interns" working full-time on the Project team in the "living prototype" environment. Interns and Executive Liaisons will represent the member usage requirements and interests through an intensive collaborative process, and channel the results of the Project back into their home organizations. (See section on Member Participation for more details <5>). 4d1

3. Detailed scenarios of future member pilots: 4e

An early and ongoing assignment for the Interns will be to work closely with related member improvement activities to develop detailed roadmap scenarios and usage requirements

for candidate in-house pilot applications. These scenarios, representing a wide variety of complex projects (e.g. CASE, total quality), will evolve throughout the Project as the interns gain increasing expertise in the "living prototype" environment, and as they collaboratively explore and study the many surrounding issues. (See also Item 5 under Content <3I>). 4e1

4. Lessons learned: 4f

The Project will be the first advanced-outpost pilot -- a "living prototype" environment where the tools and methods are co-evolved, and the results employed by the interns to conduct their group knowledge work. Wherever possible, the lessons learned will be recorded, and fed directly back into the design work in a very tight feedback loop. 4f1

Later, in the multi-year Initiative, members will be launching exploratory pilots, employing OHS-2 and associated work methods, and will be actively feeding a constant stream of lessons learned, needs, and possibilities (not proprietary data) back into the Initiative's continuing requirements definition. 4f2

5. Ongoing extensive surveys: 4g

Project team members will survey existing works on an ongoing basis by collecting, cataloging, analyzing, and ingesting intelligence information on important related activities, tools and methods. Topics will include groupware, hypertext, team processes, project methodologies, models for organizational improvement, meeting facilitation, CASE, CALS, performance metrics, integration of video, etc. The media collected will range from brochures and conference proceedings, to taped (and possibly transcribed) interviews with industry experts, and recorded demonstrations of emerging technologies. An extensive hyperdocument intelligence library will be developed and maintained for use by the Project team, and by B Activities (improvement programs) in the member organizations. 4g1

6. Ongoing recorded dialog: 4h

The Project team will be engaged in intense, ongoing dialog about the many elements of their work, including: the intelligence collection, the scenarios under development, the pilot environment, how the emerging tools and methods can best be deployed within the Project and member pilots, the lessons learned, the successive drafts of project plans and design specifications, procurement approaches, the Handbook Cycle framework, implications for special application domains, implications for standards, etc. Dialog will also be conducted with selected industry experts. A synthesis of this dialog will be fed back into the Project's knowledge products. Because participants will be working online, often from remote sites, this dialog will be largely captured online, and therefore recorded for subsequent analysis and re-use. 4h1

The Project team will also periodically meet face-to-face. This dialog will be recorded on audio (possibly video) tape. Minutes will be entered online for the record. As funds permit, the team will also study and explore how meetings are impacted when participants have been working in an intensive online OHS environment, and how to support and facilitate meetings using the OHS-based tools. Lessons learned will feed back into the design process. 4h2

7. Explicit strategy for results transfer 4i

As a strategic issue, the Project Approach deals specifically with the transfer of results at several levels. The "living prototype" environment, member participation, scenario development, lessons learned, and intensive dialog will act as a catalyst for creating deliverables which are maximally relevant and transferable to the member pilots. In addition, the prototypical tools and methods resulting from the Project, designed to boost the Handbook Cycles within complex projects, will be highly applicable later on for boosting the complex project of transferring improvements into member organizations (see also Item 4 under Content <3H>). 4i1

The Project will hopefully become a model for the effective transfer of results from other consortia. This can also extend to transfer from vendor products and services, and in-house improvement projects, into member pilots. 4i2

8. Comprehensive framework for strategic investment 4j

This Project dovetails into, and is driven by, a comprehensive strategic framework for investing in organizational improvement, particularly in developing and deploying emergent information technology and methods (see Item 6 under Content <3J>). 4j1

This strategic approach should result in better and better ways to perform each of the tasks described under <Content> and <Approach>, and eventually serve as a generic dynamic model for conducting any complex collaborative project work. 4k

MEMBER PARTICIPATION 5

Each Full Member organization is expected to provide one or two full-time interns to staff the various activities of the Project projects. Much of their project participation will be conducted remotely from their home office using the prototype OHS system to collaborate. This participation is vital to the function of the Project, to the collaborative definition of user requirements, and to the infusion of results into the member organization. Interns will serve for the full Project year, whereupon they will be rotated back into their member organizations, hopefully to support internal member pilots where their expertise can be most effectively propagated. Organizations electing to join the follow-on multi-year Bootstrap Initiative will then place interns on a one or two year rotation basis. 5a

A key element of the Project is intensive collaboration among a wide range of stakeholders. The "Executive Liaisons" from participating Member organizations will collaborate on planning and direction, and the "Interns" will collaborate at the hands-on level. 5b

Executive Liaison 5c

Each Project member will assign a liaison entrusted by the corporate executives to represent the Member's interests in the Advisory Council, and to position the Member organization for effective transfer of the Project results. As a minimum, the Executive Liaison will attend all quarterly briefings and progress meetings, and coordinate the Intern's access to Member resources, including establishing ties to related B Activities (improvement programs) within the company. The Executive Liaison might expect to spend up to one-quarter time on matters relating to the Project. 5c1

Internship Program 5d

The internship program is a program of total immersion for the Member Interns in the "living prototype" Project pilot, including extensive training and coaching, and intensive team work with other members. Interns will be expected to perform much of the Project work, and to produce a significant portion of the Project deliverables, including intelligence collection and analysis, scenario development, debating the issues, contributing to the design work, and documenting the results. 5d1

This Program has strategic importance in that members will be fully represented in the requirements definition, the results will be highly relevant, the Interns will gain the expertise to effectively transfer the results in-house, and the members will get a head start in positioning for the future based on first-hand knowledge and experience. 5d2

The Intern selection process is very important. They must be innovative dedicated team players, with a genuine pioneering spirit, and a strong background in process, design, and/or project management. Interns would ideally be able to effectively represent their company's improvement needs and plans in a detailed manner, through prior experience and by establishing and maintaining close contact with related in-house activities (with help from the Executive Liaison). A technical background is NOT required. Candidates must be approved by the Project Director. 5d3

Some managers have voiced a reluctance to "give up" such an employee for a full year. In debating this issue, it is important to consider: 5d4

- Who do you want representing your companies' broad interests? 5d4a
- How else would you propose to transfer the multi-faceted results in-house? 5d4b
- What if all the other members selected the same caliber person you selected? 5d4c
- What kind of staffing would it take to launch this type of advanced research in-house, who would you put in charge of that, and why? 5d4d

Interns will report to the Internship Program Manager, and will work closely with the Project Director and his staff. Most Interns will work from offices at their home organizations -- traveling to the Project site (Palo Alto, CA) initially for intensive training, total immersion in the online environment, and team building -- and returning periodically for follow-on coaching and face-to-face team work. Back home, they will work full-time as a distributed Project team. Members may alternatively place their Interns onsite with the Project staff for more extensive exposure. At the end of the Project year, the interns will return to work for the Member company, to begin the full-time task of transferring the results in-house. 5d5

Intern Alternatives 5e

The success of the Project will depend on a core team of Interns from Member organizations dedicated full-time to the Project research and deliverables. As such, each Full Member should contribute at least one full-time intern. In addition to this minimum, or as an alternative where exceptions are granted, the following can be considered as valuable contributions (subject to approval by the Project Director). These include donating graduate students, or faculty, or sending extra money in lieu of an intern. 5e1

Graduate Students: Members may consider contributing additional staff by "routing" them through a graduate study program at Stanford University (or other nearby university), beginning in June. Graduate student Interns would be expected to work a minimum of half-time in the Project. Master-level students can be accommodated quite directly. PhD-level involvement would require negotiating with each students' research professors and is not at all straightforward. Note that these students must first be admitted into Stanford on their own merit. Note also that because of their fluctuating academic schedules and priorities, their labor cannot necessarily be counted on in any critical path for deliverables. 5e2

An alternative would be to select and recruit an already-enrolled graduate student to work in the Project on behalf of the Member. This type of graduate student Intern would not necessarily be as effective at representing the Member's requirements, and may not have enough of a "presence" back home to effectively transfer the results in-house. 5e3

Visiting Faculty: Members may wish sponsor a faculty member from a local university to spend a sabbatical year working in the Project. This Faculty Intern may not be able to effectively represent the Member's requirements, or transfer the results in-house after the Project. However when they return to their home university they would be qualified to spawn a cluster of active Bootstrap participants at that university, through a similar study program for Member-sponsored staff. 5e4

Another form of Faculty Intern would be for the Member to sponsor a qualified employee to teach for a year at Stanford part-time (or other nearby university), and work part-time in the Project. 5e5

Extra Fees: In the exceptional case where a Full Member cannot free up the staff to donate full-time, the Member may consider paying an extra $100,000 to cover the cost of hiring an Intern onto the Project team. 5e6

Supporting Services 5f

Interns will be provided an integrated pilot environment in which to learn, apply, and evolve the bootstrapping concepts, including: 5f1

OHS Support Service: Access to and use of OHS-1 to include mainframe computer service, basic training, coaching, and hotline support. 5f1a

Vision and Direction: Support from Dr. Engelbart and his staff (and consultants as funds permit), including long-range vision and planning, intensive ongoing seminars, workshops, and team-building, task assignments and evaluation, project management, guidance in advanced exploration. The staff will also coordinate with the Executive Liaisons, interface with other research groups, consultants, industry associations, and standards groups, and generally promote the underlying strategic framework through articles, papers, books, video productions, lectures, and management seminars (e.g. the 3-day Bootstrap Seminar). 5f1b

It is expected that as more organizations join, the Project would fund an expanded level of support to include, for example: 5f2

- procurement of OHS-2 5f2a
- expanding the range of technical and staff support 5f2b
- specialty consulting, for example bringing in an expert on cataloging keyword conventions 5f2c
- enhancing the facilities (offices, meeting rooms, specially-equipped training rooms, library) 5f2d
- assistance in planning for pilots within member organizations 5f2e
- expanding the project scope (e.g. how and when to apply metrics in the pilot evaluation process) 5f2f

DELIVERABLES 6

The goal of this Project is to provide members with information, experience, working prototypes, and a strategic framework to ascertain and address their own companies' requirements. The Project will employ a unique strategic approach, emphasizing relevance and accessibility of the results to maximize transferability to the member organization pilots. The results developed by the Interns will be proprietary to the members for one full year after the Project. 6a

Summary of Deliverables 6b

Reports & Briefings
- Status reports
- Briefings
- Live demos

Operational Deliverables
- Advanced pilot environment
  - . prototype software
  - . prototype methods
  - . transfer methodologies
- Internship program
  - . unique pilot experience
  - . intensive training
  - . interns produce results
  - . interns transfer results

Knowledge Products 6b1
- Multi-year Initiative plan 6b2
- OHS-2 requirements/specs 6b3
- OHS-2 implementation plan 6b4
- Methods requirements/specs 6b5
- Strategies for results xfer 6b6
- Strategic framework for organizational improvement 6b7 6b8
- Framework for collaborative knowledge work 6b9 6b10
- Application scenarios 6b11
- Extensive intelligence base 6b12
- Recorded dialog 6b13
- Lessons learned 6b14
- Recommended standards 6b15

The plans for the Initiative and for the OHS-2 implementation will be proposed in the third quarter of the Project year. All knowledge products will be developed and delivered as online cross-indexed hyperdocuments. Certain key reports will also be printed. Following is a detailed description of the Project deliverables. 6c

Reports and Briefings 6d

Quarterly: Quarterly deliverables will include status reports documenting technical progress and financial status, onsite briefings, and live demos. A meeting of the Advisory Council of Executive Liaisons will be held (at the Project site in Palo Alto, CA, or other mutually agreeable site) to review accomplishments, problems, potential solutions, direction of the Project, and plans for the follow-on Initiative. 6d1

Workshops/Seminars: It may be desirable to conduct 1- to 3-day seminars during the course of the Project for the general education of member (and non-member) management apart from those directly involved in the Project. These will be arranged on an as-needed basis. 6d2

Mid-Year: A mid-year report will be presented to the Advisory Council detailing options for procurement or in-house development of a rapid-prototype OHS-2. The Advisory Council will work with the Project team to decide on the best approach, considering the resources

available. The Advisory Council may choose to issue a separate call for funds to boost the development effort. 6d3

Final Report: A final report will be produced at the close of the Project and disseminated to members. It will document the technical progress made toward the objectives of the Project, problems encountered with solutions proposed or tried, summary of lessons learned, and recommendations for further work. 6d4

Documented Case Project: If sufficient funding is available, an independent third-party research team will be contracted to evaluate the Project, including sociological, technical, and economic potentials and results. 6d5

Operational Deliverables 6e

Advanced Pilot Environment 6e1

The Project and Initiative will support an advanced "living prototype" pilot environment in which to assess, develop, test, evaluate, apply, integrate, and deploy evolving tools and methods. This will be a demonstration environment, and a model for future member pilots. 6e1a

Prototype OHS-1 Software: This existing prototype mainframe software will be maintained for use by the Project team (staff and interns) to conduct the Project work. OHS-1 is not recommended for wide-scale deployment and should be replaced according to the OHS-2 implementation plan as soon as funds permit. 6e1b

Prototype OHS-2 Software: If and when the prototype OHS-2 becomes available, it will replace OHS-1 as the Project's exploratory pilot system, and subsequently will be directly transferable to member pilots. 6e1c

OHS-2 code for any software developed during the course of the Project will be delivered at the end of the study via a medium jointly agreed upon by the Project members. 6e1d

Prototype Handbook Cycle Methods: All associated methods, procedures, skills, processes, conventions, and organizational roles developed to accompany the OHS will be available for deployment in member pilots. 6e1e

Transfer Methodologies: The methods developed for improved results transfer will be available for use by members in launching in-house pilots. 6e1f

Internship Program 6e2

Interns Produce Results: Member interns will be expected to make major contributions in the work of both the Project and the Initiative. The quality of the deliverables will be directly proportional to the commitment of member interns. 6e2a

Unique Pilot Experience: Interns will be given extensive exposure to the knowledge, experience, and insights of the Director and his staff, as well as direct intensive hands-on experience in the highly augmented, distributed, collaborative group knowledge development process. 6e2b

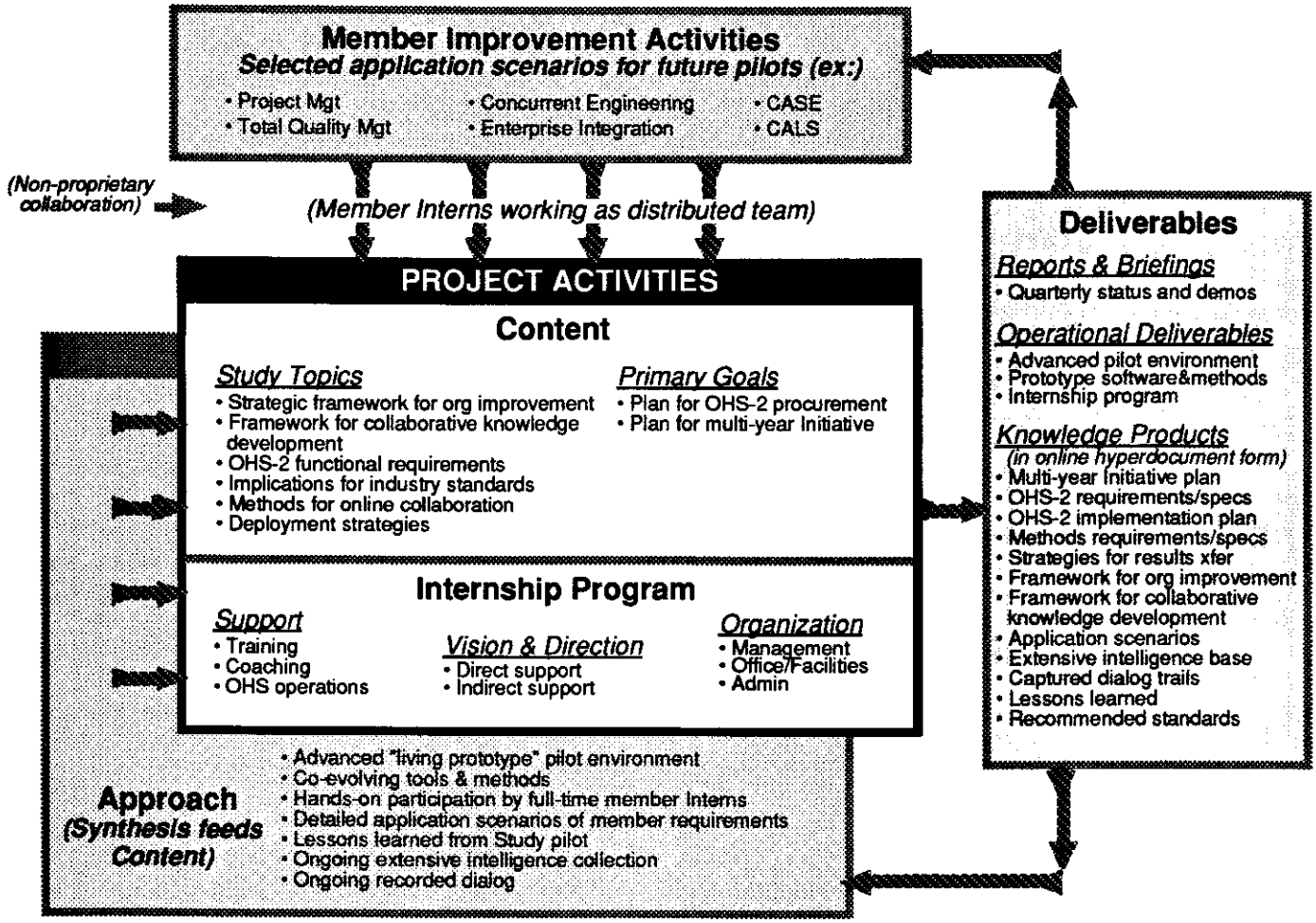
Intensive Training: Interns will be given extensive training in the use of OHS and associated methods. Up to a month of training at the Project site will be followed by remote support using the telephone and the OHS Mail and Conference systems, with regular trips back to the Project site for follow-up coaching and onsite teamwork. 6e2c

Interns Transfer Results: At the end of the Project, with guidance and planning from the Project team, and assistance from the Executive Liaison, interns will be expected to move back into the B Activity (improvement projects) of member organizations, with responsibility for transferring the results of the Project back into their home organization. 6e2d

Knowledge Products 6f

During the course of the Project, the following knowledge products will be developed within the Project team's Handbook Cycle process using the prototype OHS-1. This evolving knowledge will be developed in online hyperdocument files, continuously updated, indexed, cataloged, annotated, and cross-referenced, through a synthesis of the Project Approach elements. Resulting intelligence collections and recorded dialog will be cataloged and retrievable online as supporting documentation for each of the following deliverables. Individual documents, or hyper-linked indices to them, may be printed remotely or down-loaded at any time by the member interns. Selected versions of key documents will be printed for distribution to the members. 6f1

- Multi-year Bootstrap Initiative plan 6f1a
- OHS-2 requirements and specifications 6f1b
- OHS-2 implementation plan 6f1c
- Methods requirements and specifications 6f1d
- Deployment strategies 6f1e
- Strategic framework for organizational improvement 6f1f
- Framework for collaborative knowledge work 6f1g
- Application scenarios for future member pilots 6f1h
- Extensive intelligence base 6f1i
- Recorded dialog 6f1j
- Lessons learned from Project pilot 6f1k
- Recommended standards for commercial OHS products and services 6f1l


Member Improvement Activities
Selected application scenarios for future pilots (ex:)
• Project Mgt
• Total Quality Mgt
• Concurrent Engineering
• Enterprise Integration
• CASE
• CALS
(Non-proprietary collaboration)
(Member Interns working as distributed team)
PROJECT ACTIVITIES
Content
Study Topics
• Strategic framework for org improvement
• Framework for collaborative knowledge development
• OHS-2 functional requirements
• Implications for industry standards
• Methods for online collaboration
• Deployment strategies
Primary Goals
• Plan for OHS-2 procurement
• Plan for multi-year Initiative
Internship Program
Support
• Training
• Coaching
• OHS operations
Vision & Direction
• Direct support
• Indirect support
Organization
• Management
• Office/Facilities
• Admin
Approach
(Synthesis feeds Content)
• Advanced "living prototype" pilot environment
• Co-evolving tools & methods
• Hands-on participation by full-time member Interns
• Detailed application scenarios of member requirements
• Lessons learned from Study pilot
• Ongoing extensive intelligence collection
• Ongoing recorded dialog
Deliverables
Reports & Briefings
• Quarterly status and demos
Operational Deliverables
• Advanced pilot environment
• Prototype software&methods
• Internship program
Knowledge Products
(in online hyperdocument form)
• Multi-year Initiative plan
• OHS-2 requirements/specs
• OHS-2 implementation plan
• Methods requirements/specs
• Strategies for results xfer
• Framework for org improvement
• Framework for collaborative knowledge development
• Application scenarios
• Extensive intelligence base
• Captured dialog trails
• Lessons learned
• Recommended standards

BENEFITS 8

Offsetting Costs 8a

In discussing benefits, one must seriously consider how much change to expect in the coming decades -- 10%? or a factor of 10? Assuming dramatic, sweeping, increasingly rapid and complex change, one must then consider: 8a1

- what kind of organization will have the strength and agility to maneuver and thrive in that environment? 8a1a
- how will your organization be transformed into that kind of organization? 8a1b
- how much experimentation can your organization tolerate? 8a1c
- how much will the exploration cost? 8a1d
- what is it costing you each year NOT to have these capabilities already in place? 8a1e
- how do you propose to find an appropriate strategy for achieving this transformation? 8a1f

Preparing for the future will most likely entail unprecedented expense, effort, and adjustment. Finding an appropriate strategy will be crucial. 8a2

Practical Strategy: This Project offers members a cost-effective opportunity to explore and refine a comprehensive corporate strategy to get better and better at improving itself. 8a3

Immediate Pilot Experience: This Project offers immediate hands-on experience in an advanced "living prototype" environment. Creating a comparable exploratory pilot in-house would require considerably more resources and time to establish, and would be lacking the rich collaboration potential from other participants. 8a4

Cost-Effective: The Project offers a cost-effective and highly productive means for organizations to assess and subsequently assimilate advanced group knowledge work capabilities. 8a5

Valuable Intelligence: Transforming your organization will also require constant surveillance of important external activities, products, and services. The Project's extensive and coherent intelligence collections should be a valuable supplement to existing in-house improvement efforts. 8a6

ROI: Organizations that invest heavily in projects requiring large scale integration of evolving knowledge will benefit the most from Project membership. In addition to employing future knowledge-work capabilities effectively, members can better harness in-place technologies by learning to adapt the advanced online methods from the Project. 8a7

Organizational Memory: Capturing design intent should cause significant reductions in redundancies, both in repeated errors, and in re-deriving design decisions. Learning from others' lessons and best practices should lead to first-time quality. 8a8

Quality Knowledge Work: The quality of enterprise knowledge should increase significantly through improved coordination, and through the awareness that each knowledge

element contributed to the pool could actually be highly useful and greatly relied upon downstream. 8a9

Leveraged Investment 8b

The unique Project Approach is designed to maximize the investment leverage, while reducing and sharing the risks of exploration and experimentation. By pooling resources, members can spend less to get more, thus freeing up more internal resources for in-house investment. 8b1

Compounded Investment: The Project Content and Approach are aimed at reducing both the product cycle time and improvement cycle time, while boosting first-time quality. The continuous improvement process launched within the Project can be subsequently transferred to member pilots. 8b2

Advances on Many Fronts: The Project results are designed to support and integrate many related improvement efforts, such as enterprise integration, groupware, CASE, CALS, project management, and total quality. Researching their commonalities will lead to a "big-picture" view for coordinating and accelerating these efforts, while minimizing redundancy and costly information islands. 8b3

Leveraging Other Resources: This Project is expected to attract resources that would otherwise not be readily available to the individual organization, such as top-notch industry experts, whole intelligence collections donated by other related research activities, and the potential for grant money to supplement the follow-on Initiative. 8b4

Leveraging Other Results: Members who are involved in other consortia, initiatives, or multi-corporate R&D alliances will be better equipped to transfer and integrate those results. 8b5

Competitive Positioning 8c

More and more an organization's competitive advantage will depend on its ability to leverage its intellectual resources. In an increasingly "white-collar" world, enhancing the productivity of individuals, teams, and organizations will require much more emphasis on the use of computer and communication tools to support collaborative work. And the process of technology/process infusion will be far more complex than ever before. With so much at stake, subtle differences in strategy could put some organizations far ahead of others in capability and effectiveness. 8c1

Faster and Smarter: The comprehensive corporate strategy for continuous breakthroughs in capability, leading to better and better ways to coordinate knowledge work and deploy solutions, should result in faster and smarter organizations. Members will have a chance to jump "ahead of the pack" in acquiring these capabilities. 8c2

Long Range Vision: This Project provides a long-term vendor-independent vision for organizational improvement in which to evaluate current and future requirements for information-systems products and services. 8c3

Managing Diversity: The Project Content and Approach are designed to offer significant potential for managing diversity in a rapidly shifting global economy. 8c4

Experience and Positioning: Early hands-on experience in the advanced "living prototype" environment offers members a significant potential advantage, including an early start at positioning their companies for strategic in-house implementation of the Project results. 8c5

The Concurrent Enterprise: Boosting the coordination and integration of knowledge work across organizational boundaries and functional domains would enable the organization to operate as a "collective mind" with enhanced strategic thinking and decision making. The large scale integration of knowledge should also influence first-time quality through improved concurrent coordination of all the enterprise participants, including customers, suppliers, and joint-venture partners. 8c6

Continuous Organizational Improvement 8d

The Project will launch a comprehensive strategic process for continual and accelerated improvement in knowledge development and organizational performance. 8d1

Reducing Improvement Cycle Time: Project interns will learn to employ the Project results to manage and accelerate change -- i.e. to make better use of increased quantities of intelligence data, to better identify needs and opportunities, to collaborate quickly and effectively on the design and deployment of solutions, and readily incorporate lessons learned. 8d2

Coordinated Efforts: Integrating an enterprise -- including individuals, teams, information systems, methods, and procedures -- requires a "whole system" or "big picture" view. The Project's co-evolution approach, together with the strategic bootstrapping, offers a valuable framework for coordinating improvement efforts throughout the enterprise. 8d3

New Vendor-User Paradigm 8e

In preparing for a future of unprecedented challenges, the stakes may well be too high for each organization to forge ahead alone. Joining forces is feasible when the work is generic and future-oriented, not proprietary, and in many cases highly desirable because rigorous exploration will be very costly. In addition, joining forces will be necessary for solving many basic global problems that lie ahead. The development of an appropriate open hyperdocument system is a clear example. Understanding the requirements for highly collaborative interoperability among many diverse knowledge domains, coordinating the standards and protocols for interfacing or integrating applications software and utilities -- can only be accomplished through extensive cooperation among vendors and user organizations, where extensive shared applications experience is critical. 8e1

Industry Focus: The Project will provide an industry focus for the collaborative involvement of user organizations, vendors, consultants, government agencies, and universities -- a melting pot and proving ground for testing and integrating new tools and methods relating to collaborative knowledge development. 8e2

Future "Knowledge Workshop": Members will get a real "taste" of what the future working environment could be to help guide strategic planning efforts. The intensive real-

use experience with OHS tools and methods will help end-user organizations to understand and articulate their requirements. 8e3

American Competitiveness: This "back-door" collaboration will be vital to future American competitiveness. Japan and Europe have already begun mobilizing in this general direction. The Project will also provide a ready-made platform for winners of the Malcom Baldridge Award to fulfill their obligation to share learning experiences. The eventual infusion of resulting capabilities into American industry, as well as social and government institutions, could make a huge difference to competitiveness. 8e4

Forging New Connections: Participation in the Project will expand member connections to other relevant activities and industry experts, as well as forging new and valuable associations within and across industries. 8e5

Extra Leverage for Vendors/Consultants 8f

Information systems vendors and consultants whose business requires incisive perception of the future should benefit in extra ways from participation in the Project. The unique Project Approach may offer a new model for supplier/customer relations. This is especially desirable for companies learning to practice total quality management or concurrent engineering, which require a high level of collaboration and coordination across functional areas, including customers, suppliers, and joint-venture partners. 8f1

Stimulated Marketplace: The Project will motivate and guide major customers to take a more pro-active role and plan for the widespread assimilation of information technology; participating vendors will have the opportunity to work closely with them in shaping their plans and direction. This involvement will help alleviate vendors' guesswork about customers' future needs and how they plan to assimilate products into their rapidly shifting, increasingly complex environments. 8f2

New Product Lines: Vendors and consultants who learn to employ the Project's strategies internally can leverage their resulting expertise to provide a valuable new or improved line of business in consulting services -- assisting users in assimilating the complex new work modes. Members will also have a jump over their competitors in incorporating the Project results into existing R&D efforts. 8f3

Visibility 8g

Participation in this Project will make a strong statement to your customers, suppliers, competitors, and to your own employees, that you are serious about working with other industry leaders to forge a long-term strategy for pursuing future organizational improvement. 8g1

Timing 8h

American competitiveness will depend on decisive action from American industry and government. 8h1

Some people have asked "why don't we join after the results are completed?". Here are some serious considerations: 8h:

- nothing will be completed without industry leadership 8h2a
- creating knowledge-work interoperability will require close cooperation by all major stakeholders early on 8h2b
- the direction and focus of the work, and hence the results, will be shaped by the early participants 8h2c
- he most valuable results of the Project will not be the reports, but rather the rich experience from intensive collaboration within a co-evolving advanced pilot environment 8h2d
- with or without the Project, forging into the future will only get more and more complex and expensive; the longer this work is postponed, the more heavily invested your organization will be in its current direction 8h2e

Comparing Other Activities 8i

Unique Project Approach: 8i1

- concurrent "co-evolution" of tools and methods 8i1a
- usage-driven requirements (through framework study, member application scenarios, and intensive pilot use of successive advanced prototypes), as opposed to product driven (creating long-term vision based on existing technologies) 8i1b
- head start with tools and methods explicitly developed for this purpose, with more than 20 years of operational usage experience in industry 8i1c
- explicit provisions for transferring results into member organizations by expert interns equipped with the Project tools/methods, with relevance maximized by the Project Approach 8i1d
- dovetails into a comprehensive strategy for continuous organizational improvement. 8i1e

Model for Other Consortia: The Project Approach can be applied as a new model for running many complex distributed projects, including constortia. 8i2

ORGANIZATION

This Project is being formed as a one-year project on Collaborative Knowledge Development. The Project is modeled after MCC's Technology Project, which is a mechanism to allow the members to begin pursuing their common objectives while the detailed plans for a full-scale Program are still being formulated.

The Bootstrap Institute, directed by Dr. Douglas Engelbart in Palo Alto, CA, will be contracted by the Project, to provide vision, experience, direction, and operational support for the Project, including the Internship Program. An Advisory Council of Executive Liaisons will meet quarterly to review the Project's progress and to provide input on its future direction.

By the end of the Project year, the multi-year Bootstrap Initiative will be formed as a non-profit consortium. All rights to the Project results will be transferred to the subsequent Initiative.

Management: The Bootstrap Institute staff is broadly experienced in the design and implementation of integrated hyperdocument groupware systems, work methods, and pilot deployment, from both an engineering and an anthropological perspective. The Project Director, Dr. Douglas Engelbart, is a recognized leader and visionary in the field, having pioneered strategic frameworks for organizational improvement, groupware, hypermedia, outline and idea processing, multiple windows, display editing, and the mouse, with integrated prototypes in full operation under the NLS/AUGMENT System as early as 1968. Engelbart directed his own research lab at SRI for 20 years, and moved on to become senior scientist at Tymshare, and later at McDonnell Douglas Corporation (MDC), where he worked closely with the Aerospace Components on issues of integrated information-system architectures and associated evolutionary strategies. In addition to directing the Bootstrap Institute, Dr. Engelbart is an associate at the Stanford University Center for Design Research, where he conducts a 3-day management seminar. Engelbart is invited to speak internationally on many related topics, and has received several awards for outstanding lifetime achievement and ingenuity.

The Project's Associate Director, Christina Engelbart, has 4 years experience as AUGMENT account manager in Washington, D.C., 5 years as a partner in a Silicon Valley start-up venture, and 4 years working closely with Dr. Engelbart as general manager of the Bootstrap Institute. Raylene Pak, the Software Manager, worked for 5 years at MDC as manager of the AUGMENT Software Development Group, with over 5 years prior experience managing and developing software for NASA's Pioneer spacecraft. Duane Stone, the Project's Internship Program Manager, has 10 years experience overseeing R&D projects for the Air Force, and 12 years with Tymshare and MDC, where he was responsible for AUGMENT marketing, customer support, product specification, and launching pilot trials in government and aerospace.

The expertise of this unique Bootstrap team will be complemented by industry consultants, as funds permit, and the contributions of member Interns.

See <Appendix-A> for more detail on the Bootstrap Institute Management Team.

COSTS

10

The targeted cost of the one-year Bootstrap Project will be $1,000,000, with a minimum of $600,000 to launch.

10a

The $600,000 minimum is sufficient to produce the OHS-2 implementation plan, the plan for the follow-on Initiative, and to make some progress toward the other knowledge-product results. Costs include base level operating expenses, minimum facilities, salaries for the Project Director and his staff of 4, an Internship Program for 6-8 interns, and operation of the OHS-1 mainframe computer, which interfaces to remote public net-work and Internet email.

10b

Additional funds above $600,000 would allow greater progress through an increased staff, consultation from industry experts, the ability to support more interns, and better facilities. Additional funds could also provide for expanded scope, including procurement or development of a rapid-prototype OHS-2 suitable for supporting member pilots. In the third quarter of the Project, a report will be produced detailing the implementation options and associated costs for an OHS-2 prototype. At that time, existing members may elect to raise any additional funds required to speed the development effort. Some sample candidate areas for Project enhancement are listed in Item <5F> under Supporting Services. The Project Advisory Council will determine the optimum allocation of resources available.

10c

The term of the Project is one year. Project members have no obligation beyond the Project completion date. However, it is assumed that if the Project is productive, most members would expect to continue and expand the advanced exploratory research by forming the follow-on multi-year Bootstrap Initiative. The Advisory Council will work closely with the Project Director, his staff, and interns, to consider the alternatives, and to prepare a detailed plan to raise the necessary funds. This plan should be completed in the third quarter of the Project, to allow time to recruit additional members, and to create the necessary organizational structure.

10d

The Project membership fees are structured according to size in revenues of the participating organization. Membership in the one-year Project os open to organizations based in the U.S. and Canada.

10e

Full Membership

10f

The cost of Full Membership is the Membership Fee (below), plus assignment of an Executive Liaison person, and one or two full-time interns. In return, these members will receive rights to use any software developed, all knowledge products, intensive training and direction for the intern, and first-hand experience in the "living prototype" environment. Full members are also entitled to vote in the Advisory Council.

10f1

Revenues	Membership Fee
> $1 Billion	$100,000
< $1 Billion	35,000

10f1b

Associate Membership

10g

The Associate Membership was created to allow participation of smaller companies who cannot afford to place an intern in the Project, and is only available to members with revenues less than $1 Billion. The cost of an Associate Membership is $35,000, plus assignment of an Executive Liaison person, with no intern. The Executive Liaison will represent the Member in the Advisory Council, including participation in all discussions, but will not vote. By not placing an intern, the Associate Member will not learn as much from the Project -- i.e. will not participate at the detail design level, will miss the valuable first-hand experience in the "living prototype" pilot of the Project, and will not develop the expertise necessary to transfer the results to in-house pilots. However, for some organizations, this is the only means for participating in the collaboration, and gaining access to the reports and briefings.

10g1

Membership Manpower Commitment

10h

Intern-Associated Costs: All interns will be supported with a home office, including a modem phone line, desktop computer, assorted commercial software, and peripherals. Interns outside the San Francisco Bay Area should expect to make 6-8 trips during the Project year, with a duration of 1-3 weeks per trip, for team-building, training, coaching, and face-to-face teamwork. Additional remote costs include network usage charges for accessing the OHS-1 mainframe (remote access est. $10-20K/year for full-time use). These costs, combined with the cost of salary and benefits for the intern, are not insignificant. However, the return on manpower investment should also be significant. Consider the alternative cost of staffing a comparable exploratory pilot in-house, without benefit of the Internship Program, the Project staff knowledge and experience base, or the fully tested and documented prototype OHS-1 software. (See <5D> under Member Participation for more details on this Program.)

10h1

One alternative to allocating existing staff would be to support one or two graduate students to work as interns. The salary, overhead, and travel expenses would be considerably reduced, and there would be no network usage charges. However, these interns would not get the same total immersion as the full-time intern, may not have enough background to fully represent the Member company's interests, or the established connections to successfully spearhead the in-house pilots at the completion of the Project.

10h2

A Full Member who does not provide an acceptable Intern within two months of joining will be required to contribute an additional $100,000 to cover the Project's cost to hire a replacement.

10h3

Executive Liaison: In addition to the interns, each Member organization is to provide a designated Executive Liaison person to act as a management interface between the Project and the upper management of the Member's organization. This activity will ensure that a clear understanding of both the member's needs and the Project's methods and advances are appropriately conveyed. The Executive Liaison should expect to spend up to one quarter

time on matters related to the Project, and to visit the Project site at least 5 times, with a minimum of 3-5 days per visit. 10h4

Exceptions 10i

The Project framers recognize that there will be some organizations who wish to join and have much to contribute but cannot afford the full fee, or cannot afford to place an intern, or have goods and services to offer in lieu of a fee. Any such exceptions can be presented to the Advisory Council for special consideration on a case by case basis. 10i1

APPENDIX-A
BOOTSTRAP INSTITUTE MANAGEMENT 11

Director: Dr. Douglas C. Engelbart 11a

The Director and chief architect of the Bootstrap Institute has a thirty-year track record as a pioneer of integrated information systems and organizational augmentation. PC Magazine best summed up Engelbart's accomplishments in presenting him in 1987 with the Lifetime Achievement Award for Technical Excellence: 11a1

> *"Doug Engelbart's contribution to personal computing is almost inestimable. As the father of the mouse and one of the most insightful people on the human-to-computer interface, Engelbart has spent a lifetime advancing the state of the art. [...] Doug Engelbart, as pioneer and visionary, helped make it happen."* 11a1a

In 1957 Engelbart was employed by Stanford Research Institute, where he launched his own research lab and built up its staff to 47 members. This lab, later known as the Augmentation Research Center (ARC), was one of the earliest efforts to build interactive knowledge-work tools. 11a2

Over the next 20 years Engelbart developed a strategic framework for organizational improvement -- his "bootstrapping strategy" -- which became the driving force behind his well-known pioneering work with the mouse, display editing, hypermedia, shared-screen teleconferencing, online hypertext publishing, integrated email, outline and idea processing, multiple viewing modes, multiple windows, cross-file editing, formatting directives, and online help. Most of these now-common features were conceived in the 1960s, and were in daily use at ARC by 1970 under the name "NLS" (oNLine System). Engelbart and two of his researchers from this period received in 1991 the ACM Software System Award for this early work. 11a3

ARC also originated a universal "user interface" front-end module, including what was perhaps the first instances of protocols for virtual terminals and remote procedure calls, as well as a grammar-driven command language interpreter. Engelbart's lab was also the second node to be connected to the ARPANET, and was responsible for initiating its Network Information Center (NIC). His work has resulted in over two dozen patents. 11a4

In the past two years there has been a surge of interest and exploration in the new, inter-related topics of "Computer-Supported Cooperative Work" (CSCW), "Groupware," and "Hypertext". It is now recognized that Engelbart's emphasis at SRI on supporting collaborative work, and the breadth of associated system development, not only clearly anticipated this major trend, but produced in the NLS system what is still the most comprehensive system for supporting wide-area collaboration. 11a5

In 1978, Tymshare bought SRI's commercial rights to NLS, renamed it AUGMENT, and set it up as the principle line of business in a newly-formed Office Automation Division. Since 1984, when McDonnell Douglas Corporation acquired Tymshare, Engelbart has been working closely with the Aerospace Components of MDC on issues of integrated information-system architectures and associated evolutionary strategies (a direct extrapolation of the work begun at SRI). 11a6

In 1989 Engelbart founded the Bootstrap Institute, where he is working closely with industry stakeholders to launch a Bootstrap Initiative to put his strategies into wide-scale practice. He is also an associate at Stanford's Center for Design Research, where he conducts his 3-day management seminar *"Bootstrapping organizations into the 21st century."* 11a7

Dr. Engelbart has served on NSF oversight committees, is invited to speak internationally on many related topics, often as keynote speaker, has published dozens of articles, has been featured in many articles, books, and documentaries by other well-known authors, and has received several awards for outstanding lifetime achievement. In March 1991, Dr. Engelbart was inducted into the American Ingenuity Hall of Fame, sponsored by Coors, which *"recognizes individuals whose accomplishments are due largely to innovation and perseverance...to honor individuals who have forever changed the way we do business in the United States."* 11a8

Associate Director: Christina Engelbart 11b

Christina helped build and direct a computer company, designing and developing computer systems for convenience stores. She produced the business plans, helped secure three rounds of funding, research and develop system prototypes, sign up the nation's second largest convenience chain as a customer, hire and manage 24 employees to complete the product, and oversee the installation of 65 systems in the field. 11b1

Christina's background is in cultural anthropology, with a special focus on organizational behavior. She had three years experience supporting Tymshare's AUGMENT customers in the field, and one year involved in the design of the AUGMENT integrated mail system. 11b2

Software Manager: Raylene Pak 11c

Raylene managed the Augment software development group at McDonnell Douglas for the past five years; for the past two years she has had sole responsibility for all aspects of Augment software including overall design, new capability development, maintenance and interfaces to a variety of networks and mail systems. During the mid eighties, she implemented and/or designed Augment features such as: Reminders, Electronic Signatures, Sequential File Structuring and Journal/Mail Searching. 11c1

Raylene's background is in computer science. Prior to her work with Augment, she spent over five years managing and developing software for NASA's Pioneer spacecraft. While there she was responsible for a variety of projects ranging from micro-coded communications software to 4GL-based data base systems. She has experience with a wide range of programming languages and processors. 11c2

Intern Program Manager: Duane Stone 11d

Duane has been involved with the Augment system since the late sixties, establishing the first pilot installation in the Air Force in the mid seventies. He then moved to Tymshare in 1978 where he was involved in Augment marketing, customer support, and product specification. Later at McDonnell Douglas he managed a series of pilots which used Augment in support of: the Artificial Intelligence Community, Teaming and Collaboration Project, National Aerospace Plane Program, CAD/CAM/CALS Program, and the Advanced Tactical Fighter Program. 11d1

Duane's background is in electrical engineering, with early work for the Air Force in R&D for the intelligence community and later for the command and control community. Technical areas covered include textual data processing, information storage and retrieval, database management, distributed processing, and wide-area networks. 11d2

APPENDIX-B
References and Articles

12

Reference-1: "Doug Engelbart's Design for Knowledge-Based Organizations", Patricia Seybold, Paradigm Shift, Vol 3, No 8, 1992 (newsletter, audio tape and video tape) 12a

Reference-2: "Racing Change On A Merry-Go-Round", Paul Saffo, Personal Computing, pp 67-70, May 25, 1990 12b

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Reference-3: "Collaboration Support Provisions in AUGMENT," Douglas C. Engelbart, OAC '84 Digest, Proceedings of the 1984 AFIPS Office Automation Conference, Los Angeles, CA, February 20-22, pp. 51-58. (OAD,2221,). 12c1

Reference-4: "Authorship Provisions in AUGMENT," Douglas C. Engelbart, COMPCON '84 Digest, Proceedings of the COMPCON Conference, San Francisco, CA, February 27 - March 1, 1984, pp. 465-472. (OAD,2250,). 12c2

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Reference-5: "Knowledge-Domain Interoperability and an Open Hyperdocument System," Douglas C. Engelbart, Proceedings of the Conference on Computer-Supported Cooperative Work, Los Angeles, CA, October 7-10, 1990, pp. 143-156. (AUGMENT,132082,). 12d1

Reference-6: "MDC3S Open Hyperdocument System -- Functional Specification," Duane L. Stone, McDonnell Douglas Corporation CAD/CAM/CALS Program, April, 1990. (CCC,811,) 12d2