

**CALIFORNIA COMMUNITY COLLEGES
TECHNOLOGY II STRATEGIC PLAN
2000-2005**

**BOARD OF GOVERNORS
CALIFORNIA COMMUNITY COLLEGES
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Acknowledgements

In the California Community Colleges 2005 *“A Strategic Response for Enabling Community Colleges to Make a Defining Difference in the Social and Economic Success of California in the 21st Century,”* the Board of Governors committed to developing a Technology Plan II for the System. In collaboration with the following entities this Technology II Strategic Plan was developed.

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CALIFORNIA COMMUNITY COLLEGES TECHNOLOGY II STRATEGIC PLAN 2000-2005

Executive Summary

The Technology II Strategic Plan articulates a vision of technology in the California Community College System and how it will make a difference in the social and economic success of California in the 21st Century. The California Community Colleges must have a technology plan that strategically defines the use of technology as a resource supporting its mission. One of the major missions of the California Community Colleges is to deliver high quality education in a manner that achieves student success. Student success means preparing students to become informed members of society. By infusing technology throughout the System, the community college is responding to the needs and expectations of the State to improve student outcomes in acquiring skills and knowledge that supports social and economic successes.

The Technology II Strategic Plan is the result of a two-year collaborative effort to build on the outcomes of the first California Community Colleges systemwide technology planning effort conducted between 1994-96. This Technology II Strategic Plan was developed between 1997-00 to support the mission of the California Community Colleges System and to enable it to better serve the residents of the State of California. It is a strategic response to the needs of the system and the challenges that the integration of Information Technology presents to higher education.

Challenges

This plan recognizes that for the system to have successful technology implementation, several challenges must be addressed:

- how to prepare the California Community Colleges for technological change in the 21st century;
- the explosive use of the Internet as a required job skill, communication link and expanded source of information.
- how the California Community Colleges prepare students for workforce needs of the State;
- the increased demand for the integration of technology in teaching;
- how to keep technology refreshed and current;
- how to provide adequate levels of inter-campus and inter-segmental connectivity;
- how to apply technology to help respond to the impact of *Tidal Wave II*, and;
- the systemwide commitment to ensure that technology is accessible and usable by persons with disabilities;

Goals

The Technology II Strategic Plan focuses on three major goals for technology in the CCC for the next four years:

- **Access and Equity** - *Utilize telecommunications and technology as major tools to improve access to the California Community Colleges for all residents.*
- **Excellence** - *Achieve a higher level of excellence and quality in the curriculum, instruction, and services to students who attend the California Community Colleges through the advanced capabilities provided by telecommunications and technology.*
- **Student Success** – *Through telecommunications and technology help students achieve success in their educational and career goals.*

The goals established in the areas of access/equity, excellence/quality, and student success would strategically prepare the CCCs to effectively use technology in higher education.

Objectives

The Technology II Strategic Plan establishes four major objectives and recommendations/strategies needed to complete them: Each of these serves all three goals:

- Implement Information Technology Across the Curriculum
 - Fully integrate technology into curriculum development to ensure that students learn efficiently and effectively and that students will be able to utilize these skills as informed members of society;
 - Foster the development of technology in the teaching/learning process by ensuring that faculty have access to the latest equipment and software to make their jobs more efficient and rewarding;
- Infuse Student Services with Information Technology Solutions
 - Develop technical solutions that increase the ability of colleges to provide a wide range of student services using information technology;
- Improve Student Outcomes through Information Technology Solutions
 - Develop technical solutions that increase performance at the California Community Colleges in the critical student outcomes;
- Increase Staff Access to Information Technology
 - Integrate technology into the workplace to ensure that staff has the tools required to deliver services to students and faculty efficiently and effectively.

Cost/Funding

Community colleges are investing in telecommunications and technology but it is not enough. In its November 1999 annual report to the Legislature on the implementation of the Telecommunications and Technology Infrastructure Program (TTIP), the Chancellor's Office identified 5 funding sources and 8 categories in telecommunications and technology where the California Community Colleges currently report expending over \$100,000,000 per year. However, this investment only addresses a part of the challenge. The growing demands of students and faculty will require a more substantial investment in telecommunications and technology. The system requires an infusion of funds that is based on a sustainable and renewing TCO model in order to meet the growing technological needs of faculty, students, and staff.

The total costs for the five-year period covering fiscal years 2000-2005 will be \$1,099,593,999 averaging about \$200 million a year, or **approximately \$200 per year for each community college student (FTES)**. Currently, community college expenditure per FTES is \$3,786. This amount is already significantly less than the national expenditure per FTES in community colleges, which is \$6,086. This increase in technology funding represents **a ½ of 1% addition to current funding**.

The plan envisions a collaborative funding effort involving major stakeholders: the State, local college, business and industry. The plan assumes a Total Cost of Ownership (TCO) model for aggregating cost associated with providing access to computers and Information Technology. The majority of costs associated with the plan (64%) provide students with access to technological resources.

The costs for this Technology II Strategic Plan would be funded from revenues generated from two sources:

- state resources: 90 %
- public/private partnerships: 10 %

The Technology II Strategic Plan articulates a vision of technology in the system and how it will make a difference in the social and economic success of California in the 21st Century. This plan is a strategic response. The expanded uses of technology in support of the California Community Colleges mission will improve teaching and learning, increase student access, improve student support services, and achieve better efficiencies and effectiveness in administrative support.

I. Introduction

The vision of technological infusion throughout the California Community Colleges supports the multi-faceted mission of the System. The 2005 and the Telecommunications and Technology Advisory Committee's (TTAC) visions articulated below both supports the mission critical needs of the colleges.

The vision of California Community Colleges 2005 is that "the California Community Colleges will, to the full limits of all available funding, provide post-secondary access to quality programs and services for all eligible students seeking admission. The colleges will play a major role in enabling the State to meet its workforce preparation needs, and will otherwise ensure that every qualified student with the capacity and motivation to benefit from programs within its mission will have a place, and will not be shut out by economic or social disadvantage."

The Telecommunications and Technology Advisory Committee (TTAC) developed a vision for the use of technology in System that states, "the California Community Colleges will use technology to enable our students and communities to be successful in a knowledge-based society by providing universal access to quality learning".

These two visions taken together express the daunting tasks that face the community colleges; providing open access to higher education, continuous learning and retraining for the State's workforce, and quality learning.

A. In Support of the Mission of the California Community Colleges

As defined in the California Education Code section 66010.4, the primary mission of the California Community Colleges is:

to provide open access to academic and vocational instruction at the lower division level for both younger and older students, including those persons returning to school, as well as to advance California's economic growth and global competitiveness through education, training, and services that contribute to continuous work force improvement.

This mission will not be adequately fulfilled without a planned strategic augmentation of telecommunications and technology throughout the California Community Colleges.

B. Purpose of the Technology II Strategic Plan

The purpose of the Technology II Strategic Plan is to create permanent funding approaches to community college technological needs. Funding received under the Technology II Strategic Plan must be structured to support the recommended baseline infrastructure levels for colleges and sustain the investment of the Technology I Strategic Plan (TTIP) infrastructure and programs.

The California Community Colleges are the largest higher education system in the world. The continuation and expansion of the Technology I will be critical to the ability of the community colleges to meet the educational needs of California's population and the workforce needs of the California economy. The challenge is not just to meet those expanding needs, but also to deliver high quality education in a manner that achieves student success, is both relevant and timely, and a human and physical infrastructure that is better organized and better utilized.

By encouraging the expanded uses of technology in the above stated California Community College mission, the Technology II Strategic Plan will improve teaching and learning, increase student access, improve student support services, provide an educated, technically proficient workforce for California and achieve better efficiencies and effectiveness in administrative support. Information tools, such as the personal computer and the Internet, are increasingly important to economic success and full participation in all aspects of American society.

C. What Are the Consequences of Not Implementing This Plan?

The implementation of Technology II Strategic Plan is vital not just to the educational success of the students of the California Community College, but the economic success of the state of California. The California economy is driven by Information Technology (IT). This IT-driven economy has placed some unprecedented responsibilities on the community colleges in responding to the state's needs for an educated citizenry that responds to the economic and social success of the California. As early as 1997, a research report by Rand, *Breaking the Social Contract, The Fiscal Crisis in Higher Education* stated:

“Recent shifts in California's economy have made higher education more significant than ever. The industrial jobs that once formed the backbone of the economy are dwindling...The service-related jobs that are taking their place require a level of knowledge and skill that, for the most part, can be gained only through programs offered at California's colleges and universities. If workers in today's economy are cut off

from higher education, they will be unable to attain the proficiency levels needed to master new technologies and enter new occupations.”

The shifts in the economy to global information network are today’s realities. If California is to maintain a viable workforce, the community college must be able to provide the appropriate education and training. As recently as the late-1980’s, the California economy was heavily dependent on defense related jobs in the manufacturing and government sectors. With the end of the Cold War in 1989, the state saw a dramatic cut in defense spending and disproportionate share of base closures.

The Digital Economy...

- More Americans make computers that make cars.
- More Americans build semiconductors than construction machinery.
- More Americans spend their days processing data than refining petroleum.
- Over one third of real gross domestic product growth in the past three years came from information technology industries.
- Information technology industries are now directly responsible for over one third of the real growth of the U.S. economy.

Source: U.S. Government Working Group on Electronic Commerce, First Annual Report, November, 1998

The economic health of California is tied to the availability of on-going education in technology. Therefore, the community college has a compelling need to have an adequate infrastructure that supports the technological needs of the students, faculty and staff. The Rand report, *Breaking the Social Contract, the Fiscal Crisis in Higher Education*, 1997 went on to say that workers with a high school diploma will have real earnings of about 40 percent less in the year 2015 as compared to their counterparts in 1976.

The consequences of not implementing the Technology II Strategic Plan would mean that the students entering the Community College System would not receive the technological proficient education needed to master the new technologies and be able to enter the newer occupations.

Investment in higher education must be a state priority through the first decade of the new millennium. The future economic vitality of California depends in large part on the state’s ability to educate its citizens and to help them develop the work and social skills needed to compete with workers of other nations and states in our global economy. It is essential that we recognize the inextricable link between an educated citizenry and economic progress. Pure and simple, Californians deserve no less than a seamless, integrated education system, a system that allows no one to slip through the

cracks. Historically acclaimed for excellence and innovation, a responsive and flexible system of postsecondary education is the key to ensure that California will flourish in the new millennium.

The state economy is moving towards a knowledge-based service company. Software has made the use of computers ubiquitous in today's society. Smaller and more powerful computers are being used not only for computations, but also for communications and entertainment.

Source: *Continuing the Promise—Strategies for Higher Education in the New Century*, Warren Fox, California Postsecondary Education Commission, October 29, 1999

Some of the greatest beneficiaries have been in emerging industries pioneered by California: the Internet, multimedia and biotechnology.

- California is now home to one-in-five computer software jobs in the nation.
- California is home to roughly one-in-six high-tech manufacturing jobs in the nation.
- California exports over \$100 billion in manufactured goods, nearly three-quarters of which are high-technology products.
- California also attracts a significant share of foreign direct investment. In 1996, that investment exceeded \$100 billion, and supported 550,000 jobs. Investors are drawn to the state for its cutting edge technologies and direct access to California's large and diverse consumer market. In fact, the majority of new investment during the expansion has been in the high-tech industries of telecommunications, pharmaceuticals, and computer software, as well as wholesale trade.

Source: *Economic Growth Through Diversification*, California Economic Review, California Trade and Commerce Agency, Office of Economic Research, Second Quarter, 1999

“ We're in a situation in America today where the pool of skilled workers is declining and will continue to decline. And as that happens demand for a skill workforce will go up. Educators need to be much more keenly aware of how the marketplace is changing, and if they don't change with it, they'll do their students a disservice. Policymakers should understand that technology is bringing the immediate needs of business into sharp focus. In the past business would say, “We'll take any student with the basic three Rs and retrain them to do whatever we need.” Today, business is saying, “Turn out people I can use immediately or require just minimum training, or at

least through their education process, they need to know how to be self-initiating in their efforts.

Technology enables a student to be self-directed and self-initiated.”

Source: *Two Governors: Leaders for Technology in Education*, by Kim Moyer, Converge Magazine, November 1998

The CA Trade and Commerce Agency’s California Economic Strategy Panel identified some key areas as critical to California’s economic future. Every industry emphasized that skill-sets improvement through education and workforce training is its top priority. Job opportunities and changing skill-sets need to drive training programs. The California Community College has no choice but to implement a sound technological strategic plan that provides for a return on this investment to the economic success of the workers.

The Legislature in AB 64, Chapter 8.5, Article 1, section 52251 which created the Digital High School Program found and detailed the following:

- 1) Computer knowledge and skills are essential for individual success in school and career and for continued economic prosperity of the State of California.
- 2) All pupils in California must be “computer literate” before they complete high school.
- 3) Traditional learning is enhanced by appropriate technology.
- 4) It is the intent of the Legislature that all high schools in the state become “digital high schools” by the end of the first of the 21st century and that these schools fully integrate computers, networks, training and software to achieve computer literacy in all pupils and faculty and to improve academic achievement.

One of the key objectives in section 52252 is: To increase collaboration among high schools, private industry, postsecondary education institutions, and community organizations.

The state investment in the Digital High School Program should total over \$400 Million with \$300. per high school student on a one-time basis with \$45.00 per student for on-going annual basis. By the year 2000-2001, technology should be fully integrated into every high school in the State of California.

State Superintendent of Public Instruction Delaine Eastin stated that one of the goals of this program is “to see our students graduating with the technology literacy skills and abilities that will enable them to successfully enter the job market and continue their pursuit of life-long learning. Ninety percent of the jobs created from this moment on (10/14/97) will require

advanced technological training.” “ In this the home of the Silicon Valley, it is simply unacceptable to be at the bottom of the ladder in terms of computers per students.”

People are talking, and the national media are writing, about the quality of education provided by community colleges and the role of technology.

Bill Gates

CEO of Microsoft

“America is leading the way in high technology and in the next seven years, it's estimated that 80 percent of new jobs in this country will be in high tech. Community colleges have an important role to play in making certain we have skilled workers ready to help businesses take advantage of all the opportunities in the Digital Age.”

Jim Adams

Chairman, Texas Instruments

"The community college system is an absolutely imperative part of the fabric of education in this country. It's the thing that will help us be competitive leaders in the world, and corporations like mine have to retain a competitive leadership throughout the U.S., throughout the world."

Tom Peters

Management Expert, Author

"Support your community colleges... the unsung, under-funded backbone of America's all-important lifelong-learning network."

Norman Rice

Former Mayor of Seattle

"Community college prepared me and gave me the confidence I needed...Community colleges are a great bridge, a bridge from high school to college, from welfare to work..."

*Source: American Association of Community Colleges
One Dupont Circle, NW, Suite 410, Washington, DC 20036*

Thirty-seven percent (37%) of California Digital High School students will next go to a California Community College. What will they find? The current episodic, uneven funding of technology for the Community College campuses has created a mix of obsolete to state-of-the-art technology, large support staff inadequacies, lack of trained faculty and staff and minimal technology integration through the learning and teaching environment. The investment in the students to make them technologically ready will meet a gap in this next phase of the majority of students' postsecondary experience. The CA Community Colleges must be synchronized with the Digital High School program to continue the investment in time, money and learning to continue

to prepare these students “to successfully enter the job market and continue their pursuit of life-long learning”. Every year this gap widens, until the catch-up may be impossible or even more costly. The funding of technology at the CA Community Colleges is the next logical step to the Digital High School Program.

The future health of California’s economy is intricately tied to the ability of California Community College to deliver a skilled workforce. Failure to implement and finance this Plan would leave our students, faculty and staff unable to compete and take advantage of the opportunities in the Digital Age.

II. Technology Planning Challenges Facing the California Community Colleges

Preparing the California Community Colleges for the 21st century—The California Community Colleges leadership at every level recognizes the need to determine what are the appropriate uses for technology to improve education. California's economy is driven by technology --- both by the high technology industry and by the application of technology to carry out the general commerce of California. In California, even more than in the rest of the United States, familiarity with the use of computers is fundamental to economic success. It is no longer viable to expect California Community College students to function without a baseline of networks, hardware and software similar to what they will confront every day in the workplace.

"Pascarella and Terenzini (1998), in a paper submitted to *The Review of Higher Education*, 1998 addressed what challenges students and faculty will face in the next century, state: "Shifts identified ... in the profile of the undergraduate student body and in the economic and political climate in which higher education finds itself are accompanied by a rapidly emerging and expanding array of computer and information technologies". While all higher education institutions must incorporate these new technologies in their teaching and in their training of students, for community colleges this point takes on a higher sense of urgency and import.

First, for those attending two-year institutions without the desire to transfer and earn an undergraduate degree, social mobility as reflected by advancement in a job (or even landing a job) will be adversely affected by not having the technological skills to compete and succeed in the labor market. Second, the role of community colleges is central to the retaining of America as envisioned by the current administration. Those individuals who are in a position to lose their jobs because machines, technology, and the economy have replaced them must seek a refuge where they can be prepared to go back into society and, once more, become productive members in a global economy."

Source: *Community Colleges in the 21st Century: Revisiting and Reexamining Their Mission, New Expeditions Charting the Second Century of Community Colleges*, a W. K. Kellogg Foundation Initiative, by Amaury Nora University of Houston, Houston, TX

Student Profile: James Le

James Le works fulltime in a local plant. His employer is shutting down in the next two years and James needs to return to school to upgrade his work skills. James wishes that the local community college courses offered in his rural community could reach him at a distance. His employer will allow the use of the job site during lunch and off-peak hours for community college courses to be offered

on-line to the workers. The community college curriculum can provide marketable skills in technology that will meet the new job skills of the local business markets. James is now taking courses at his job site and will get a certificate in programming that guarantees him a job with a local employer.

“As we begin the third millennium, computer literacy has become a prerequisite for success in today’s workforce. Moreover, the workplace is replete with fundamental and structural changes that challenge participants to adapt more flexibly than ever before. Lester C. Thurow, Dean of the School of Business at Harvard University, argues that the new economy is global, features relentless competition, and offers no such thing as a smooth ride. In this new economy, knowledge builds wealth, and the most important resource is people.

Technology is a given in the new economy, and how a corporation uses technology will determine its ability to succeed. The new economy may include low-tech companies, but they will not be competitive for long. Thus, success in the workforce of the new economy will be measured by each person’s ability to use technology effectively and efficiently.

Information technology is one of the drivers of the emerging economy, an economy that is global, highly competitive, and dependent on people as its most vital resource. To be a successful participant in the workforce, each person will need to have *technology and change savvy*. As increasing numbers of students enter through the open door with little or no previous access to computers, the Internet, and technology literacy skills, community college leaders must take strategic and aggressive steps to help provide the necessary access and skill sets. By rising to the expectation, community colleges are well positioned to help bridge the Digital Divide.”

Source: *Community Colleges Bridging the Digital Divide*, League for Innovation in the Community Colleges, Leadership Abstracts, by Alfredo G. de los Santos Jr., Former Vice Chancellor, Student and Educational Development, Maricopa Community Colleges and Gerardo E. de los Santos Director of Programs at the League for Innovation in the Community College.

Tidal Wave II—The California Community Colleges Board of Governors *California Community Colleges 2005* (July 1998) reported that most of the increased enrollment demand for higher education in the 21st century would be served by the community colleges. The *2005* report also state that “the colleges will expand appropriate use of technology in providing support services, performing administrative functions, and in delivering instruction to achieve optimum use in existing physical plant and in best meeting the learning needs of students”. In a November 1999 Sacramento Bee column titled “‘Tidal Wave II’ to hit colleges...” it was noted that “on the brink of the 21st century California public colleges are facing a surge of students that will strain

our resources and overwhelm the system". The article encouraged a better use of existing facilities through video and computer technology. The human and physical infrastructure must be enhanced, better organized and better utilized. The newest population estimates of incoming college students predict 500,000 new students entering the California Community Colleges by 2005. Thus, the need for a sound technological response continues to grow.

Explosive Use of the Internet—Ability to use the Internet is becoming a required job skill. The same article cited above states, "...the demand for more higher education is driven by need for financial success in a high-tech age." The GartnerGroup Report also found that use of the Internet is expanding rapidly as both a means of communication and as an expanded source of information and is vital to California Community College students. Internet access is no longer a luxury for our students. Increasingly, the ability to navigate and use the Internet will be a required job skill for the majority of California's workers. E-mail has become as pervasive a means of communication today as the telephone or the U.S. mail was five years ago. California Community College students cannot prosper if they lack the connectivity and desktop tools, such as universal student e-mail, to fully participate in this changing educational environment.

"However, these advances also point to our place in the Digital Divide, where this technology hyperbole is increasingly realized on only one side of the "racial ravine." Data from multiple sources make it clear: the Digital Age is disproportionately distant from minority and economically challenged populations, and the distance across the divide is increasing.

In addition to other issues that have surrounded these cohorts in the past, we must now also grapple with the significant lack of access to technology they experience. Finally, we must do more than provide these students with access to technology. We also must ensure that they develop a technology base that allows them to use technology well and that they acquire the ability to recognize and adapt to the fast pace of change in the Digital Age."

Source: *Community Colleges Bridging the Digital Divide*, League for Innovation in the Community Colleges, Leadership Abstracts, by Alfredo G. de los Santos Jr. and Gerardo E. de los Santos February 2000 Volume 13 Number 1.

Increased demand for the integration of technology in teaching—GartnerGroup research (see further discussion in Section III-A, Background on Technology Planning) shows that the lack of readily available user help and support is a primary barrier to the successful adoption of new technology and new technology-enabled methods in every professional discipline. The GartnerGroup recommends that if California Community College faculties are going to succeed in integrating technology to improve the successful outcomes for students, the faculty will need training and technical support. Faculty will require assistance in finding the right

technology tools to achieve the desired outcomes and in learning how to use the tools that are selected. Further, learning how to use the tools is not limited just to an initial tutorial but must include ongoing assistance to ensure that the faculty member is able to focus on the course content.

“Technology is often touted as a means to remove intermediaries—teachers and librarians, for example—who separate learners from knowledge, allowing unfettered direct access to information. To the contrary, today’s information environment is very much anarchistic, with intermediaries needed perhaps more than ever to help learners find their way through oceans of irrelevant electronic information and learning alternatives. A world with too much information will greatly value services of navigation, counseling, and coaching.”

Source: *Technology and the Future of the Community College, New Expeditions Charting the Second Century of Community Colleges*, a W. K. Kellogg Foundation Initiative, by Jane N. Ryland, President Emerita, CAUSE, Boulder, CO

Sustainability of Technology Infrastructure—The GartnerGroup identified sustainability as a major challenge facing higher education institutions in the 21st century: how to keep the technology refreshed and current. The challenge was mentioned at every campus that the GartnerGroup visited in the course of the study for their report. A key GartnerGroup recommendation is that Technology II must support the sustainability of the technology infrastructure by providing funding to achieve a minimum for technology infrastructure.

“To achieve effective utilization of technology, significant additional human resources are required for support of the growing community of technology users. Support broadly includes initial and ongoing training, installation and maintenance of hardware and software (both initially and as regularly upgraded), help-desk resources to trouble-shoot and resolve problems, and especially faculty support in changing the teaching and learning process to accommodate technology.”

Source: *Technology and the Future of the Community College, New Expeditions Charting the Second Century of Community Colleges*, a W. K. Kellogg Foundation Initiative, by Jane N. Ryland, President Emerita, CAUSE, Boulder, CO

Technology Support and Staffing—The GartnerGroup identified a second major challenge facing higher education institution in the 21st century: how to effectively support the ever-increasing demand for information technology tools and the staff to support those tools. Infrastructure means more than just desktops, routers and wiring.. One of the limitations of Technology I was its inability to fund and address the need for permanent support staff. As a result, technology provided by Technology I was delayed or underused at many colleges. Institutions that are unable to plan for the support of their technical environments will end up with

obsolete technology. Obsolete technology is costly to support. Older and obsolete technology will not represent the type of environments that students will need to use in the workplace. A sound infrastructure plan must include permanent, qualified support staff on a full-time basis

Need for Adequate Levels of Intra-Campus and Inter-Campus Connectivity—

The California Community College and the California State University systems have worked collaboratively to coordinate the development and maintenance of the now four-year-old 4CNet statewide network with other intersegmental activities related to the TTIP. The initial focus was networking the CSUs and the CCCs together into one data/video statewide network. The need for access continues to grow exponentially, especially as it relates to Internet access. Already 19% of the CCC sites will be at capacity in a matter of months. Planning and implementation need to be a step ahead of the moment at which access would be denied.

The individual college needs to be able to grow its technology infrastructure to take advantage of the systemwide backbone. We cannot have dirt roads leading onto a super highway nor super off-ramps leading to a dirt highway infrastructure. The challenge is synchronizing the systemwide and local growth so that they both expand in a balanced, cost-effective manner to meet the growing needs of students, faculty and staff.

Accessibility for Persons with Disabilities—The California Community Colleges have long provided specialized support services for students with disabilities. In the mid-1980's it became clear that the increased reliance on computer technology in education would require colleges to provide students with disabilities some mechanism for using such technology. High Tech Centers were established at each college to provide computer equipment particularly adapted for use by students with disabilities. The High Tech Training Center Unit was also established at DeAnza College to provide statewide training and technical support for these centers.

However, much of the equipment now in use in college High Tech Centers is outdated. In particular, some older adaptive technology cannot work with software designed for graphic user interfaces such as Microsoft Windows. Of real concern is the fact that new products are being developed for the mainstream educational setting that cannot be used with even the most sophisticated adaptive equipment.

In 1998, the Office for Civil Rights of the United States Department of Education (OCR) completed a systemwide review of accessibility for blind and visually impaired students in the California Community Colleges. OCR directed that, in order to satisfy the requirements of the Americans with Disabilities Act, community colleges must ensure that adaptive equipment and software are not confined to a High Tech Center, but are available for use by students with disabilities throughout the campus (in libraries, computer labs, offices, learning centers, placement offices). Moreover, OCR requires that newly acquired or developed software and hardware should be designed to be accessible for students with disabilities. Critical information

conveyed by graphic elements must be available in an alternative text-based form that is usable by blind and visually impaired students. Audio information must be captioned for the deaf and screen layout should be designed so students with learning disabilities can use it.

Student Profile: Cristina Morales

Cristina has enrolled in a class in which the instructor designed a typical-looking website that has multiple "windows" open on the web page. The instructor felt that having separate windows on the course home page for "Class Reading", "Exam Schedule" and for "General Course Guidelines" would make it easier for students to find items quickly. This method allowed students to skip the table of contents, and do a quick visual scan across the page and go immediately to the area they need.

However, Cristina is blind and uses a screen reading computer program. This program gives an auditory reading of the web page and she heard "Class general course reading guidelines exam schedule".

Unfortunately the instructor did not know that a screen reading program reads from top to bottom and left to right. The instructor included too many topics and in such an order that someone who cannot visually read the screen (this would also be difficult for someone with a learning disability) has almost no chance of deciphering the information on the page. Cristina's education is hampered because the instructor lacks appropriate training in the use of technology, and more specifically how to write curriculum for a web-based course for all students with disabilities.

The Chancellor's Office has been working for the past two years to address the issues identified in the OCR report. Last year, the Chancellor's Office issued *Distance Education: Access Guidelines for Students with Disabilities (August 1999)*. Additional guidelines are now being developed for making printed and electronic information available in alternative formats for students with disabilities.

The Technology II Plan has been written to further the system's commitment to access for persons with disabilities by ensuring that accessibility is considered in the basic design of the technology infrastructure and in the software and hardware that will be developed or purchased for use with that infrastructure. This approach is cost efficient because it will minimize the need for modifying equipment and software after the fact or purchasing expensive adaptive equipment to overcome inaccessible

designs. It will also provide built-in access that will benefit faculty, staff and administrators with disabilities. Fully implementing this concept of accessibility through universal design will make the California Community Colleges leaders in ensuring equality of opportunity for persons with disabilities in the increasingly technology-based world of the 21st century.

Student Profile: John Williams

John is a full-time community college student. He has limited use of his hands. The history instructor told John that a book referenced in the lecture was available in the college library automated catalog system. John went to the library and found that all the computer stations use a standard computer "mouse". Because of his disability, John cannot use a "mouse" and he requires a computer that is adapted to use something other than just keyboard commands. John is unable to conduct the search for the book on his own. He has to ask another student or a staff person to assist him in this search and in all future searches for materials in the college library automated catalog system. John is less efficient as a student and he lacks timely access to information that is available to every other student. All students should have the ability to review information on their own without having to ask for assistance.

The Chancellor's Office, *Distance Education: Access Guidelines for Students with Disabilities (1999)* is available upon request or at <http://www.htctu.fhda.edu/dlguidelines/final%20dl%20guidelines.htm>

III. Technology II Strategic Plan

A. Background of Planning for the California Community Colleges Technology I

The California Community Colleges have long fostered the use of technology to improve teaching and learning. High Tech Centers were established at colleges beginning in the mid-1980's. Distance Education has been a part of the outreach programs of the Community Colleges for decades. In the mid-1990's, it became clear, however, that a more systematic and strategic approach would be necessary to meet the emerging technical higher education environment.

The California Community Colleges Technology I Strategic Plan was developed as a result of a grant funded by the U.S. Department of Commerce. This strategic study identified the need for a statewide telecommunications and technology system to effectively carry out the mission of the California Community Colleges System. The statewide telecommunications and technology system was first funded in the 1996 State Budget Act and called the Technology and Telecommunications Infrastructure Program (TTIP). This funding has provided the California Community Colleges with a telecommunications and technology infrastructure that provides the networks and resources that are beginning to meet the needs of faculty, students and staff.

The TTIP has three major components: (1) telecommunications and technology infrastructure, (2) telecommunications applications, and (3) human resources technology training.

- The goal of the infrastructure component is to develop and implement the required telecommunications and technology networks and resources to effectively meet the California Community Colleges' needs.
- The goal of developing new telecommunications applications is to enhance student learning and educational outcomes through:
 - improved instructional and instructional support services,
 - improved student services through telecommunications and technology that support the needs of students, and
 - improved administrative services and systemwide coordination through telecommunications and technology.
- The goal of training is to enable faculty, students, and staff to use telecommunications and technology in the completion of their education and career goals.

The TTIP implementation involves 124 California Community College sites, including the colleges district offices and the Chancellor's Office. The TTIP has a systemwide focus with the system now completely linked in two major areas: 1) data via connection to the California Community College and California State University Network (4CNet), and 2) video conferencing capabilities at each college and district site. Two additional areas are nearing completion: dual satellite downlink capability (analog and digital) for each college and district office, and library automation.

One other systemwide TTIP project is the implementation of a digital satellite uplink site which will allow the community college sites to offer satellite services to distribute educational video programming from community college campuses to more of the population in California through downlink locations here and anywhere in the continental United States. The Board of Governors selected Palomar College to host the California Community College Satellite Network (CCCSAT) in May 1999. The broadcast center and downlinks to all of the colleges are scheduled to be operational by mid-2000.

The TTIP program has also allowed the California Community Colleges system to test and evaluate pilot applications that support the uses of the network, training and human resources development of faculty and staff in distance education and educational technology. From the beginning of funding for statewide community college telecommunications infrastructure improvements, a portion of the monies were set aside for Telecommunications Model Applications Pilot Projects (TMAPP). The best practices and lessons learned from these grants contribute to the recommendations in the Technology II Strategic Plan.

As a requirement of TTIP funding, the districts submit their expenditure plan to their local Boards of Trustees for approval and then to the Chancellor's Office. The districts are also required to report on their prior year's expenditures from six funding sources, including TTIP funds, across eight funding categories. The Chancellor's Office observed the following instructional trends in the districts' TTIP expenditures:

- upgrade of obsolete technology,
- instructional network improvements,
- support for educational uses of technology,
- expansion of distance learning classrooms, and
- campus instructional programs.

Other program designed to work in harmony with the TTIP program was the California Virtual Campus (CVC) funded in the California Community Colleges in 1998-99 for \$2.9 million. The focus of the CVC is to accelerate the development and delivery of distributed learning. It has been created to become a 24-hours-a-day, seven-days-a-week learning environment that can deliver education to

students and training to a workforce anytime, anywhere. The CVC serves as a gateway to technology-mediated distance learning courses and programs from the California Community Colleges.

The CVC has formed four CVC Regional Centers that provide technical support to faculty and staff involved in distributed education at the California Community Colleges. A college or a partnership of colleges hosts each center. Services and activities of the centers are designed to provide a combination of on-site and virtual support services specific to the needs of the faculty and staff at each college in their regions. The four regional centers are De Anza College, Rio Hondo College, Coastline College in collaboration with the San Diego Community College District and Cerro Coso College in partnership with the Los Rios Community College District.

In addition to the four regional centers, El Camino College hosts the CVC Professional Development Center, which provides staff development for the CVC centers and participating colleges. This Center coordinates the California Community Colleges efforts to expand off-site educational opportunities. The Center gathers, organizes and disseminates information/data related to courses and programs developed by the California Community College for the CVC. It also works with the four regional centers and the Chancellor's Office to develop and promote protocols and standards for services delivered by the CVC.

Student Profile: Mary Montgomery

Mary wanted to return to a community college to improve her chances for employment. She is a single, thirty-five year old mother of two children. She is enrolled in the local Welfare to Work program to assist her in getting employed. The welfare reform program is located in a One-Stop facility at the local mall. At the same mall, the local community college offers computer literacy classes. Mary enrolled in a basic technology literacy class. Being able to attend classes at the mall was less intimidating to Mary than going onto a campus at her age. The availability of technology classes in a non-threatening environment has made a tremendous difference in Mary and her family in improving their economic choices. She is now enrolled on campus taking additional courses to improve her job search skills.

These telecommunications and technology efforts represent the TTIP/Technology I effort, which are the foundation of the Technology II Strategic Plan. Without the development of campus-wide networks connected to the California Community Colleges wide-area-network (4CNet), the inter-campus, intra and inter-district educational and library collaboration envisioned in Technology Plan I, Technology II could not be fully realized.

In the fall of 1997, the Chancellor's Office began development of this Technology II Strategic Plan for 2000-2005. The goal was a systemwide technology plan that would build on the Technology I Plan and encourage expanded uses of technology and continue to support the mission of the California Community Colleges (CCCs). It would also foster long-range strategic plans at colleges for using technology in teaching and learning, increasing student access, improving student support services, and achieving better efficiencies and effectiveness in administrative support.

To assist in the comprehensive task of developing a plan and recommendations, the Chancellor's Office engaged the GartnerGroup consulting firm to complete a study and develop recommendations for a Technology II Strategic Plan. The GartnerGroup report recommends strategies to support the investments made in the Technology I Strategic Plan. The GartnerGroup report also re-focuses the priorities in Technology I from inter-campus connectivity to intra-campus educational technology development. In developing their report, GartnerGroup also consulted with college presidents, campus information technology officers, faculty and student services representatives, trustees, and students. The GartnerGroup conducted its study between June 20, 1999 and December 1, 1999. Some of the principle activities of the GartnerGroup effort included:

- eight workshops with Telecommunications and Technology Advisory Committee (TTAC)
- focus groups with CCC students, faculty and trustees,
- campus visits and interviews with campus stakeholders at 10 California Community Colleges considered being prototypical examples of the varied size, technical sophistication and demographic composition of the majority of the community college.

The Technology II Strategic Plan for 2000-2005 leverages and expands upon the investments of the system's existing Technology I Strategic Plan and the recommendations of the GartnerGroup Report.

B. Technology II Goals: Access and Equity, Excellence, Student Success

- 1. Access and Equity** - *Utilize telecommunications and technology as major tools to improve access to the California Community Colleges for all residents*

Access means more than access to data, video, and library information or to the Internet. It means that students, faculty, staff and administration are able to utilize technology to facilitate interactions in classrooms, labs, libraries, learning resource centers, offices, and the workplace and/or the home. Within this broad definition of access is the commitment by California Community Colleges to ensure that all technology infrastructure, hardware, and software will be designed to the maximum extent technically feasible and that necessary up-to-date adaptive equipment and software will be widely available throughout the college. Information tools, such as the personal computer and the Internet, are increasingly important to economic success and full participation in all aspects of American society.

To prepare productive citizens in the California of the 21st century a baseline technology infrastructure needs to be built in order for students, faculty, staff and the community to have access to information and classes. The Total Cost of Ownership Model, described below under "Cost", determines that adequate baseline.

Community Colleges provide students with access to life skills. A vital basic skill is now the effective use of technology. The Academic Senate for the CCCs in its draft document "*Guidelines on Minimum Requirements for Technology, Draft #3*" (October 28, 1999), "strongly supports the concept that state of the art equipment and instrumentation are indispensable across the curriculum, especially in vocational areas, in the delivery of hands-on student skills development." They also state that "the hardware and software must either be in the hands of the faculty or easily accessible to them. Support and services should meet private sector standards for quality and performance."

- 2. Excellence** - *Achieve a higher level of excellence in the curriculum, instruction, and services to students who attend the California Community Colleges through the advanced capabilities provided by telecommunications and technology.*

In its quest for excellence, the California Community Colleges in partnership with the private sector and the State of California propose to integrate advanced information technologies into instruction, instructional support and student services. This Technology II Strategic Plan supports a commitment to excellent

education, and to effective preparation of students for social and economic success in the future knowledge-based business environment.

Excellence requires providing students and faculty with the tools, services, incentives, training and support staff (all elements of the technology infrastructure) needed to develop and deliver quality instruction to students. Excellence requires that the Chancellor's Office provide the leadership to ensure that quality is built into this effort.

Excellence also requires that the State of California funds the technology infrastructure, the Chancellor's Office plans and monitors the technology infrastructure, and the colleges implement the technology infrastructure as planned and funded. All three partners need to work closely together.

3. Student Success— *Through telecommunications and technology help students achieve success in their educational and career goals.*

Monitoring and measuring the success of the recommended solutions for access and excellence proposed in this plan will allow documentation of the level of student success. The California Community Colleges achieve success through the students, faculty, staff and administrators, and in partnership with the community. In order to achieve success with this technology plan, it must focus on these key players and monitor and measure their successes within this framework. Exposing students to information technology, such as the personal computer and the Internet, are increasingly important to economic success and full participation in all aspects of American society.

Emerging technologies and learning practices extend and expand opportunities to meet the educational needs of unserved or underserved populations. They empower students by permitting greater access to information, and by increasing the variety of learning options. People with computers and Internet access can use these tools to find a job, acquire new skills, start a small business, and become more informed citizens. The California Community College system seeks to maintain and expand student success through the use of technological resources.

C. Technology II Objectives

There are four major objectives that the Technology II Strategic Plan will achieve:

- Implement information technology across the curriculum
- Infuse student services with information technology solutions
- Improve student success through information technology solutions
- Increase staff access to information technology.

Each of the four major objectives supports all of the three goals. When all of these objectives are met students, faculty, staff and community will receive:

- Access and equity with more exposure to the uses of technology in their educational experiences;
- Excellence in the quality of education supported by a sound technology infrastructure that provides students and faculty with the tools, services, training and support staff to deliver quality instruction to students;
- Student success by empowering students and permitting greater access to information, and by increasing the variety of learning options

1. Implement Information Technology Across the Curriculum

This objective seeks to fully integrate technology into curriculum development to ensure that students learn efficiently and effectively and that students will gain the skills that apply to their careers and that support lifelong learning. This objective also seeks to foster the development of technological alternatives by ensuring that faculty have access to the latest equipment and software to enable them to enhance student learning through creatively applying these tools in their teaching. It fosters an environment that allows time and compensation for full-time and part-time faculty to develop quality instruction using innovative methods and technologies.

Colleges should have policies and procedures that ensure the following:

- A computer use policy that promotes accessibility and safeguards academic freedom.
- Web Guidelines that safeguard accessibility and academic freedom.
- On going training and staff development in emergent technologies.
- Adequate and timely repair and replacement plans to maintain currency of all technology.

Recommendations and Related Strategies

- a. *Ensure that faculty have access to the latest equipment and software so that they can perform their jobs more efficiently and effectively, to serve student needs in the 21st century, and provide training for faculty in the use of these tools.***

Strategy: Establish and support a baseline of technology infrastructure at every college that will ensure that all full-time and part-time faculty will have access to services. Foster a wider variety of instructional approaches by providing faculty access to professional resources.

- Faculty will participate in train-the-trainer programs and participate in on-campus faculty training programs using materials and techniques learned from these programs.
- College faculty trainers will contribute best practices and lessons learned to be shared system-wide through a CCCCCO central portal.
- Faculty will use the expertise, as needed, of the technology support staff for class development, training, and instructional support. Their job duties would include, but not be limited to:
 - identify appropriate technologies to enrich existing course offerings and/or to encourage particular student outcomes including the development of distance education resources accessible to students with disabilities;
 - identify appropriate technologies to create and enrich new course offerings and/or to encourage particular student outcomes including the development of distance education resources accessible to students with disabilities;
 - incorporate appropriate technology into existing and new syllabi;
 - learn new presentation techniques to effectively deliver technology-enabled instruction.
- Faculty will share best practices developed and lessons learned with other faculty and instructional designers through collaboration mechanisms.

b. *Improve faculty and student access to automated library and learning resources including electronic information databases and administrative services.*

Strategy: Provide seamless access to information, regardless of format and location, through continued development of library services and systems that will foster access to systemwide information resources. Access to library and information resources is an essential service and is crucial to the support of quality curriculum. Continued support of the Library and Learning Resources component sources, such as the TTIP funding, will enable the college system to move toward a virtual library and learning resources program:

- Provide for a baseline of continued maintenance of the library automation investments made in Technology I.

- Facilitate the development of a network of virtual catalogs for access by college students, faculty and staff. This could be done in unison with the Library of California and other initiatives in the library community.
- Establish an equitable means for colleges to participate in resource sharing of information resources that are not in a digitized format.
- Foster access to and delivery of core information resources and electronic resources through cooperative or consortium purchasing.

c. *Establish and support a technology “refresh” program for computers and related equipment at all colleges.*

Strategy: Ensure that every full-time and part-time faculty and staff member has a computer and software that are no more than three years old. Identify gaps between existing college infrastructure and the target baseline model and fund the colleges to bring them to a minimum to the baseline.

d. *Increase the number of classes utilizing multimedia, video conferencing, Internet, e-mail correspondence between faculty and students, and satellite transmission of classes, while maintaining and assuring the quality of these offerings.*

Strategy: Continue to expand the California Virtual Campus (CVC) of the California Community Colleges in addressing the development of new courses and curriculum and the re-engineering of existing courses and curriculum. Provide an environment that allows time and compensation for faculty to develop quality instruction using innovative methods and technologies. This recommendation is also achieved in part through the strategies associated with the following training recommendation. These efforts should focus on facilitating collaboration among students and faculty to foster learning and communication.

e. *Increase the level of funding for technology training. As appropriate, utilize the existing systemwide-training resource centers (@ONE and the CVC Centers) to support faculty and staff training.*

Strategy: Increase the level of funding, currently funded at \$7 million with the TTIP and CVC programs, to allow for the system to implement training programs so that faculty know how to best utilize the above hardware and software. This will support teacher-training programs to improve the technical expertise of instructors and add to the quality of their teaching.

Recommended activities could include, but need not be limited to the following:

- A one-stop online central portal for training resources for the CCC system.
- A searchable database of online tutorials and courses for "just in time" learning as needed by faculty and staff regarding technology.
- Support to local campus technology trainers by providing fully developed training materials for delivery to their campus.
- An electronic infrastructure for technology trainers and instructional designers to share workshop materials and online resources developed locally.
- Online academic communities (e.g. Discipline/Student Service related sites) to share resources and discuss issues.
- Instructor-led online and live workshops for faculty and staff involved in distributed education.
- Online needs assessment of training needs.
- Online catalog of distributed education courses at California colleges and universities.
- "Library" of resources available to faculty and staff using the technologies involved in distributed education.

f. *Develop a centralized web-based resource center for materials, resources and processes with full faculty access to support the best practices in curriculum and instruction.*

Strategy: Expand the On-line Curriculum and Instruction Resource Center that was initiated by Santa Barbara City College through a TMAPP Grant. The Center acts as a central repository for official policies, procedures and guidelines, as well as a depository for curriculum content. The current prototype offers direct deposit of materials, automated indexing, a single-screen search and retrieval process and tools for developing curricular processes.

The Chancellor's Office should provide on-going leadership and oversight of the Online Curriculum and Instruction Resource Center. Maintaining the centralized Resource Center for faculty would provide:

- centralized materials, resources and activities with selective search and retrieval, and procedural uniformity;
- immediate, real time access to information and resources;
- the ability to track the status of any materials submitted by the field;
- references for model practices, such as model course of study outlines;

- best practices and the dissemination of quality material/information and new ideas;
- easy access to grants information, grant abstracts, progress reports and final reports that is easily identifiable;
- the ability for Chancellor's Office to identify and update all directories;
- the ability to inform colleges about statewide committees and workgroup activities by providing a central depository of agendas, meeting minutes, and reports.

The Resource Center would provide a central site for major contributions in Distributed Learning, a site for all business practices related to curriculum and a central portal for all activities for the California Community Colleges. In addition, the Resource Center would be capable of housing web-based information for all of the Chancellor's Office units.

g. Define more clearly and support the role of the TTAC in the identification, review of existing and development of new technology standards and baselines.

Strategy: Foster shared decision making through the maintenance of the Telecommunications and Technology Advisory Committee (TTAC).

h. Establish methodologies and tools to measure the effectiveness of technology in the classroom and in faculty and student collaboration.

Strategy: Include in the annual reporting process areas to determine and track such indicators as the following:

- Number of on-site college courses using multi-media instructional materials
- Number of distance learning courses and sections offered
- Number of classes in which collaboration is encouraged through the use of e-mail
- Number of faculty with e-mail accounts at the colleges
- Number of faculty who have Web-pages at the colleges
- Number of faculty who post their lectures and course materials to the e-mail site
- Assessment of the effectiveness of the above strategies.

i. Establish methodologies and tools to measure increases in the use of technology and technological applications in library, media, tutorial and learning assistance programs.

Strategy: Incorporate into the existing Library Learning Resources and Tutoring Annual Data Survey questions that gather information to establish achievement of agreed upon standards. Improved incorporation of technology in this area should focus on the higher collaboration between faculty to student, student to student and library and learning resources faculty and other college faculty.

j. Modify the reporting processes to ensure funds are used to support the plan's objectives.

Strategy: Incorporate the following as appropriate into the existing related survey or reporting processes.

- Monitor and measure the quality of faculty access to technology and ability of the services and tools provided to foster the development of quality instruction for students.
- Maintain, monitor and measure the benefit and appropriateness of on-going technology training for faculty and staff.
- Monitor and measure the telecommunications and technology infrastructure to ensure that it provides cost-effective and efficient services for faculty.

2. Infuse Student Services with Information Technology Solutions:

Information technology in student services should provide on-line student access to college administration, faculty, classes, and libraries, in a manner that is fully accessible for all students, including students with disabilities, consistent with the requirements identified by OCR. Student support systems and services must be accessible to students regardless of time and location. Equally important, the quality of the services should be comparable to the services provided to students at each college.

Recommendations and Related Strategies

a. Support the development of student services technology applications that have systemwide impact.

Strategy: Develop a centralized approach to bundling services that can reduce duplication and leverage investments of colleges in this area. The explosion of the Internet is impacting the way colleges provide Information Technology services. CCCs should pool resources beyond the district level, thus improving services to students in a more cost-effective manner.

Continue to investigate and develop the best practices from programs that have been identified and funded through the Model Application Pilot

Projects (TMAPP) and other resources. Projects in the TMAPP program are designed to serve a Research and Development function for the California Community Colleges. Projects funded in the TMAPP program include On-line Tutorial Support, Universal Internet Access, On-line Counseling and Advisement, and Remote Access to Library Information, Electronic Transcript Exchange.

- b. *Provide a baseline suite of student support systems and services that should be available at each college and that the results of these projects would be designed to assist colleges and would be accessible to students, regardless of time and location or method of delivery, regardless of disability or income level.***

Strategy: Develop and promote on-line systems that give students access to college administration, faculty, classes and libraries and learning resource centers, in compliance with the requirements for accessibility identified by the Office for Civil Rights. These should include, but not be limited to, applications, registration, educational planning, counseling, tutoring, electronic transcripts, financial aid and access to grades. Develop systems that allow students to remotely register for classes, look up schedules, communicate and collaborate with their instructors or other students, take classes, or find information in libraries or on the Internet. These services should meet or exceed those services available through a student visit to the campus.

- c. *Continue to establish vendor partners at the system level in collaboration with the Foundation for the California Community Colleges to leverage the system's size in order to achieve collaborative, cost-effective purchases and contracts.***

Strategy: Continue to develop a comprehensive cooperative purchase program with the Foundation for the California Community Colleges. That program has grown from six vendor agreements to over 35 in eight months. These agreements are designed to pool the purchasing power of the 106 colleges. The estimated total savings to the colleges are projected to be over \$20M during the coming year. This strategy can leverage the purchasing power of the system and provide savings that can be re-directed into other mission critical activities.

- d. *Improve the reporting processes to support the needs of the colleges in meeting the plan's objectives.***

Strategy: Incorporate, as appropriate, the following into the existing related survey or reporting processes:

- Monitor and measure the automated efforts in student support services (for example, grades, transcripts, application, registration, education planning, course scheduling and financial aid).
- Encourage collaboration between the Chancellor's Office and the colleges to develop policies defining accountability measurement methodologies.
- Establish methodologies and tools to measure increases in on-line Student Services resulting in higher student satisfaction and improved student service, such as increased use of Web-based college applications, financial aid applications, and counseling appointments scheduled. as they relate to technology issues. (Specific student service focus to be established at district/college level.)
- Monitor and measure how instructional support services (e.g. information competency, tutoring, learning assistance, reference assistance, and targeted programs) are assisting in meeting CCC student success categories.

3. Improve Student Success through Information Technology Solutions:

This objective seeks to provide students with access to student services, instructional support and educational benefits of technology during their community college experience by providing technology that is comparable to what they will find in the work environment. It seeks to develop information technology-based solutions to improve performance at the California Community Colleges in the critical student outcomes of course completions, workforce development, transfers to four year colleges, degrees and certificates awarded, and basic skills.

Recommendations and Related Strategies

- a. *Establish and support a baseline of technology infrastructure at every college that will ensure that all students, regardless of demographics and disabilities, will receive the benefits from such technology in their student services and instructional programs.***

Strategy: Support data driven decision-making, systemwide collaborative initiatives and increased communication among students, faculty and staff via a baseline approach. This strategy would enhance and maintain the technological and support personnel infrastructure at each institution to improve the quality of instruction and to take full advantage of the educational curriculum and information resources.

- Address the Total Cost of Ownership (TCO) for technology for students. TCO is not just the purchase of hardware and software, but it is the on-going need for training and technical support, including strategies to refresh the technology.
- Establish and support a technology “refresh” program at all colleges. This “refresh” program would replace technology on a three-year business cycle. Identify gaps between existing college infrastructure and the target baseline model and fund the colleges to bring them at a minimum to the baseline.
- Ensure that technology would be available for students with disabilities at open and instructional labs and classrooms, libraries and learning resource centers that would be commensurate with the numbers of students with disabilities in the general student population. (Ten percent has been used as a general estimate.) Also, all newly developed or purchased software and hardware should, to the maximum extent possible, be designed with accessibility in mind.

b. *Sustain the systemwide network and the investment of Technology I and expand, as needed, data/video connectivity to reach more students through technology.*

Strategy: Continue to fund the 4CNet connection with the California State University, including the expansion of bandwidth as needed and providing connectivity to official off-site centers.

c. *Require a local technology plan for each college and/or District. The plan would be based on standards and models developed by the Chancellor’s Office in collaboration with Telecommunications & Technology Advisory Committee (TTAC). There would be a single initial plan submitted with brief annual updates.*

Strategy:

- Fund colleges in the first year of the program to develop local telecommunication and technology plans.
- Conduct a series of workshops to facilitate consistency in the development of local technology plans through a grant from the Chancellor’s Office.
- Provide external consultative assistance to colleges through a systemwide contract for such services.
- Review/approve plans by the Chancellor’s Office prior to release of implementation funds.

d. *Modify the annual reporting processes to ensure compliance by colleges with the plan’s objectives.*

Strategy: Incorporate as appropriate the following into the existing related survey or reporting processes in the Chancellor's Office.

- CCCCCO will encourage collaboration with the colleges to develop policies defining accountability measurement methodologies. And therefore monitor and measure:
 - the quality of student access to resources through the use of technology.
 - the telecommunications and technology infrastructure to ensure that it provides cost-effective and efficient services for students, faculty and staff.
 - the quality of faculty access to technology and ability of the services and tools provided to foster the development of quality instruction for students.
 - the benefit and appropriateness of on-going technology training for faculty and staff.

- In consultation with TTAC and other appropriate advisory entities, CCCCCO will establish methodologies and tools to measure increased utilization of on-line student services.

- Ensure that the Chancellor's Office is sufficiently staffed to effectively coordinate and monitor all the technology initiatives and plans that are currently available throughout the agency in instruction, human resources, work force development, financial aid, etc. and the recommendations proposed in this plan.

- Assist TTAC and the CCCs in developing a model IT Plan template,

- Monitor that campuses have a local IT Plan which supports the state-wide strategic educational objectives of access (including students with disabilities), quality, enrichment and administrative efficiency, and

- Monitor (in plan years 2 and 3) that the campuses have used the Tech II funds to support the stated priorities and can provide measurement data demonstrating progress in meeting these objectives.

- Working with TTAC and the CCCs, the CCCCCO staff will develop and refine the TCO model.

- The Foundation for California Community Colleges will raise \$1,099,594 million and/or set up cooperative purchase

agreements for that amount or a combination of the above to lower cost of equipment and services to colleges.

- COCCC will continue to fund statewide and regional centers such as 4CNet, CCCSAT, @O.N.E., California Virtual Campus Centers (CVC), the High Tech Center Training Unit for Assistive Technologies, and the Online Curriculum Resources Center, and others subject to review and renewal by TTAC and CCCCCO staff.
- CCCCCO will continue to fund a central portal as a system-wide training provider. The central portal will coordinate its activities, development of training materials etc. with the California Virtual California Campus (CVC), CCCSAT and other future initiatives for faculty engaged in distance learning.
- Year to year continued funding for all training initiatives will be based, in part, on evidence of collaboration and the participating faculty trainer feedback and formal evaluation administered by TTAC and the Chancellor's Office.

4. Increase Staff Access to Information Technology:

This objective seeks to integrate technology into college offices and support areas to ensure that staff have the tools required to deliver services to students and faculty efficiently and effectively. This would ensure that staff have access to the latest equipment and software to make their jobs more efficient and rewarding, and would provide for training them on how to use these tools.

Recommendations and Related Strategies

- a. *Ensure staffs have access to the latest equipment and software to enable them to enhance student learning by creatively applying those tools in their teaching.***

Strategy:

- Establish and support a baseline of technology Infrastructure at every college that will ensure that all full-time staff will have access to services.
- Establish and support a technology "refresh" program at all colleges. This "refresh" program would replace technology on a three-year business cycle. This would ensure that every full-time staff member has a computer and software that is no more than three years old. Identify gaps between existing college infrastructure and the target baseline model and fund the colleges to bring them at a minimum to the baseline.

b. *Implement systemwide training programs to enable staff to best utilize the technology provided in above recommendations.*

Strategy: Increase the level of funding for staff training. It would need to be comparable to the strategy identified in recommendation associated with faculty training.

- Staff will participate in train-the-trainer programs and participate in on-campus training programs using materials and techniques learned from these programs.
- Staff will use the expertise, as needed, of the technology support staff for administrative application development, training, and technical support.
- Staff, as needed, will use the expertise of the college's technical support person (s) in identifying appropriate technologies to encourage particular student outcomes including the development of student services and administrative applications.

c. *Modify the Chancellor's Office annual reporting processes to ensure compliance by colleges receiving funds to include staff access to Information Technology related activities.*

Strategy: Incorporate as appropriate the following into the existing related survey or reporting processes:

- Monitor and measure the telecommunications and technology infrastructure to ensure that it provides cost-effective and efficient services for staff.

5. SYSTEMWIDE ADMINISTRATION

A new leadership role should be established in the California Community College Chancellor's Office to carry out this new body of work and expectations that are laid out in this plan. To ensure that the goals of access and equity, excellence, and student success are fully realized throughout the System, this new statewide leadership would be responsible for establishing the appropriate policies, processes and procedures to implement the Technology II Strategic Plan. Also, the systemwide administration would coordinate all of the technology initiatives and plans in the agency.

Recommendations and Related Strategies

a. Establish a senior level management position with the California Community College Chancellor's Office to provide leadership on information technology, including these specific functions:

- Coordinate all technology related educational initiatives within the Chancellor's Office, including the Technology II Plan.
- Monitor, research and disseminate best breed of tools for hardware, software, Internet services and networking in order to advise the colleges.
- Work with the Foundation to secure procurement and contracts on behalf of the system to acquire current technology under cost effective terms.

D. Total Cost to Implement the Technology II Strategic Plan

The total costs for a five-year period represent approximately an additional \$200 for each community college student (FTES) per year.

The following cost table summarizes the cost estimates for the recommendations and strategies for Technology II by objective to:

- Implement Information Technology Across the Curriculum
- Infuse Student Services with Information Technology Solutions
- Improve Student Success through Information Technology Solutions
- Increase Staff Access to Information Technology

In the past, colleges have struggled to acquire technology such as PCs for student, faculty and staff use and instructional and administrative purposes. The acquisition of these computers was usually funded by grants that covered the initial capital investment of equipment. The GartnerGroup research shows that the initial cost of hardware and software is only 30% of the Total Cost of Ownership (TCO) for computers.

“Institutions that are unable to plan for the support of their technical environments and keep them refreshed will end up with obsolete technology. Obsolete technology is costly to support. Furthermore, older and obsolete technology will not be representative of the type of environment that students will likely have to use in the workplace.”

GartnerGroup and the Telecommunications and Technology Advisory Committee (TTAC) worked at length to determine the TCO model appropriate for the Community College environment. Please refer to *Appendix A* for more detail on the TCO model. It describes the TCO model components and the cost associated with them. There are 19 components in 5 categories:

- Hardware and software
- Systems management
- Support
- Development support
- Communications support

The cost estimate for the technology for access for faculty, students and staff is based on these recommendations and uses the Total Cost of Ownership model cost of **\$2,929 per PC.**

The TCO for the California Community Colleges is much lower than the TCO average for Information Technology (IT) industry of \$5,706. The GartnerGroup identified several reasons for this difference:

- The vendors heavily discounted the hardware and software for CCC
- The support levels are lower than the IT industry.
- The salaries of support staff are significantly lower than average. This is explained by the CCC tendency to hire low-end salary IT staff.
- Most campuses can be classified as a moderately complex environment.

While the TCO may seem too low and may not be ideal from an industry point of view, the implementation of this proposed model for funding and budgeting represents a significant improvement over the current state.

There are 26 line items in the following cost table. The TCO model helps to form the basis for the allocation of funds in only 3 of the line items, however those 3 represent 63.7% (\$700,395,132) of the total cost of the plan.

The other 23 line items are derived from a variety of factors including feasibility studies in the areas of electronic transcripts, digital signatures, on-line curriculum resource centers, and data warehousing, as well as annual expenditure plans and fiscal and program reports from colleges. Other factors include cost derived from cooperative purchase agreements for library database resources, library automation maintenance contracts as well as agreements associated with the maintenance and expansion of the 4CNet statewide network. When distributed directly to colleges, training costs are derived from an existing standard established in Technology I. Project specific costs are determined by the resource needs associated with the detailed workplan require to accomplished the targeted goal.

Local planning costs are calculated at \$25,000 per site. This amount does not address the full cost of planning. It is meant to provide assistance to districts and colleges in planning the local implementation of telecommunications and technology.

**Table 2
Cost to Implement Technology II Strategic Plan**

	Year 2000/01	Year 2001/02	Year 2002/03	Year 2003/04	Year 2004/05	Five Year Accumulated Total
Implement Information Technology Across the Curriculum						
Technology for Access (Faculty) ¹	\$5,666,666	\$4,841,637	\$5,863,858	\$7,235,636	\$8,406,230	\$26,347,361
Multi-media Classrooms	\$0	\$6,000,000	\$6,000,000	\$6,000,000	\$6,000,000	\$24,000,000
Virtual Library and Learning Resources	\$0	\$14,000,000	\$10,000,000	\$10,000,000	\$10,000,000	\$44,000,000
Electronic Resources Acquisition	\$0	\$4,000,000	\$4,000,000	\$4,000,000	\$4,000,000	\$16,000,000
Learning Resources Database Maintenance	\$0	\$6,000,000	\$6,000,000	\$6,000,000	\$6,000,000	\$24,000,000
Learning Resources Automation Maintenance	\$0	\$9,500,000	\$9,500,000	\$9,500,000	\$9,500,000	\$38,000,000
Faculty Educational Technology Development Fund	\$0	\$2,000,000	\$5,000,000	\$5,000,000	\$5,000,000	\$17,000,000
Faculty Distance Education Development Training (CVC)	\$2,900,000	\$2,900,000	\$2,900,000	\$2,900,000	\$2,900,000	\$11,600,000
Technology Training (Faculty)	\$4,000,000	\$5,000,000	\$6,000,000	\$7,000,000	\$8,000,000	\$26,000,000
On-line Curriculum and Instruction Resource Center	\$300,000	\$1,200,000	\$900,000	\$900,000	\$900,000	\$4,400,000
Collaboration Resources (Audio/Data)	\$2,300,000	\$2,300,000	\$2,300,000	\$2,300,000	\$2,300,000	\$9,200,000
TSP Projects (Satellite/@ONE)	\$2,500,000	\$2,500,000	\$2,500,000	\$2,500,000	\$2,500,000	\$10,000,000
						Subtotal: \$267,914,027
Infuse Student Services with Information Technology Solutions						
Common Application	\$0	\$1,425,000	\$204,166	\$204,166	\$204,166	\$2,037,498
Electronic Transcript	\$0	\$2,120,500	\$312,166	\$312,166	\$312,166	\$3,056,998
Digital Signature	\$200,000	\$588,000	\$971,250	\$1,672,500	\$1,885,750	\$5,117,500

¹ TCO Model Line Item

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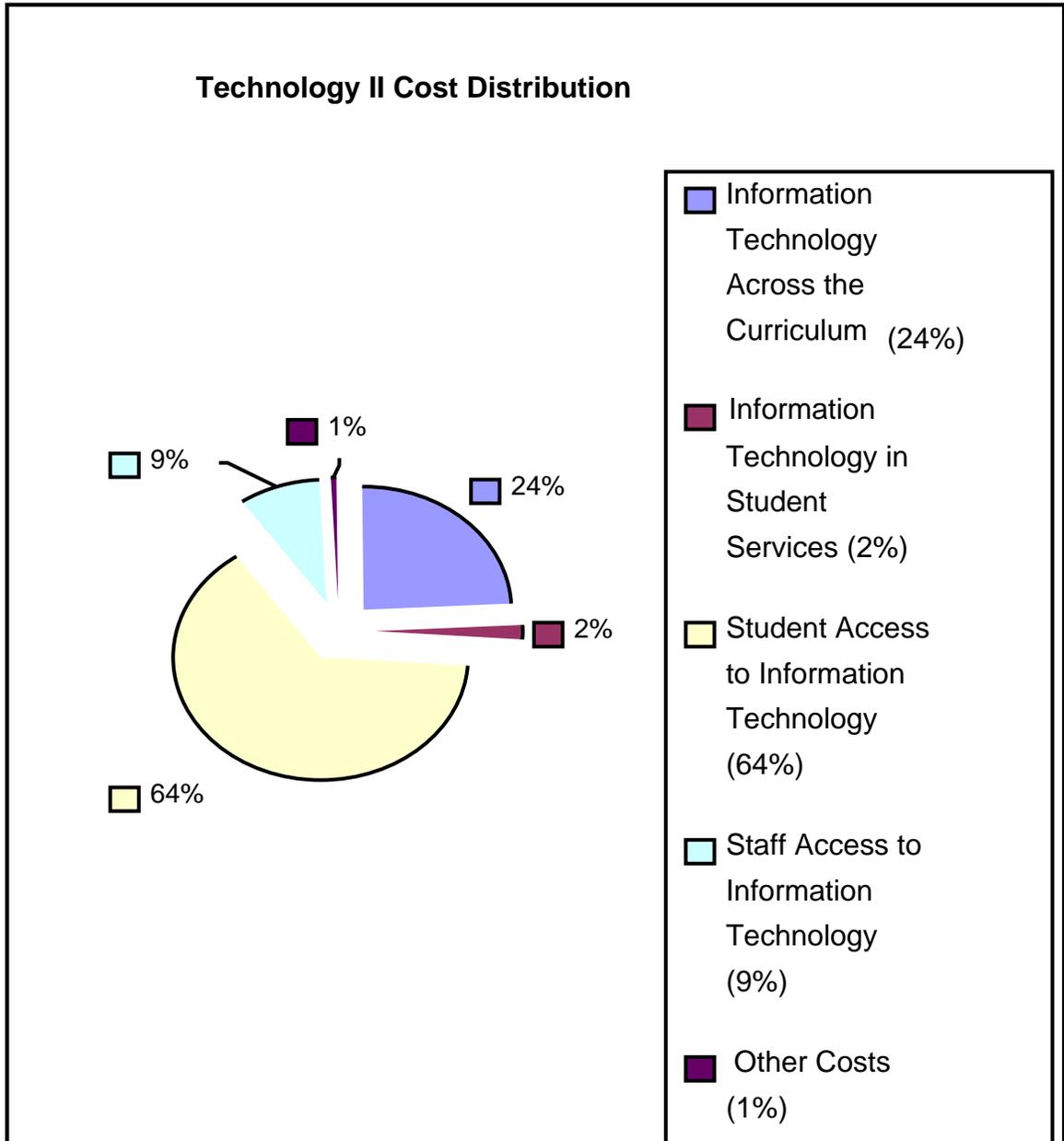
Data-warehousing and Web Hosting	\$300,000	\$2,000,000	\$500,000	\$500,000	\$500,000	\$3,500,000
On-line Registration	\$0	\$2,120,500	\$312,166	\$312,166	\$312,166	\$3,056,998
TMAPP Grants	\$0	\$700,000	\$700,000	\$700,000	\$700,000	\$2,800,000
					Subtotal:	\$19,768,994
Improve Student Success through Information Technology						
Technology for Access (Students) ² , including Disability Access (Ratio 1:20 FTES)	\$5,666,666	\$140,483,481	\$147,507,662	\$154,883,030	\$162,627,160	\$611,167,999
4CNet Connectivity, including additional sites	\$10,227,019	\$18,120,442	\$15,783,978	\$16,353,282	\$32,625,573	\$93,110,294
					Subtotal:	\$704,278,393
Increase Staff Access to Information Technology						
Technology for Access (Staff) ³	\$5,666,666	\$14,568,846	\$15,298,167	\$16,062,636	\$16,950,123	\$62,879,772
General Staff Training	\$4,000,000	\$5,000,000	\$6,000,000	\$7,000,000	\$8,000,000	\$26,000,000
Technical Staff Training	\$0	\$848,000	\$848,000	\$848,000	\$848,000	\$3,392,000
					Subtotal:	\$101,938,438
Administration						
Lead Planning Grant	\$500,000					\$500,000
Local Technology Planning/Other optional areas	\$3,072,983					\$3,072,983
Systemwide Administration	\$0	\$522,816	\$552,816	\$522,816	\$522,816	\$2,121,264
					Subtotal:	\$5,694,247
Annual TOTAL	\$47,200,000	\$292,708,220	\$327,082,558	\$387,154,144	\$451,370,724	\$1,099,593,999

The total costs for a five-year period represent approximately an additional \$200 per year for each community college student (FTES). Currently, total community college expenditure per FTES is \$3,786. This amount is already significantly less than the national expenditure per FTES in community colleges, which is \$6,086. This increase in technology funding represents a ½ of 1% addition to current funding.

² TCO Model Line Item

³ Ibid

Graph 1 illustrates the cost distribution of Technology II by objectives. Student Access to Information Technology would receive the largest share of dollars, which is 64 percent. The next largest share distributed costs would be Information Technology Across the Curriculum at 24 percent.



Graph 1-Cost Distribution by Objective

E. Funding the Technology II Strategic Plan

1. Background

Currently, funding for the California Community Colleges occurs within the annual legislative budgeting process with no assured or predictable level of funding for technology initiatives. Many of the system's telecommunications initiatives are large in scale (e.g., data, satellite and video networks) and span several years to implement. Colleges are reluctant to make commitments to permanent IT staff or equipment purchases without multi-year funding. Annual funding is currently handled as follows:

- TTIP Funds are appropriated by the Legislature at current baseline level categories within three major areas of use:
 - Infrastructure: Data, Video, Satellite and Library Automation
 - Applications (Research and Development):
 - Telecommunications Model Applications Pilots Projects (TMAPP)
 - Telecommunications Special Projects (TSP)
 - Training: Human Resources Technology Training Fund and Coordinating Training Center
- The annual Budget Change Proposal (BCP) process is utilized to gain additional funding for the colleges,
- Some TTIP funds are apportioned to specific individual colleges by the Chancellor's Office based on single year grant projects.
- The individual colleges carry out current technology purchases alone or in collaboration with the Foundation for California Community Colleges negotiated contracts. Cooperative agreements lead to economies of scale, cost reductions, and result in more technology on every college for the same or lower cost. Participation in these blanket purchase agreements is wholly voluntary but requires adherence to established technology standards as approved the Chancellor's Office in concert with the TTAC.

2. A New Funding Model

A new approach to funding Community College technology initiatives is recommended to ensure the success of the Technology II Strategic Plan.

- The Legislature should recognize that technology investment is continuous and evolutionary, not episodic and revolutionary.
- Funding for technology development at community colleges should be a part of the permanent baseline budget of the system and its participating colleges.

- Except in cases of statewide fiscal emergency, a predictable level of funding should be provided. This would in turn encourage the colleges to make the required investments in classified staff, technology tools and vendor support needed to maintain the quality and competitiveness of our colleges.
- Colleges with additional available funding could exceed the minimum standards without penalty.
- Once baseline minimums are achieved, the colleges would be responsible for determining the internal distribution of these funds to support the Technology II Strategic Plan technology priorities, such as colleges administrative systems.

There is a need to support administrative systems for local colleges which is an important set of services (Financial, Student Services, and Human Resources). TTAC recognized the need for these systems but felt that the issues and questions related to this need were so large at this time that this area should be focused on by TTAC and the CCCs in the future. TTAC also felt that this matter should be dealt with after the infrastructure and student access areas had been addressed. The cost of the administrative systems would have significantly increased the cost of this plan and if the plan did not invest in the college first and they were not technically ready, the administrative systems would not be able to be put to the most effective use.

However, they did recommend that if a college met the standards of infrastructure and access in this Technology II Strategic Plan through early local initiatives that it would be beneficial for the colleges and students, faculty and staff to use the funds from this plan to address college administrative systems needs. They would allow some flexibility for the colleges once they had met the goals of this plan to address other needed technological areas.

3. Funding Distribution

Funds would be distributed through the Chancellor's Office based on the following:

- Full-time equivalent students (FTES) and number of sites (i.e. districts, colleges and formally approved campuses and/or official off-site centers within the system) should be the basis for apportioning the funds and limited to supporting these identified priorities.
- Adjustment of the FTES apportionment to ensure that the smallest colleges and the largest colleges would not be under or over funded when compared to the median.
- Demonstration that the campus has a local IT Plan which supports the statewide strategic educational objectives of access, quality, enrichment and administrative efficiency.

- Demonstration (in plan years 2 and 3) that the campus has used the funds to support the stated priorities and can provide measurement data demonstrating progress in meeting these objectives.
- Allocation of second year funding would be allocated to all colleges producing IT plans and supporting execution documents (since it is likely that the colleges would not receive second year funds until some time into the fall of 2000)

4. Baseline Standards

The Chancellor's Office would develop a baseline of current technology standards, including standards to support student access. Student access standards would include supporting special access needs under the Americans with Disabilities Act.

- This baseline would be established after advice from TTAC, in concert with other Chancellor's Office policy groups.
- The baseline would become the basis for selecting technology vendor partners and negotiating statewide purchase pricing for baseline components.
- California Community Colleges systemwide standards-based procurement, in collaboration with the Foundation for California Community Colleges, would be pursued and awarded consistent with California Codes and Regulations, guidelines, and processes. Colleges would be able to buy individually from these vendors at the contracted prices.

5. Sources for Funding Technology

Community colleges are already investing substantially in telecommunications and technology but they are unable to do enough. In its November 1999 annual report to the Legislature on the implementation of the Telecommunications and Technology Infrastructure Program (TTIP), the Chancellor's Office identified 5 funding sources and 8 categories in telecommunications and technology expenditures for colleges. The California Community Colleges currently report expending over \$100,000,000 per year. However, this investment only addresses a part of the challenge. The growing needs of students, faculty and staff and the educational demands of the 21st Century detailed above will require a more substantial investment in telecommunications and technology. The system requires an infusion of funds that is based on a sustainable and renewing TCO model in order to meet the growing technological needs of faculty, students, and staff.

In March 1999, the California Citizens Commission on Higher Education stated in their report, *Toward A State of Learning: California: Higher Education for the Twenty-first Century*, "without a realistic plan that will work in good and bad financial

times, California will not be able to preserve the promise of higher education to all that qualify". The Commission's finance recommendations represent a mutual commitment among the state government, the students, and the institutions of higher education to face the challenges together. The increased costs of including technology throughout the system require just such a new approach to financing.

This plan assumes shared responsibility for the funding strategies identified in this report. It is recommended that over the life of the plan, funding be generated from the following resources:

- State Resources: 90 %
- Public/Private Partnerships: 10 %

This implementation strategy would provide a diverse approach to funding the technology needs of the system while ensuring more sustainable revenues for the community colleges.

a. New State Resources for Technology

The state funds would be new dollars targeted for technology requested through the BCP process for Proposition 98 funds.

b. Public/Private Partnerships

State, federal and industry leaders consider the community colleges a critical player in the economic development of the state. The local community college provides technical training and education that support the local job market needs. Therefore, it is recommended that ten percent of the funding for the Technology II Plan come from public/private partnerships. The Foundation for the California Community Colleges would lead this centralized, systemwide effort to develop these partnerships that would provide for donations, cost reductions and additional funding grants to meet the objectives of this plan. Therefore, every dollar spent by state funding will go farther in achieving the objectives of this plan.

c. *Summary of funding revenue source distribution*

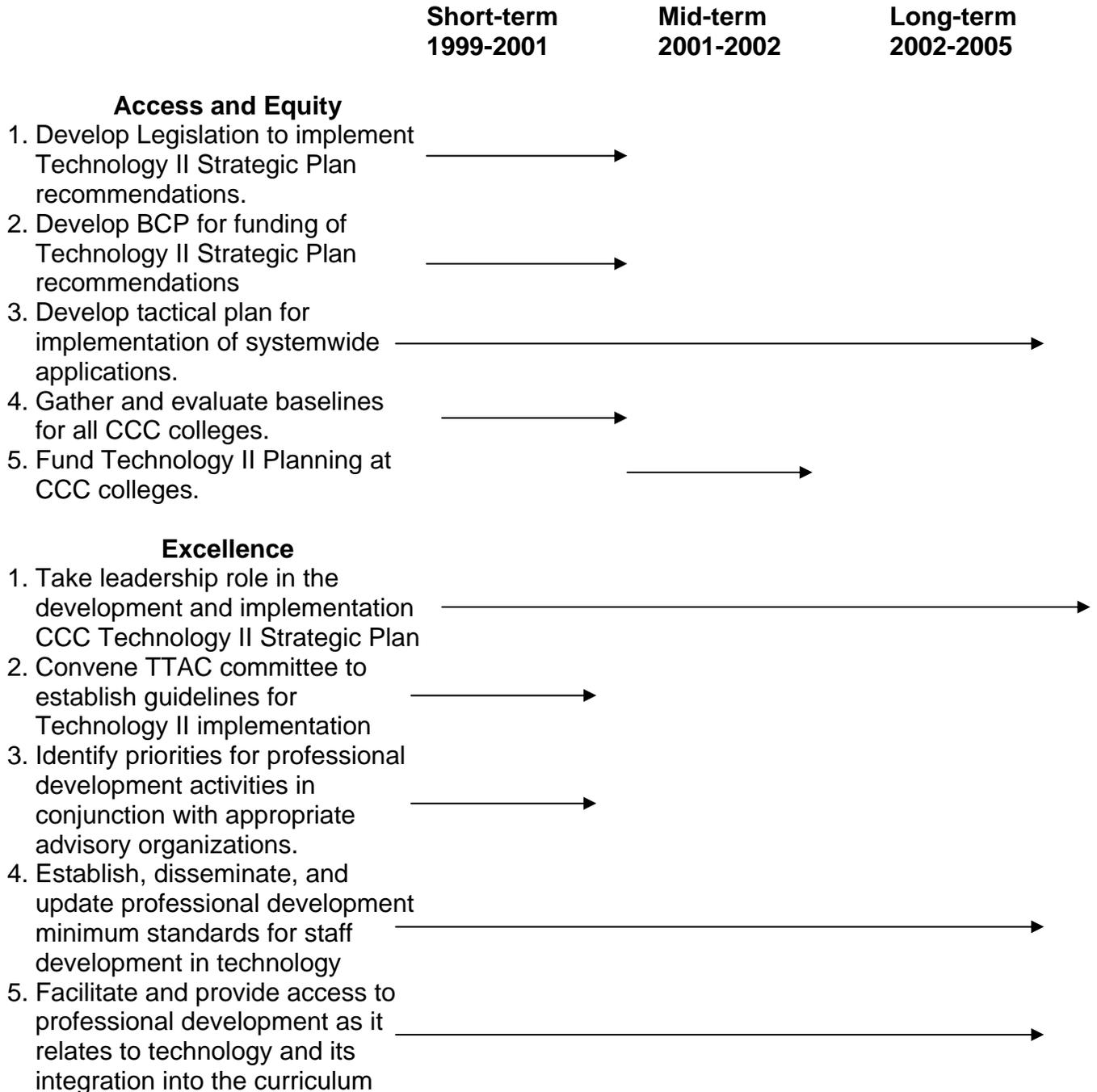
Table 3
Summary of Funding Revenue Source Distribution

	Year 2000/01*	Year 2001/02	Year 2002/03	Year 2003/04	Year 2004/05	Five Year Accumulated Total
State Resources (90%)	\$47,200,000	\$223,865,299	\$224,958,806	\$236,435,759	\$261,894,735	\$994,354,599
Public/Private Partnership (10%)	\$0	\$24,873,922	\$24,995,423	\$26,270,640	\$29,099,415	\$105,239,400
	\$47,200,000	\$248,739,222	\$249,954,229	\$262,994,398	\$290,944,150	\$1,099,593,999

*Phased in approach begins in year 2001/02. 2000/01 reflects State Resources only.
These 2000-01 dollars are included in the current system budget as of March 3, 2000.

IV. Timeline

This timeline lays out in broad terms the activities needed to launch this plan. Following approval of the plan and the development of the tactical plan more detailed timelines and activities will be developed.



6. Ensure the availability of technical assistance programs to promote efficiencies →
7. Provide leadership for replacement of obsolescent technology based on 3 year refresh schedule →
8. Develop and implement incentives for business and industry technology partnerships. →

Student Success

1. Evaluate best practices in current and past grant programs →
2. Further define baseline criteria and evaluation guidelines. →
3. Establish template and guidelines for Local Technology Plans. →

V. Conclusion

The California Community Colleges must have a strategic plan in place that defines and implements the use of technology as a resource that supports its mission. The System needs a funding strategy that will support its telecommunications and technological requirements. The State has invested \$84 million dollars in the first four years of the TTIP that should be expanded and leveraged. The System must be proactive in its response to the challenges facing the System in the next five years. One of those challenges, "Tidal Wave II", will stretch the CCCs resources if the system is not prepared to handle the demands of the increased enrollment. This Technology II Strategic Plan will allow the CCCs to more effectively utilize existing facilities, programs and resources. All this can be accomplished with an investment by the State of California of an additional \$200 per community college student (FTES) per year.

The Technology II Strategic Plan articulates a vision of technology in the system and how it will make a difference in the social and economic success of California in the 21st Century. This plan is a strategic response. The expanded uses of technology in support of the CCCs mission will improve teaching and learning, increase student access, improve student support services, and achieve important efficiencies and effectiveness in administrative support.

The economic success of the State of California relies on the infusion of technology into the community colleges. This Strategic Plan responds to the needs of our students in getting jobs that lead to successful careers while meeting the needs of the workforce. This plan will assist the System in advancing California's economic growth and global competitiveness and contribute to continuous workforce improvement. Finally, this Technology II Plan will result in an enhanced student educational experience while providing students the ever-increasing technology skills required by the California economy.

"Technological literacy is a survival skill. No academic discipline can claim to provide lasting knowledge that will insure success in the constantly changing workplace in the information age. There will be even less incentive for students to consume higher education in traditional two-year and four-year chunks, because learning will be required on a continuous basis in every work setting. Students in the information age must be able to plug into learning, whenever, wherever and however it is required for the job. Learning and earning become synonymous in the information age."

Source :Langhorst, Scott A. 1997 "Changing the Channel: Community Colleges in the Information Age". Community College Review – Winter. <http://www.so.cc.va.us/ccreview.htm>

Student Profile: Rachel Binns

*Rachel is a senior at Celebration, a cutting-edge digital high school. She knows her textbook is the world accessed through the computer, access from any computer, anytime, anyplace. The world is her classroom. Next year, she will be attending college, and she wonders, are they ready for her? Rachel in her article in Converge Magazine, May 1999, states "College is a step up from high school; college offers students more opportunities in an environment of higher learning. It is because of this I expect a step up in technology and opportunities as well. **Do you have updated technology in place? Are you ready for me?"***

*"Always having computers available in convenient places has spoiled me. Working with the Internet as well as personal networked documents has become the norm. Too many campuses are content with a few computer labs. **Will you have computers readily available for me?"***

*"I look forward to being able to access advanced equipment such as electron microscopes, digital video distribution systems and remote submersible cameras all through the Internet from the comfort of my dorm room. **Is all this possible at your college?"***

*There are college graduates today who are not prepared for the technologically advance work world, **but that will not happen to me, will it? Are you ready for me?"***

Are we ready?

APPENDIX A: Total Cost of Ownership (TCO)

Source: CCC Technology II Plan Recommended Strategy by GartnerGroup Consulting December, 1999

GartnerGroup recommends that each client should use the GartnerGroup's TCO concepts and models and develop their own cost model. GartnerGroup worked with CCC to develop a CCC-specific TCO model (from now on referred to as the "CCC TCO Model"). The model was derived from a mid-sized campus with 12,000 FTES. This model will be used as the basic model to extrapolate the cost for the system as a whole.

In order to estimate the total cost of ownership for the CCC system, i.e., the CCC TCO Model, a 12,000-student campus model was used. In this model we are only looking at the direct costs (hardware and software, systems management, support, development support, and communications support) as the indirect costs (i.e., existing investment in administrative systems) cannot be estimated easily. Furthermore, a detailed data collection by college was not done for indirect costs categories. Instead the GG TCO categories were used and a set of minimal baseline assumptions (see table 1) were developed based on input from CCC executive IT staff and GartnerGroup best practices.

For the particular model 12,000 FTES campus, assuming 20 FTES per PC (600 PCs) and 300 PC for Faculty and staff (900), the cost would be \$2,636,100 or \$2,929 per PC. In addition, 10% of the equipment will need to be equipped with assistive technology. The cost for assistive technology is \$2000 per machine. If there were 600 PCs, 60 would need to be adapted for a total cost of \$120,000. The total annual cost comes to \$2,756,100. This translates to \$230 per FTES.

**Direct Costs of Hardware & Software
(assuming a college of 12,000 students)**

Sub Category	Cost/ yr. / PC	Assumptions	Accum. Costs
PC hardware and Operating systems cost	\$550/yr	(Acquisition depreciated over 3 years)	\$605,000
Assistive technology hardware and software (10% of PCs)	\$667	(Acquisition depreciated over 3 years)	\$160,000
O/S and Office Software Licenses	\$100/yr		\$110,000
Peripherals	\$100/yr		\$110,000
Network Operating System Hardware	\$45/yr	1.5 servers	\$49,500
NOS Licenses	\$20/yr		\$22,000
Switches, hubs and bridges (Hardware and Software)	\$42/yr	\$125/port	\$46,200
Wiring	\$60/yr		\$66,000
NSM Hardware and Software	\$160/yr		\$176,000
Training	\$250/yr		\$275,000
Servers (HDW and SFTW) for web services)	\$50/yr		\$55,000
Technical staff training	\$75/yr		\$82,500
		Total Cost	\$1,757,200

*Note: Chart does not include printers for assistive technology. The printers are estimated at \$4000 per printer. One printer per each lab that provided assistive technology would be necessary.

Direct Costs of Systems Management

Network and Systems Admin. (Novel, etc. include wiring staff)	\$187/yr	1 staff / 300 PCs; (3.66) loaded cost = \$45,000/yr + 25%	\$206,250
Technical Management	\$187/yr	1 / 500 PCs @ \$75K + 25%	\$205,250
Web Administration	\$51/yr	1 staff per 12,000 FTES; loaded cost=45,000/yr + 25% = \$	\$56,250
Administrative Systems Support (web, user development)	\$68/yr	1 @ \$60K + 25% = \$75,000	\$75,000

applications)			
		Total Cost	\$543,750

Direct Cost of Support

Level 1 Support	\$375/yr	1 staff / 150 PCs; \$45,000/yr + 25% = \$56,250 / staff	\$412,500
		Total Cost	\$412,500

Direct Cost of Development Support

Application Development	\$102/yr	2 staff / 12,000 FTES campus loaded cost = \$45,000/yr/staff + 25% = \$56,250	\$112,500
		Total Cost	\$112,,500

Direct Cost of Communications Support

Network	\$60/yr	24,000/yr : 1-6000 FTES 48,000/yr: 6,000-12,000 FTES 72,000/yr: 12,000-18,000 FTES 96,000/yr: 18,000+ FTES	\$66,000
		Total Cost	\$66,000
PC TCO	\$2,929	Accumulative Cost	\$2,891,950

Table 1. CCC TCO Model Assumptions

The Total Cost of Ownership (TCO) model chart, shows support at 8hrs/day x 5 days/wk. If support were increased to an 18 hrs/day to cover evening and late night usage, costs would have to be increased. Evening and late night usage costs would be less than daytime costs due to fewer students and faculty. The Service Level (SL) is assumed to be 2 hour response time for classroom and/or critical administrative application and 24 hour response time for non-critical support problems.