EXECUTIVE SUMMARY

Recommended DIS Office Functions, Budgets and Funding Mechanisms (1997-1999)

A basic redirection in the methods and extent to which WRD provides centralized computer support services through the DIS Office is needed because of

- an increasingly diversified hardware and software operating environment,
- increased training needs associated with the diversified environment,
- increased demands on local- and wide-area networks,
- the need to support for some unforeseeable amount of time existing software 'legacy' systems--widely-used systems based on somewhat dated hardware and/or software,
- the existence, at a minimum, of constrained funding and possibly reduced funding available to support traditional DIS Office roles, and
- an overcommitted DIS staff.

To the extent possible, DIS should provide *whole-system support*, resulting in hardware and software integrated into WRD workflow. Whole-system support should be a combination of direct assistance at the site administrator level, coordination of activities, and identification of outside resources. CPAC recommends that the DIS Office adopt the following general strategy:

- Provide leadership and support for enhancing wide- and local-area networks.
- Focus the technical assistance role of the DIS Office at the systems (site administrator) level.
- Increase the level of resources dedicated to product research, evaluation and procurement of commercial software that can facilitate the WRD mission.
- Limit in-house software development to minor script writing linking legacy software and databases to off-the-shelf software packages, facilitating interoperability and integration into WRD workflow.
- Continue, or initiate, the development of standardized releases of operating systems and selected applications software for SGI, Sun, DG, and NT hardware systems.
- Coordinate a reduced number of funded help groups, consisting primarily of hardware and software experts at the cost center level, to support hardware and software priorities established by CPAC.

The DIS Office role in training should be to (1) coordinate and facilitate user and site administrator training from commercial sources, and (2) select, coordinate, sponsor, and develop in-house training primarily for site administrators. Training officers, regional computer specialists, and software-specific "experts" at the regional or cost-center levels should play a greater role in training. NCTM should continue to be sponsored by DIS, but geared towards the training of system administrators and not end users. A single media (e.g. WWW) with emphasis on organization, brevity, currency, and accuracy would be more cost-effective than maintaining multiple outlets for information dissemination.

CPAC recommends that the process utilized in budgeting and staffing the DIS Office involve a zero-based approach, where each function and position is reviewed and priced annually, and a fixed budget is established early in the fiscal year. The DIS Office budget and staffing should be consistent with adequate delivery of the required functions. The current approach of renegotiating budgets throughout the year, and attempting to maintain user-level support for an expanding array of hardware and software systems by spreading support thinner, is demoralizing for the DIS Staff, unsatisfactory to users, and cost ineffective.

Recommended DIS Office Functions, Budgets and Funding Mechanisms (1997-1999)

Background

The Computer Policy Advisory Committee (CPAC) report entitled “WRD’s Computing Environment for 1997 through 1999” (also known as FUTCOM2) was released in early 1997. The report contains a number of assumptions about internal and external trends that will affect computing in the WRD during 1997-99. The report also includes a wide range of recommendations on hardware, software, and computer support services in the Division.

At the September 1996 CPAC meeting the DIS office was charged to develop recommendations to CPAC on how to best support the Division’s needs in 1997 with a mixed computing environment, assuming existing resources. DIS was to focus on priorities and to identify tasks which could not be accomplished with existing resources. On October 22, 1996, Tom Wood distributed an email to CPAC on DIS Support Services Recommendations. The email included (1) Systems Support Unit (SSU) FY97 tasks, (2) Spatial Data Support Unit (SDSU) workplan elements for FY97, (3) Applications Support Unit (ASU) services for FY97, (4) DIS office help files for FY97, and (5) tables summarizing DIS software support activities.

On December 2, 1996, Susan Trapanese, distributed a proposal to CPAC for funding DIS support of hardware, applications, and operating systems. The proposal noted that the DIS “budget allocation processes is in direct conflict with WRD’s need to provide a strong centralized [computer] support office.” DIS suggested that a committee be formed to study DIS resource and support issues associated with fulfilling the FUTCOM2 vision. This recommendation and the draft FUTCOM2 report were discussed at the December 1996 CPAC meeting. Members of CPAC noted that there appears to be continued erosion of centralized support in WRD, but that centralized support seemed to be vital to efficiently accomplishing the Division’s mission. Subsequently, CPAC formed a subcommittee with a rather broad mandate--analyze DIS organizational structure and funding. Members of the subgroup were J. Bales, M. Bunch, S. Goss, S. McEwen, and B. Mrazik.

At the same time the CPAC subcommittee was reviewing DIS, the 1997 Headquarters Review Team was reviewing Headquarters support functions, including DIS. The 1997 review team reported to the Chief Hydrologist in July 1997. DIS also was reviewed by a Headquarters Review Team in 1996, and recommendations were contained in the November 1996 report “Review of Headquarters Support Functions in the Water Resources Division--A Report to the Chief Hydrologist.” CPAC subcommittee members held discussions with members of the 1997 Headquarters Review Team about DIS. However, this CPAC report is independent from the 1997 Headquarters Review Team report.

Detailed background information can be found at *http://wwwrcolka.cr.usgs.gov/uo/comp/dis*. this site contains copies of pertinent email and links to sites with other relevant background information.

Traditional DIS Functions and Budgeting

The DIS Office recently identified nearly 350 functions which DIS or DIS-funded staff perform. Past and recent functions of the DIS Office include:

- providing standardized releases of operating systems and applications
- planning, growing, and managing the telecommunications network
- coordinating and participating in national-level email-based help groups
- coordinating national-level procurements and maintenance activities
- providing guidance and solutions for computer security issues
- coordinating and participating in designing and conducting training

DIS is funded out of the WOTSC budget. Budgets are often negotiated with the Assistant Chief Hydrologist for Operations after the fiscal year has begun. Because of this process, DIS faces uncertainty and difficulty in planning. The FY97 budget is about $1.25M, but funding has been set at about $1.195M. Most of the funds are used for salary costs, with a small amount of funding for travel and the purchase of hardware and software for testing purposes.

Assumptions about Factors and Trends Affecting the DIS Office in 1997-99

The primary assumed trend documented in the FUTCOM2 report that relates directly to the DIS office is: "The computer environment for the Water Resources Division for the next three years can be characterized by the continued use of the Data General systems and by an increasing emphasis on popular, Microsoft Windows / Intel applications, particularly through the use of Windows NT and Windows NT / Wincenter servers... There will also be a slow growth in the use of other Unix platforms, such as those from Sun and Silicon Graphics, especially for use as compute and application servers". In other words, there will be an increase in the number of different kinds software used by Division staff and a more heterogenous hardware environment in which software is used. It is likely that a more heterogeneous computing environment will result in increased support costs, but these increased costs may be offset by declines in costs of hardware and software.

Additional observations and assumptions pertinent to DIS Office operation include:

- There has been a declining trend in centralized computer support funding; a significant change in priorities will be required to halt the decline or reverse this trend.
- More use of mainstream, off-the-shelf software will be made for user applications and the need for centralized development of large, customized packages will decrease, but there will be an increased need for centralized coordination of modules and objects.
- Training will be increasingly important to enable users to utilize new tools and to understand the new and emerging technologies, systems, and applications.
- Demands on both local-area networks (LAN) and wide-area networks (WAN) will increase dramatically.
- AIS and NWIS will continue as major corporate 'legacy' systems, with Ingres as their support-

ing database management system.

- GIS applications will utilize Arc/INFO, ArcView and other ESRI software products running on a mix of hosts--but slowly migrating to NT systems.
- The demise of DG Unix will require that existing Unix 'legacy' programs be ported to another environment.
- Since the completion of the FUTCOM2 report, there have been some improvements in NT-system functionality and it will clearly become a major system for the Division. Also, because of substantial investments in Sun and SGI systems by the Division, it is assumed that DIS will continue to provide support for those systems during the 3-year planning horizon.

Purpose and Scope

The purpose of this report is to provide recommendations on DIS functions, budgets, and funding mechanisms in order to ensure that the FUTCOM2 vision for computing in WRD during 1997-99 is fulfilled. These recommendations are based on discussions with DIS staff, CPAC, the 1997 Headquarters review team, and others; on a review of current DIS functions; and on some assumptions about budget and computing trends in WRD. Both general and very specific recommendations are included in this report.

This report is limited to the DIS Office. However, functions, staffing and budgets of all computer-related units (DIS, HASS, NWIS, and BAMS) should be examined to determine whether consolidation could lead to economies of scale and the elimination of redundant functions. The 1996 Headquarters Review Team noted that "computer support in Headquarters is fragmented and could be improved by consolidation."

General Strategy for Redirection of DIS Operations, 1997-99

During the past decade or more, a strong centrally-funded and managed computer support group has played a key role in the succesful growth of computing in WRD. The presence of standardized hardware and sofware throughout the Division resulted in significant savings in development, maintenance, and training costs, as well as enhancing consistency and staff efficiency. In this type of environment the provision of centralized support services to both end users and systems-level staff was cost-effective. With technological and policy changes that are leading to a more diverse computing environment, there is a renewed need to recognize the strengths that centralized support brings to WRD, and to maintain or increase this support within policy and funding constraints.

However, a basic redirection in the methods and extent to which WRD provides centralized computer support services is needed because of

- an increasingly diversified hardware and software operating environment,
- increased training needs associated with the diversified environment,
- increased demands on local- and wide-area networks,
- the need to support for some unforeseeable amount of time existing 'legacy' systems: some-

what dated hardware and/or software that are widely used in WRD,

- the existence, at a minimum, of constrained funding, and possibly reduced funding, available to support traditional DIS Office roles, and
- an overcommitted DIS staff.

To the extent possible, DIS should provide *whole-system support*, resulting in hardware and software integrated into WRD workflow. Support should be a combination of direct assistance at the site administrator level, coordination of activities, and identification of outside resources. CPAC recommends that the DIS Office adopt the following general strategy for the 3-year planning period:

- Provide leadership and support for enhancing wide- and local-area networks.
- Focus the technical assistance role of the DIS Office at the systems (site administrator) level, with selected applications-level support.
- Increase the level of resources dedicated to product research, evaluation and procurement of commercial software that can facilitate the WRD mission.
- Limit in-house software development to minor script writing that links legacy software and databases to off-the-shelf software packages and facilitates their interoperability and integration into WRD workflow.
- Continue, or initiate, the development of standardized releases of operating systems and selected applications software for SGI, Sun, DG, and NT hardware systems.
- Coordinate a reduced number of funded help groups, consisting primarily of hardware and software experts at the cost center level, to support hardware and software priorities established by CPAC.

Proposed DIS functions are summarized in table 1. Functions are listed in order of priority assigned by CPAC. Priorities assigned during the 1997 Headquarters Review process, and the results of an informal Northeast Region poll of District Chiefs and Site Administrators are included for comparison. Costs to implement specific functions have been estimated; if possible, costs (tangible or intangible) associated with failure to implement the functions are provided. Detailed background information used to produce the table can be found at *http://wwwrcolka.cr.usgs.gov/uo/comp/dis/table3.html*.

Function Specific Recommendations

The following sections contain specific recommendations for DIS redirection in 1997-99. These recommendations are subdivided in four functions: hardware and operating system support; software support; telecommunication networks; training, technical assistance, and information dissemination; and spatial data support.

Table 1: --Summary of DIS Functions, Priorities, and Costs

[Headquarters review ratings: 1 - 5, with 1 being highest priority;
Northeast Region poll based on results from 26 respondents, including District Chiefs and Site Administrators]

Function	Priority		Cost to Implement	Cost if not Implemented
	97 Hdqtrs Review	NR Poll		
Wide- and Local-Area Network Support	1.27-1.67	Essential	$241,000	---
Hardware Procurement and Maintenance	---	Very Important	$163,500	$8,700,000 in FY97
Hardware and Operating System Support- DG hardware and DG/UX Sun hardware and Solaris SGI hardware and Irix Intel hardware and NC-WinCenter Pro NCD X-terminals	1.32-1.46	Essential	$209,000+	Loss of field support assistance would mean that SSU would support 150-170 DG sites and their respective administrators.
Hardware and Operating System Support Peripherals, LRGS systems and SCO UNIX, and Linux	---	---	---	---
Hardware Technology Research	---	Essential	$55,000	---
Hardware and Operating System Training	1.32	Important	$6,000	$200,000 +
Software Support--Priority 1 software (table 2)	1.45-1.53	Very Important	$485,500	Loss of reduced maintenance charges from software vendors; increased difficulty in installing new versions of commercial software.
Software Support--Priority 2 software (see table 2)	---	---	$30,000	
Software Technology Research	1.58	Essential	$90,000	Inadequate improvement of interoperability of commercial products with USGS software and hardware
Technical Advisory Committee	1.46	---	$50,000	Loss of support for security, and of team needed to test NT configurations with WRD's UNIX system
Security	1.48	Essential	$88,000	Inability to conduct security scans
NCTM	---	---	$130,000	Higher training costs for SA's
GIS Software Procurement	1.29	---	$23,000	$98,000 minimum
GIS Software Support	1.29	---	$184,000	Increase in response time to users; violation of terms of ESRI contract.
Software Procurement	---	Very Important	$59,000	At least $3,000,000 in FY97
Hardware and Operating System Support Windows 3.1., 95, and 97, MacIntosh, and Prime	---	Important	--	---
GIS Software Training	1.70	---	$21,000	---
Other GIS Services	1.77 - 2.08	---	$68,000	---
WWW Services	1.85	Very Important	$28,000	---
Software Training	2.09	Important	$121,000	Higher costs, lower effectiveness
Headquarters Assistance	---	---	To be provided independently from DIS Office	

Table 2.--Packages for DIS Software Support and Associated Annual Costs

Software	Platforms	Annual Cost
Priority 1		
AWK	DG/UX, Solaris, Irix, NT/WcP	$5,000
C	DG/UX, Solaris, Irix	$6,500
E-mail	DG/UX, Solaris, Irix, NT/WCP, MAC	$81,500
Emacs	DG/UX, Solaris, Irix	$1,500
FORTRAN	DG/UX, Solaris, Irix, NT/WCP	$10,000
FrameMaker	DG/UX, Solaris, Irix, NT/WCP, MAC	$33,500
Graphics	DG/UX, Solaris, Irix, NT/WCP	$33,000
Ingres	DG/UX, Solaris, Irix, NT/WCP	$91,500
Java	Solaris, Irix, NT/WCP	$5,000
Perl	DG/UX, Solaris, Irix, NT/WCP	$5,000
Python	DG/UX, Solaris, Irix, NT/WCP	$5,000
rdb	DG/UX, Solaris, Irix, NT/WCP	$9,000+
SNA	DG/UX	0
WWW	DG/UX, Solaris, Irix, NT/WCP	$16,000
SAMBA	DG/UX, Solaris, Irix, NT/WCP	$14,000
SAS	DG/UX. Solaris, NT/WCP	$13,000
MC VisualC/C++	NT/WCP	$7,000
Priority 2		
Adobe Illustrator	Solaris, NT/WCP	$5,000
C++	Solaris, Irix	$7,000
CorelDraw	MAC, NT/WCP, Solaris, Irix	$5,000
G2	DG/UX	$6,000
MS Project	NT/WCP	0
MS Visual Basic	NT/WCP	$7,000

Hardware and Operating Systems Support

- DIS should continue to support the phase-out of the Prime computers, discontinuing all support on 9/30/97 or whenever the last Prime site has ported NWIS to the DG.
- DIS should discontinue any activities in support of stand-alone PCs, which are not networked, other than laptop computers, as well as PC’s running operating systems other than Windows and NT.

- DIS should discontinue support of MAC systems by 9/30/97.
- DIS should continue to conduct product research, evaluation, procurement and integration of other Unix platforms, (Sun and SGI hardware and operating systems) in order to allow porting of Unix-based corporate 'legacy' systems to a viable Unix platform.
- DIS should expand its product research, evaluation, integration, procurement, and site administrator support for upcoming 'mainstream' hardware and operating systems, specifically, Windows NT and Wincenter Pro.

Software Support

- DIS should evaluate the use of all sources, including outside vendors, for user help and training, with the goal of reducing the level of funded, in house, user support for commercial software packages.
- DIS should continue, or initiate, systems-level support for (1) DG, Sun, SGI, X-terminals, and NT hardware and (2) the software systems identified in table 2.
- DIS should limit in-house software development to minor script writing that links legacy software and databases to off-the-shelf software packages and facilitates their interoperability.
- DIS should continue to coordinate funded email-based help groups for selected topics, and should publicize the availability of this form of help. There is a need, however, to significantly reduce the number of funded email groups. Decisions to reduce funded email help groups should include an analyses of help group usage. Currently there are about 40 funded email help groups.

Telecommunication Networks

Research, planning, design, testing, procurement, management, maintenance, security and technical assistance of the Wide-Area Network (WAN) are critical functions of the DIS office. During the 3-year period covered by this report, WRD network equipment replacement/upgrades will continue, and significant demand for increased network speeds are likely. The explosive growth of WWW applications, the need for improved response to the Internet, serving of real-time and historical data to cooperators, and the growing demands of software distribution over the network are driving the continuing need for upgrades.

The FUTCOM2 report states that "...the Division and the Survey will have to become smarter about serving large volumes of data in a secure fashion....By 1999/2000 our own data network requirements will have increased significantly due to multimedia and WWW applications and data dissemination. WAN network speeds for District and large offices will increase to between 256 Kbps and T1 levels. Network costs will continue to increase at the rate of approximately 5-10% per year."

Enhanced DIS involvement in planning, product research, procurement, security and systems-level training in wide- and local-area networks will be needed over the next 3 years to achieve maximum network efficiencies at the lowest possible cost. Training for site administrators, in both WAN and LAN capacity planning, network administration and trouble-shooting will be a necessity. Network sniffers, other diagnostic tools, and network monitoring/recording software should be made available to field site administrators to facilitate these functions at the local level. SWAT

Teams should continue to be available to help site administrators customize their network, servers, and applications to prevent both computer server and network bottlenecks.

Training, Technical Assistance, and Information Dissemination

The DIS Office role in training should be to (1) coordinate and facilitate user and site administrator training from commercial sources, and (2) select coordinate, sponsor, and develop in-house training primarily for site administrators. DIS should investigate centralized procurement of training for widely-used commercial software packages. Training officers, regional computer specialists, and software-specific "experts" at the regional or cost-center levels should play a greater role in training. NCTM should continue to be sponsored by DIS, but be geared towards the training of system administrators and not end users or user applications.

The DIS role in information dissemination relative to hardware, software, telecommunications and security should continue. However, emphasis should be placed on reducing the number of information-transfer vehicles. In the past, the DIScussion Newsletter, email, WWW pages, tri-fold cards and other mechanisms have been used to convey information. A single media (e.g. WWW) with emphasis on organization, brevity, currency and accuracy would be more cost-effective than maintaining multiple outlets.

Spatial Data Support

The Spatial Data Support Unit was created within the DIS Office in 1994, but has never been fully staffed as originally envisioned. CPAC recommends that DIS limit its support of spatial data systems to product research, evaluation, procurement, and systems-level support. Policy and standards issues, relative to Geographic Information Systems and spatial databases, are more appropriately placed in other WRD offices, with the Bureau leadership role being taken by the National Mapping Division.

DIS Office Organization

CPAC recommends that the current organization of DIS into a System Support Unit (SSU), with focus on hardware, operating systems, and telecommunications, and an Applications Support Unit (ASU), with focus on applications software, be continued as a logical and workable organization. The reduced role of the ASU in user applications support should be offset by a increased role in contracting of such services and of writing, or contracting the writing, of scripts to facilitate the integration of commercial software into WRD 'legacy' systems and databases.

CPAC recommends that Headquarters system administration functions be provided out of a separate dedicated unit of DIS. The day-to-day maintenance and user help currently provided by staff throughout the DIS Office is difficult to manage and control and diverts the attention and resources from the DIS mission to support the Division as a whole. In particular, the level of resources required to support and integrate Headquarters MAC systems in the Division computer environment is extremely taxing on DIS Office resources. The option of transferring system administration functions from DIS to the individual cost centers within Headquarters is also feasible. However, hands-on system administration within the DIS Office provides some benefit in keeping DIS in closer touch with issues faced by system administrators throughout the Division.

CPAC does recommend that graphics support (both routine production and graphics group activities) currently performed within DIS, be moved elsewhere in the Headquarters organization. This support activity is inconsistent with the mission of DIS as envisioned for the next 3 years.

DIS Office Budget, Staffing and Funding

CPAC recommends that the process utilized in budgeting and staffing the DIS Office involve a zero-based approach, where each function and position is reviewed and priced annually and a fixed budget is established early in the fiscal year. The DIS Office budget and staffing should be consistent with adequate delivery of the functions described above, with specific functions being eliminated, when necessary, to meet budgetary constraints. The current approach of renegotiating budgets throughout the year, and attempting to maintain user-level support for an expanding array of hardware and software systems by spreading support thinner, is demoralizing for the DIS Staff, unsatisfactory to users, and cost ineffective.

Budget and staffing decisions should be based on priorities established in this report (tables 1 and 2). Particular functions should be fully funded, rather than diluting efforts on priority functions so that more activities could be attempted. The past practice of partially funding all functions is no longer appropriate, because key functions become neglected or only inadequately fulfilled.

The FY-97 budget for the DIS Office is $1.25 Million, but DIS is funded at $1.195 Million by the Division assessment (WOTSC) and cost recovery for various contracts. Some $1.048 Million, or 84 percent of the DIS budget is consumed by salaries, either within the DIS Office, or for field-based staff who are funded to provide software development or user help. This leads to a situation in which discretionary funding, which might be used to increase hardware and software purchases for testing and evaluation purposes, is inadequate. CPAC concurs with the DIS Office position that training funds be allocated at a minimum of 2 percent of the Office salary base. In addition, the DIS Office must have sufficient funding to procure new hardware and software for testing and evaluation purposes. DIS should continue to pursue no-cost, trial hardware and software packages, as well as purchase selected hardware and software for testing and evaluation purchases, such as the proposed FY-98 purchase of a Sun server and software licenses. To the extent that any system is used for Headquarters production (rather than testing and evaluation purposes), the purchase costs should be recovered from the HQ offices using the server. Likewise, the staffing costs for Headquarters system administration activities should be borne by Headquarters cost centers in proportion to the number of clients served.

CPAC recommends that the DIS Office continue to be supported by the Division assessment (WOTSC) rather than through user fees. The redirection of DIS over the next 3 years toward product research, evaluation, the procurement of major common-use hardware and software, and the provision of systems-level (rather than applications) support, renders a user-fee approach not cost-effective and administratively burdensome. DIS should inform sites early in the fiscal year of all fixed costs to be recovered from the site.