To: Executive Staff and direct Reports
From: Bill Gates
Date: May 26, 1995

The Internet Tidal Wave

Our vision for the last 20 years can be summarized in a succinct way. We saw that exponential improvements in computer capabilities would make great software quite valuable. Our response was to build an organization to deliver the best software products. In the next 20 years the improvement in computer power will be outpaced by the exponential improvements in communications networks. The combination of these elements will have a fundamental impact on work, learning and play. Great software products will be crucial to delivering the benefits of these advances. Both the variety and volume of the software will increase.

Most users of communications have not yet seen the price of communications come down significantly. Cable and phone networks are still depreciating networks built with old technology. Universal service monopolies and other government involvement around the world have kept communications costs high. Private networks and the Internet which are built using state of the art equipment have been the primary beneficiaries of the improved communications technology. The PC is just now starting to create additional demand that will drive a new wave of investment. A combination of expanded access to the Internet, ISDN, new broadband networks justified by video based applications and interconnections between each of these will bring low cost communication to most businesses and homes within the next decade.

The Internet is at the forefront of all of this and developments on the Internet over the next several years will set the course of our industry for a long time to come. Perhaps you have already seen memos from me or others here about the importance of the Internet. I have gone through several stages of increasing my views of its importance. Now I assign the Internet the highest level of importance. In this memo I want to make clear that our focus on the Internet is crucial to every part of our business. The Internet is the most important single development to come along since the IBM PC was introduced in 1981. It is even more important than the arrival of the graphical user interface (GUI). The PC analogy is apt for many reasons. The PC wasn't perfect. Aspects of the PC were arbitrary or even poor. However a phenomena grew up around the IBM PC that made it a key element of everything that would happen for the next 15 years. Companies that tried to fight the PC standard often had good reasons for doing so but they failed because the phenomena overcame any weaknesses that resisters identified.

The Internet Today

The Internet's unique position arises from a number of elements. TCP/IP protocols that define its transport level support distributed computing and scale incredibly well. The Internet Engineering Task Force (IETF) has defined an evolutionary path that will avoid running into future problems even as eventually everyone on the planet connects up. The HTTP protocols that define HTML Web browsing are extremely simple and have allowed servers to handle incredible traffic reasonably well. All of the predictions about hypertext - made decades ago by pioneers like Ted Nelson - are coming true on the Web. Although other protocols on the Internet will continue to be used (FTP, Gopher, IRC, Telnet, SMTP, NNTP). HTML with extensions will be the standard that defines how information will be presented. Various extensions to HTML, including content enhancements like tables, and functionality

enhancements like secure transactions, will be widely adopted in the near future. There will also be enhanced 3D presentations providing for virtual reality type shopping and socialization.

Another unique aspect of the Internet is that because it buys communications lines on a commodity bid basis and because it is growing so fast, it is the only "public" network whose economics reflect the latest advances in communications technology. The price paid for corporations to connect to the Internet is determined by the size of your "on-ramp" to the Internet and not by how much you actually use your connection. Usage isn't even metered. It doesn't matter if you connect nearby or half way around the globe. This makes the marginal cost of extra usage essentially zero encouraging heavy usage.

Most important is that the Internet has bootstrapped itself as a place to publish content. It has enough users that it is benefiting from the positive feedback loop of the more users it gets, the more content it gets, and the more content it gets, the more users it gets. I encourage everyone on the executive staff and their direct reports to use the Internet. I've attached an appendix, which Brian Fleming helped me pull together that shows some hot sites to try out. You can do this by either using the .HTM enclosure with any Internet browser or, if you have MS Word set up properly, you can navigate right from within this document. Of particular interest are the sites such as "YAHOO" which provide subject catalogs and searching. Also of interest are the ways our competitors are using their Websites to present their products. I think SUN, Netscape and Lotus do some things very well.

Amazingly, it is easier to find information on the Web than it is to find information on the Microsoft Corporate Network. This inversion where a public network solves a problem better than a private network is quite stunning. This inversion points out an opportunity for us in the corporate market. An important goal for the Office and Systems products is to focus on how our customers can create and publish information on their LANs. All work we do here can be leveraged into the HTTP/Web world. The strength of the Office and Windows businesses today gives us a chance to superset the Web. One critical issue is runtime/browser size and performance. Only when our MS Office - Windows solution has comparable performance to the Web will our extensions be worthwhile. I view this as the most important element of MS Office 96 and the next major release of Windows.

One technical challenge facing the Internet is how to handle "real-time" content - specifically audio and video. The underlying technology of the Internet is a packet network which does not guarantee that data will move from one point to another at a guaranteed rate. The congestion on the network determines how quickly packets are sent. Audio can be delivered on the Internet today using several approaches. The classic approach is to simply transmit the audio file in its entirety before it is played. A second approach is to send enough of it to be fairly sure that you can keeping playing without having to pause. This is the approach Progressive Networks Real Audio (Rob Glaser's new company) uses. Three companies (Internet Voice Chat, Vocal Tec, and Netphone) allow phone conversations across the Internet but the quality is worse than a normal phone call. For video, a protocol called CU-See Me from Cornell allows for video conferencing. It simply delivers as many frames per second as it sees the current network congestion can handle, so even at low resolution it is quite jerky. All of these "hacks" to provide video and audio will improve because the Internet will get faster and also because the software will improve. At some point in the next three years, protocol enhancements taking advantage of the ATM backbone being used for most of the Internet will provide "quality of service guarantees". This is a guarantee by every switch between you and your destination that enough bandwidth had been reserved to make sure you get your data as fast as you need it. Extensions to IP have already been proposed. This might be an opportunity for us to take the lead working with UUNET and others.

Only with this improvement and an incredible amount of additional bandwidth and local connections will the Internet infrastructure deliver all of the promises of the full blown Information Highway. However, it is in the process of happening and all we can do is get involved and take advantage.

I think that virtually every PC will be used to connect to the Internet and that the Internet will help keep PC purchasing very healthy for many years to come. PCs will connect to the Internet a variety of ways. A normal phone call using a 14.4k or 28.8k baud modem will be the most popular in the near future. An ISDN connection at 128kb will be very attractive as the connection costs from the RBOCs and the modem costs come down. I expect an explosion in ISDN usage for both Internet connection and point-to-point connections. Point-to-point allows for low latency which is very helpful for interactive games. ISDN point-to-point allows for simultaneous voice data which is a very attractive feature for sharing information. Example scenarios include planning a trip, discussing a contract, discussing a financial transaction like a bill or a purchase or taxes or getting support questions about your PC answered. Eventually you will be able to find the name of someone or a service you want to connect to on the Internet and rerouting your call to temporarily be a point-to-point connection will happen automatically. For example when you are browsing travel possibilities if you want to talk to someone with expertise on the area you are considering, you simply click on a button and the request will be sent to a server that keeps a list of available agents who can be working anywhere they like as long as they have a PC with ISDN. You will be reconnected and the agent will get all of the context of what you are looking at and your previous history of travel if the agency has a database. The reconnection approach will not be necessary once the network has quality of service guarantees.

Another way to connect a PC will be to use a cable-modem that uses the coaxial cable normally used for analog TV transmission. Early cable systems will essentially turn the coax into an Ethernet so that everyone in the same neighborhood will share a LAN. The most difficult problem for cable systems is sending data from the PC back up the cable system (the "back channel"). Some cable companies will promote an approach where the cable is used to send data to the PC (the "forward channel") and a phone connection is used for the back channel. The data rate of the forward channel on a cable system should be better than ISDN. Eventually the cable operators will have to do a full upgrade to an ATM-based system using either all fiber or a combination of fiber and Coax - however, when the cable or phone companies will make this huge investment is completely unclear at this point. If these buildouts happen soon, then there will be a loose relationship between the Internet and these broadband systems. If they don't happen for some time, then these broadband systems could be an extension of the Internet with very few new standards to be set. I think the second scenario is very likely.

Three of the biggest developments in the last five years have been the growth in CD titles, the growth in On-line usage, and the growth in the Internet. Each of these had to establish critical mass on their own. Now we see that these three are strongly related to each other and as they come together they will accelerate in popularity. The On-line services business and the Internet have merged. What I mean by this is that every On-line service has to simply be a place on the Internet with extra value added. MSN is not competing with the Internet although we will have to explain to content publishers and users why they should use MSN instead of just setting up their own Web server. We don't have a clear enough answer to this question today. For users who connect to the Internet some way other than paying us for the connection we will have to make MSN very, very inexpensive - perhaps free. The amount of free information available today on the Internet is quite amazing. Although there is room to use brand names and quality to differentiate from free content, this will not be easy and it puts a lot of pressure to figure out how to get advertiser funding. Even the CD-ROM business will be dramatically

affected by the Internet. Encyclopedia Britannica is offering their content on a subscription basis. Cinemania type information for all the latest movies is available for free on the Web including theater information and QuickTime movie trailers.

Competition

Our traditional competitors are just getting involved with the Internet. Novell is surprisingly absent given the importance of networking to their position however Frankenberg recognizes its importance and is driving them in that direction. Novell has recognized that a key missing element of the Internet is a good directory service. They are working with AT&T and other phone companies to use the Netware Directory Service to fill this role. This represents a major threat to us. Lotus is already shipping the Internotes Web Publisher which replicates Notes databases into HTML. Notes V4 includes secure Internet browsing in its server and client. IBM includes Internet connection through its network in OS/2 and promotes that as a key feature.

Some competitors have a much deeper involvement in the Internet than Microsoft. All UNIX vendors are benefiting from the Internet since the default server is still a UNIX box and not Windows NT, particularly for high end demands, SUN has exploited this quite effectively. Many Web sites, including Paul Allen's ESPNET, put a SUN logo and link at the bottom of their home page in return for low cost hardware. Several universities have "Sun sites" named because they use donated SUN hardware. SUN's Java project involves turning an Internet client into a programmable framework. SUN is very involved in evolving the Internet to stay away from Microsoft. On the SUN Homepage you can find an interview of Scott McNealy by John Gage where Scott explains that if customers decide to give one product a high market share (Windows) that is not capitalism. SUN is promoting Sun Screen and HotJava with aggressive business ads promising that they will help companies make money.

SGI has also been advertising their leadership on the Internet including servers and authoring tools. Their ads are very business focused. They are backing the 3D image standard, VRML, which will allow the Internet to support virtual reality type shopping, gaming, and socializing.

Browsing the Web, you find almost no Microsoft file formats. After 10 hours of browsing, I had not seen a single Word .DOC, AVI file, Windows .EXE (other than content viewers), or other Microsoft file format. I did see a great number of QuickTime files. All of the movie studios use them to offer film trailers. Apple benefited by having TCP support before we did and is working hard to build a browser built from OpenDoc components. Apple will push for OpenDoc protocols to be used on the Internet, and is already offering good server configurations. Apple's strength in education gives them a much stronger presence on the Internet than their general market share would suggest.

Another popular file format on the Internet is PDF, the short name for Adobe Acrobat files. Even the IRS offers tax forms in PDF format. The limitations of HTML make it impossible to create forms or other documents with rich layout and PDF has become the standard alternative. For now, Acrobat files are really only useful if you print them out, but Adobe is investing heavily in this technology and we may see this change soon.
Adobe Acrobat and QuickTime are popular on the network because they are cross platform and the readers are free. Once a format gets established it is extremely difficult for another format to come along and even become equally popular.

A new competitor "born" on the Internet is Netscape. Their browser is dominant, with 70% usage share, allowing them to determine which network extensions will catch on. They are pursuing a multi-platform strategy where they move the key API into the client to commoditize the underlying operating system. They have attracted a number of public network operators to use their platform to

offer information and directory services. We have to match and beat their offerings including working with MCI, newspapers, and other who are considering their products.

One scary possibility being discussed by Internet fans is whether they should get together and create something far less expensive than a PC which is powerful enough for Web browsing. This new platform would optimize for the datatypes on the Web. Gordon Bell and others approached Intel on this and decided Intel didn't care about a low cost device so they started suggesting that General Magic or another operating system with a non-Intel chip is the best solution.

Next Steps

In highlighting the importance of the Internet to our future I don't want to suggest that I am alone in seeing this. There is excellent work going on in many product groups. Over the last year, a number of people have championed embracing TCP/IP, hyperlinking, HTML, and building client, tools and servers that compete on the Internet. However, we still have a lot to do. I want every product plan to try and go overboard on Internet features. One element that will be crucial is coordinating our various activities. The challenge/opportunity of the Internet is a key reason behind the recent organization. Paul Maritz will lead the Platform group to define an integrated strategy that makes it clear that Windows machines are the best choice for the Internet. This will protect and grow our Windows asset. Nathan and Pete will lead the Applications and Content group to figure out how to make money providing applications and content for the Internet. This will protect our Office asset and grow our Office, Consumer, and MSN businesses. The work that was done in the Advanced Technology group will be extremely important as it is integrated in with our products.

We must also invest in the Microsoft home page, so it will be clear how to find out about our various products. Today it's quite random what is on the home page and the quality of information is very low. If you look up speeches by me all you find are a few speeches over a year old. I believe the Internet will become our most important promotional vehicle and paying people to include links to our home pages will be a worthwhile way to spend advertising dollars. First we need to make sure that great information is available. One example is the demonstration files (ScreenCam format) that Lotus includes on all of their products organized by feature. I think a measurable part of our ad budget should focus on the Internet. Any information we create - white papers, data sheets, etc., should all be done on our Internet server.

ITG needs to take a hard look at whether we should drop our leasing arrangements for data lines to some countries and simply rely on the Internet.

The actions required for the Windows platform are quite broad. Paul Maritz is having an Internet retreat in June which will focus on coordinating these activities. Some critical steps are the following:

1. Server. BSD is working on offering the best Internet server as an integrated package. We need to understand how to make NT boxes the highest performance HTTP servers. Perhaps we should have a project with Compaq or someone else to focus on this. Our initial server will have good performance because it uses kernel level code to blast out a file. We need a clear story on whether a high volume Web site can use NT or not because SUN is viewed as the primary choice. Our plans for security need to be strengthened. Other Backoffice pieces like SMS and SQL server also need to stay out in front in working with the Internet. We need to figure out how OFS can help perhaps by allowing pages to be stored as objects and having properties added. Perhaps OFS can help with the challenge of maintaining Web structures. We need to establish distributed OLE as the protocol for Internet programming. Our server offerings need to beat what Netscape is doing including billing and security support. There will be substantial demand for high performance transaction servers. We need to make the media server

work across the Internet as soon as we can as new protocols are established. A major opportunity/challenge is directory. If the features required for Internet directory are not in Cairo or easily addable without a major release we will miss the window to become the world standard in directory with serious consequences. Lotus, Novell, and AT&T will be working together to try and establish the Internet directory. Actually getting the content for our directory and popularizing it could be done in the MSN group.

2. Client. First we need to offer a decent client (O'Hare) that exploits Windows 95 shortcuts. However this alone won't get people to switch away from Netscape. We need to figure out how to integrate Blackbird, and help browsing into our Internet client. We have made the decision to provide Blackbird capabilities openly rather than tie them to MSN. However, the process of getting the size, speed, and integration good enough for the market needs works and coordination. We need to figure out additional features that will allows us to get ahead with Windows customers. We need to move all of our Internet value added from the Plus pack into Windows 95 itself as soon as we possibly can with a major goal to get OEMs shipping our browser preinstalled. This follows directly from the plan to integrate the MSN and Internet clients. Another place for integration is to eliminate today's Help and replace it with the format our browser accepts including exploiting our unique extensions so there is another reason to use our browser. We need to determine how many browsers we promote. Today we have O'Hare, Blackbird, SPAM MediaView, Word, PowerPoint, Symmetry, Help and many others. Without unification we will lose to Netscape/HotJava.

Over time the shell and the browser will converge and support hierarchical/list/query viewing as well as document with links viewing. The former is the structured approach and the later allows for richer presentation. We need to establish OLE protocols as the way rich documents are shared on the Internet. I am sure the OpenDoc consortium will try and block this.

3. File sharing/Window sharing/Multi-user. We need to give away client code that encourages Windows specific protocols to be used across the Internet. It should be very easy to set up a server for file sharing across the Internet. Our PictureTel screen sharing client allowing Window sharing should work easily across the Internet. We should also consider whether to do something with the Citrix code that allows you to become a Windows NT user across the Network. It is different from the PictureTel approach because it isn't peer to peer. Instead it allows you to be a remote user on a shared NT system. By giving away the client code to support all of these scenarios, we can start to show that a Windows machine on the Internet is more valuable than an arbitrary machine on the net. We have immense leverage because our Client and Server API story is very strong. Using VB or VC to write Internet applications which have their UI remoted is a very powerful advantage for NT servers.

4. Forms/Languages. We need to make it very easy to design a form that presents itself as an HTML page. Today the Common Gateway Interface (CGI) is used on Web servers to give forms 'behavior' but its quite difficult to work with. BSD is defining a somewhat better approach they call BGI. However we need to integrate all of this with our Forms3 strategy and our languages. If we make it easy to associate controls with fields then we get leverage out of all of the work we are doing on data binding controls. Efforts like Frontier software's work and SUN's Java are a major challenge to us. We need to figure out when it makes sense to download control code to the client including a security approach to avoid this being a virus hole.

5. Search engines. This is related to the client/server strategies. Verity has done good work with Notes, Netscape, AT&T and many others to get them to adopt their scalable technology that can deal with large text databases with very large numbers of queries against them. We need to come up with a

strategy to bring together Office, Mediaview, Help, Cairo, and MSN. Access and Fox do not support text indexing as part of their queries today which is a major hole. Only when we have an integrated strategy will we be able to determine if our in-house efforts are adequate or to what degree we need to work with outside companies like Verity.

6. Formats. We need to make sure we output information from all of our products in both vanilla HTML form and in the extended forms that we promote. For example, any database reports should be navigable as hypertext documents. We need to decide how we are going to compete with Acrobat and QuickTime since right now we aren't challenging them. It may be worth investing in optimizing our file formats for these scenarios. What is our competitor to Acrobat? It was supposed to be a coordination of extended metafiles and Word but these plans are inadequate. The format issue spans the Platform and Applications groups.

7. Tools. Our disparate tools efforts need to be brought together. Everything needs to focus on a single integrated development environment that is extensible in a object oriented fashion. Tools should be architected as extensions to this framework. This means one common approach to repository/projects/source control. It means one approach to forms design. The environment has to support sophisticated viewing options like timelines and the advanced features SoftImage requires. Our work has been separated by independent focus on on-line versus CD-ROM and structured display versus animated displays. There are difficult technical issues to resolve. If we start by looking at the runtime piece (browser) I think this will guide us towards the right solution with the tools.

The actions required for the Applications and Content group are also quite broad. Some critical steps are the following:

1. Office. Allowing for collaboration across the Internet and allowing people to publish in our file formats for both Mac and Windows with free readers is very important. This won't happen without specific evangelization. DAD has written some good documents about Internet features. Word could lose out to focused Internet tools if it doesn't become faster and more WYSIWYG for HTML. There is a critical strategy issue of whether Word as a container is strict superset of our DataDoc containers allowing our Forms strategy to embrace Word fully.

2. MSN. The merger of the On-line business and Internet business creates a major challenge for MSN. It can't just be the place to find Microsoft information on the Internet. It has to have scale and reputation that it is the best way to take advantage of the Internet because of the value added. A lot of the content we have been attracting to MSN will be available in equal or better form on the Internet so we need to consider focusing on areas where we can provide something that will go beyond what the Internet will offer over the next few years. Our plan to promote Blackbird broadly takes away one element that would have been unique to MSN. We need to strengthen the relationship between MSN and Exchange/Cairo for mail, security and directory. We need to determine a set of services that MSN leads in - money transfer, directory, and search engines. Our high-end server offerings may require a specific relationship with MSN.

3. Consumer. Consumer has done a lot of thinking about the use of on-line for its various titles. On-line is great for annuity revenue and eliminating the problems of limited shelf-space. However, it also lowers the barriers to entry and allows for an immense amount of free information. Unfortunately today an MSN user has to download a huge browser for every CD title making it more of a demo capability than something a lot of people will adopt. The Internet will assure a large audience for a broad range of titles. However the challenge of becoming a leader in any subject area in terms of quality, depth, and price will be far more brutal than today's CD market. For each category we are in

we will have to decide if we can be #1 or #2 in that category or get out. A number of competitors will have natural advantages because of their non-electronic activities.

4. Broadband media applications. With the significant time before wide scale iTV deployment we need to look hard at which applications can be delivered in an ISDN/Internet environment or in a Satellite PC environment. We need a strategy for big areas like directory, news, and shopping. We need to decide how to peruse local information. The Cityscape project has a lot of promise but only with the right partners.

5. Electronic commerce. Key elements of electronic commerce including security and billing need to be integrated into our platform strategy. On-line allows us to take a new approach that should allow us to compete with Intuit and others. We need to think creatively about how to use the Internet/on-line world to enhance Money. Perhaps our Automatic teller machine project should be revived. Perhaps it makes sense to do a tax business that only operates on on-line. Perhaps we can establish the lowest cost way for people to do electronic bill paying. Perhaps we can team up with QuickBooks competitors to provide integrated on-line offerings. Intuit has made a lot of progress in overseas markets during the last six months. All the financial institutions will find it very easy to buy the best Internet technology tools from us and others and get into this world without much technical expertise.

The Future

We enter this new era with some considerable strengths. Among them are our people and the broad acceptance of Windows and Office. I believe the work that has been done in Consumer, Cairo, Advanced Technology, MSN, and Research position us very well to lead. Our opportunity to take advantage of these investments is coming faster than I would have predicted. The electronic world requires all of the directory, security, linguistic and other technologies we have worked on. It requires us to do even more in these areas than we planning to. There will be a lot of uncertainty as we first embrace the Internet and then extend it. Since the Internet is changing so rapidly we will have to revise our strategies from time to time and have better inter-group communication than ever before.

Our products will not be the only things changing. The way we distribute information and software as well as the way we communicate with and support customers will be changing. We have an opportunity to do a lot more with our resources. Information will be disseminated efficiently between us and our customers with less chance that the press miscommunicates our plans. Customers will come to our "home page" in unbelievable numbers and find out everything we want them to know.

The next few years are going to be very exciting as we tackle these challenges are opportunities. The Internet is a tidal wave. It changes the rules. It is an incredible opportunity as well as incredible challenge I am looking forward to your input on how we can improve our strategy to continue our track record of incredible success.