

**Futurists  
Revisited**

**"Your source for  
yesterday's look  
at today."**

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**Vannevar Bush  
and the WWW**

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**1. Introduction**

- 2. Start Interview
- 3. Memex Explained
- 4. How Web Differs
- 5. Which is Better?
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## Introduction **Vannevar Bush and the WWW**

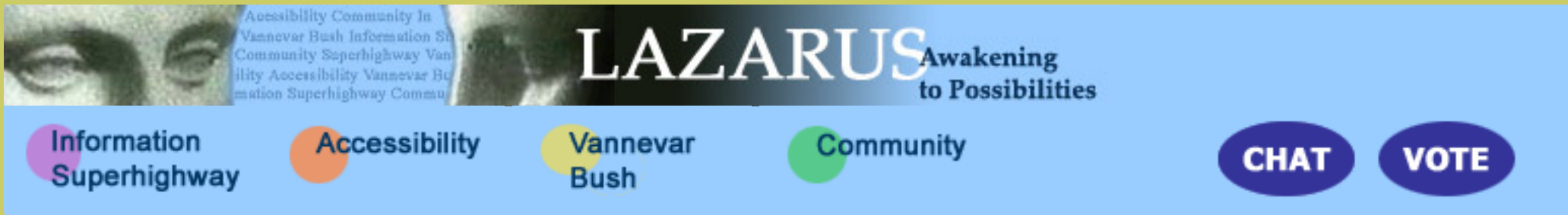
The following conversation was transcribed during the airing of the popular (and fictional) television show *Futurists Revisited*, hosted by Jim Marinetti. The show aired on January 14, 2001. Because he had been "missing" since 1974, there was some suspicion that the Dr. Vannevar Bush on the show was not the real Vannevar Bush. However, all worries were dispelled when it was realized that the show was fictional anyway.

During the fictional interview, Bush and Marinetti discussed Bush's early vision of the "memex," a machine for indexing and accessing information. Bush and Marinetti then considered the recent development of the World-Wide Web and compared Bush's decades-old vision to the present-day manifestation on the Web. Finally, Bush considers the role of "trailblazers" in designing a useful Web.



**Vannevar Bush**

**Follow Trail: [Start Reading the Interview >](#)**



The banner features a background image of a person's face. On the left, there is a vertical list of terms: "Accessibility Community In", "Vannevar Bush Information S", "Community Superhighway Van", "ility Accessibility Vannevar Bu", and "mation Superhighway Commu". The word "LAZARUS" is prominently displayed in large white letters, with the tagline "Awakening to Possibilities" to its right. Below the banner are four colored circles with text: a purple circle for "Information Superhighway", an orange circle for "Accessibility", a yellow circle for "Vannevar Bush", and a green circle for "Community". On the far right are two dark blue oval buttons labeled "CHAT" and "VOTE".

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**Start Interview**

**Vannevar Bush and the WWW**

**Jim Marinetti:**

Welcome to *Futurists Revisited*, your source for yesterday's look at today. For this show we welcome our guest, former Director of the Office of Scientific Research and Development, Dr. Vannevar Bush. Way back in 1945 Dr. Bush published "As We May Think," describing, among other things, a "memex" system for indexing, storing, and accessing the great information of the ages. Some people today are comparing the memex to the World-Wide Web. Dr. Bush, how did you think up such a contraption so long ago?

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"The human mind does not work that way. It operates by association."

**Vannevar Bush:**

Well, Jim, there was a great deal of the scientific information developed during and shortly after World War II. We had a problem keeping it all organized. "Our ineptitude in getting at the record [was] largely caused by the artificiality of systems of indexing." We alphabetized or sorted by number. We forced people to follow certain rules to trace from subclass to subclass. It was so cumbersome. The problem was that "the human mind does not work that way. It operates by association." That's why I conceived the memex.

**Jim Marinetti:**

So, the memex was really conceived out of human need. So many of the people that come on this show were inspired by technology and tried to figure out a way to make the technology useful. I admire those that dream in your direction, Dr. Bush.

**Vannevar Bush:**

Thank you Jim.

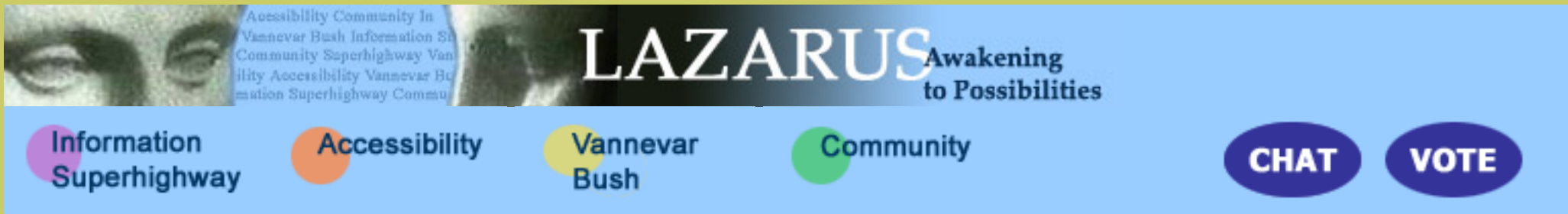
**Jim Marinetti:**

Dr. Bush, can you explain your memex to our audience? How did you think it might work?



**Bush (left) and Marinetti discuss the "memex."**

**Follow Trail: Vannevar Explains the Memex >**



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**Memex Explained** **Vannevar Bush and the WWW**

**Vannevar Bush:**

I conceived of the memex as "a sort of mechanized private file and library." It would store books, records, communications, and every bit of information you might want. Because it would be mechanized, you could find anything on the memex with "exceeding speed and flexibility." Basically, it could fill in all the gaps in your memory and could "think" like you do because you told it how to think.



**Vannevar Bush with his Differential Analyzer**

"...Modern-day computers? The Internet? Are they similar to what you thought the memex would be?"

**Jim Marinetti:**

That sounds very promising Vannevar - even today. May I call you Vannevar? You might not know because you have been "missing" for so long, but the name "Bush" has such a negative connotation these days...I'm sorry. Because you have been gone, you haven't followed the development of the digital age. Have you seen modern-day computers? The Internet? Are they similar to what you thought the memex would be?

**Vannevar Bush:**

I spent some time working on a modern computer yesterday and earlier today. I have to admit that it is a bit disappointing, personally, that digital computers flourished instead of my early idea of an analog computer. However, today's computers are physically very similar to my memex. They have a viewing screen, keyboard, and various buttons and seem to be attached to desks. The portable machines, the ones detached from desks, are the ones that excite me. I never imagined the mechanisms becoming so

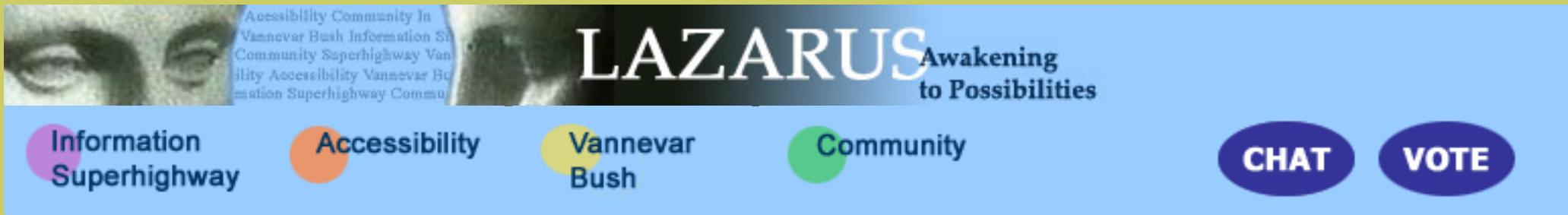
small.

You also wanted to know about the Internet. Well, yesterday, I was on the World Wide Web for the first time looking for information. I found it frustrating, but entertaining. It was a bit like a game, really. I can see why people like to compare the World Wide Web to what I wrote, but the Web seems to be quite a bit different from my memex.



**Bush sits back and discusses the merits of modern computing**

**Follow Trail: [Why the Web Differs from the Memex >](#)**



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**How Web Differs**

**Vannevar Bush and the WWW**

**Jim Marinetti:**

First, can you tell our audience how it is similar?

**Vannevar Bush:**

One of the fundamental concepts of the memex was the "provision whereby any item may be caused at will to select immediately and automatically another...tying two items together." The Web's hyperlinks seem to do this associative indexing work. It's a bit disorganized, though, because so many different people can add to the information on the Web and connect it however they like. Only designated hyperlinks, mostly designated by writers, connect to associated information.

"Any item may be caused at will to select immediately and automatically another...tying two items together."



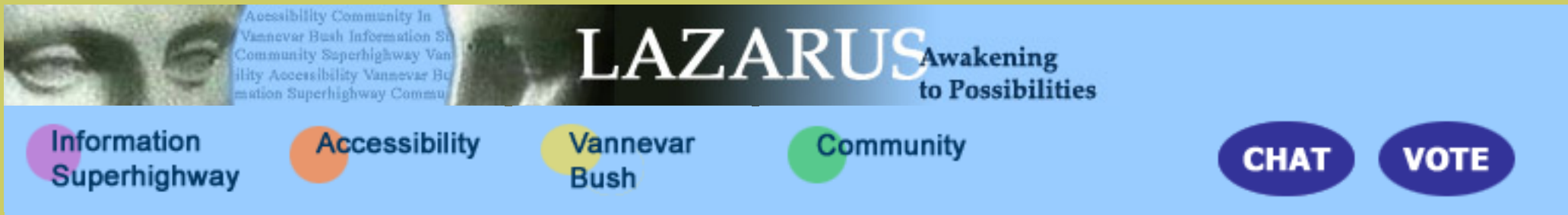
**Bush demonstrates his "photocomposer," an early word processor**

I thought of the memex as more of a personal contraption. I would add the information that I found interesting and associate it in ways that made sense to me. If I was a lawyer, I could trade associative trails with other lawyers and we could build up an impressive index of organized information. The Web seems too large to be organized in such useful trails, or else it is just too difficult to find useful trails. I never thought that all of the memex information in the world would be connected. It might just be too much information. I don't think such a large body of information can be easily designed to match the thought process of a human mind. I don't know if Web networks are advancements or just complications.

**Jim Marinetti:**

Most people today consider being wired and being connected to the Internet very positive advancements. Explain to this modern audience why a globally connected Web might be a complication. I guess I'm asking why the local memex has an advantage over the global Web.

**Follow Trail: Which is Better? Web or Memex? >**



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Which is Better?

Vannevar Bush and the WWW

"The way the World-Wide Web is now - as big as it is - there would have to be some type of filtering and choosing system for people to use so they can make sense of all the information on the Web."

### Vannevar Bush:

Well, Jim, I'll admit that there are some obvious advantages to having access to that much information. I even mentioned in "As We May Think" that pre-indexed encyclopedias could be inserted into a memex for reference. I just doubt how much of the information on the Web can be valuable to a specific person. I found plenty of information in one day that I would imagine *no one* would find useful. It is very difficult to make an organized trail of so much information.

It would be much easier to allow people to fill their own memex and choose the information and organization for their memex. The way the World-Wide Web is now - as big as it is - there would have to be some type of filtering and choosing system for people to use so they can make sense of all the information on the Web. The Web seems to be slapped-together lists of products to buy and news and other things. It is trying to do much more than I planned for the memex.

**Jim Marinetti:**

So, are you disappointed with the World Wide Web?

**Vannevar Bush:**

Yes and no. I just thought it would be different. I envisioned the content of the memex to be more academic...more based on a thought process. I thought the memex could reveal how great minds thought - the path they followed to develop their ideas. It was important that others could see all of the steps that led to the final product, not just the final product. People could share how thoughts were formed. Maybe these people that do the sharing could act like the filters I was talking about.

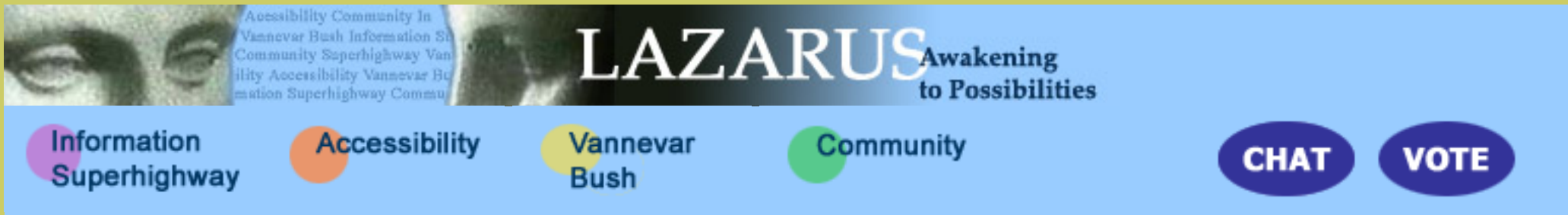


**Vannevar relaxes on his sailboat...no doubt contemplating the modern Web**

**Jim Marinetti:**

Are you talking about the "trailblazers" you described in you article? Could skilled trailblazers improve the Web?

**Follow Trail: Who are the Trailblazers? >**



The banner features a background image of a person's face. On the left, there is a vertical list of navigation links: "Information Superhighway", "Accessibility", "Vannevar Bush", and "Community". Each link is preceded by a colored circle (purple, orange, yellow, and green respectively). To the right of the navigation links, the word "LAZARUS" is written in large, white, serif font. Below it, the tagline "Awakening to Possibilities" is written in a smaller, white, sans-serif font. On the far right, there are two dark blue buttons with white text: "CHAT" and "VOTE".

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Trailblazers

Vannevar Bush and the WWW

"...useful trails through the enormous mass of the common record."

**Vannevar Bush:**

I guess so. I saw trailblazing as a new profession that established "useful trails through the enormous mass of the common record." It seemed like a noble research profession that would organize information for the human mind. Are there trailblazers out there on the Web today, Jim?

**Jim Marinetti:**

Well, I'm not sure, Vannevar. There *are* people out there designing the information that you see on the Web. They go by many names, like Information Designer. Some are more skilled than others, but the trails these people make are mostly intentional. A company named *Yahoo!* became very popular on the Web because it suggested trails for people to follow.



**Bush works with his "intagraph," a machine that could "think" for itself**

### **Vannevar Bush:**

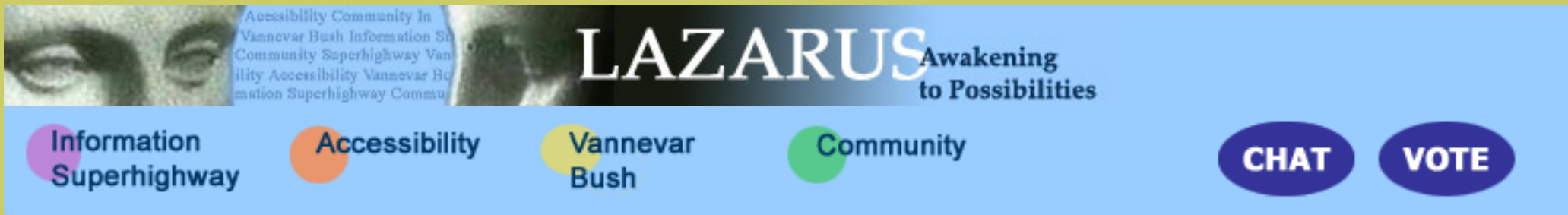
But there aren't really trails...just indexes...or there are too many trails available at once. When I thought of the memex I thought of how the human mind thinks of one idea and then develops subsequent ideas. I guess I thought it would follow a linear order from one idea to the next. Sometimes people think about two things at once, but usually they follow a pattern of one-thing leads to the next. Most of the information on the Web seems to be organized differently. These Information Designers have arranged information hierarchically so that people can make choices - lots of choices at once - and find information quickly. That is all well and good, but it is really more useful for selling products than revealing thought processes. I

talked before about how cumbersome it can be to follow a trail through subclasses of information. That is a machine organization, not necessarily a human associative process.

It seems like designers of the information on the Web are so concerned with providing people with choices that they aren't giving those people any real value...they aren't blazing trails...they are just providing access. Every time I looked at information on the Web, there were countless choices of hyperlinks that I could follow..maybe twenty choices at once. The choices didn't seem matched to thought processes... they just seemed to be guesses at what people might want to read...and most of the information isn't worth reading anyway.

"They aren't blazing trails...they are just providing access."

**Follow Trail: How Trailblazers Might Follow the Example of the Memex >**



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**Memex Followers**

**Vannevar Bush and the WWW**

"Isn't it important to let people find their own ways through information?"

**Jim Marinetti:**

But Vannevar, easy navigation is one of the most valued qualities of Websites today. Just ask Jakob Nielsen. Isn't it important to let people find their own ways through information?

**Vannevar Bush:**

Yes. The whole idea of the memex was to allow people to organize and access information. Of course I want people to be able to know where information is located. I also want them to know or decide for themselves how the information is organized. But I don't think that the answer to the problem is providing twenty hyperlinks on every document.

**Jim Marinetti:**

So, Vannevar, what is the answer? What can your vision of the memex tell us to help shape the World Wide Web?

### **Vannevar Bush:**

One of the most important changes to make in the Web is the shift the focus from the single document to the trail of documents. This should be easier on the Web than with the memex because the documents are being designed specifically for the Web. With the memex a trailblazer would have had to piece together letters and books and musical scores and all sorts of media that didn't quite fit together. The way I understand the Web, it works well with all sorts of media - even sound and video - and it should be easy to specifically design useful trails. Trails that tell important stories and reveal thought processes. Trailblazers shouldn't have to force awkward media types together awkwardly. They should be able to build cohesive trails of documents.



**Is the Differential Analyzer the Answer?**

### **Jim Marinetti:**

I still want to know how people will access these trails. If the trails of documents will not focus on navigation, how will we reach them?

**Follow Trail: Will Search Engines Solve Our Problems? >**

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"If the trails of documents will not focus on navigation, how will we reach them? "

**Vannevar Bush:**

Hopefully we can use hyperlink navigation for associative organization and a different method for different navigation. Right now there is a big problem locating information because it is created and coded in so many different ways. With the memex, I envisioned the ability to tap in the code of, say, a book. The code for the book would cause "the title page of the book [to] promptly appear" and allow the reader to follow its trail. I see two different types of codes on the Web right now. One is the code you can type into a search engine. The other is the URL code for a page. The search engine tries to understand real words, while the URL is unique to a page. There needs to be a uniform system for cataloging all of the information that goes into the memex or onto the Web so that there is a type of code that understands human language and is unique to a given trail.

**Jim Marinetti:**

Well, we've all been frustrated with search engines. You seem to be describing some sort of smart search engine that we would use only when we wanted to start down a new path...er...trail. Some people think that XML might be a language that would allow for such search engines to exist. There seem to be many possibilities but few successes.

**Vannevar Bush:**

Don't forget how young the Web is. I worked for years on some projects that never quite succeeded. The Web is struggling because it is trying to fulfill many uses. I conceived of the memex as mostly a reference tool and a way to store and build up human knowledge. The vision of the memex was not nearly as interactive as the Web; you couldn't buy anything using your memex. If I understand XML, I would think that it could be used to distinguish the purpose of a trail. Consumer trails could be coded differently than reference trails and computers might be smart enough to locate the right information...if the trailblazers organized and coded the trail correctly. Then the Web could fulfill the promise of the memex and maybe even some more.



**Vannevar Bush  
discusses the potential  
of the World Wide Web**

**Jim Marinetti:**

Well, Vannevar, let's hope that the Web does fulfill that potential as it matures. Maybe the vision of the memex and your ideas will help all those trailblazers and Information Designers out there. This has been very interesting, but sadly we're out of time. I'd like to thank Vannevar Bush for joining us today; this has been *Futurists Revisited*. Good night.

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**Follow Trail:Further Reading**

- > "As We May Think" at Atlantic Monthly
  - > Vannevar Bush at Electronic Labyrinth
  - > Symposium on Vannevar Bush at MIT Website  
(Photos)
  - > The Memex at Pioneer Website
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## About Vannevar Bush and the WWW

Vannevar Bush was a real man. He lived from 1890-1974. He was an amazing man, but in no way did he really have this fictional conversation with this fictional host of this fictional television show twenty-seven years after his death. Vannevar Bush did write "As We May Think," and did describe the "memex." The portions of the fictional interview that appear as quotations in the text are taken from Bush's essay to simulate what he might have said. You can find the essay online at the [Atlantic Monthly](#). While the contents of this website hope to add insight to the discussion of today's World Wide Web and Bush's memex, they are intended to inform and entertain - not represent the actual statements of Vannevar Bush. The photographs used throughout these Vannevar Bush pages are used with permission from MIT. Much thanks to the kind people at MIT Museum for granting permission for the use of the photographs.

Please enjoy the website and think of what you might expect Vannevar Bush to say about today's World Wide Web.

The Vannevar Bush interview on [Futurists Revisited](#) was created and written by Chris Holstrom for an Information Design course at the University of Washington. It was then contributed to Lazarus.

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