

leading the Web to its full potential

“The Consortium has been changing constantly since it was formed. Having completed a ‘catching up’ and stabilizing phase with HTML 4.0 and HTTP 1.1, W3C has started state-of-the-art common specifications such as in Scalable Vector Graphics (SVG) and Platform for Privacy Preferences (P3P). It is also forging ahead with a new idea—the semantic Web—a unification of data everywhere, through the Web, into effectively one large database. The Resource Description Framework (RDF) and the Extensible Markup Language (XML) are the two layers which provide a stable foundation for a very exciting set of developments to come.”

Tim Berners-Lee  
Director, W3C

## a new era where people use a semantic Web to engage, enrich, and educate

The World Wide Web provides people with information on every topic. For growing numbers of people, it is also emerging as the environment of choice for services related to their professional activities and personal interests. The Web provides a vehicle for civic participation, commercial transactions, and education. It gives people access to world news, employment opportunities, and each other. And while the potential uses for the Web seem endless, exercising that potential requires new technology development.

What has been missing from the Web is a standard way to create and collect information about information—also known as metadata. Enabling the creation of descriptive information makes it possible for Web data to be effectively searched and processed by computers. These models produce results that surpass current technologies in accuracy and scalability, while providing additional features, such as validation.

Implementation of a stable, extensible model for metadata is the next step in leading the Web to its full potential. RDF—Resource Description Framework—and XML—Extensible Markup Language—are two technologies from W3C that will aid the Web to grow and better serve the needs of the global Web community.

“The Consortium is pivotal in ensuring that the World Wide Web advances communications and serves cultures around the globe.”

**Nobuo Saito**

Dean and Professor of Environmental Information  
Keio University

#### THE INTERNET: THE WORLD'S LARGEST COMPUTER NETWORK

In 1969, the U.S. Department of Defense's Advanced Research Projects Agency (DARPA), established the Internet as a way to connect the many military, university, and defense contractors working on its projects. ARPANet was designed to use decentralized networking. This allowed the network to grow extremely quickly and to survive isolated computer failures.

In the mid-1980s, the National Science Foundation (NSF) developed its own network, NSFNet, to be used for scholarly research at colleges throughout the United States. NSFNet also offered students and faculty new ways to collaborate with their peers. Before long, email, newsgroups, and public file servers sprouted, computer lines became overloaded, and the Internet was flourishing. Since then, the Internet's continued growth has been phenomenal to say the least. Today it spans all seven continents. The number of users easily approaches hundreds of millions.

#### THE WORLD WIDE WEB: SIMPLIFIED AND UNIVERSAL ACCESS TO THE INTERNET

The World Wide Web, commonly referred to as the “Web,” was first conceived in 1989 by Tim Berners-Lee as a project to improve collaboration between researchers at CERN (the European Laboratory for Particle Physics in Geneva, Switzerland). The Web was devised as a seamless model in which all information on the Internet could be accessed in an extremely simple and consistent manner—from any computer, in any country, by any authorized user. Although the Web soon spread outside the halls of the CERN research laboratories, it didn't really take off until late 1992. Its sudden success was due, in part, to the popularity of Mosaic, a graphical browser created by NCSA (National Center for Supercomputing Applications). Currently the Web is the most popular and fastest-growing information system deployed on the Internet, representing more than 80% of its traffic.

#### THE WORLD WIDE WEB CONSORTIUM: THE LEADER IN GLOBAL WEB EVOLUTION AND INTEROPERABILITY

The rapid growth of the Web made it difficult for CERN to continue to oversee and coordinate the entire Web development effort. It became clear that the Web had outgrown its beginnings in the physics community. In 1994, the World Wide Web Consortium (W3C) was founded at MIT in collaboration with CERN and with seed funding from DARPA and the European Commission. From the beginning, Director Tim Berners-Lee has been committed to developing a neutral, open forum for the evolution of Web technology, a mission reflected by today's 300-plus-Member global Consortium.

**the Web and the Internet:  
a place to share information and do business**



# uniquely positioned to lead the evolution

Leading the World Wide Web's evolution means staying ahead of a significant wave of applications, services, and social changes. For W3C to effectively lead such dramatic growth at a time when a "Web Year" is equivalent to a few months, it must demonstrate exceptional agility, focus and diplomacy. To this end, the Consortium fulfills a unique combination of roles traditionally ascribed to quite different organizations.

Like its partner standards body, the Internet Engineering Task Force (IETF), W3C is committed to developing open, technically sound specifications backed by running sample code. Like other information technology consortia, W3C represents the power and authority of hundreds of developers, researchers, and users. Hosted by research organizations, the Consortium is able to leverage the most recent advances in information technology.

W3C works on technologies that impact people's daily commercial, cultural and personal activities. For several years W3C has recognized the social, legal, and public policy challenges associated with the development of the Web.

## HOST INSTITUTIONS

W3C was formally launched in October 1994 at the Massachusetts Institute of Technology's Laboratory for Computer Science (MIT LCS). Moving beyond the Americas, the Consortium established a European presence in partnership with France's National Institute for Research in Computer Science and Control (INRIA) in April 1995. As the Web's influence continued to broaden internationally, the resulting growth in W3C Membership created the need for an Asian host. In August 1996, Keio University in Japan became the Consortium's third host institution.

## MEMBERS

The Consortium's real strength lies in the broad technical expertise of its Membership. W3C currently has more than 300 commercial, non-profit, and academic Members worldwide, including hardware and software vendors, telecommunications companies, content providers, corporate users, citizen groups, and government and academic entities.

W3C provides a vendor-neutral forum for its Members to address Web-related issues. Working together with its team and the global Web community, the Consortium aims to produce free, interoperable specifications and sample code. Funding from Membership dues, public research funds, and external contracts underwrites these efforts.

The Consortium's Advisory Committee (AC) is composed of one official representative from each Member organization, who serves as the primary liaison between the organization and W3C. The Advisory Committee's role is to offer advice on the overall progress and direction of the Consortium.

## TEAM

W3C is led by Director Tim Berners-Lee, creator of the World Wide Web, and Chairman Jean-François Abramatic. With more than 30 years combined expertise in a wide array of computer-related fields, including real-time communications, graphics, and text and image processing, Berners-Lee and Abramatic are well prepared to lead the Consortium's efforts in spearheading the global evolution of the Web. The Consortium's technical staff include full-time and part-time employees, visiting engineers from Member organizations, consultants, and students from more than 13 countries worldwide. The W3C Team works with the Advisory Committee, the press, and the broader Web community to promote W3C's objectives.

## RECOMMENDATION PROCESS

Specifications developed within the Consortium must be formally reviewed by the Membership. Consensus is reached after a specification has proceeded through the review stages of Working Draft, Proposed Recommendation, and Recommendation. As new issues arise from Members, resources are reallocated to new areas to ensure that W3C remains focused on topics most critical to the Web's interoperability and growth.

# on of the Word Wide Web

## DOMAINS

Leading the evolution of a technology as dramatically in flux as the World Wide Web is a challenging task. W3C is a unique organization, well adapted to today's fast-paced environment. Its mission is to lead the Web to its full potential: as a scalable computer-to-computer system, as an efficient human-to-computer interface, and as an effective human-to-human communications medium. In order to achieve these goals, W3C's team of experts works with its Members to advance the state of the art in each of the four Domains: Architecture, User Interface, Technology and Society and The Web Accessibility Initiative. Each Domain is responsible for investigating and leading development in several Activity areas which are critical to the Web's global evolution and interoperability.

## ACTIVITIES

When W3C decides to become involved in a new technology or policy, it seeks the approval of its Membership to initiate an Activity in that area. W3C Members are formally invited to review the proposed scope and charter, and subsequently to participate in the work of the Activity. Generally an activity is carried out by one or more groups which may be working groups, interest groups or coordination groups. An Activity may also be carried out by establishing a software project.

The current list of Activities is as follows:

### Architecture Domain

HTTP  
HTTP-NG  
Jigsaw  
TV and the Web  
Web Characterization  
XML

### User Interface Domain

Amaya  
DOM  
Graphics  
HTML  
Internationalization  
Math  
Mobile Access  
Style Sheets  
Synchronized Multimedia

### Technology and Society Domain

Digital Signatures  
Metadata  
Micropayments  
Privacy

### Web Accessibility Initiative

WAI International Program Office  
WAI Technical Activity

## OPEN SOURCE SOFTWARE

The natural complement to W3C specifications is running code. Implementation and testing are an essential part of specification development and releasing the code promotes exchange of ideas in the developer community. All W3C software is Open Source. W3C Open Source Software includes:

**Jigsaw**, W3C's object-oriented web server, written in Java and supporting HTTP 1.1

**Amaya**, W3C's testbed browser/editor

A **CSS Validator** which allows the user to validate the CSS style sheets used by HTML and XML pages

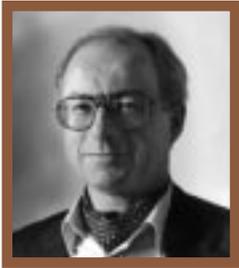
An **HTML Validator** which allows HTML documents to be validated against the DTDs for HTML, including for HTML 4.0

**Libwww**, a general-purpose Web API written in C for Unix and Win32. It is a highly modular extensible API which can be used as the code base for writing Web clients, servers, and proxies.

**HTML Tidy**, a free utility for correcting HTML syntax automatically and producing clean markup. Tidy can be used to convert existing HTML content into compliant XML.

"W3C's hope is to become a truly global organization with an ever-expanding and wide-reaching membership. Our goal is to further the Web's evolution as a robust, scalable, and adaptive infrastructure; as a platform for the application of computation to knowledge; and as a responsible human communications medium—all while preserving its universal interoperability."

Jean-François  
Abramatic  
W3C Chairman



**Jean-François Abramatic**  
W3C Chairman  
Joined W3C April 1995

**Responsibilities**

Spearheads the Consortium's strategic direction

**Education**

Ph.D. in Computer Science, University of Paris VI, France

M.S. in Engineering, Ecole des Mines, Nancy, France

**Related Positions**

1997–Present: Director of Development, INRIA, France

1996–1999: Associate Director of the Laboratory of Computer Science (LCS) at MIT, Cambridge, MA, USA

1992–1996: Director of Development, INRIA

1989–1992: Chairman and Chief Executive Officer for a start-up X Window terminal company

**Other Activities**

General Chairman of the Fifth International World Wide Web Conference, held in Paris in May 1996

Holds two patents and has authored more than 40 papers in journals and conferences



**Tim Berners-Lee**  
W3C Director  
Joined W3C September 1994

**Responsibilities**

Oversees all activities within the Consortium

**Education**

B.A. in Physics, Queen's College at Oxford University, England

Honorary degrees from the Parsons School of Design (D.F.A., 1996), Southampton University (D.Sc. 1996) and University of Essex (D.U. Essex)

**Related Positions**

1994–Present: Principal Research Scientist, MIT LCS

1984–1994: Fellowship at CERN. In 1989 he invented the World Wide Web and since then has continued to guide the development of the Web including early work on HTML, HTTP, and URLs

**Awards**

Distinguished Fellow of the British Computer Society

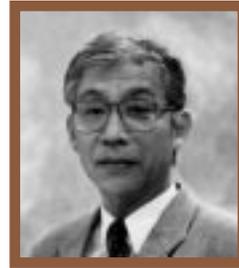
Recipient of 1997 Duddell Medal of the Institute of Physics

Recipient of 1996 ACM Kobayashi Award

Recipient of 1996 IEEE Computer Society Wallace McDowell Award

Co-recipient of 1996 Computers and Communication (C&C) Award

Co-recipient of 1995 ACM Software Systems Award



**Nobuo Saito**  
W3C Associate Chairman  
Joined W3C September 1996

**Responsibilities**

Associate Chairman of W3C

**Education**

Ph. D. in Computer Science, University of Tokyo, Japan

M. Eng. in Mathematical Engineering and Instrumentation, University of Tokyo

**Related Positions**

1995–Present: Dean, Faculty of Environmental Information, Keio University, Japan

1990–1995: Professor, Faculty of Environmental Information, Keio University

1978–1990: Professor, Faculty of Engineering, Keio University

**Other Activities**

ISO/IEC SC22/WG15 (POSIX), the head of Japanese delegation

The Chairman of AOW (Asia Oceania Workshop)

Actively involved in several projects including development of multimedia platform, campus networks, etc.



**Alan Kotok**  
W3C Associate Chairman  
Joined W3C May 1997

**Responsibilities**

Membership recruitment and W3C Site Management at MIT

**Education**

M.B.A. Clark University, Worcester, MA, USA

B.S. and M.S. in Electrical Engineering, MIT, Cambridge, MA, USA

**Related Positions**

1996–1997: V.P. Marketing, GC Tech, Inc.

1962–1997: Corporate Consulting Engineer, Digital Equipment Corp.

1994–1996: W3C AC Representative, Digital Equipment Corp.

**Other Activities**

Member of Science Advisory Board, Cylink Corp.

Consultant: Compaq.



**Vincent Quint**  
W3C Deputy Director for Europe and User Interface Domain Leader  
Joined W3C February 1996

**Responsibilities**

Assists Director with the Consortium's European operations

Coordinates all activities with in the User Interface domain

Chair of the Hypertext Coordination Group

**Education**

Ph.D. in Mathematics, University of Grenoble, France

Ph.D. in Computer Science, University of Grenoble, France

M.S. in Engineering, University of Grenoble, France

**Related Positions**

1990–present: Leader, Project Opera, INRIA

1980–1990: Project Manager, Structured Documents Project

**Other Activities**

Member of several committees, including the Electronic Publishing (EP) Series of Conferences

Actively involved in the design and development of various systems, including Grif, Thot, and Amaya



**Tatsuya Hagino**  
W3C Deputy Director for Asia  
Joined W3C September 1997

**Responsibilities**

Assists Chairman and Director with the Consortium's Asian operations

**Education**

Ph.D. in Computer Science, University of Edinburgh, Scotland

M.S. in Mathematical Sciences, Kyoto University, Japan

**Related Positions**

1993–Present: Associate Professor, Keio University

1990–1993: Lecturer, Keio University

1987–1990: Assistant Professor, Kyoto University

**Other Activities**

Actively involved in several system projects, including the next generation micro kernel project and multimedia network education project.

Member of SFC's steering committee



**Philipp Hoschka**  
W3C Architecture Domain Leader  
Joined W3C January 1996

**Responsibilities**

Coordinates all activities within the Architecture Domain.

Chair of Synchronized Multimedia (SYMM) Interest Group

Chair of TV and Web Interest Group

**Education**

Ph.D. in Computer Science, University of Nice-Sophia Antipolis, France

Diploma (M.S.) in Computer Science, University of Karlsruhe, Germany

**Related Positions**

1992–1996: Graduate Research Assistant, High Speed Networking Group (Rodeo), INRIA, France

1991–1992: Software Development Engineer, Networking Research Group, University of Nottingham, UK

1990–1991: Research Assistant, IBM European Networking Center, Heidelberg, France

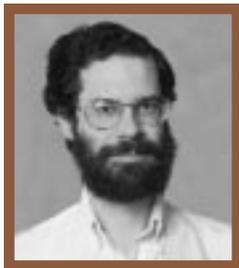
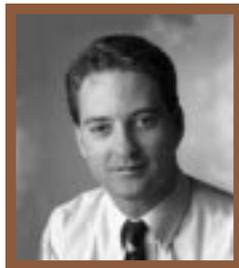
**Other Activities**

Editor of SMIL 1.0 W3C Recommendation

Chair of W3C Workshop "Television and the Web"

Chair of W3C Workshop "Push Technology"

Chair of W3C Workshop "Real-Time Multimedia and the Web"



**Daniel J. Weitzner**  
W3C Technology and Society  
Domain Leader  
Joined W3C September 1998

**Responsibilities**

Coordinates all activities  
within the Technology and  
Society Domain  
Liaison with governments and  
private sector on Internet  
policy matters.

**Education**

B.A. in Philosophy,  
Swarthmore College,  
Swarthmore, PA, USA  
J.D. Buffalo Law School,  
Buffalo, NY, USA

**Related Positions**

Co-founder and Deputy  
Director, Center for Democracy  
and Technology  
Deputy Policy Director,  
Electronic Frontier Foundation  
Chair, Platform for Internet  
Content Selection (PICS) Public  
Policy Committee

**Judy Brewer**  
Web Accessibility Initiative  
Domain Leader and WAI  
International Program  
Office Director  
Joined W3C September 1997

**Responsibilities**

Coordinates all activities within  
the Web Accessibility Initiative  
Directs Web Accessibility  
Initiative International  
Program Office

**Education**

Management Certificate,  
Boston University Corporate  
Education Center, Boston,  
MA, USA  
Graduate Certificate, Technical  
Writing, Northeastern  
University, Boston, MA  
M.A. in Teaching ESL,  
University of Massachusetts,  
Boston  
B.A. Independent Concentration  
in Applied Linguistics, Princeton  
University, Princeton, NJ, USA

**Related Positions**

1990–1997: Project Director,  
Massachusetts Assistive  
Technology Partnership

**Other Activities**

Advisory committee and  
board activities include: the  
US Access Board's Electronic  
and Information Technology  
Access Advisory Committee;  
National Council on Disability's  
TechWatch; Board of Directors  
of the Association of Access  
Engineering Specialists; Board  
of Directors of the Adaptive  
Environments Center

**Dan Connolly**  
XML Activity Lead  
Joined W3C March 1995

**Responsibilities**

Leads the XML Activity

**Education**

B.S. in Computer Science,  
University of Texas, Austin,  
Texas, USA

**Related Positions**

1994–1995: Software  
Engineer, Hal Software  
Systems  
1993–1994: Software  
Engineer, Dazel (formerly  
Atrium)  
1990–1993: Software  
Development Engineer,  
Convex

**Other Activities**

Editor of HTML 2.0  
specification  
Editor of World Wide Web  
Journal Vol. 2 - XML:  
Principles, Tools, and  
Techniques

**Ralph R. Swick**  
W3C Technology and Society  
Domain Technical Director  
Joined W3C January 1997

**Responsibilities**

Technical oversight of all  
activities within the  
Technology and Society  
Domain, assisting Daniel  
Weitzner.

**Education**

B.S. in Physics and  
Mathematics, Carnegie  
Mellon University, Pittsburgh,  
Pennsylvania, USA

**Related Positions**

1994–1996: Technical  
Director, X Consortium, Inc.  
1980–1994: Principal  
Software Engineer, Digital  
Equipment Corp.

**Other Activities**

W3C Metadata Activity Lead  
Co-editor of the RDF Model  
and Syntax Specification

**Daniel Dardailler**  
Web Accessibility Initiative  
Technical Activity Lead  
Joined W3C July 1996

**Responsibilities**

WAI Project Manager  
W3C Site Manager at INRIA,  
Sophia-Antipolis, France

**Education**

Ph.D. in Computer Sciences,  
University of Nice, France  
M.S. in Computer Sciences,  
University of Grenoble, France  
B.S. in Math Physics,  
University of Marseille, France

**Related Positions**

1994–1996: Software  
Architect, X-Window Consortium  
1990–1994: Principal  
Engineer, The Open Software  
Foundation  
1986–1990: Research Fellow,  
Bull Research Center

**Other Activities**

Coordinator of WAI-TIDE  
European Commission Project  
Lecturer and teacher of  
computer science at  
engineering schools and  
universities internationally for  
more than ten years  
Author of several papers in  
journals and conferences

**Josef Dietl**  
Head of Member Relations  
Joined W3C June 1997

**Responsibilities**

Develops Member Relation  
efforts with focus on  
participation and contribution  
Contact for W3C Offices

**Education**

Diploma (M.S.) in Physics,  
Technical University of  
Munich, Germany

**Related Positions**

1995–1997: Domain Leader,  
CompuServe Germany

**Other Activities**

Co-founder of FITUG, a  
German cyberrights  
organization  
Actively involved in various  
consulting activities

**Janet Daly**  
Head of Public Relations  
Joined W3C February 1999

**Responsibilities**

Leads Public Relations efforts,  
including press relations and  
message development

**Education**

B.A. in English, University of  
Massachusetts, Amherst, MA,  
USA  
Graduate Studies: Harvard  
University, Cambridge, MA,  
USA; University of  
Massachusetts, Boston, MA

**Related Positions**

1997–1998: Communications  
Director, Newmarket Network  
1996–1997: Production  
Manager, Tripod Inc.  
1990–1996: Information  
Officer, Project Athena, MIT

**Other Activities**

Guest Lecturer on educational  
uses of Internet-based  
technologies, and information  
design for the Web

# executive management

# a global partnership

“The Consortium thrives on diversity, especially its international nature. W3C Offices provide local points of contact for W3C members and also can provide a focus for discussion of issues of specifically regional interest.”

Tim Berners-Lee  
Director

W3C is an international industry-supported consortium, jointly hosted by three institutions: the Massachusetts Institute of Technology's Laboratory for Computer Science—MIT LCS (Americas); the National Institute for Research in Computer Science and Control—INRIA (Europe); and Keio University (Asia). All three hosts work together to provide vendor-neutral leadership in the evolution of the Web, including designing, developing, and promoting common technical standards.



## MIT LABORATORY FOR COMPUTER SCIENCE (LCS)

Massachusetts Institute of Technology (MIT) is a major U.S. research university in Cambridge, Massachusetts. Its Laboratory for Computer Science (LCS), now in its fourth decade, conducts a broad research program in information science, from the development of information infrastructures such as the World Wide Web to understanding the theories that underlie computer science. The LCS is dedicated to the invention, development, and understanding of information technologies expected to drive substantial technical and socio-economic change.



## THE NATIONAL INSTITUTE FOR RESEARCH IN COMPUTER SCIENCE AND CONTROL (INRIA)

The National Institute for Research in Computer Science and Control (INRIA) is a French public-sector scientific institute. INRIA is made up of five Research Units located at Rocquencourt (near Paris), Rennes, Sophia Antipolis, Nancy, and Grenoble. INRIA's main assignments include transferring research results to industry and conducting both fundamental and applied research. Areas of current research include information processing, advanced high-speed networking, structured documents, and scientific computation.



## KEIO UNIVERSITY

Keio University, one of Japan's oldest private universities and foremost computer science research centers, has five major campuses around Tokyo. In 1990, the University opened Shonan Fujisawa Campus and two new faculties, including the Faculty of Environmental Information. At that time, Keio began to focus on next-generation education, research on fundamental information technology, and global solutions in the advanced information society. Shonan Fujisawa Campus, as well as Keio's other campuses, promotes joint research projects in cooperation with industry, government, and international organizations. Keio is currently one of the world's leading research centers for network and digital media technology.

## W3C OFFICES

To enhance the communication between W3C and the Web community, W3C has opened W3C Offices covering specific geographical areas. W3C Offices are the first point of contact between the Consortium and its Membership, as well as the general public in their corresponding region. These are just some of the activities in which W3C Offices may be involved:

- providing support to locally-organized events
- organizing translations for W3C documents
- establishing and managing a mirror site
- acting as a forum for the members in their region
- feeding back local input to W3C
- producing promotional material
- supporting W3C communications and press releases



## W3C OFFICES: CONTACT INFORMATION

### Germany

W3C Office at GMD  
Institut für Medienkommunikation  
Schloss Birlinghoven  
Sankt Augustin 53754  
Germany  
Tel: +49 2241 14 2910  
Fax: +49 2241 14 2071  
Email: w3c-gmd@gmd.de

### Greece

W3C Office at FORTH  
Foundation for Research and Technology—Hellas  
P.O. Box 1385  
711 10 Heraklion  
Crete  
Greece  
Tel: +30 81 391601  
Fax: +30 81 391674  
Email: w3c-forth@ics.forth.gr

### Hong Kong

W3C Office at HKUST  
Hong Kong University of Science & Technology  
Department of Computer Science  
Clear Water Bay  
Kowloon  
Hong Kong  
Tel: +852 2358 7010  
Fax: +852 2358 2679

### Sweden

W3C Office at SICS  
Swedish Institute of Computer Science  
164 29 Kista  
Sweden  
Tel: +46 8 752 1504  
Fax: +46 8 751 7230  
Email: w3c-sics@sics.se

### Taiwan

W3C Office at NCTU  
National Chiao Tung University  
Computer Center  
1001 Ta-Hsueh Road  
Hsinchu  
TAIWAN, R.O.C.  
Tel: +886 3 573 1900  
Fax: +886 3 571 4031

### The Netherlands

W3C Office at CWI  
Centrum voor Wiskunde en Informatica  
Kruislaan 413  
1098 SJ Amsterdam  
The Netherlands  
Tel: +31 20 592 4171  
Fax: +31 20 592 4199  
Email: w3c-cwi@cw.nl

### United Kingdom

W3C Office at RAL  
Rutherford Appleton Laboratory  
Chilton  
Didcot  
Oxfordshire OX11 0OX  
United Kingdom  
Tel: +44 1235 446822  
Fax: +44 1235 445385  
Email: w3c-ral@inf.rl.ac.uk

# architecture

“Our goal is extending the Web’s building blocks so that in the next millennium, even more users, applications, and devices can leverage the power of the Web.”

**Philipp Hoschka**  
Architecture  
Domain Leader

## FOUNDATIONS FOR THE FUTURE OF THE WEB

The Architecture Domain aims to build and extend the Web architecture to support the continuing growth of the Web. This Domain is working in three key areas: (1) improving HTTP for a faster and more efficient Web; (2) developing the Web architecture to support mobile phones, televisions and other devices and (3), the development of XML as a format for exchanging structured data.

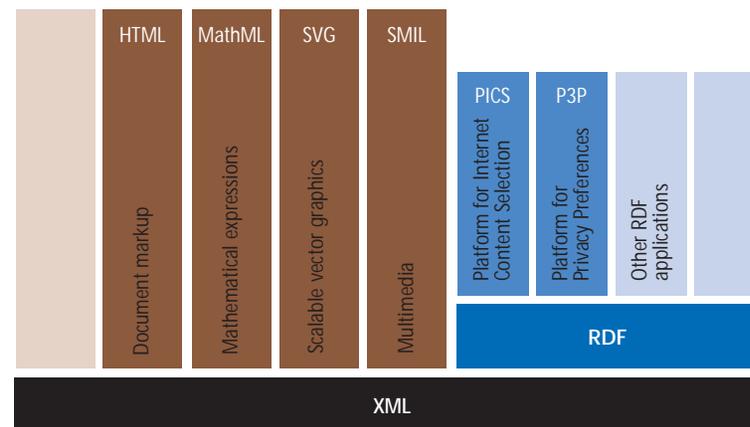
## THE W3C ARCHITECTURE TEAM

Philipp Hoschka is the Architecture Domain Leader and also leads the Synchronized Multimedia Activity. The team further includes Dan Connolly (XML Activity Lead), Jim Gettys (visiting engineer from Compaq), Johan Hjelm (visiting engineer from Ericsson), Youichirou Koga (visiting engineer from NEC), Yves Lafon (Jigsaw Activity Lead), Benoit Mahé (Jigsaw engineer), Henrik Frystyk Nielsen (HTTP and HTTP-NG Activity Lead), Hidetaka Ohto (visiting engineer from Matsushita Electric Industrial Co), C.M. Sperberg-McQueen (working with the XML Activity), and Daniel Veillard (XML Activity).

## XML

Extensible Markup Language—known as XML—provides a simple approach to representing structured text and information. The extent of its acceptance manifests itself through the steady increase in applications both on and off the Web expressed using XML syntax. These efforts are emerging across cultures, languages, and professional disciplines, ranging from the health care industry to electronic commerce.

W3C develops and defines XML, having issued the XML 1.0 Recommendation in 1998. XML now underpins markup languages and applications developed by W3C.



*XML now underpins a number of W3C languages and applications.  
The Resource Description Framework—RDF—is also taking on an increasingly important role.*

## HYPertext TRANSFER PROTOCOL (HTTP)

As Web traffic has come to dominate the Internet, remedying the weaknesses of the HTTP protocol has become of crucial importance. W3C has successfully worked with the Internet Engineering Task Force (IETF) to refine and improve the protocol, this work has now led to the HTTP/1.1 standard. HTTP/1.1 brings a number of key benefits. For example, browsers need fewer connections to the server to download documents, and more efficient caching of Web content means that pages are faster to access. These benefits lead to faster Web access at reduced load on a network.

More recent work concerns a flexible extension mechanism to HTTP/1.1, enabling programmers to add their own features to the protocol where a given application demands extra functionality. W3C has produced two sample HTTP/1.1 implementations - Jigsaw and Libwww- and demonstrated that HTTP/1.1 truly speeds up the access of Web information.

## WEB CHARACTERIZATION

Many experts predict that the volume of Web traffic on our communication networks will soon surpass the volume of voice telephone traffic. This creates new challenges for network designers. While telephone traffic has been analyzed for the last 100 years, we are only starting to understand Web traffic. To foster research in Web performance measurement and evaluation, the Web Characterization Activity has brought together a group of some of the most renowned researchers in performance measurement to develop the tools and measurement methods needed to manage tomorrow's Web traffic.

## HTTP-NG: THE NEXT GENERATION

In the early days, nobody could have anticipated the sheer volume and variety of data which travel across the Web. It comes as no surprise, then, to discover that the HTTP protocol, extended and modified to cope with the increasing demands placed upon it, may require more comprehensive review. The purpose of the HTTP-NG project is to develop a new generation of the HTTP protocol better suited to the needs of the future. Flexible enough to support existing uses of the Web, and geared to the increasing number of distributed applications using the network, HTTP-NG will be based on the sound engineering practices of simplicity, modularity, and layering. W3C has already completed an initial feasibility study with encouraging results from test implementations. The group is now progressing to the next stage of the project, finally developing the new HTTP architecture into a set of robust and well-proven Internet specifications.

## TELEVISION AND THE WEB

As TV migrates from analog to digital technology, there are many opportunities for integrating the Web and television. Web content will be used to augment television broadcasts, for example with special offers, program guides and reviews, background information on sports teams, and so on. Televisions will be able to display Web pages on news, weather and financial information, transmitted with television channels but not tied to any particular program. People expect television to work reliably, leading to a great emphasis on correct implementation of web standards in this area. W3C is helping to develop Web standards together with television standards organizations.

## OPEN SOURCE SOFTWARE

### JIGSAW

Jigsaw is W3C's Java-based Web server. With a modular architecture and HTTP/1.1 compliance, the Jigsaw server is a premier platform for W3C and the Internet community to try out new ideas. The server uses an object-oriented approach to store files and to process incoming requests, making it easily extensible and efficient. Used on a daily basis at W3C to manage our cooperative working environment via the W3C site, Jigsaw has also been used as a PICS label bureau, and as a test-bed for an experimental IP multicast-based cache-sharing protocol.

### LIBWWW

W3C's libwww is a cross-platform Web software library written in C. It supports the most common Web protocols, and is well suited for building a wide variety of applications such as Web clients, servers and robots. Recent work on libwww has produced a record-breaking high-performance implementation of HTTP/1.1, using persistent connections, pipelining, smart output buffering, and persistent caching.

# user interface

“Web information will grow immensely in variety, and be used by a much greater diversity of people than today. What is imperative is that simplicity and interoperability continue to be of prime importance.”

Vincent Quint  
User Interface  
Domain Leader

## ENABLING A RICH VARIETY OF INFORMATION TO BE DISTRIBUTED ON THE WEB

The User Interface Domain seeks to improve all user/computer communications on the Web. With XML fast gaining acceptance, work on HTML (for publishing documents), on MathML (for publishing math), on SMIL (for multimedia presentations), and on SVG (for publishing diagrams and vector-based graphics), now uses XML as a common underlying format. The Document Object Model (DOM) meanwhile, ensures that, “behind the scenes”, markup is structured around a clean model enabling programs and scripts to manipulate information efficiently via a uniform interface. W3C’s work on style sheets will lead to tools for “re-purposing” documents for different devices: authors can write the material once and then re-purpose it for rendering on mobile phones, televisions, palm top computers and other devices as required. Internationalization continues as an important part of our contribution to ensure that people across cultures and languages can communicate across the Web, making it truly world wide.

## THE W3C USER INTERFACE TEAM

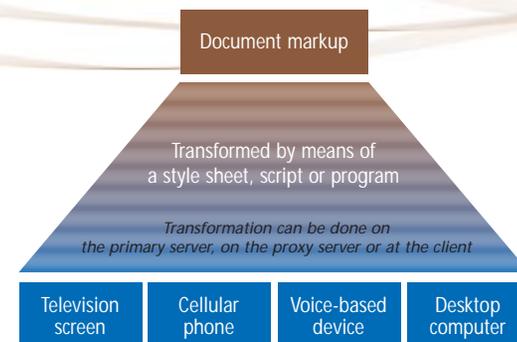
Lead by Vincent Quint, the team includes Takuya Asada (Mobile Access Activities), Bert Bos (Style Sheets, Internationalization and XML Activities), Martin Dürst (Internationalization Activity Lead) Ramzi Guetari (Amaya Activity), Masayasu Ishikawa (HTML and Mobile Access Activities), Jose Kahan (Amaya Activity), Philippe Le Hégarret

(Style Sheet Activity), Arnaud Le Hors (DOM Activity Lead), Håkon Lie (Style Sheets Activity Lead), Chris Lilley (Graphics Activity Lead), Shin’ichi Matsui (Mobile Access Activity, visiting engineer from Matsushita Electric Industrial), Dave Raggett (HTML Activity Lead, visiting engineer from Hewlett Packard), and Irène Vatton (Amaya Activity Lead).

## HTML

Hypertext Markup Language—known as HTML—is the lingua franca for publishing on the World Wide Web. Following the success of W3C’s HTML 4.0, the Consortium is designing the next generation of the markup language. The new HTML is re-cast in XML, and is being designed so that HTML can be used in combination with other XML applications. For example, a document might be written in HTML, but include a mathematical formula written in MathML or tags from a specialized XML application. Important also is the ability to sub-set HTML for simpler clients. End-users and authors alike will benefit from work on describing the capabilities and user preferences for particular devices, for instance, display characteristics and information on the kinds of graphics formats supported, the level of HTML and style sheets support, and so on. The next generation of HTML will also see style sheets and other tools used to tailor documents according to the needs of different classes of browser. Transformation of markup can be done on the primary server, on a proxy server or at the client.

*Style sheets and other tools tailor HTML documents to the needs of different devices accessing Web information.*



## STYLE SHEETS

Style sheets offer precise control over the presentation of Web pages. Not only can Web designers specify the visual effects they want, but also aural style sheets give control over voice, pitch and other aspects of how the text will sound when rendered into speech. W3C continues to work with its Members, evolving the Cascading Style Sheets (CSS) language to provide even richer stylistic control, while emphasizing the importance of the thorough implementation of CSS on browsers. For more complex publishing tasks, such as automatically producing a table of contents, and for converting documents written in XML into HTML for publication, W3C is developing the Extensible Style Sheets Language (XSL), which builds upon experience with CSS and DSSSL. A key goal is to ensure that W3C Recommendations all use a common underlying framework for style.

## DOCUMENT OBJECT MODEL

HTML allows authors to structure documents into headings, paragraphs, hypertext links and other components. W3C's Document Object Model (DOM) is a standard internal representation of the document structure and makes it easy for programmers to access components and delete, add or edit their content, attributes and style. DOM offers a consistent programming interface for manipulating a document with programming languages such as Java and ECMAScript. The DOM Level 1 Specification is now a W3C Recommendation, and work continues on support for manipulating style properties and events.

In addition to its application to HTML and Web pages, the DOM has been designed also with XML in mind: XML's inherent extensibility makes the DOM even more valuable to XML designers. The standard DOM interface enables them to write software (similar to plug-ins) for processing customized tag-sets in a language- and platform-independent way. A standard API makes it easier to develop modules for XML processing that can be re-used in different applications.

## GRAPHICS

With a long-standing interest in graphics for the Web, W3C was invited to support the PNG graphics format, which became a Recommendation in 1996. PNG has widespread support on the latest generation of browsers, offering true color, real transparency and faster incremental display.

More recent work concerns Scalable Vector Graphics. Rather than sending pixel values down the wire, an alternative approach is to send instructions for drawing lines (vectors) and filling shapes, a technique used by many of the popular drawing packages. W3C is developing an open vector graphics format written in XML, and designed to work across platforms, output resolutions, color spaces, and a range of available bandwidths. Scalable Vector Graphics will mean that Web documents will be smaller, faster, more interactive, and displayable on a wider range of device resolutions, from small mobile devices to office computer monitors and high-resolution printers—a significant advance in Web technology.

Developed in close collaboration between W3C and the CGM Open Consortium, the WebCGM Profile Recommendation adds reliable and interoperable hyperlinking to graphics-rich

applications such as interactive electronic manuals with complex technical diagrams.

## MOBILE ACCESS

People are already demanding ubiquitous, device-independent access to the Web. Web information and services will become increasingly accessible from cellular phones, pagers, in-car computers, palm-top computers and other mobile devices. W3C's Mobile Access Activity is interested in ensuring that the protocols and data formats of the Web provide an effective fit for mobile devices. Such work is necessary to ensure that mobile devices reach their full potential in the context of the global Internet. The Web provides an increasingly important means for companies, organizations and individuals to "meet" for business, news and entertainment. W3C wishes to facilitate the important role that mobile devices have to play in a world increasingly using Internet-based global communications.

Of related interest are techniques for using voice interaction for accessing the Web. This includes using telephones or when hands/eyes free operation is essential (in cars). Proposed W3C work on voice browsers includes enhancements to HTML and style sheets, and explicit ways to control voice interaction using XML, as well as ways to transform Web content to better suit the needs of using voice interaction to browse, follow links and fill-in forms.

## INTERNATIONALIZATION

The Web facilitates communication around the world between people speaking different languages. The goal of the Consortium's work on Internationalization is to ensure that W3C's formats and protocols are usable worldwide in multiple languages and writing systems. W3C has successfully stressed the role of Unicode as the basis for identifying characters in documents—for example, in the HTML 4.0, XML, CSS2 and DOM specifications. Work is continuing on providing markup and style components for international needs. A character model for the Web is in development which takes into account requirements arising from the increasing interaction of the various software components.

## SYNCHRONIZED MULTIMEDIA

W3C has developed the Synchronized Multimedia Integration Language (SMIL). SMIL enables content developers to write complex multimedia presentations where audio, video, text and graphics are combined. Written in XML, SMIL is a declarative language which is as easy to author as HTML. With it, authors can control the synchronization of media components, in parallel or in sequence. For example, one can specify that a particular audio track should be played in accompaniment with particular images and Web pages. W3C published the SMIL 1.0 Recommendation in June 1998. Since then, the Activity has received new input from W3C Members and has started work on a successor.

## MATH

Although HTML has a large repertoire of tags, it does have tags for mathematical expressions. W3C has been working with a number of companies with experience in editing and processing math on computers, as well as other specialist organizations. This work has cumulated in a markup language called MathML, and W3C released MathML 1.0 as a Recommendation in April 1998. MathML provides two sets of tags, one for the visual presentation of math and the other associated with the meaning "behind" equations. Specialized tools provide the means for typing in and editing mathematical expressions. W3C's Amaya browser supports MathML and has been used to demonstrate its capabilities.

## OPEN SOURCE SOFTWARE

### AMAYA BROWSER/EDITOR

Amaya is W3C's own testbed browser/editor. With the extremely fast-moving nature of Web technology, Amaya plays a central role at the Consortium. Easily extended to integrate new ideas into its design, Amaya provides developers with many specialized features, including multiple views, where the internal structural model of the document can be displayed alongside the browser's view of how it should be presented on the screen. Amaya has been used to demonstrate how MathML works, and provides a math editor for the purpose. Amaya also implements HTTP1.1, HTML 4.0, and many features of CSS, and has been used as an experimental platform with vector graphics.

# technology and society



“We have the opportunity, and in some cases, nearly a mandate, to shape Web technology that will enhance human interaction in three arenas: identity, money, and property.”

Daniel Weitzner

Technology  
and Society  
Domain Leader

## ADDRESSING THE SOCIAL, LEGAL AND PUBLIC POLICY CHALLENGES RAISED BY THE GROWTH OF THE WEB

W3C is responsible for helping to address the social, legal, and public policy challenges raised by the growth of the Web. The Technology and Society Domain began by addressing issues such as freedom of expression, protection of minors from harmful content, and privacy. Work is now fast expanding to other areas.

As the Web becomes the platform for global electronic commerce, and an increasingly important venue for politics, arts and culture, the technologies of digital signatures, metadata, payment over the Web and copyright management become of crucial importance.

Relevant questions include:

How will Web-held information be organized so that users can find exactly what they want, quickly?

How will people know that a document such as a contract, price list, or other item comes from a reliable source?

Can users be sure that a Web document sent over the net has not been tampered with en route?

How can people be certain that personal information filled out on a form will not be used by other parties against their wishes?

How will the rights of online authors and publishers be managed on the Web?

## THE W3C TECHNOLOGY AND SOCIETY TEAM

Headed by Daniel Weitzner, the Technology and Society Team includes Ralph Swick (Metadata Activity Lead), Daniel LaLiberte (Open Source Developer), Massimo Marchiori (P3P and Metadata Activities), Thierry Michel (Electronic Commerce Activity Lead), Rolf Nelson (Privacy Activity Lead), and Joseph Reagle (Digital Signatures and P3P Activity, Policy Analyst).

## METADATA

The Web now holds a tremendous amount of information. If we want machines to help us navigate this information—for instance, to find a bookseller that has a copy of a book on a particular subject, to find the cheapest airfare or the hotels in a particular price range in a given town—then we need some way of describing and cataloging the information, in a format that machines can usefully process and query. Work at W3C on metadata—that is, information about information—seeks to provide just that. The Consortium has completed work on the basic Resource Description Framework (RDF) specifications, a knowledge representation/relational database language for items on the Web. These “resources” may be a Web page, a particular paragraph or image on a Web page, or an entire Web site. Future work may focus on query languages and reasoning engines for metadata across the Web.

An early example of metadata is PICS—the Platform for Internet Content Selection. PICS is W3C’s suite of specifications allowing people to distribute information about Web content in a simple, computer-readable form. PICS helps parents and others to filter out undesirable material or direct children to sites that may be of special interest to them.

## PRIVACY

Users want to know whether they should entrust personal information to a given Web site. How does the site manage personal information? Will it disclose any of this information to others? What will the user get in return?

W3C’s Platform for Privacy Preferences Project (P3P) allows users to be informed of a site’s practices. Users may then negotiate for a different privacy policy and come to an agreement with the site which will be the basis for any subsequent release of information. W3C members, including software developers, financial service providers, marketers, and privacy advocates, have cooperated on the P3P specification. In addition, W3C’s privacy work is conducted in close consultation with governments around the world. The W3C team devotes significant resources to explaining and marketing the technology with view to stimulating regional adoption in the Americas, Europe, Asia, and around the world.

## DIGITAL SIGNATURE INITIATIVE

Digital signatures serve to identify the origin of a document and to ensure that the information has not been tampered with en route. A single-bit change in giga-bytes of data can be detected. Digital signatures allow users to check that downloaded information has come from a reputable source, which is especially important for documents implying commitments such as contracts, price lists, manifests and press releases. In view of recent developments in Web technologies, future work will address the digital signing of XML and RDF as this is critical for a variety of electronic commerce applications, including payment tools.

## MICROPAYMENTS

Micropayments are very small payments made over the Web. The goal of W3C’s work on Micropayments is to develop a framework for the seamless integration of micropayments into the Web architecture. One may envision that links would display the cost, currency, description of goods and other data associated with the item in question. When users clicked on them, the browser would ask the user to pay via an electronic wallet for the item, possibly with different electronic wallets for different payment systems in use.

W3C is developing a common mark-up language for payment information, and an API to support such a system.

# Web accessibility initiative

“W3C realizes the critical importance of the Web for people with disabilities, and is committed to increasing the accessibility of the Web.”

Judy Brewer

Web Accessibility Initiative Domain Leader

## ENSURING THAT THE UNIVERSALITY OF THE WEB INCLUDES ACCESS BY PEOPLE WITH DISABILITIES

The Web Accessibility Initiative (WAI) focuses on making the Web accessible to the many millions of existing and potential Web users who have disabilities. These disabilities range from blindness and low vision to hearing problems, motor limitations and cognitive impairments. Working in coordination with industry leaders, disability organizations, research institutions and governments, the WAI adopts a multi-pronged approach through technology guidelines, tools, education, and research and development.

The Web has the potential to provide access to information where previously there were barriers. To fulfill this promise, however, the Web

Accessibility Initiative must encourage Web content developers, browser manufacturers, and authoring tool manufacturers to exploit the accessibility-friendly features built into newer W3C Recommendations.

Browsing the Web from a range of devices, rather than just from traditional desktop computers, is becoming increasingly commonplace. An added bonus of accessible Web content is that it easily transforms for use on mobile phones, in-car computers and other devices with limited or no screen. WAI's technology developments and guidelines also support this increasing need for device-independent access to the Web.

## THE W3C WEB ACCESSIBILITY INITIATIVE TEAM

As Director of the WAI International Program Office, Judy Brewer leads the growing WAI team. Daniel Dardailler, working from W3C's European host site at INRIA, France, manages the WAI Technical Activity. Other team members working in the WAI Domain include Marja-Riitta Koivunen (visiting engineer from Helsinki Telephone Corporation), Ian Jacobs (Technical Writer), Charles McCathieNeville (WAI Authoring Tool Guidelines WG), Masafumi Nakane (WAI Education and Outreach), and Masayasu Ishikawa (WAI liaison to the Mobile Access Interest Group).

## WAI TECHNICAL ACTIVITY

The WAI Technical Activity encompasses three areas of work: Technology development, Guidelines, and Tools.

### TECHNOLOGY DEVELOPMENT

The Protocols and Formats Working Group (PFWG) reviews all W3C specifications to identify accessibility requirements, and jointly explore solutions. WAI contributed to the design of HTML 4.0, CSS2, SMIL, and MathML, which now contain a number of features that support accessibility. Recent work has involved reviewing the Document Object Model (DOM) specification, and requirements for XML, Scalable Vector Graphics (SVG), mobile computing, and a number of other areas as the W3C's scope continues to broaden.

### GUIDELINES

An important part of the work of the Web Accessibility Initiative is the development of guidelines explaining how to make the Web more accessible.

**Web Content Accessibility Guidelines:** These are for people writing and designing Web pages. These include checkpoints and techniques for making Web content accessible to those with disabilities, including the need to include alternative text for images; how to design tables that can be read properly by screen readers; and how to design forms so that they work well for people who cannot easily use a mouse.

**User Agent Accessibility Guidelines:** These include guidance for browser manufacturers and developers of other user software such as multimedia players and voice browsers. The guidelines include how to make the software operable without a pointing device; having both visual as well as aural representations of controls such as menus, buttons, and short-cuts; and enabling users to set the color and font size.

**Authoring Tool Accessibility Guidelines:** These are guidelines for a broad range of authoring tools, including WYSIWIG HTML editors, save-as-HTML or XML converters, tools that dynamically generate Web pages, image editors, and site management tools. These WAI guidelines explain how to incorporate prompts, alerts, and validation into such software to promote the production of Web content that is accessible to those with disabilities. The guidelines also explain how to make the user interface of the tools accessible.

### TOOLS

In the tools area, WAI gathers, coordinates, and further develops tools that can help evaluate and repair Web sites. The goal is to produce a toolkit that can be offered to content providers and users who encounter barriers when using the Web. Work on this toolkit involves stand-alone tools, as well as modules that can be incorporated into other Web authoring tools. It will enable the automated validation of accessibility, as well as more in-depth, semi-automated evaluation allowing for human judgment.

## WAI INTERNATIONAL PROGRAM OFFICE

The WAI International Program Office (IPO) coordinates the involvement of different parties with an interest in accessibility, including industry, disability organizations, research organizations, and government. The WAI IPO manages an interest group for the discussion of overall WAI activities; hosts the Education and Outreach Working Group; participates in standardization activities; promotes implementation of WAI guidelines; and tracks research and development which can affect future Web accessibility.

### EDUCATION AND OUTREACH

Education and outreach to all sectors of the Web community tie together the WAI's developments in technology, guidelines and tools. The WAI Education and Outreach Working Group coordinates the development of curriculum modules, demonstration packages, workshops, and related materials in order to increase awareness of the need for and solutions to Web accessibility.

### RESEARCH AND DEVELOPMENT

The WAI IPO monitors research and development that could affect the future accessibility of the Web. This may include giving input into technologies that hold the promise of enhancing the future accessibility of the Web, as well as technologies that could create new barriers on the Web, to ensure that developers are aware of the universal design ("design for all") approach.

# membership

## WHY YOUR ORGANIZATION SHOULD JOIN W3C

As a World Wide Web Consortium Member, your organization can participate in the collective voice of the global Web community. Member organizations gain access to W3C's technical expertise and can lead the evolution of innovative Web technologies in a neutral forum. There are already more than 300 Members: hardware and software vendors, content providers, telecommunications companies, corporate users, citizen groups, and government and academic entities.

## MEMBERSHIP BENEFITS

- Participation in working groups, workshops, and symposia
- A voice in providing strategic direction to the Consortium
- A seat on W3C's Advisory Committee (AC)
- Access to Members-only Web site, containing information on events, technologies, software releases, working groups, forums, mailing lists, news, and announcements
- Members-only weekly News Service
- Direct access to other experts in the Web community

## HOW TO BECOME A MEMBER

Membership in the World Wide Web Consortium is open to any organization that completes a Full or Affiliate Membership agreement. As described in W3C's Prospectus, <http://www.w3.org/Consortium/Prospectus>. Affiliate status is reserved for non-profit organizations and commercial firms with annual revenues under \$50 million.

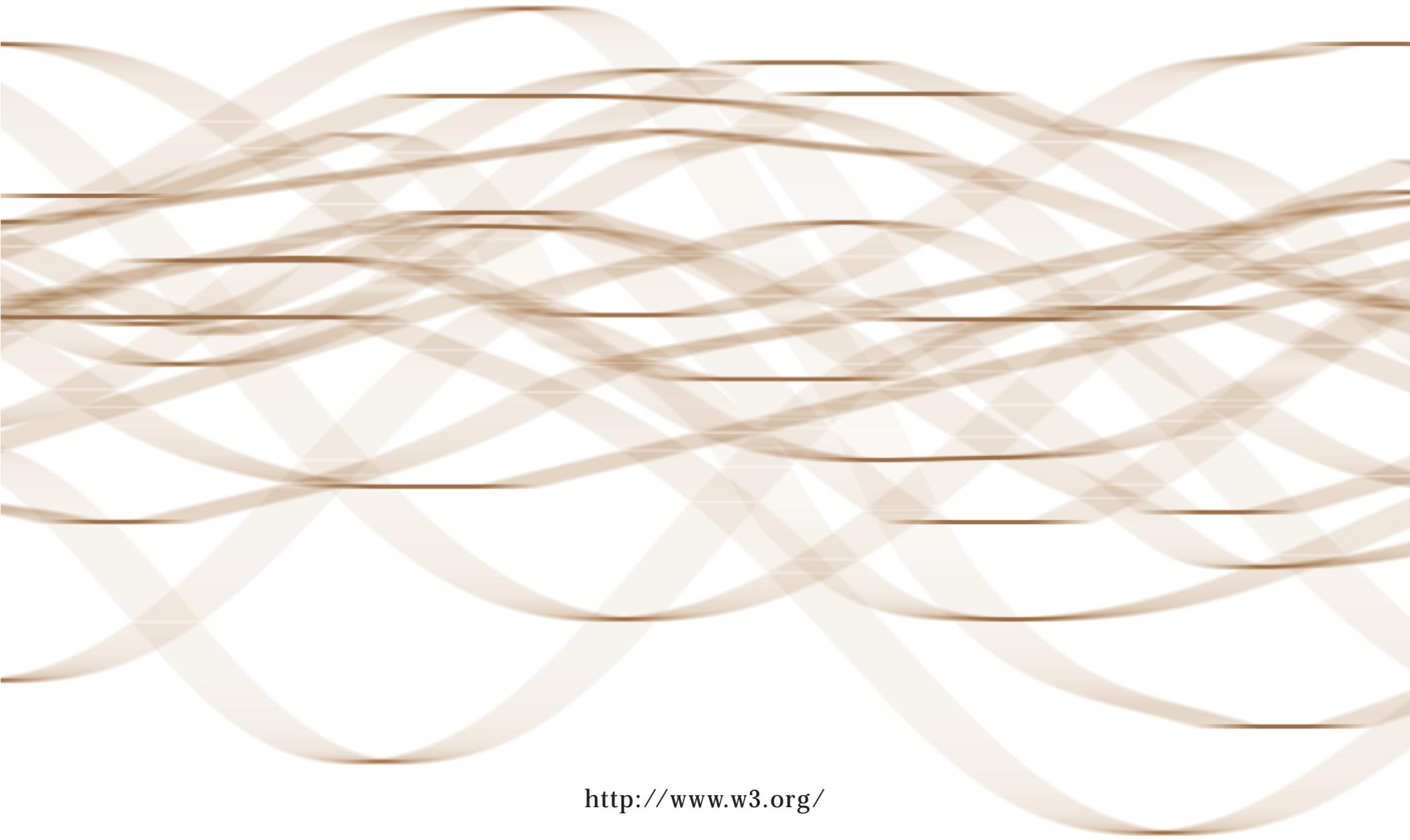
For more information about the World Wide Web Consortium and its Members, visit W3C's home page at <http://www.w3.org/> or send email to [membership@w3.org](mailto:membership@w3.org).



<http://www.w3.org/>

"The Web community is made up of all those who browse or put information on the Web, who use the Web as their workplace, who develop new products and services on the Web, who provide Internet access, and who have ideas about how to improve the Web. The Consortium is the neutral forum where these parties meet to agree on common specifications. W3C gains richness from the meeting of all these forces."

Tim Berners-Lee  
Director, W3C



<http://www.w3.org/>