Stichting NLnet Annual Report 2001

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1. Introduction

goal

The Articles of Association of Stichting NLnet define its goal as "*fostering electronic information exchange and everything that is related to this and/or can be beneficial to this.*"
In the course of NLnet's history (starting in 1982), the goal has evolved to stimulation of network technology research and development in the domain of Internet technology.

Open Source requirement

The merge of NLnet's Internet Service Provider (ISP) activities in WorldCom (formerly UUnet) in 1997 provided Stichting NLnet with the means to actively stimulate the development of network technology and to make this freely available to the community in its broadest sense. To this purpose, a wide range of internet-related projects are currently being funded for which Open Source licensing conditions, and in many cases the General Public License (also known as GPL or GNU license), hold.

NLnet projects

The projects undertaken by Stichting NLnet can be divided into:

- *Network research*: e.g. IIDS, research on interactive intelligent network agent technologies;
- *Network development and engineering*: e.g. NLnet Labs, which focussed on secure DNS and IPv6 in 2001;
- *Network technology exchange*: e.g. the international exchange programme ReX in cooperation with USENIX;
- *Network technology development/engineering "productising,"* focussing on concrete results: e.g. secure DNS service database interaction (Bind V9 DLZ), efficient and scalable distribution of free software and documentation (SIRS), safe and robust network infrastructure design for schools (schoolLAN), generator for natural language parsers (AGFL), logging report generator (LogReport), and many more;
- *Sponsoring of other "Open Source" or educational initiatives* in the area of networking: e.g. Web contests (ThinkQuest), open source development (FSF and ISC), and technology conferences (SANE, HAL and YAPC::Europe).

In 2001, Stichting NLnet financed projects to the sum of € 1.331.042 (compared to € 685.405 in 2000). NLnet has budgeted € 1.903.800 for projects in 2002 and € 2.000.000 for 2003.
As an organisation, Stichting NLnet does not derive any direct benefits from the undertaken projects or their results.

upcoming projects for 2002

In 2001, four new projects were defined which are expected to formally start in early 2002:

- *CP2PC*: a feasibility study for developing a generic programming interface to file-sharing peer-to-peer (P2P) systems and a simple GUI client based on this interface. This should allow a user to interoperate with multiple P2P networks simultaneously. This study starts on March 1, 2002 and will last for three months, with two scientific programmers involved;
- *Open Sesame*: a generic framework for storing and querying RDF and RDF Schema (Web interface to databases). The project starts on March 1, 2002 and is expected to continue for 20 months, with two full-time people;
- *A-A-P*: A-A-P intends to create a flexible and portable framework for distributed development of software. The project starts on March 1, 2002 and will last one year, with one full-time person.
- *LCC*: This project investigates the creation of a system of local content caching, in which a content provider can notify a Local Content Cache of new content for search engines. This investigation will take about six months, with three part-time people involved.

projects new in 2001

AHA	Adaptive Hypermedia for All is an adaptive web interface system. The first phase of this project started in June 2001 and will take one year. It involves ~ 2 fte.
ALIAS	ALIAS is an interdisciplinary study of the legal aspects of the use of network agents and the implications for software development. The project started in February 2001 and will continue until early 2003, with four part-time people funded.
BIND DLZ	BIND DLZ (Dynamically Loadable Zones) is a project to develop generic extensions to the BIND V9 DNS server in order to support dynamic retrieval of DNS data from an external database.
Stichting SchoolLAN	SchoolLAN is a pre-configured computer network infrastructure for primary schools. In order to coordinate the regional schoolLAN initiatives and to manage the technical advancement of schoolLAN, NLnet established a foundation, Stichting SchoolLAN, on August 14, 2001. Three people are working full time in this foundation, which is currently sponsored in full by NLnet. The NLnet bootstrap involvement is expected to end after two years.
TimeWalker	TimeWalker is a visualisation system for huge amounts of logging events and data. The project started in April 2001 and will end in June 2002. The total estimated effort is 1.5 fte (two people).

projects finalizing in 2001

AGFL

The AGFL-GNU project, which started in January 2000, finalized its work on the development of a natural language parser generator at the end of 2001 with a generated parser for English documents and an example application for searching GNU software package documentation. Final delivery of the full results is expected in April 2002.
NLnet has sponsored this project with € 113.768 in total, with an implementation effort of nearly 2 man-years.

SIRS

The Scalable Internet Resource Server project (SIRS-1, SIRS-2 and SIRS-3) has lasted three years. It developed a service that allows Internet resources to be widely distributed and replicated across the Internet in a scalable way. The final report was published in February 2002. Various releases of the software have been available for download since January 2001. Work will continue with a trial to mirror a huge amount of freely distributable software and documents over the Internet.
NLnet has sponsored this project with € 356.218 in total, with an implementation effort of close to 6 man-years.

2. Project policy

Stichting NLnet's primary goal is to stimulate new developments in network (internet) technology, improve existing technology, and to encourage new applications of existing technology.
The Stichting has chosen to do this by supporting non-proprietary network-oriented projects.

policy

Stichting NLnet's methods to contribute to the development of new network (internet) technology, improvement of existing technology, and new applications of existing network (internet) technology are to:

1. Subsidise (fully or partially) software development;
2. Finance advanced scientific research into network technology, in co-operation with universities;
3. Provide financial and organisational backing for dissemination and exchange of knowledge about internet technology through conferences, workshops and contests;
4. Sponsor Internet knowledge development and knowledge exchange programmes between universities, colleges and research institutes.

Internet

All projects aim to develop, improve or apply network (internet) technology;

Open Source public forum

all results of projects are made freely available to the community, and are presented, if possible, at one or more suitable international conferences.

The Governing Board decides whether a project proposal is of interest to and appropriate for Stichting NLnet, possibly after consulting the Advisory Board and/or other experts in relevant field(s).

3. NLnet Projects in 2001

AGFL
parser generation for natural languages

Finding information on the Internet is not always easy. Good natural language interfaces could make it easier to search for information and improve the quality of the results. The goals of the AGFL project (Affix Grammars over a Finite Lattice--Katholieke Universiteit Nijmegen, professor Kees Koster) are to expand research in the area of grammar development for natural language and to create tools to support automatic generation of efficient parsers for such grammars. The results will be useful to the software development community as a whole.
Due to the lack of time left for the AGFL project, the example application has been simplified to provide a simple phrase-based search service for the help information of GNU software packages. Originally, the example application was to deliver web document classification software for the English language.

Although the AGFL project ended in November 2001, the AGFL software and documentation still needs to be wrapped up for final distribution. See http://www.cs.kun.nl/agfl/ for more information. The AGFL software will be available as a GNU software package. A presentation of AGFL will be given in the Freenix track of the USENIX Annual Technical Conference in June 2002.

The AGFL project started in January 2000 and lasted to the end of 2001. It involved about 22 months of software engineering. The first GPL'ed release of the AGFL parser generator software was made in April 2001. NLnet sponsored € 45.508 for 2001. The total cost of the project was € 113.768.

AHA
adaptive hypermedia for all

In January 2001, NLnet signed a contract to support a software development and engineering project at the Technical University of Eindhoven (TU/e). The project aims to develop technology for extending Web servers with user transparent adaptive functionality. The system is called Adaptive Hypermedia for All (AHA), and development is under the supervision of professor Paul De Bra (TU/e).
Due to staffing problems, the project started later than intended in July 2001. The development is based on the earlier work of Paul De Bra. Support from students from the TU/e and the University of Antwerpen has been obtained.
In 2001, the project focussed on: generalizing earlier prototyping efforts, AHA support for documents from an external source, filtering Hyper Text Markup Language input files to eXtensible Markup Language format, using and modularising XML Document Type Definition for external representation, and developing AHA tags for XML parsing speedup. Detailed progress reports are available at NLnet's project website http;//www.nlnet.nl/projects/aha/.

In 2002, we expect to see software for the authoring interfaces needed to create concept hierarchies and relationship types, as well as server-side applications that form the open adaptive engine.
If the first year of this project is successful, it will be followed up with a second year. The plan is to then incorporate a number of extensions that will turn AHA into a more versatile adaptive hypermedia platform.

More technical information on AHA and demonstrations of the software can be obtained via http://aha.win.tue.nl.

Stichting NLnet is sponsoring this first year of the project for a total of € 91.926. The costs for 2001 were € 45.963.

ALIAS
legal aspects of software agents

The ALIAS project is an interdisciplinary study to explore and analyse the legal and technical implications of the use of software agents in the context of Dutch, European and US law. A conceptual framework has been devised in which a number of intermediary concepts (autonomy, identifiability, trace-ability, integrity and trust) are related to both legal and technical concepts.
Various university faculty disciplines are working together here: computer scientists of the IIDS group (Vrije Universiteit), headed by professor Frances Brazier, and legal experts from the IIR group (Vrije Universiteit), headed by professor Anja Oskamp, and from the CRBI group (University of Tilburg), headed by professor Corien Prins. This inter-disciplinary co-operation effort makes the project rather unique. It has also resulted in a slow project start due to terminology communication issues that have caused delays into 2002. Most of these issues appear to have been resolved by now; thus, better results are expected in 2002 and early 2003. The project should be completed in 2003.

The conceptual framework of ALIAS is described in a paper that has been accepted for presentation at the Bileta conference (http://www.bileta.ac.uk) in April 2002. More information on ALIAS is available via http://www.iids.org/alias.

This two-year project started in February 2001. Stichting NLnet is sponsoring up to € 188.120 total for this project. In 2001, € 48.016 was spent on ALIAS. The four people involved with ALIAS are working part time on this project.

BIND DLZ
dynamically loadable zones

The BIND DLZ (Dynamically Loadable Zones) project aims to develop some extensions to the BIND V9 DNS server implementation, allowing DNS zone and record data to be stored in a database and modified without restarting or reloading the BIND V9 DNS server. A generic interface and a specific driver for the Postgres database will be implemented in phase 1 of this project. Depending on the results of the first phase, this may be followed up by driver implementations for other databases like MySQL, Berkeley DB, ODBC and LDAP.
The project started in December 2001 by Rob Butler in the USA. NLnet has spent € 1.115 in 2001 on the project and has committed a total of US$ 20.000 for its first phase, which is expected to be completed before August 2002.

Free Software Foundation (FSF)

The Free Software Foundation is renown for its efforts in the area of freely distributable software development: GNU software and licensing policy. The well known GNU Public License (GNU GPL) and GNU Free Documentation License (GNU FDL) are used for many NLnet-sponsored projects.
Stichting NLnet donated US$ 15.000 in 2001 to support the work of the FSF. Since 1999, NLnet has made yearly donations of a comparable amount to FSF. More details on FSF can be found at http://www.fsf.org.

Interactive Intelligent Distributed Systems (IIDS)

network/agent research

In 1999, Stichting NLnet and the Department of Sciences at the Vrije Universiteit Amsterdam formally agreed on a long-term collaboration to do research on Intelligent Interactive Distributed Systems (IIDS, http://www. iids.org) for a period of ten years. Professor Frances Brazier heads the IIDS research group.

focus

The group's primary research directive is to devise a flexible, modifiable architecture for the development of large-scale interactive intelligent agents in a wide-scale distributed network. The research programme distinguishes three main lines of research:

(1) Middleware (an Agent Operating System [AOS] and an agent environment [Mansion])
(2) Services (including an Agent Factory, Directory Services and Management Tools)
(3) Distributed Applications to explore requirements and to test results (distributed design, mobile co-operative information retrieval agents, embedded internet services, system administration)

The start of the group was difficult and required more time than originally anticipated. The part-time function of the research management for the group has been increased to 0.8 fte to remedy this issue.
From the start, the group has been successful in attracting active participation of MSc students for their final term projects / MSc theses for 6 – 12 months at a time. In the summer of 2001, the group of Niek Wijngaards (researcher) and two scientific assistants (David Mobach and Guido van 't Noordeinde), was strengthened by the addition of Benno Overeinder (researcher) and Etienne Posthumus (scientific programmer). The output of the group has increased significantly: publications include papers and presentations on generative migration of mobile agents in heterogeneous environments, distributed shared representations of agents, collaborative distributed design, adaptive agents and the Agent Factory.
More details of the research, results and plans can be found in chapter 4 of this annual report. Much of this research has been done in close collaboration with professor Andy Tanenbaum and professor Maarten van Steen of the Computer Systems group at the same university. IIDS is also the computer science partner in the interdisciplinary ALIAS project mentioned previously.

NLnet has contributed € 208.157 in 2001 to support the IIDS group. For 2002, a contribution of € 388.272 has been approved, but this amount will be reduced by the unused portion of NLnet's 2001 contribution (€ 81.073).

Internet Software Consortium (ISC)

distribution of BIND & DHCP

ISC governs the development of BIND V8 and V9, as well as DHCP software. These software packages implement the domain name server and dynamic host configuration protocols. Nominum Corp. does the majority of the Bind V9 development under the direction of ISC. Additionally, ISC hosts several software distributions, such as NetBSD, OpenLDAP and XFree86.

In April 2001, NLnet paid US$ 175.000 to the ISC, thereby concluding the financial guarantee it made in mid-1999 to fund the completion of BIND V9 development. The goal of providing a (series of) public

release(s) of this important reference implementation under the modified BSD license has been met.
Teus Hagen is a member of ISC's Board of Directors.

Stichting NLnet Labs

Internet software development

Stichting NLnet Labs was established in late 1999 with a mission to further develop Open Source Software for the Internet and all other related scientific developments. The laboratory, a long-term development environment for up to six people, is fully financed by Stichting NLnet and cost a total of € 153.000 in 2001. It is situated in Amsterdam in one of the Matrix buildings of the ASP (Amsterdam Science Park), and had three employees during most of 2001. Ted Lindgreen is the executive director.

DNSSEC

NLnet Labs continued its experiments with the deployment of DNSSEC for country top-level domains in 2001, but the work was postponed in October 2001 while awaiting clear decisions from the IETF standardization process.

nsd root server

Meanwhile, a new project was started, in co-operation with RIPE, to write a new DNS implementation geared specifically to root servers and not containing any code from existing implementations. A rough prototype of the server, named *nsd*, was made available in 2001. Alpha and beta releases will follow in 2002.

IPv6

InTouch has made available an IPv6 connection to NLnet Labs, and work has begun testing and adapting common network applications for native IPv6 network communications.

NLnet Labs was rather unsuccessful in expanding its staff over the year as originally planned. However, the situation for 2002 looks much brighter, with several people lined up for new contracts in early 2002. See http://www.nlnetlabs.nl for more information.

Stichting NLnet Labs publishes its own annual report.

Stichting LogReport Foundation

log file analysis and reporting

A group of enthusiastic software developers approached Stichting NLnet in April 2000 with a plan for a new initiative in the area of report generation. The purpose of this initiative is to develop a system with which useful reports can be generated from the various system logs of (network) activity.
Stichting LogReport Foundation was founded in 2000 to support these activities. The members of Stichting LogReport's Governing Board are: Teus Hagen (chair, Stichting NLnet), Wytze van der Raay (treasurer, Stichting NLnet) and Jakob Schripsema (secretary, neutral).

international team

Joost van Baal joined LogReport in November 2001 as its first developer and is now co-ordinating an international team of part-time developers and maintainers. This team, which averages four people, is working on LogReport software development and the set-up of a report responder service. In 2001, nine beta releases of Lire, the primary LogReport software package, were made available from the LogReport web site (http://www.logreport.org) and through SourceForge (http://sourceforge.net/projects/logreport).

log file coverage

Reports are generated from a variety of logs, including: Bind V8 and V9 query logs, firewall logs (Cisco, ipchains/iptable, IP filter, WELF), email (Exim, qmail, Postfix, sendmail, Netscape), print logs (CUPS, LPRng), ftp transfer logs (ProFTP, WU ftpd, MS IIS), web proxy logs (squid, WELF, MS ISA), and databases transaction logs (MySQL). The first official release is planned for early 2002.

The LogReport development team is one of the few projects of Stichting NLnet where the developers are widely spread over the world (Canada, USA, Bulgaria, Netherlands).

Stichting LogReport Foundation is exploring the possibility of alternative funding models (e.g. exploitation of its Open Source software) in order to extend its current efforts.

Stichting LogReport is fully sponsored by NLnet for its first two years. The total amount sponsored by NLnet in 2001 was € 140.000. Based on the employment of approximately 1.6 fte during the year, NLnet expects to sponsor Stichting LogReport in 2002 with € 92.000. LogReport publishes its own annual report.

NILO
Open Source PXE

Stichting NLnet initiated the NILO project in 1999 to develop a public domain source code implementation of the PXE standard for Network Interface Cards (NIC) as defined by Intel. A low-level technical problem has caused a deadlock situation in the development, thereby stopping the project. An effort to restart the project in 2001 did not succeed. The NILO code will probably be integrated into the kernel code of the LinuxBIOS project.

ReX
International research exchange

In the summer of 1999, a unique programme was started, together with USENIX, which supports international research and development: the Research Exchange Programme (ReX), http://www.NLnet.nl/projects/rex/. This programme aims to facilitate the exchange of technology between research institutes world wide by working on computer software projects, especially those involving network technology and open systems. Research groups with complementary and strongly related research foci can gain from collaborating with each other, broadening the potential scope of their results. Because the results are to benefit the community and be freely available, all software is to be open source.

In 2001, the second year of ReX, three new exchanges took place:

- *University of Delft and University of Berkeley:*
  a three-month exchange in order to develop distributed localization algorithms for wireless sensor networks;
- *University of Tilburg and University of Cambridge:*
  a four-month exchange to conduct research on the automatic construction of electronic dictionaries for use in text mining and related applications using memory-based learning techniques;
- *University of L'Aguila and University of Colorado:*
  a nine-month exchange in order to develop novel wireless applications that leverage the Internet-scale publish/subscribe middleware framework of Siena.

The Indian Statistical Institute in Calcutta and Lund University have been granted funds for an exchange in order to develop software allowing for stream ciphering for secure communication over a network. This exchange has severely been delayed.

Two new exchanges were approved in 2001 but will take place in 2002:

- *University of Pennsylvania and University of Leiden:*
  a nine-month exchange to jointly develop a prototype for an extensible packet monitor based on Intel's IXP1200 network processor;

- *University of Cambridge and MIT*:
  a three-month visit at MIT to brainstorm for new ways of dealing with the robustness and scalability problems of systems designed to resist censorship.

The total cost of the ReX program in 2001 was US$ 50.083, including USENIX's administrative expenses. Stichting NLnet paid approximately 50% of this amount, for a total of € 25.967.

steering committee

The members of the ReX Steering committee responsible for this programme are: Evi Nemeth and Peter Honeyman (USENIX), Frances Brazier (chair) and Teus Hagen (Stichting NLnet), and Mike O'Dell (neutral). The committee's task is to initiate and evaluate proposals and to monitor and evaluate the ReX exchange projects. There is administrative support from USENIX and NLnet.

schoolLAN
network infrastructure

The schoolLAN project focuses on the development of a small, robust, and centralised network targeted for primary schools. SchoolLAN initially started in 1999 as a technical concept and tools for configuration development by Stichting NLnet in co-operation with four primary schools in two regions of the Netherlands. This technical design has been extended in 2000 and upgraded in 2001 to a technical configuration concept. In addition, a plan has been developed to create support organisations for primary schools in five regions of the Netherlands. The regional support organisations are set up with regional teacher training colleges and vocational training colleges specialising in IT. The major differentiator of the schoolLAN project is its orientation on the use of an Open Source development mode, not only for the technical network/computer portion but also for the (digital) educational component.

Stichting schoolLAN

The technical involvement of the regions did not meet the goals set for 2000 and 2001. In order to boost the co-operative development efforts, NLnet decided in June 2001 to create an interregional coordination centre. This was started on August 14th with the formation of Stichting schoolLAN, a new foundation with three technical employees. Stichting schoolLAN is initially sponsored in full by Stichting NLnet. The foundation started to streamline the schoolLAN developments for 2001 and to facilitate the distribution of the schoolLAN software with a CD-rom and extensive documentation. See http://www.schoollan.nl for more information (in Dutch!).

Governing Board

The Governing Board of Stichting schoolLAN consists of Teus Hagen (chair, Stichting NLnet), Wytze van der Raay (treasurer, Stichting NLnet), and Kees Keijzers (secretary, University of Nijmegen).

NLnet is supporting a number of regional and interregional schoolLAN management efforts and initiatives via Stichting schoolLAN:

schoolLAN Arnhem

In January, the efforts in the Arnhem region were formalized. A contract for technical support was awarded to the ROC Rijn IJssel College in Arnhem, and Ruud Suk from MicroFox was contracted as local co-ordinator. In October 2001, a regional foundation, Stichting schoolLAN Arnhem, was formed with support from NLnet in order to co-ordinate and manage the schoolLAN efforts in that region. The first five of the expected twenty primary schools were equipped with schoolLAN by the end of 2001.

schoolLAN Venlo

In the region Venlo, the support of NLnet has made it possible for Fontys College, Gilde College, and the foundation Stichting Prisma to

	install and provide support for schoolLAN in all primary schools of Stichting Prisma (16 - 20 schools). Prisma will also support schoolLAN at non-Prisma schools in that region.
Overijssel, Noord Holland	Contact with colleges in Zwolle (Deltion and Landstede), Alkmaar, and Hoorn (Horizon), Educational Service Institutes (OBD Kennemerland and Noord-Overijssel), and companies such as Systeam in Zwolle has not succeeded in significant schoolLAN activities in either region because of manpower problems and inadequate technical capabilities.
Friesland	For the region Bolsward in the province of Friesland, negotiations began to start a schoolLAN support service via the educational service provider GCO Fryslân. This NLnet-funded initiative will begin in March 2002 in order to start schoolLAN for an anticipated 15 primary schools. Progress in the regions is slow due to a lack of decision power and sufficient technical knowledge, low motivation, a non-commercial minded culture, and the top-down, regulated structure of the educational organisation.
national level	Discussions with the government's educational inspection, Stichting ICT op school (national education-oriented ICT information access point), Stichting Kennisnet, @NL.tree (Internet information access and Internet service provider and support), and the Ministry of Education, Culture and Science (directoraat ICT) have been started in order to initiate better educational usage of the technical capabilities of schoolLAN.
	Stichting NLnet has registered the trademark schoolLAN in the Benelux to prevent misuse by other parties. The total cost of the schoolLAN-related projects for NLnet in 2001 was € 190.343, of which € 97.000 was spent on Stichting schoolLAN. A total of € 300.000 has been budgeted for 2002.

Scalable Internet Resource Service (SIRS)

distributed mirroring	SIR Service is an application of the GLOBE software developed in a research context by the Computer Systems Group at the Vrije Universiteit Amsterdam (Andy Tanenbaum and Maarten van Steen - see http://www.cs.vu.nl/globe). SIR Service was defined in December 1998 as "a distributed alternative for existing anonymous ftp file services, based on GLOBE." SIRS development started in December 1998 and evolved into a widely scalable information "mirroring" system. A beta release of the SIRS software was made publicly available under BSD license in January 2001. Also, the so-called Globe Distributed Network (GDN), a collection of servers and client-side components that allow users to distribute and replicate packages of files, was brought online.
	The SIRS-3 project started in 2001, with the goal of overcoming the drawbacks found in earlier phases of SIRS. It has implemented improved security (trace-ability and access control) and a robustness model (crash and communication recovery) together with better management tooling (site, global system and content management). In addition, more beta testing of the software has been done, which should evolve into a real live application in early 2002: the mirroring of the huge, freely distributable software distribution site SourceForge.

The work of this project was presented in the Freenix track of the USENIX Annual Technical Conference in 2000 and will be discussed in an invited talk at the SANE 2002 conference.

The cost of SIRS-3 in 2001 was € 145.210. The combined SIRS projects have required a total funding by NLnet of € 356.218 over the past three years and a software engineering effort of close to 6 man-years (excluding research efforts for Globe in general). The SIRS developments have had a larger impact than expected on the Globe research effort at the distributed systems group of the Vrije Universiteit. This experience was a welcome surprise for the involved researchers. SIRS/GDN is finding its way into the further development of GLOBE.

Stichting ThinkQuest

Stichting ThinkQuest Nederland (a non-profit organisation) was created at the end of 1999 to promote Internet use in education and to stimulate the development of educational Internet applications. ThinkQuest Nederland (http://www.thinkquest.nl) participates in the international ThinkQuest programme, and is one of the initiators of the European eXplora programme.

Governing Board

At the end of 2001 the Governing Board consisted of Frances Brazier (Stichting NLnet, chair), Aad van der Niet (BVEnet, treasurer), Boudewijn Nederkoorn (SURFnet BV), Ferry de Rijcke (Onderwijsinspectie) and Pieter Hogebrink (Onderwijsinspectie Zwolle).

staff

Pien Voortman is the executive director of Stichting ThinkQuest Nederland. Together with six employees, she is responsible for the organisation of the contests, new initiatives and internationalisation.

The Ministry of Education and Culture has provided an enormous boost to the ThinkQuest organisation in the Netherlands by considerably increasing the amount of available funding, mainly for prizes.

web contests

In 2001, there were five types of contests organized: the usual international contest (for 12-19 year olds), the contests for secondary school children, for primary school children, and for school teachers and students, and the art contest, which was new in 2001.

Kennisnet

Efforts have been started to form a closer relationship with Stichting Kennisnet, an Internet service and content provider exclusively for primary and secondary schools. This relationship is expected to evolve to the point where ThinkQuest will operate under the umbrella of Kennisnet in 2002.

TimeWalker
visualizing huge data sets

TimeWalker is a software development project which will result in a novel software tool for "browsing and data mining" huge amounts of time stamped data. The tool utilizes principles obtained from the information visualisation technology. The visualisation technique makes use of the human ability to recognize patterns in colour representations.

The project started in April 2001 and was expected to conclude in November 2001. However, development has been stretched out to June 2002 in order to create more opportunity for feedback from beta testers like network and system managers.
A dedicated TimeWalker seminar was held in Utrecht in October 2001 to attract beta testers. TimeWalker has also been presented at the international Linux 2001 Kongress in November 2001 in Enschede.

The first public beta release was made on December 2, 2001. Follow-up releases are to be announced in early 2002. Source code maintenance and software distribution for TimeWalker is handled via the SourceForge web site. More information on TimeWalker can be obtained via http://sourceforge.net/projects/timewalker.

The project is done by Prometa Ratum b.v. The work is driven and managed by Theo de Ridder, in co-operation with Pim Buurman. The total NLnet funding for this project is € 150.000. In 2001, NLnet spent € 100.000 on TimeWalker.

3.2 Conferences

HAL 2001

In August 2001, a rather unique congress was organised on the campus of the University of Twente under the name Hackers at Large, or HAL 2001 (http://www.hal2001.org/). About 3000 people visited the event, which hosted an interesting mix of professionals, scientists, activists, hobbyists etc. The informal atmosphere, hands-on workshops, practical tutorials and technical presentations all contributed to a very lively exchange of Internet networking knowledge and experience. This successful event was the fourth in a series that has been running every four years since 1989 (1989 - Galactic Hacker Party; 1993 – Hacking at the End of the Universe; 1997 – Hacking in Progress).
Stichting NLnet supported HAL 2001with a donation of € 10.000.

SANE 2002

The NLUUG (http://www.nluug.nl/), Stichting NLnet and USENIX (http://www.usenix.org/) are sponsoring SANE 2002, the third Systems Administration and Networking Conference in Europe. SANE 2002 will be held from May 27 to May 31, 2002 at the MECC in Maastricht. The conference will have a three-day tutorial program, followed by a two-day technical program. In addition, a poster session and a small tradeshow are being held in conjunction. Many active NLnet projects are expected to present their work at SANE 2002.
Stichting SANE 2000, the non-profit foundation created to organize SANE 2000, the previous conference in this series, has been renamed Stichting SANE and is again responsible for organising this event. Stichting NLnet is represented on the board of Stichting SANE and also provides financial and administrative support.
In 2001, Stichting NLnet provided a guarantee of € 25.000 and an interest-free loan of € 15.000 to Stichting SANE. It is expected that NLnet's financial support for SANE will be increased in 2002 to overcome the difficulties caused by the deteriorated economic climate for this type of conference.

YAPC::Europe 2001

YAPC::Europe 2001 (http://www.yapc.org/Europe/2001/) was the second edition of a European Perl conference, patterned after the YAPC ("yet another Perl conference") events organised in North America. It was held in the beginning of August 2001 at the Hogeschool Holland in Diemen. This inexpensive, grassroots Perl conference was visited by some 250 people, mostly professional Perl programmers. Security, including network security, was one of the leading conference themes.
Stichting NLnet has supported the organisation of YAPC::Europe 2001 by sponsoring a second conference room and the production of the proceedings CD-rom, for a total cost of € 1.990.

3.3 Other activities in 2001

	Stichting NLnet is continually in pursuit of new projects. To this purpose, NLnet maintains relations with organisations such as USENIX, NLUUG, RIPE, and SURFnet. Relations with universities are another potential source of projects. A few universities (Nijmegen - Expertise Centrum Nederlands, and Amsterdam) were visited in 2001.
Open Source and business	Relations with some small high-tech companies and the Ministry of Economic Affairs were established by Stichting NLnet. The main topic of those meetings has been to discuss and advise on Open Source issues for these companies, including Polderland, Aidministrator Nederland and Nexial Systems. The latter discussions led to initiation of the Open Sesame and LCC projects in 2002.
computer science and education	The schoolLAN project has had an unexpected influence on the way network technology is taught at two high schools (HBO Fontys and ROC RIJC). The education there has become more practical and technologically oriented, as opposed to focusing mostly on software configuration management. Both students and teachers have been highly motivated and enthusiastic.

4. The IIDS project in the picture

world-wide systems

The Internet is today's main infrastructure for communication between systems world-wide. Information is inherently distributed over such systems on the same world-wide scale. Locality is, in essence, no longer a requirement since information and services are provided and accessed by systems all over the world. The systems themselves may even be mobile, e.g. laptops, and intelligent, e.g. PDAs.

intelligent software agents

Software agents provide a means to access information and/or services that are inherently distributed but not necessarily accessible from all parts of the world due to bandwidth constraints, processing constraints and/or security constraints for example. Agents are multi-threaded processes that autonomously roam the Internet, gather and process information, and interact with other agents and objects. Agents may or may not have an external, public embodiment (i.e. public information that can be accessed by others). Their processes are not visible to the outside world.

increasing numbers of agents

As the number of agents and objects in a multi-agent system increase, scalability becomes increasingly important. Multi-agent systems need to be able to scale (in terms of agents and available resources) on demand. This needs to occur without noticeable loss of performance or considerable increase in administrative complexity. They also need to be robust and capable of dealing with the dynamic nature of the Internet securely.

IIDS research group
mission

The Intelligent Interactive Distributed Systems Group (IIDS Group) was initiated by Stichting NLnet and established at the Vrije Universiteit in Amsterdam. The group's mandate is to advance technology to support the development of flexible, adaptable architectures for large-scale intelligent interactive distributed systems — a technology needed to cope in a world in which the Internet plays such a significant role.

AgentScape
agent framework

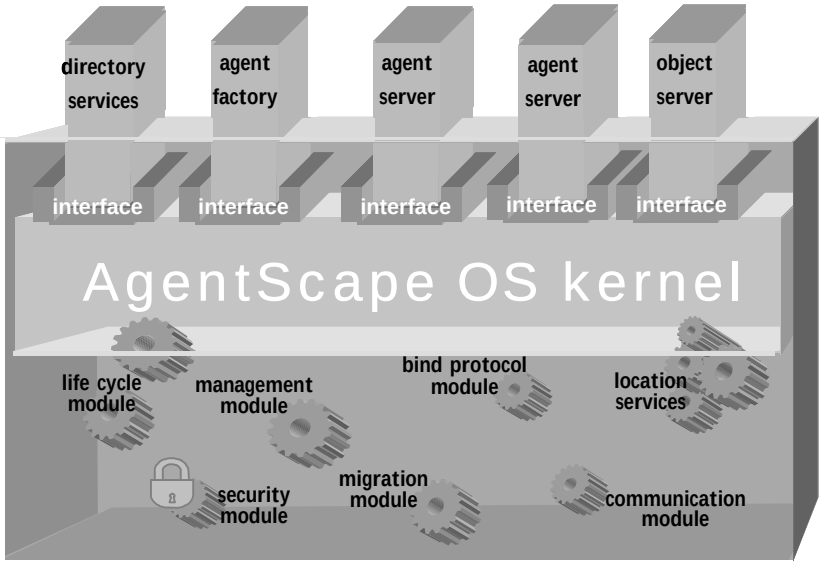
The current focus is the AgentScape framework. This research is done in collaboration with the Computer Systems Group at the Vrije Universiteit. The framework includes the AgentScape Operating System (AOS), directory services, an agent factory, and libraries for developers of intelligent multi-agent systems. This environment needs to support heterogeneity, interoperability with legacy systems, and multiple qualities of services.

The Agentscape Operating System is middleware designed specifically to support agents in large-scale distributed environments. It can, in fact, be seen as a virtual machine distributed over a wide-area network consisting of heterogeneous hosts. All calls are filtered by the middleware and appropriate calls are dispatched to the underlying operating system, services, etc. Having the middleware filter (trap) all calls is necessary for security reasons.

distributed virtual machine

A location in the distributed system is a set of hosts run by a single administrative entity. Each host runs an AOS kernel, agent servers, object servers, and service access providers. An agent server hosts agents, an object server hosts objects (based on GLOBE technology),

and a service access provider makes external services accessible to agents.



agent management

The management system in the AOS is responsible for creation, deletion and migration of agents. This system needs to interact with other parts of the AOS to ensure that performance, fault-tolerance, and security policies are enforced. A unified view of an agent's life cycle is essential, as this specifies which states of an agent are distinguished and which transitions between these states are possible. The current model has three basic states (in addition to creation and deletion): suspended, in-transit and active. The suspended state plays a central role in this model.

An agent may be in the suspended state for a number of reasons (e.g. to be created, migrated, stored while inactive, encrypted, certified, and/or modified). Agents' external representations may be replicated. All operations on suspended agents need to be co-ordinated by an agent operating system (or platform).

the Agent Factory
an AgentScape service

The Agent Factory is an AgentScape service. It (re)designs agents' configurations and knowledge during an agent's lifetime. An agent can go to an Agent Factory and ask for its knowledge and/or functionality to be modified (e.g. updates of ontologies). The Agent Factory can also be used to extend the basic mobility of agents to true heterogeneous environments, i.e. different operating systems, different agent platforms, and different programming languages. To this purpose, the Agent Factory automatically adapts mobile code to a specific host: a form of generative mobility. The mobile code does not need to be sent to another host, but a blueprint of the mobile code's functionality is sent together with information needed to resume work. At each host, a service is available which inspects a blueprint and generates the corresponding program code. The program code generation process uses libraries of "building blocks" to reconfigure agents. These libraries may be host dependent.

automated agent adaptation

Migrating to a bank may require 128 or 256 bit SSL-encrypted communication. This functionality can be incorporated into the agent by the host to which it has migrated. Upon moving to another host,

this specific functionality may no longer be available in this form but in another.

MANSION
a new paradigm for application design

The WWW has limited functionality. It was designed for distributed document access, not for distributed processing. The MANSION paradigm and environment have been designed by van 't Noordende (a PhD student) together with IIDS and the Computer Systems Group, to support application designers using AgentScape to create multi-agent applications. MANSION defines rooms and worlds of rooms between which agents can roam. Security policies are defined at different levels and supported by the MANSION environment.

the virtual bookshop a typical application

The virtual bookshop, the book world, houses different *book* companies each with their own room(s). As they are also competitors, they may have restricted access to some rooms or sections thereof, possibly with varying degrees of security. Agents wander through the different rooms comparing prices and services, placing orders, and performing financial transactions on behalf of their human users. The extent to which agents are free to decide to purchase books will vary. In some cases, agents are designed to work fully autonomously; in other cases, agents are designed to find relevant information which human users can use to decide whether or not they wish to purchase the book. If so, the users can perform the necessary transactions. For scalability reasons, rooms may be distributed over different locations world-wide without the user or its agent ever noticing. The agent should not be able to tell the difference and AgentScape makes sure the rooms (including the objects in the rooms) are updated as needed.

electronic auctions and markets

Another domain for which MANSION and AgentScape have been designed is that of electronic auctions and markets. In an electronic auction world, each room has its own characteristics and rules. Agents may need to prove they are equipped with the knowledge needed in a specific type of auction (e.g. Dutch, English or Vickery) and have specific credentials to be able to prove this. In some cases, agents may need to provide additional credentials such as proof of identity, proof of financial credibility, and/or financial backing of a trusted third party. In most cases, agents will be able to see which other agents are in the room they have entered at the same time (not necessarily their real identity). They may use this information to build profiles of their competitors. Sometimes this information may be of use outside the room, and at other times it may not. Depending on the security policy, agents may be limited in the type of information they are allowed to access while in the room or take with them when leaving a room. Together, MANSION and the underlying AgentScape framework provide a security architecture to support such policies.

more information

For more information on all of the above-mentioned topics and publications on the work in progress, see http://www.iids.org.

5. Stichting NLnet organisation

NLnet birth date

Stichting NLnet was formally established as a "stichting" (Dutch for foundation) on February 27, 1989 and is situated in Amerongen, the Netherlands. It is registered at the Chamber of Commerce, Amsterdam under number 41208365. In 1999, Stichting NLnet changed its Articles of Association to obtain a full non-profit status (so-called Article 24 status, "algemeen nut status").

NLnet foundations

To be able to maintain a clear separation between Stichting NLnet's funding operations and the project technology related operations, Stichting NLnet has created separate legal entities for some of its more specialized projects, such as 2000's Stichting NLnet Labs and Stichting LogReport and September 2001's Stichting schoolLAN. These foundations, directed in full or in part by Stichting NLnet, have applied for and obtained a full non-profit tax status.

Governing Board

The Governing Board of Stichting NLnet consists of:
Chair: Teus Hagen teus@NLnet.nl
Treasurer: Wytze van der Raay wytze@NLnet.nl
Secretary: Frances Brazier frances@NLnet.nl
Board member: Jos Alsters jos@NLnet.nl

operations

For the daily operations, a Board of Directors has been selected from the Governing Board:
General director: Teus Hagen (full time)
Financial director: Wytze van der Raay (full time)
Research director: Frances Brazier (one day per week).

Frances Brazier holds a part-time position (four days per week) as full professor at the Vrije Universiteit (IIDS research group) in Amsterdam.

Advisory Board

An Advisory Board of three people supports the Governing Board of Stichting NLnet:
advisor on technology: Paul De Bra, full professor, University of Eindhoven;
advisor on legal affairs: Anne-Marie Kemna, ICT director, Steins Bisschop Meyburg & Co Advocaten en Notarissen;
advisor on finances: Erik Esseling, vice-president, Cap Gemini Ernst & Young Nederland.

For external (financial and legal) advice and consultancy, Stichting NLnet is supported by: CMS Derks Star Busmann Hanotiau (legal, tax and notary advice), PriceWaterhouseCoopers (accountancy and salary affairs), Lombard Odier (investment management), and Attica Vermogensbeheer (investment management).

6. Finances

means

Stichting NLnet finances its projects and activities from the revenues obtained from its invested capital. If possible, subsidies from the government and/or third parties will also be used for project activities, but to date this has not been the case.

6.1 Fiscal status

tax exemptions

Stichting NLnet has not been running a commercial company since mid 1994 and does not plan to do so in the future. Therefore, the foundation is not subject to Value Added Tax (BTW in Dutch) or company tax (vennootschapsbelasting in Dutch).

general benefit status

As of March 9, 1999, Stichting NLnet has been classified, at its request, by the Dutch tax office (Department Registratie en Successie) as an entity with general benefit objectives within the meaning of the Successiewet 1956 (article 24 sub 4).

foreign taxes

In addition to this, Stichting NLnet obtained a so-called place of residence declaration (woonplaatsverklaring) from the Dutch tax office for companies on June 8, 1999. This declaration enables the foundation to reclaim part of the foreign taxes withheld on foreign dividends. In September 2000, a request was filed with the tax office to obtain a separate declaration enabling the foundation to be exempt for source tax withheld on USA dividends, according to article 36 of the Double Taxation Convention between the USA and the Netherlands. This request was granted on January 16, 2002.

6.2 Administration

euro

A switch of base currency from guilder to euro was made on January 1, 1999. This guarantees a proper alignment between the books and the investment management reports by Lombard Odier and Attica; the latter reports are also based on the euro because of the switch to euro in the equity and bond markets. After three years of euro experience, Stichting NLnet does not expect to have any internal administrative problems with the permanent introduction of the euro on January 1, 2002.

Current accounts in non-euro currency with a non-zero balance are subject to a currency adjustment at the end of each month, based on the end-of-month exchange rates supplied by the investment managers.

salary administration

The salary administration has been contracted to Salarisadviesgroep Rayon Centrum of PricewaterhouseCoopers. This group also prepares the salary tax forms.

accountant

PricewaterhouseCoopers has been charged with compiling and auditing Stichting NLnet's Annual Accounts 2001. The accountancy report is a separate document with this Annual Report.

6.3 Cost of activities in 2001 and budget for 2002

cost of activities in 2001

The cost and revenue of Stichting NLnet's activities in 2001 are summarised and compared with numbers for 2000 below (all amounts in EUR):

	2001		*2000*	
	debit	*credit*	*debit*	*credit*
Net interest income		37.658		33.131
Cost of projects	1.331.043		685.406	
Cost of staff	322.966		303.814	
Depreciation of inventory & equipment	3.985		8.947	
Other costs	43.882		53.952	
Withdrawal from capital		1.664.218		1.018.988
Total	1.701.876	1.701.876	1.052.119	1.052.119

cost of projects 2001

A specification of the "Cost of projects" item in relation to the original budget and to previous years follows (all amounts in EUR):

Project	*Cost 2001*	*Budget 2001*	*Cost 2000*	*Cost 1999*	*Total cost until 2001*
AGFL	45.508	45.508	68.260	-	113.768
AHA	45.963	88.000	-	-	45.963
ALIAS	48.016	-	-	-	48.016
DLZ	1.115	-	-	-	1.115
Free Software Foundation	16.336	12.000	11.761	9.395	37.492
HAL 2001	10.000	-	-	-	10.000
IIDS	208.157	300.000	200.000	23.997	432.154
ISC/BIND V9	199.362	300.000	-	74.324	347.562
LogReport	140.000	140.000	19.370	-	159.370
MAPS	-	-	-	22.077	22.077
NILO	76	0	-	16.756	16.832
NLnet Labs	153.000	255.000	234.165	-	387.165
ReX	25.967	100.000	9.986	-	35.953
SANE 2002 / 2000 / 1998	-	-	-	-	0
schoolLAN	190.343	250.000	6.297	2.293	198.933
SIRS	145.210	145.209	131.029	70.374	356.218
ThinkQuest	-	-	-	226.890	226.890
TimeWalker	100.000	-	-	-	100.000
TwinSite	-	-	4.538	-	4.538
YAPC::Europe 2001	1.990	-	-	-	1.990
New projects	-	182.283	-	-	-
Other	-	-	-	239	2.326
Total	1.331.043	1.818.000	685.406	446.345	2.548.362

budget 2002

The provisional budget for 2002, as approved by the Board, is as follows (all amounts in EUR):

	Budget 2002	
	debit	*credit*
Net interest income		30.000
Cost of projects	1.903.800	
Cost of staff	370.000	
Depreciation of inventory & equipment	5.000	
Other costs	61.200	
Withdrawal from capital		2.310.000
Total	2.340.000	2.340.000

projects budget 2002

The specification of the "Cost of projects" item, expanded with an extrapolation to 2003 for multi-year projects, is as follows (all amounts in EUR):

Project	*Budget 2002*	*Budget 2003*
AHA	94.000	48.000
ALIAS	95.000	8.000
cp2pc	75.000	-
DLZ	50.000	-
Free Software Foundation	16.000	16.000
IIDS	310.000	410.000
LogReport	92.000	-
NLnet Labs	316.000	331.800
Open Sesame	126.000	98.000
ReX	50.000	51.500
SANE 2002	20.000	-
SchoolLAN	300.000	150.000
TimeWalker	56.250	-
New projects	303.550	886.700
Total	1.903.800	2.000.000

6.4 Investment policy

start of year status

On January 1, 2001, Stichting NLnet had a capital of 36,1 million euro at its disposal. The majority of this capital, namely 35,2 million euro, was invested under an investment management agreement with Lombard Odier Asset Management (Nederland) N.V., also operating under the name Lombard Odier Institutional Asset Management. A small part was kept in the form of MCI WorldCom shares, for a value of 0,4 million euro. All investment assets were in custody of Kas-Associatie N.V. in Amsterdam (operating under the name Kas Bank N.V. since January, 1, 2002).

changes in 2001

In the course of the year, significant changes have been made in the above arrangements. In January, 1,25 million euro was withdrawn from the managed investment capital to cover NLnet's expected operating expenses in 2001. In June, a decision was taken to contract a second investment manager, Attica Vermogensbeheer B.V. As a consequence, 11,0 million euro was shifted from management by

Lombard Odier to management by Attica. The latter funds are held at Effectenbank Stroeve in Amsterdam. In early September, the WorldCom shares, which were inherited from the escrow obligation to UUNET that ended on August 28, 1998, were finally sold, and the proceeds were added to the savings accounts used for covering NLnet's operating expenses. Thus at year end, investment management duties were split between Lombard Odier and Attica, with no other NLnet-managed investments remaining.

Lombard Odier

Lombard Odier has been charged since the end of 1997 to perform investment management with a "neutral" investment profile (global distribution 70% equities, 30% bonds) to obtain the best return with limited risk. Their investment performance is measured each quarter by comparison with a composite benchmark, which consists of the weighted average of a number of financial indexes:

Weight	*Index*
55%	MSCI Europe Equity Index
15%	MSCI USA Equity Index
20%	EFFAS EMU Government Bond Index (maturity > 1 year)
10%	EFFAS USA Government Bond Index (maturity > 1 year)

In mid-2001, Lombard Odier adjusted its management policy by appointing a single responsible "balanced" manager for the entire NLnet portfolio. This change should result in better risk balancing and risk management for the total portfolio. In addition, the internal separation between European equities and USA equities has been dropped in favour of an integrated equity portfolio (while retaining the original composite benchmark). Tuning capabilities have been increased by replacing the investment in a single USA equity fund (LOINAF) by discrete investments in a variety of USA equities.
The development of the benchmark index and the result obtained by Lombard Odier (net, after subtraction of all costs) over the year 2001 is shown in the following table:

Ultimo	*Benchmark*	*Result LO*
December 2000	100,0	100,0
March 2001	94,6	91,2
June 2001	97,8	93,6
September 2001	85,1	80,7
December 2001	92,8	88,0

As can be seen, the net investment result of Lombard Odier throughout 2001 has been a rather negative return of –12,0% in comparison to -2,4% in 2000 and +30,2% in 1999. In relation to the benchmark, which showed a negative return of –7,1% in 2001 (and positive returns of +1,2% in 2000 and +24,4% in 1999), Lombard Odier has booked a disappointing result in 2001, both in absolute and relative terms. Looking back over a longer period – with four years of investment history with Lombard Odier – the long-term results can still be considered satisfactory, both in an absolute and relative sense: the average annual return over the period 1998 – 2001 was +8,35% in comparison to 7,85% for the benchmark.

Attica

Nonetheless, the clear negatively diverging trend in the results of 2000 and early 2001 has prompted NLnet to re-evaluate its investment management policies, drawing comparisons with several internal and external alternatives. As a result, a decision has been made to move at least one-third of the investment assets to an alternative management strategy, based on alternative investments like market-neutral funds and long-short funds (also known by the more generic name hedge funds) and geared towards positive, low-volatility net returns. Attica Vermogensbeheer in Amsterdam has been selected as the NLnet manager for this part of the portfolio. They are charged with obtaining a positive net investment result in absolute terms, where the quality of the result is measured by comparing both the return and the risk (volatility) with those of the same benchmark discussed above in conjunction with Lombard Odier. While performance simulations have shown great potential for this approach, the actual performance history is still too short to draw any definitive conclusions:

Ultimo	*Benchmark*	*Result Attica*
July 2001	100,0	100,0
August 2001	95,0	100,2
September 2001	88,5	100,0
October 2001	92,1	100,9
November 2001	95,5	103,0
December 2001	96,5	104,4

But so far, the return of +4,4% versus a benchmark return of -3,5% is encouraging (not shown but also quite positive is the risk reduction).

end of year status

At the end of 2001, Stichting NLnet's capital had decreased to 31,0 million euro (including a small negative revaluation reserve). Lombard Odier managed 18,9 million euro of this end-of-year total, while Attica managed 11,5 million euro. To cover most of the liquidity needs over the year 2002, an amount of 1,75 million euro has been scheduled for withdrawal from the Lombard Odier-managed part in mid-March 2002.

6.5 Cost and revenue of investment management

investment results 2001

The cost and revenue of managing the invested capital of Stichting NLnet in 2001 can be summarised as follows (all amounts in EUR):

	debit	credit
Realised results from investment funds		-27.646
Realised results from equities		-1.341.380
Realised results from bonds		263.688
Realised results from forward exchange contracts		-.8.383
Realised currency differences in cash accounts		27.508
Investment revenue: interest on bonds and deposits		391.259
Investment revenue: dividend on equities		396.484
Transaction costs	55.858	
Custody charges	9.897	
Dividend taxes	85.310	
Cost of reclaiming dividend taxes	1.654	
Investment management fees	117.516	
Net capital decrease		568.705
Total	270.235	270.235

revaluation reserve

In addition to the above, the unrealised results of the investment portfolio at the end of 2001 (shown in the balance sheet as revaluation reserve) can be summarised as follows (all amounts in EUR):

Unrealised results on investment funds	644.247
Unrealised results on equities	-595.932
Unrealised results on bonds	59.539
Unrealised results on forward exchange contracts	-120.510
Total revaluation reserve ultimo 2001	-12.657
Idem ultimo 2000	2.823.316
Decrease of revaluation reserve in 2001	2.835.973

Stichting NLnet Governing Board, May 2002