

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ
ФЕДЕРАЦИИ
ФЕДЕРАЛЬНОЕ АГЕНТСТВО ПО ОБРАЗОВАНИЮ

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Кафедра иностранных языков естественнонаучных и инженерно-технических
специальностей

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ФОРМИРОВАНИЕ ПОЛИКУЛЬТУРНОЙ ОБРАЗОВАННОСТИ БУДУЩЕГО ИНЖЕНЕРА

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Рекомендовано Ученым советом государственного образовательного учреждения высшего профессионального образования «Оренбургский государственный университет» в качестве учебного пособия для студентов естественнонаучным и инженерно-техническим специальностям, обучающихся по программам высшего профессионального образования

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В практикуме представлены теоретическая информация по переводу; аутентичные тексты по современным проблемам науки и техники; тексты, составленные преподавателями кафедры по различным естественнонаучным и инженерно-техническим специальностям; задания к текстам для обучения чтению, переводу и говорению; слова к текстам для расширения вокабуляра студентов.

Обучение профессионально-ориентированному переводу в рамках курсов «Иностранный язык», «Технический перевод» и «Практический курс профессионально-ориентированного перевода» для студентов очного, заочного и вечернего отделений направлено на формирование поликультурной образованности студентов – будущих инженеров.

Практикум адресован студентам высших учебных заведений.

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Введение

Данный практикум в рамках курсов «Иностранный язык», «Технический перевод» и «Практический курс профессионально-ориентированного перевода» предназначен для студентов 2 - 4 курсов естественнонаучных и инженерно-технических специальностей очного, заочного и вечернего отделений. Цель практикума – формирование поликультурной образованности будущего инженера в рамках лингвообразования в процессе работы с предложенным материалом при билингвальном обучении.

Практикум состоит из 9 разделов, восемь из которых содержат достаточно большое количество текстов с системой тренировочных и (или) речевых упражнений. В некоторых разделах дана информация по переводу, которая поможет студентам переводить тематические тексты, содержащие грамматические явления, которые предусмотрены учебным планом; даются примечания, содержащие контекстуальный перевод отдельных слов и словосочетаний, объяснение некоторых трудностей перевода, встречающихся в тексте и т.д. Кроме того, в разделы включены диалогические тексты, повторяющие и расширяющие пройденные ранее темы, а также тексты, содержащие дополнительную информацию.

Цель первого раздела – закрепление навыков устного общения на английском языке о специальности студентов. Это специальности факультетов естественнонаучного и инженерно-технического направлений, как очного, так и заочного, и вечернего отделений.

Цель второго раздела – научить студентов работать с различными видами научных публикаций на английском языке. Все упражнения данного раздела носят коммуникативный характер.

Третий - пятый разделы предназначены для самостоятельной работы студентов заочного и вечернего отделений. Целью данных разделов является развитие у студентов навыков чтения и перевода научно-технической литературы. При чтении оригинальных английских текстов студенты узнают подробнее о путях развития компьютерных технологий, получают информацию о промышленности в странах изучаемого языка, об иностранных ученых, внесших свой вклад в развитие науки и техники.

Шестой - восьмой разделы носят познавательный характер для формирования поликультурной образованности будущего инженера и могут служить источником дискуссий на занятиях в продвинутых группах под контролем преподавателя, который может варьировать использование предложенного для изучения материала по своему усмотрению, в зависимости от уровня знаний студентов.

В девятом разделе дан словник, который поможет студентам при переводе текстов и значительно расширит их вокабуляр.

1 Section I My Specialty

1.1 Text I “My specialty is a teacher of Informatics”

1.1.1 Learn the new words

to be a first (second-, third-) year student – быть первокурсником;
establishment – учреждение, заведение;
software engineer – программист;
to train – готовить;
highly-qualified – высококвалифицированный;
to be in great demand – пользоваться большим спросом;
to deal with – быть связанным с чем – либо;
to master – овладевать;
computer processing of information – информатика;
well – equipped laboratories – хорошо оборудованные лаборатории;
to have at one’s disposal – иметь в распоряжении;
the latest achievements – новейшие достижения;
Strength of Materials – сопромат;
Technical Servicing – техническое обслуживание;
research work – исследовательская работа;
course work – курсовая работа;
graduation thesis – дипломная работа;
degree – степень;
to gain – получать, приобретать;
Hardware engineers – инженеры по аппаратному обеспечению;
applied informatics – прикладная информатика;
automation – автоматизация;
manual work – физическая работа;
mental work – умственная работа;
available – доступный, пригодный;
profitable – выгодный, полезный;
to undertake – выполнять;
efficiency – производительность;
wastage – потери;
to assure – уверять;
rapid – быстрый, скорый;
to employ – применять, использовать;
competition – конкуренция;
benefit – выгода;
combine – соединять;
provided – при условии;
for the good of man – на благо человека;
complete economy – совершенная экономика.

1.1.2 Pay attention to the pronunciation of the following words

- ch – [k], [tʃ], [ʃ] technology, achievement, machinery, research, change; architecture, chemistry, mechanics, technology, technical;
- th – [ð] [θ] other, strength, algorithmic, wealth, thesis; methods, mathematics, theoretical;
- ph – [f] philosophy, physics;
- sh – [ʃ] establishment.

1.1.3 Find the equivalents

efficiency	ИСПОЛЬЗОВАТЬ
to train	ВОЗМОЖНОСТЬ
to gain	ГОТОВИТЬ
competition	ИМЕТЬ В РАСПОРЯЖЕНИИ
for the benefit	ПРИБРЕТАТЬ
an opportunity	ПРОИЗВОДИТЕЛЬНОСТЬ
to have at one's disposal	ПОТЕРИ
to employ	ФИЗИЧЕСКАЯ РАБОТА
manual work	КОНКУРЕНЦИЯ
wastage	С ВЫГОДОЙ

1.1.4 Find the synonyms

1 institution	a well prepared
2 to master	b establishment
3 well equipped	c to fulfill
4 to undertake	d to obtain
5 to assure	e to be connected with
6 rapid	f to be convinced of
7 profitable way	g quick
8 computer processing of information	h useful
9 available	i informatics
10 to deal with	j accessible

1.1.5 Read the text and translate it

One of the largest higher educational establishments in our town is the Orenburg State University. I'm the second – year student of the faculty of Informatics. This faculty was organized in 1998. It trains highly – qualified hardware engineers, software engineers and other specialists. I'll be the teacher of Informatics and a translator. We are in great demand nowadays.

The rapid technological progress of our time offers mankind wonderful prospects for a richer life – but only on condition that we make the social and

political changes that advancing technology demands. Automation offers opportunities for immensely increasing the material wealth of mankind.

If automation can take over our manual work, so also computers can relieve us of much of our mental work. They can relieve the scholar or scientist of weary hours spent on searching for references and leave him more time for real research. In the factory they can plan the production process far more skillfully than a human manager. In agriculture, given information about soil quality, available manpower and machinery, market conditions and the like, a computer can plan the usage of the land in the most profitable way.

Computers will soon be able to undertake the far more difficult task of planning a whole economy for maximum efficiency and minimum wastage – provided the economy is one that is based on planning for the good of man, it rather than on competition for the benefit of a privileged few. This planning of a complete economy has not yet been achieved in practice, but development work in Russia and the whole world has gone far enough to assure us that it will be done within a few years. I like my future profession.

One can be the daytime, the evening – time and the extra – mural students. The whole process of studying deals with the mastering of new progressive technology in industry and economy.

The students study strength of materials mathematics, physics, a foreign language (English, German, and French), and philosophy. The main subject is computer processing of information. We attend lectures; do laboratory works and tests in well – equipped laboratories which we have in our disposal. Mastering one of the foreign literature and learn about the latest scientific and technical achievements abroad.

The second – year students begin to study special computer sciences such as: applied Informatics, Technical servicing, mathematical analysis, Algorithmic languages and pedagogical sciences.

The third – year students combine their studies with their research work. They write course papers and graduation thesis on the scientific problems of their research work. Many highly – qualified teachers work at the departments of our faculty, some of them have candidates degrees and scientific ranks. Being the fifth – year students we shall be sent to work at different enterprises, schools, higher educational establishments where we can learn to employ in practice the knowledge we'll gain at the University.

1.1.6 Answer the following questions

- 1 What University do you study at?
- 2 What faculty do you belong to?
- 3 What specialists does the Faculty of Informatics train?
- 4 Why have you chosen the profession?
- 5 What do you study English for?
- 6 Where can our graduates work?
- 7 What does the rapid technological progress of our time offer mankind?

- 8 What will computers be able to do?
- 9 What do you want to do in the future?
- 10 Do you believe the computer can relieve the scholar or scientist of weary hours spent on searching for references and leave him more time for real research?
- 11 What is your attitude towards the computer?

1.1.7 Insert the prepositions (in, of, with, for, over)

- 1 We are great demand nowadays.
- 2 The whole process studying deals the mastering new progressive technology ... industry.
- 3 We have well equipped labs our disposal.
- 4 The students combine their studies their research work.
- 5 We can learn to employpractice the knowledge.
- 6 Automation offers opportunities immensely increasing the material wealth mankind.
- 7 Automation can take our manual work.
- 8 It is based planning the good of man.

1.1.8 Make up the sentences

- 1 highly – qualified, it, hardware engineers, trains, and, applied Informatics, software engineers, specialists.
- 2 deals with, the whole process of studying, in industry, the mastering of, and other fields, new progressive technology, of economy.
- 3 lectures, attend, to laboratory works and tests, we, well – equipped labs, in.
- 4 us, of much, computers, of our mental work, relieve, can.
- 5 within, it, a few years, done, will be.

1.1.9 Translate the sentences

- 1 Автоматизация делает возможным повышение благосостояния человечества.
- 2 На заводах компьютеры могут спланировать производственный процесс лучше, чем это сделает человек.
- 3 На практике еще не достигнута полная компьютеризация экономики.
- 4 Компьютер поможет спланировать использование земель наиболее благоприятным способом.
- 5 Владение иностранными языками дает возможность читать иностранную литературу и узнать больше о научных и технических достижениях заграницы.

1.1.10 You are in the computer room for the first time. Dramatize the dialogue

Comrade Petrov is a well – qualified specialist in the field of computers. The first – year students’ ask him questions:

1 What is the general purpose of the memory or storage unit? Thank you.

P. The computers memory stores the numbers to be operated on; it stores intermediate results that are generated during the course of a computation.

2 What information is stored in the computer memory? Thank you.

P. It stores the final results and the instructions themselves are also stored in the computer memory.

3 What is the memory access time? Thank you.

P. The time required to transmit one computer word out of the memory to where it will be used is called the memory access time.

4 What are the latest achievements of modern electronics? Thank you.

P. The latest achievements of modern electronics are increasing of computer efficiency.

5 What memories are used in microcomputers? Thank you.

P. RAM, ROM and PROM are used in microcomputers.

1.2 Text II “Computing machinery, complexes, systems and networks”

1.2.1 Read the text, translate it

Orenburg State University is the largest higher educational establishment in the town. Faculties and Institutes of the university train specialists in many fields of technology. One of them is the faculty of information processing.

It was organized in 1999 on the base of the Institute of Energy and information processing. The main research trend of the faculty is connected with modern development in computing technique. Now the faculty comprises several departments. The largest and leading are the departments of software and hardware.

One of the specialties is CMCSN (computing machinery, complexes, systems and networks). This course is widely recognized as a valuable qualification for those wishing to become computer professionals. It aims to provide practical training in computer skills, enabling you to apply your skills in a commercial environment. Particular emphasis is placed on the development of computer systems. The course also concentrates on communication and teamwork, complementing your technical abilities to ensure your participation at work.

It offers a 5-year course of study where students are provided with a wide general scientific and general engineering education. The first and second year students study mathematics, physics, foreign language, (English, German or French), technical drawing, social sciences, philosophy, computer - processing of information. The academic program is composed of a varying number of courses or subjects within a field of specialization. The current curriculum consists of the following

disciplines: Electronic Circuits, Microprocessor Systems, Modeling of Electronic Circuits, Information Theory, Programming for Data Processing, Computer Networks and so on. They take lectures, do laboratory and practical work, do calculations in the computing center, read special literature. In the process of education students take hold of experiences of functioning in one of the modern operating systems, methods of the building of translators, methods of designing, principles of the physical organization and protection of database, methods of the association computing machinery in systems and networks. In the third year students combine their studies with their research work.

As a rule they write their term papers and graduation thesis on the problems of their research work. After the graduates pass their final exams they get their diplomas of engineer. System engineer can execute the following types of professional activity: design, research, production management etc. Graduates of this specialty can be adapted to any activity expecting the use of computer, including pedagogical one in any educational establishment.

A computer science degree is a wonderful preparation for the future. It will sharpen your analytical skills as you delve into the structures and forms of software stretch your creative talents as you design new systems and give you the confidence to sell your ideas to a waiting world. You will come to understand why systems work as they do and what you learn will never go out of date for as long as people go on being people and computers go on being computers. For though fashions in packages we take for granted today are among the most complex artifacts ever created. To understand them is to understand humanity at the uttermost exertion of its intellectual power. Deep down, computer science is about people. Students of our Department of Computer Science are provided with an educational experience that brings out the best in everyone. Whether you prefer to focus intently and specialize in a few topics or develop a more broadly-based perspective, our course structures will adapt year-by-year to suit you. You may be drawn by the challenge of innovative research. The Department is active in many areas at the forefront of computing-notable formal methods, parallel process, artificial intelligence, speech and language processing and computer graphics.

1.2.2 Read the following phrases after the teacher, learn them by heart

1 the faculty of computing sciences	- факультет информационных технологий
2 higher educational establishment	-вуз
3 computing technique	- вычислительные методы
4 computer software	- программное обеспечение
5 data processing	- обработка данных
6 computer networks	- вычислительный центр
7 in the original	- в оригинале
8 current curriculum	- текущий учебный план
9 hardware	- стандартная схема, арматура

1.2.3 Read the following words and learn them by heart

1 faculty	- факультет
2 to train	- ГОТОВИТЬ
3 specialist	- СПЕЦИАЛИСТ
4 technology	- техника
5 research trend	- исследовательское направление
6 maintenance	- эксплуатация
7 particular	- определенный
8 branch	- отрасль
9 to sharpen	- заострять, обострять
10 to delve	- рыться, копаться (в документах)
11 uttermost	- самый отдаленный, величайший
12 artifact	- предмет материальной культуры
13 exertion	- усилие, напряжение
14 challenge	- сложная задача, проблема

1.3 Text III “Software for Computing Technique and Automatic Systems”

1.3.1 Find the main sentences in the text and retell the text using these sentences. While retelling add personal information

Orenburg State University is one of the biggest, one of the most modern higher educational establishments in Orenburg region. There is a lot of modern technique, especially in the Internet centre. It consists of several classes with many good computers. All students can visit the Internet center and do their science work there. You can get to know a lot of information, concerning your research theme. You can send e-mail letters to every city, every country of the world and get answers from there.

Besides there are the Centre of Information Technologies (CIT), the Centre of Distance Education (CDE) in the Internet Centre of the University. These organizations create new software for the University, teach people who want to study sciences by the Internet.

The faculty of Computer Sciences (FCS) of Orenburg State University trains specialists in the field of electronics and computing technique. One of its departments is called Software for Computing Technique and Automatic Systems (SCTAS).

This course is for students wishing to become computer professionals. They learn to write different programs. Each program serves to solve some practical or theoretical problems. The aim of studying is teaching students to model different processes and solve problems connected with them. For example, the task is to calculate the lifting strength of the airflow, blowing to the wings of the airplane. The program has to take experimental data of the speed and directions of airflow in different parts of the wings. The result of calculations will be shown on computer display in readable form. It means it may be represented as the sequence of images (forming animation) of different graphics and diagrams. To solve the problem we

need: 1. Mathematical model of the plane being represented in the form of equation system; 2. The remedies for solving this mathematical system; 3. The remedies for data representation at the computer display.

To provide step 1 we need to know physics and mathematics which are not connected with computers. The field of knowledge refers to the subject of the problem. This step should be produced by engineers in the field of physics. But if mathematical model is not difficult, the programmer may solve it himself. So students are to learn such subjects as physics and mathematics.

The next step to be provided is that students have to learn computing mathematics, discreet mathematics, computer modeling and others.

For solving the third step our curriculum gives us the opportunity to learn such disciplines as computer graphics, interactive graphics systems.

The first terms of studying will give the students elementary skills of working with a computer; they'll get to know computer sciences, programming and what not.

The next term curriculum provides more difficult for understanding disciplines. They are: Operating Systems, Architecture of Computing Systems and Network, Software for Computer Networks, Data Bases, Projecting and Creating Data Bases, Theory of Computing Processes and Structures, Basics of Operating Systems, Mathematical Methods of Information Protecting. For example, "Organization and Functioning of Electronic computing Machines" helps to understand every process inside the computer, besides, it gives the basics of low-level Assembler programming language. The Operating Systems course gives information about products of different companies.

Besides professional and special disciplines there are general subjects and humanities. Nowadays engineer has to be a professional in the field of his specialization and he must know foreign languages, history, philosophy, economics, and sociology. And, of course, he has to know mathematics, physics, and information sciences.

Many students of the specialty will become professionals in their scientific field after getting the diplomas of engineer. Specialists of SCTAS can work as programmers in small firms and big companies; also they can read lectures in the University and be good leaders.

SCTAS as the specialty gives you great perspectives for the future.

1.3.2 Read the following phrases, learn them by heart

Internet centre

get to know

Centre of Distance Education (CDE)

The faculty of Computer Sciences (FCS)

Software for Computing Technique and Automatic Systems (SCTAS)

experimental data

equation system

and what not

great perspectives for the future

interactive graphics systems
readable form
Architecture of Computing Systems and Network
curriculum
elementary skills

1.3.3 Speak about your specialty using the words below

educational establishment; to train hardware engineers, software engineers;
new progressive technology in industry and economy; the latest scientific and
technical achievement abroad; to combine their studies with their research work; high
– qualified teachers; to employ in practice the knowledge.

1.4 Text IV “Civil Engineering “

1.4.1 Find the equivalents

to train	согласно
a degree	получать
to gain	учебный план
an opportunity	готовить
an establishment	курсовая работа
according to	иметь в распоряжении
a graduate	учреждение
to have at one's disposal	степень
course paper	возможность
academic plan	выпускник

1.4.2 Find the synonyms

well-prepared;
institution;
to be connected with;
diploma paper;
to be supplied with;
possibility;
to obtain (to get);
to get knowledge;
to be in need.

1.4.3 Read and translate the text

I am a second year student of the Civil Engineering Faculty of the Orenburg State University. It is one of the largest higher educational establishments in our town. The Civil Engineering Faculty was founded in 1970. It trains civil engineers in

the following specialties: "Industrial and Public Construction", "Manufacture of the Building Structures", "Architects", "Designers", "Automobile Roads", "City-Construction and Economy".

During the years of activity the faculty has trained many highly-qualified engineers. Such specialists are in great demand nowadays.

There are the day-time, the evening-time and extra-mural departments. Those who combine studies with their work are trained at the evening-time and extra-mural departments.

The whole process of studying deals with mastering new construction methods and progressive technology of production of building structures and materials.

The junior students are taught mathematics, physics, a foreign language (English/German/French), chemistry, philosophy, computer processing of information. We attend lectures, do laboratory work and tests. We have quite a number of well-equipped laboratories at our disposal. Mastering one of the foreign languages enables us to read foreign literature and learn about the latest scientific and technical achievements abroad.

The senior students study special engineering subjects such as Strength of Materials, Theoretical Mechanics, Building Materials, Geodesy, Architecture, etc.

The fourth-year students combine their studies with their research work. We write course papers and graduation thesis on the scientific problems of our research work. Many highly - qualified teachers work at the departments of our faculty, some of them have candidate's degrees and scientific ranks, summer the students of our faculty, besides vacation, have their practical hours in order to have a clear idea of what our specialty means. According to the academic plan the fifth - year students are sent to work at different plants and construction sites, where they learn to employ in practice the knowledge they gained at the University.

During practice the students master the job of a civil engineer and at the same time collect materials for their diploma papers.

The final and most important period in students' life is the defense of the graduation work in the presence of the State Examining Board. All the graduates get work according to their specialty.

We shall work at building material factories, on construction sites, at design and research institutions and laboratories. Besides, we are provided with everything necessary for a scientific career entering a post-graduate course. In a word we have a wide range of job opportunities.

1.4.4 Answer the questions, using the words

I suppose...

I believe...

I think...

As a rule...

It seems to me...

Usually...

As far as I know (remember)...

Besides...

1 What University do you study at ?

2 What faculty do you belong to ?

- 3 When was it founded?
- 4 Are you a second-year student?
- 5 What specialists does the Civil Engineering Faculty train?
- 6 Why do you want to become a civil engineer?
- 7 What subjects is the academic program composed of?
- 8 Why do our students study foreign languages?
- 9 What does the course of studies end with?
- 10 What problems do the students deal with in their course papers and graduation theses?
- 11 Where do our graduates work?
- 12 In what way can graduates continue their study?

1.4.5 Inserts the prepositions (with, at, in, on)

- 1 The process of studying deals mastering new construction methods.
- 2 Such specialists are..... great demand now.
- 3 We have quite a number..... well-equipped laboratories..... our disposal.
- 4 We write graduation thesesdie scientific problems of our research work.
- 5 We are provided..... everything necessary for a scientific career.

1.4.6 Make up the sentences

- 1 their specialty, get work, all the graduates, according to;
- 2 a wide range of, we, job opportunities, have;
- 3 our faculty, work, at the department of, highly-qualified teachers, many;
- 4 is, in our town, it, higher educational establishments, one of the largest;
- 5 their studies, students, their research work, the fourth-year, with,-combine.

1.4.7 Find the equivalents in the text

- 1 процесс обучения;
- 2 технология производства;
- 3 второкурсник;
- 4 дипломная работа;
- 5 информатика;
- 6 ВУЗ;
- 7 новейшие научные достижения,
- 8 высококвалифицированные преподаватели;
- 9 в нашем распоряжении;
- 10 строительная площадка;
- 11 ученая степень.

1.4.8 Fill in the gaps with the words below

1 We write and graduation theses on the scientific problems of our..... work.

2 In summer the students of our faculty, besides, have their practical hours.

3 We have quite a number of..... laboratories at our disposal.

4 The whole process of studying..... with mastering new methods.

5 The final and most important period in students' life is of graduation work.

6 During the years of..... the faculty has trained many highly qualified engineers.

Words: construction; activity; research; deals; vacation; course papers; well-equipped; defense.

1.4.9 Ask your groupmate

-if he is a second-year student;

-if there are the day-time, evening-time and extra-mural departments;

-if the fourth-year students combine their studies with their research work;

-if during practice the students master the job of a civil engineer;

-if those who combine studies with their work are trained at the evening-time department.

1.4.10 Speak about your specialty

a second-year student; to be founded; to train engineers; departments; new construction methods; to be taught; to master foreign language; graduation thesis; according to the academic plan; job opportunities.

2 Section II IT Abroad

2.1 Read some translation rules and use the information in your work

2.1.1 Синтаксические трудности при переводе

Для того чтобы научиться грамотно переводить, необходимо иметь не только общую языковую подготовку, но и овладеть основами перевода. В основе правильного перевода лежит принцип адекватности - соответствия текста перевода тексту оригинала, т.е. точная передача содержания английского текста на русский язык с максимальным сохранением стилистических особенностей оригинала. Рассмотрим некоторые синтаксические трудности перевода.

2.1.2 Типы предложений в английском языке

В английском языке принято различать по составу пять основных типов предложений:

1 Подлежащее - сказуемое (-обстоятельство).

Henry bowed. Генри поклонился.

A vase fell off the shelf. Ваза упала с полки.

Help will arrive soon. Помощь скоро будет оказана.

2 Подлежащее - сказуемое - прямое дополнение.

A boy threw a snowball. Мальчишка кинул снежок.

3 Подлежащее - сказуемое - косвенное дополнение.

I told him the truth. Я сказал ему правду.

She gives me a pain. Она причиняет мне боль.

4 Подлежащее - глагол-связка - предикативный член.

The snow was dirty. Снег был грязный.

James became a citizen. Джеймс стал гражданином.

5 Подлежащее - сказуемое - прямое дополнение - объектно-предикативный член.

He dyed his mustache red. Он покрасил усы в рыжий цвет.

Существующие в английском языке типы предложений с точки зрения структуры можно условно разделить на два подтипа - основные и второстепенные. К основным относятся полные предложения.

Sam laughed. Сэм рассмеялся.

It is not easy to learn a foreign language quickly, especially one as difficult as Russian.

Быстро выучить иностранный язык нелегко, особенно такой трудный, каким является русский язык.

К второстепенным относятся, главным образом, неполные предложения, встречающиеся, как правило, в устной речи, например:

The more, the merrier. On your way, please. What a stupid thing for him to do!

2.1.3 Компрессия

Суть приема состоит в более компактном изложении мысли одного языка средствами другого языка за счет использования семантически более емких единиц. В литературе по вопросам перевода существует понятие "компрессия текста", которое А.Д. Швейцер определил как преобразование исходного текста с целью придать ему более сжатую форму. Компрессия текста достигается путем опущения избыточных элементов высказывания, элементов,

восполнимых из контекста и внеязыковой ситуации, а также путем использования более компактных конструкций.

To strike gold –напасть на золотую жилу;

Stigma-клеймо позора;

To toil- тянуть лямку;

Round trip – проезд туда и обратно.

2.1.4 Объединение и разделение предложений как приемы перевода

Объединение предложений применяется при обучении переводу на родной язык, равно как и обратный прием - разделение сложного предложения (из-за трудностей восприятия или громоздкости конструкции) на два или три более простых. Объединение двух предложений в одно не только позволяет сократить текст, но и значительно облегчает само его восприятие.

Bipartisan selection of poll watchers and their right to challenge voters and their votes are designed to prevent ballot-box stuffing.

Чиновники, следящие за процедурой выборов, избираются на двухпартийной основе. Они могут проверять права избирателей на участие в голосовании и инспектировать избирательные бюллетени с целью недопущения мошенничества.

2.1.5 Использование инверсии

Явление *инверсии* предполагает расположение слов в обратном порядке по отношению к их обычному расположению. Инверсия, в отличие от прямого порядка слов в английском предложении, заключается в постановке глагола и других элементов предложения перед подлежащим, что, конечно, привлекает к этим элементам особое внимание читателя, придает стилю образность и эмоциональную экспрессивность.

Foreign borrowers find restrictions in their path *only* in the United Kingdom.

It is only in the United Kingdom that foreign borrowers find restrictions in their path.

В первом предложении простая констатация факта. Второе предложение намного эмоциональнее. Следовательно, и в переводе должны быть отражены оба эти момента.

Иностранные заемщики встречаются ограничения на своем пути *только в Соединенном Королевстве.*

***Только в Соединенном Королевстве* встречаются на своем пути ограничения иностранные заемщики.**

Конструкция *it is ... that* позволяет выделить любой из членов предложения.

Нарушение обычного следования слов и словосочетаний в предложении приводит к выделению "переставленного" элемента предложения. В этом случае можно говорить об особом, добавочном значении, приобретаемом предложением. Любое изменение строгого порядка слов, присущего английскому языку, придает высказыванию большую выразительность.

1 Порядок слов изменяется в ряде отрицательных конструкций, когда отрицание выносится на первое место в предложении.

а) **Neither ... nor** *ни...ни*, в том случае, когда **nor** вводит самостоятельное предложение.

These measures will affect *neither* the country's competitive advantage in foreign trade, *nor* will they restrain the domestic expenditure.

Эти меры не только не скажутся на конкурентоспособности страны в области внешней торговли, но и не помогут ограничить внутренние расходы.

б) **No** + сравнительная степень прилагательного, в том случае, когда это конструкция стоит в начале предложения.

No longer is it a question of increasing the supply of raw materials.

Не является это больше и вопросом увеличения поставок сырья.

2 Обратный порядок слов наблюдается и в эмфатической конструкции **just as ... so... настолько ...насколько....**

Just as the balance of international payments of the US is in many respects unique, so as the measures the President has just proposed to correct the deficit on these accounts.

Насколько единственным в своем роде является платежный баланс США, настолько уникальны и меры, только что предложенные Президентом для ликвидации дефицита по этим счетам.

3 Иногда на первое место выносится часть сказуемого (причастие прошедшего времени пассива либо именная часть составного именного сказуемого).

Sterling developed as a reserve currency because it was managed against the background of the U.K.'s early industrial strength, allied to this was the possibility afforded to the territories of the former British Empire of raising capital in the London capital market on favorable terms.

Фунт развивался как резервная валюта, поскольку этому способствовало раннее развитие промышленной мощи Англии; этому способствовала также возможность для территорий, входивших в бывшую Британскую империю, получать капиталы на выгодных условиях на Лондонском рынке капитала.

4 Вынесение предлога на первое место в предложении также вызывает изменение порядка слов.

In come the information, out flows the ideas.

Информация поступают человеку, а он выдает идеи.

5 Порядок слов изменяется в предложениях, где на первом месте стоит **only**.

Only then could really free man be developed.

Только в этом случае может развиваться действительно свободный человек.

2.1.6 Общая перестройка структуры предложения

Различного рода *перестройки предложения* требуют постоянного учета особенностей структуры английского предложения. Например, в английском предложении обстоятельства (по сравнению с другими членами предложения) весьма подвижны, и переводчик может и даже должен использовать эту закономерность. Составитель англо-русского фразеологического словаря А.В. Кунин и его соавтор по работе Ю.М. Катцер указывают, что в русском языке допустимо наличие в начале предложения ряда разнородных обстоятельств, а в английском это исключено.

Перестройка предложения при переводе вызывается также тем, что в английском языке более широко употребляется страдательный залог.

He is considered to be a good inspector.

Его считают хорошим инспектором.

К пассиву нередко прибегают при переводе безличных конструкций с наречиями типа *можно, нельзя, надо и т.д.*

Putting things off till tomorrow can no longer be tolerated.

Нельзя откладывать важные дела на завтра.

2.2 Text I “Great Britain: Geography. Economy. Industry”

2.2.1 Check up your pronunciation

shallow, generally, temperate, frequent changes, commerce, chiefly, textile, nevertheless, percent, export, modernizing existing, efficient.

2.2.2 Form the new words (- ion, - ation, - en, - ally, - ive, - ition, - re, - is + ing, - im, - ment)

Distribute, occupy, wool, practice, product, add, organize, modern, possible, equip.

2.2.3 Learn the new words

1 subject to – подлежащий чему – либо, имеющий силу в случае чего – либо; при условии выполнения чего – либо;

2 to provide – зд. являться;

3 finishing grounds – районы рыбной ловли;

4 engineering – машиностроение;

5 to scrap – сдавать в металлолом;

6 shrinkage – сокращение, уменьшение;

7 twice as much – вдвое больше;

- 8 to owe to somebody for something – быть обязанным кому – либо;
 9 to account for – приходиться;
 10 latitude- широта;
 11 arable- пахотный;
 12 pasture- пастбище;
 13 meadow- луг;
 14 hedge- изгородь;
 15 rainfall- осадки;
 16 to ensure-обеспечивать, гарантировать;
 17 extractive industry- добывающая промышленность;
 18 manufacturing industry- обрабатывающая промышленность;
 19 by-products- побочные продукты;
 20 a host of- множество;
 21 tank- емкость, резервуар;
 22 tin-plat- белая жечь;
 23 corrugated- рифленый, гофрированный;
 24 tinned (Am. canned.) fruit- фруктовые консервы;
 25 tin (Am. can)- консервная банка;
 26 shipbuilding- судостроение;
 27 to scrap- сдавать в металлолом;
 28 scrap- металлолом;
 29 shrinkage- сокращение, уменьшение;

2.2.4 Translation Notes

1 The climate **is subject to** frequent changes. Климат **подвержен** частым переменам.

Subject to *подлежащий чему-либо, имеющий силу лишь в случае чего-либо; подверженный чему-либо; при условии выполнения чего-либо.*

Importation of the goods **subject to** the prohibitive tariff-ввоз товара, подлежащего обложению запретительной пошлиной

Payment **is subject to** Clause 3 of the Contract. Платеж производится на условиях, изложенных в пункте 3 контракта.

The discount **is subject to** ordering more than 10 machine-tools. Скидка предоставляется при условии, что будет заказано 10 станков.

2 ...there is perhaps no British industry that **owes more to** the foreigner **for** its development ...пожалуй, в Англии нет такой отрасли промышленности, которая своим развитием была бы обязана другим странам в большей степени, чем шерстяная.

При переводе английской конструкции **to owe to somebody for something** необходимо изменить порядок слов. Аналогично переводится конструкция **to depend on somebody for something** *зависеть в чем-либо от кого-либо.*

Great Britain **depends on** imports for her foodstuffs. В отношении продовольственных товаров Англия находится в зависимости от импорта.

3 twice as much *вдвое больше.*

4 Существительное **plant** имеет две грамматические формы. В значении *завод* это – исчисляемое существительное.

A new steel plant will be built in this area.

New steel plants will be built in this area.

Как неисчисляемое оно имеет собирательное значение *оборудование* (см. текст).

Only about a third of the gross fixed capital formation...is for plant and machinery. Только треть прироста основных средств...идет на оборудование и станки. [1]

2.2.5 Translate into Russian orally

1 The manufacturing industry accounted for 56 per cent of the country's exports.

2 Coal is mined in the eastern part of the country.

3 The iron and steel industry produces a host of useful by-products.

4 Tin-plate is an important export item.

5 Plant and machinery account for 67 per cent of the engineering industry's exports.

6 The factory depends on automation for increasing productivity.

7 The quality of the goods was excellent whether produced for export or for domestic use.

8 The port of Antwerp which in the past already owed its prosperity to its location with regard to commercial shipments in the North Sea is today situated on the busiest trade route in the world.

9 The investments in plant and machinery amounted to about \$ 3.000.

10 In order to start using more productive methods we have to invest capital in computerizing of plant and machinery.

2.2.6 Translate the sentences

1 The climate is subject to frequent changes.

2... since they account for almost to percent of Britain's exports ...

3... there is perhaps no British industry that owes more to the foreigner for its development ...

4... they export twice as much cotton goods ...

5... much of the plant and machinery was out of date.

2.2.7 Read the text and translate it

The British Isles form a group lying off the north – west coast of Europe with a total area of about 121,600 square miles. The seas surrounding the British Isles are everywhere shallow. These shallow waters are important because they provide excellent fishing grounds as well as breeding grounds for the fish.

Britain has a generally mild and temperate climate. It lies in middle latitudes to the north-west of the great continental land mass of Eurasia. The climate is subject to frequent changes but too few extremes of temperature.

Most of Britain is agricultural land of which about a third is arable and the rest pasture and meadow. Farming land is divided into fields by hedges, stone walls or wire fences and, especially in the mixed farms which cover most of the country, presents a pattern of contrasting color. The cool temperate climate of Britain and the even distribution of rainfall ensure a long growing season.

According to the Ministry of Labor there are 17000 different occupations in Great Britain, but they fall into three main classes. First, there is industry, i.e. the work of turning raw materials into finished goods. Secondly, there is commerce, i.e. the distribution of goods, their transport and all the financial operations connected with them. Thirdly, there are direct services to the community, the work of, for example, the teacher, the doctor or the actor.

Industrial work is of two types: first, the extractive industries, i.e. the industries which are concerned with the getting of wealth from the land or sea, e.g. agriculture, fishing, mining; and secondly, the manufacturing industries whose work it is to change the gifts of nature into the forms the people require, e. g. the engineering and textile industries, or the constructive industries which take the finished products of the manufacturers to build them into something else.

When one speaks of the industries of Britain, it is chiefly the 'heavy industries' or the textile industries that one has in mind.

About 3-5 per cent of the coal produced in Britain is exported, chiefly from Newcastle, Hull, Cardiff, Liverpool and Glasgow. About one quarter of the coal is coked for smelting iron or for producing coal gas, and from the by-products of this process are manufactured a whole host of things, ranging from explosives to dyes, from fertilizers to aspirins, from saccharine to plastics.

Within recent years the motor – engineering industry has become one of the most important in Britain. It is located in the Birmingham area, the Greater London area, the Oxford area and the Luton area.

Though the textile industries of Britain are not so fundamental as coal or iron, they employ nearly a million people and, since they account for almost 10 per cent of Britain's exports, they are among the ones best known abroad.

Few British industries have so long a history or have done so much to forward Britain's commercial prosperity as the woolen industry, and there is perhaps no British industry that owes more to the foreigner for its development.

Bradford of Yorkshire holds pride of place in almost every branch of the trade whether for the manufacture of woolen or mohair goods.

Liverpool and Manchester import practically all the raw cotton used in the industry and they export twice as much cotton goods as all the other ports of Britain put together.

But much of the plant and machinery was out of date. A thorough reorganization was needed.

The Government offered to pay compensation to the firms affected and to make a grant of one quarter towards the cost of modernizing existing, and of putting in new equipment.

In order to start using more productive methods they had to invest capital in computerizing of plants. These measures, it is hoped, will result in a more efficient and competitive industry. In order to start using more productive methods they have to invest capital in computerizing of plant and machinery. [1]

2.2.8 Ask questions on the text

2.2.9 Read the text once more. What questions can you answer?

2.2.10 Find sentences with the Gerund and the Participle. Translate them, define their functions

2.2.11 Speak

- 1 about British industry;
- 2 about problems with plant and machinery;
- 3 about Government's measures to make industry more efficient.

2.2.12 Fill in the blanks (to automate, transforming, transaction, to change, Internet communications)

- 1 The opening the online auto marketplace will allow suppliers and buyers routine transactions and simplify the bidding process for everything.
- 2 The Internet is every piece of the Ford Company and the car industry.
- 3 The company could become a profit maker since it will collect a fee or commission for every that takes place over the network.
- 4 E – commerce is going the way businesses interact with each other.
- 5 By using the speed of and the power of large computerized databases to handle global sales and purchasing, the companies hope to control costs.

2.2.13 Make up the possible expressions using adjectives and nouns

A	B
fishing	methods
frequent	industry
textile	prosperity
commercial	grounds
different	occupations
productive	changes

2.3 Text II “Lift the Congressional Quota on High-Skilled Workers” by Daniel T. Griswold (a *director of the Center for Trade Policy Studies at the Cato Institute*. March 27, 1998)

2.3.1 Read the text

America's information technology companies are starved for high-skilled workers. The shortage was created by an arbitrary quota on immigrants set before the World Wide Web and 486 PCs even existed. In 1990 Congress capped the annual number of H-1B visas set aside for high-skilled immigrant workers at 65,000. This year, because of booming demand for workers in America's high-technology sector, the quota is expected to be filled by June, making an already tight labor market even tighter. Failure to lift the cap soon will disrupt production and dull the competitive edge of America's most dynamic companies.

There's plenty of evidence of a shortage. A study by Virginia Polytechnic Institute estimates that more than 340,000 information technology jobs are currently unfilled. Wages in a number of high-skilled occupations such as systems analysts and software programmers have been rising at double-digit rates, a sure signal that demand is outstripping supply. The unemployment rate among electrical engineers nationwide today is 0.4 percent.

The problem will only get worse. The U.S. Department of Labor predicts 130,000 new information technology jobs each year for the next decade. Yet American colleges are producing only 25,000 graduates in computer science a year, 40 percent fewer than in the 1980s, and only 20,000 electrical engineering graduates, one-third fewer than a decade ago. Although many high-tech jobs do not require such degrees, the decline in computer and engineering degrees can only aggravate whatever shortage exists.

A lack of qualified workers is forcing U.S. companies to postpone new research projects. Two-thirds of information technology companies surveyed recently said the shortage of high-skilled workers is a barrier to their future growth. Cypress Semiconductor of California counts 16 projects on hold because of a shortage of engineers. With product cycles of one year or less, every postponed project means lost sales, lost profits and fewer jobs created to support research and development.

The answer is simple: Lift the cap on high-skilled immigrants. Allow U.S. companies to hire the workers they need to get the job done, whatever the workers' national origin.

Immigrants already play a vital role in America's high-technology economy. While immigrants are less than 10 percent of the U.S. population, they comprise 30 percent of research and development scientists and engineers with Ph.D.s. More than one-third of the engineers in Silicon Valley are foreign born.

Andrew Grove, the founder and CEO of Intel, the world's largest semiconductor maker, immigrated to the United States from Hungary. James Goslin, a Canadian national, developed for Sun Microsystems the Java programming language, which is now used by 400,000 programmers worldwide. Why deprive

ourselves of the present and future benefits of immigration when the past benefits are so obvious?

The anti-immigrant lobby has attacked a bill by Sen. Spencer Abraham (R-Mich.) that would raise the H-1B cap to 90,000, calling it a "sweatshop" bill for high-technology workers. The charge is just plain silly. High-technology jobs are among the most rewarding in the country. Salaries in Silicon Valley average \$42,000 a year, among the highest in the country. The only sweating those workers do is during lunch hour in the company gym.

High-skilled immigrants do not undercut the wages or job opportunities of native American workers. Indeed, according to data from the National Academy of Sciences and the National Science Foundation, foreign-born engineers and scientists typically earn slightly more than their native-born counterparts with the same academic credentials and experience. Immigrants also bring specialized language skills to industries such as software, where a growing percentage of sales for U.S. companies are in non-English-speaking markets. By enhancing the innovation, growth and competitiveness of American high-tech companies, immigrants create job opportunities for natives--along with better and more affordable products for consumers.

So why don't American companies train natives to fill the open positions? America's high-tech industry already spends more than \$200 billion a year on formal and informal job training. Companies that need workers today can't wait indefinitely for the public school monopoly to improving its teaching of math and science.

Companies pay a \$10,000 to \$15,000 premium to cover the relocation and visa application costs of a skilled immigrant under the H-1B program, with no savings in labor costs. If U.S. companies could meet their personnel needs by hiring only natives, they probably would. But there are simply not enough qualified native workers to meet demand. In the end, the only proof of a worker shortage that matters is the fact that companies want to hire workers but are being prevented from doing so by a government restriction.

The absurdly low H-1B cap is nothing more than a form of centralized industrial policy. It represents an attempt by Congress to micromanage the nation's most dynamic and innovative industry by dictating the composition of its most important resource, human capital. Congress should lift the H-1B cap so that America's high-technology companies can continue to create wealth for all of us in a competitive and open market. *This article originally appeared in the Journal of Commerce.*[2]

2.3.2 Answer the questions

1 The article was written ten years ago. Is it true nowadays that America's information technology companies are starved for high-skilled workers?

2 What was the annual number of high-skilled immigrant workers in 1990?

3 What is a lack of qualified workers forcing U.S. companies to?

4 Where are the highest salaries in the country? How much is it?

5 How much does America's high-tech industry spend a year on formal and informal job training?

6 What do immigrants bring to industries such as software, where a growing percentage of sales for U.S. companies are in non-English-speaking markets?

2.3.3 Find recent information on the problem of high-skilled immigrant workers in the USA in the Internet

2.3.4 Speak on the problem adding chosen facts

2.3.5 Comment the quotation by Bill Gates at Testimony before the Committee on Science and Technology, US House of Representatives, March 12, 2008

"If we increase the number of H-1B visas that are available to U.S. companies, employment of U.S. nationals would likely grow as well. For instance, Microsoft has found that for every H-1B hire we make, we add on average four additional employees to support them in various capacities." [2]

2.4 Text III "Open the gates wide to high-skill immigrants"

2.4.1 Read the text

As the amazing expansion of the 1990s roars along, labor market conditions continue to tighten throughout the country. The unemployment rate has been below 4, 5 % since November of last year, and nearly one-half of all Americans live in areas with unemployment rates below 4 %. Limits on labor supply are now impeding employment and output growth in an increasing number of sectors and regions.

Nowhere have market conditions been tighter than in the information-technology sector. Since 1993, this sector has added more than 1 million net new jobs with wages that are on average about three –quarters higher than the rest of the economy. The unemployment rates for information –technology workers, including electrical engineers, computer scientists, and programmers, are below 2 %, forcing regional employers to mount national searches to fill open positions.

In part, the strong demand to information – technology workers reflects the economy's overall strength. Efforts to head off Y2K problems have also intensified the search for such workers this year. But it's a mistake to conclude that the increase in demand for computer scientists, system analysts, and computer programmers is temporary. Spending on information technologies has risen steadily since 1992 and now accounts for more than half of total business spending on producer – durable equipment.

According to a recent commerce Dept. report, the nation will require at least 1.3 million new information-technology workers over the next decade to create a new system, more will be needed to operate them.

Big jump. As a result of the intense scramble to hire information-technology workers, the number of special visas for skilled foreign workers available for this year has already been used up. The Clinton Administration initially opposed an increase in the number of these visas because of concerns about possible negative effects on American workers through immigration.

But a recent study indicates that immigration of information-technology workers has a positive economic impact. A detailed analysis of Silicon Valley's experience over the past 20 years, demonstrates that such immigrants have been a major source of new job and wealth creation, bringing skills, creativity, capital, and links with global markets to the region.

Today immigrants account for at least one-third of the scientific and engineering work-force in the Valley and occupy senior executive positions in at least one-quarter of its new technology companies. Many have advanced degrees in computer science and engineering, fields in which the number of degrees granted by U.S. universities to American students has been declining.

Lift that cap. Over time, employment opportunities in information technology will stimulate more American students to acquire the necessary skills. They will be helped by the numerous educational initiatives of the Administration, including programs to upgrade basic skills in math, science and reading in primary and secondary schools; to increase college enrollment rates; and to provide retraining. State and local governments are responding to the skill demands of the new economy, often working with private companies to develop youth apprenticeship programs. Numerous companies in the information-technology sector have introduced their own programs to attract and train students for information-technology jobs.

For many programming jobs, the necessary skills can be acquired in a matter of months. For others, however, it lasts years and requires substantial improvements in math and science education even before college. In the meantime, immigrants who possess the requisite skills should be allowed – indeed encouraged – to fill the gap. Conditions in the information-technology sector indicate that it's time to raise the cap on special visas yet again and to provide room for further increases. Silicon Valley's experience reveals that the results will be more jobs and higher incomes for both American and immigrant workers. [2]

2.4.2 Answer the questions

- 1 Would you like to work abroad?
- 2 Nowadays labor market conditions continue to tighten throughout the world, don't they?
- 3 What is the unemployment rate in this country? Is it growing by and by?
- 4 Can you find any work?
- 5 What is a result of the intense scramble to hire information-technology workers?
- 6 How many immigrants are there in the Valley?
- 7 How many immigrants occupy senior executive positions of new technology companies?

2.5 Text IV “Innovation Feeds Success in the PC Industry”

2.5.1 Read the text and retell it

In the personal computer industry, innovation is the path to success. This reality is widely understood by small and large companies alike. That’s why makers of PCs, microprocessor chips, peripherals, software application and operating systems incorporate new features continuously. It’s why hardware and software improve so rapidly, even as prices fall relentlessly. It’s wondrous for consumer, wondrous for the economy and unprecedented in any other industry. It’s truly exciting to work in an industry that is so motivated to always do better. The pressure is intense but the pace is thrilling.

Every product on the market today will be obsolete within a few years. The only question for my company is whether we’ll be the ones to replace our product, or whether some other company will do better job. Everybody here knows it, and so do our competitors. If we don’t keep up with technology and the market, we’ll quickly become irrelevant.

Innovations is particularly important for an operating system, the software feat coordinates the elements of computer – including its applications and peripherals, so that information can flow. The more functions the operating system coordinates or assumes, the easier the computers to use. Customers value this simplicity. Even sophisticated users of personal computers have limited time and patience. They want to get access to information quickly. They don’t want to have to figure out how to make a lot of pieces work together. They just want a computer to work.

Integrating features to achieve power and simplicity has been a hallmark of the PC industry. A single Intel microprocessor chip now contains features that once required dozens of chips, including math co-processor chips. That’s why PCs are faster, smaller, cheaper, and less likely to fail than they were only a few years ago. But to remain competitive in the chip business, Intel must continue to sweep new features into the microchips.

Today’s PCs have built-in modems, CD-ROMs and other peripherals that not so long ago were add-ons that could be a hassle to get to work. But as operating system evolved to support these peripherals manufactures started making them standard equipment and people started taking them for granted.

Version 1 of first Microsoft’s first operating system, MS-DOS, didn’t let you use hard disks. Information could be stored only on cassette tapes or floppy disks. If we hadn’t integrated hard-disk support into the operating system in 1983, few people today would even remember the name “MS-DOS”. The essence of Windows, its graphical interface, was an add-on to MS-DOS when it first came out.

Just as countless new features have been integrated into automobiles, home entertainment systems and dozen of other products over the year, many software features that began as separate parts have been integrated into Windows. These include fonts, memory management, disk compression, CD-ROM support, networking and Internet access, power management for laptops and scores of other capabilities.

Often the new capabilities make it easier for people to access information from an ever-widening array of sources – recently including new kinds of storage devices and wireless links to the Internet. Many people take Web browsing for granted now, because it’s easy to set up and run any brand of browser we built into Windows. Before, only the technically adept could figure out how to configure a PC to connect to the Web.

The reason my company has thousands of people improving and testing Windows is that computer users have a choice of operating systems, including older versions of Windows. If we don’t make big strides forward, people won’t bother to upgrade – or they’ll switch to another operating system.

Competition for operating systems also comes from “middle-ware” products such as Lotus Notes, which takes over some of what Windows offers consumers. Sun has similar ambitions for Java, which it sees as an operating system as well as a programming language. Netscape hopes to expand its browser software into a platform that makes conventional operating systems irrelevant.

Microsoft’s response has been to keep prices down and innovate rapidly, integrating features into Windows to meet the consumers’ needs. (Yes, these innovations include Internet Explorer, now the subject of a court challenge.) Every few years we release a whole new version of the operating system, but along the way we offer incremental upgrades. Some of these, such as network and Internet support, take the form of interim releases that later are folded into the operating system.

It’s common for makers of operating systems to release modules in stages, as they become available. Apply does it. Vendors of many of the flavor of UNIX do it. Microsoft is not different. Customers and computer manufacturers are eager for incremental improvements, from bug fixes to big new features. When we have something good and well-tested, we often don’t hold it for the next major release of the operating system. We get it out there.

So, what comes next? We’ll see operating systems that support speech and visual recognition, letting PCs interact with people more naturally. We’ll see incredible on-screen graphics. We’ll see high-speed connections to rich information from all over the world. Every operating system will offer these kinds of incredible features because innovation is the path to success. Any software company that doesn’t innovate won’t be around long. [2]

2.5.2 Ask questions on the text and ask your friends to answer them

2.6 Text V “Silicon Valley”[3]

2.6.1 Read and translate the text

Origin of the term

Silicon Valley is the southern part of the San Francisco Bay Area in Northern California, United States. The term originally referred to the region's large number of silicon chip innovators and manufacturers, but eventually came to refer to all the high-tech businesses in the area; it is now generally used as a metonym for the high-

tech sector. Despite the development of other high-tech economic centers throughout the United States, Silicon Valley continues to be the leading high-tech hub because of its large number of engineers and venture capitalists. Geographically, Silicon Valley encompasses the northern part of Santa Clara Valley and adjacent communities.

The term Silicon Valley was coined by Ralph Vaerst, a Northern California entrepreneur. Its first published use is credited to Don Hoefler, a friend of Vaerst's, who used the phrase as the title of a series of articles in the weekly trade newspaper Electronic News. The series, entitled "Silicon Valley USA," began in the paper's issue dated January 11, 1971. Valley refers to the Santa Clara Valley, located at the southern end of San Francisco Bay, while Silicon refers to the high concentration of companies involved in the semiconductor and computer industries that were concentrated in the area. These firms slowly replaced the orchards which gave the area its initial nickname, the Valley of Heart's Delight.

History

Since the early twentieth century, Silicon Valley has been home to a vibrant, growing electronics industry. The industry began through experimentation and innovation in the fields of radio, television, and military electronics. Stanford University, its affiliates, and graduates have played a major role in the evolution of this area.

Social Roots of information technology revolution in America

It was in Silicon Valley that the integrated circuit, the microprocessor, the microcomputer, among other key technologies, were developed, and that the heart of electronics innovation has beaten for four decades, sustained by about a quarter of a million information technology workers. Silicon Valley was formed as a milieu of innovations by the convergence on one site of new technological knowledge; a large pool of skilled engineers and scientists from major universities in the area; generous funding from an assured market with Defense Department; the development of an efficient network of venture capital firms; and, in the very early stage, the institutional leadership of Stanford University.

Roots in radio and military technology

The San Francisco Bay Area had long been a major site of U.S. Navy research and technology. In 1909, Charles Herrold started the first radio station in the United States with regularly scheduled programming in San Jose. Later that year, Stanford University graduate Cyril Elwell purchased the U.S. patents for Poulsen arc radio transmission technology and founded the Federal Telegraph Corporation (FTC) in Palo Alto. Over the next decade, the FTC created the world's first global radio communication system, and signed a contract with the U.S. Navy in 1912.

In 1933, Air Base Sunnyvale, California was commissioned by the United States Government for the use as a Naval Air Station (NAS) to house the airship USS Macon in Hangar One. The station was renamed NAS Moffett Field, and between 1933 and 1947, US Navy blimps were based here. A number of technology firms had set up shop in the area around Moffett to serve the Navy. When the Navy gave up its

airship ambitions and moved most of its West Coast operations to San Diego, NACA (the National Advisory Committee for Aeronautics, forerunner of NASA) took over portions of Moffett for aeronautics research. Many of the original companies stayed, while new ones moved in. The immediate area was soon filled with aerospace firms such as Lockheed.

Stanford Industrial Park

After World War II, universities were experiencing enormous demand due to returning students. To address the financial demands of Stanford's growth requirements, and to provide local employment opportunities for graduating students, Frederick Terman proposed the leasing of Stanford's lands for use as an office park, named the Stanford Industrial Park (later Stanford Research Park). Leases were limited to high technology companies. Its first tenant was Varian Associates, founded by Stanford alumni in the 1930s to build military radar components. However, Terman also found venture capital for civilian technology start-ups. One of the major success stories was Hewlett-Packard. Founded in Packard's garage by Stanford graduates William Hewlett and David Packard, Hewlett-Packard moved its offices into the Stanford Research Park slightly after 1953. In 1954, Stanford created the Honors Cooperative Program to allow full-time employees of the companies to pursue graduate degrees from the University on a part-time basis. The initial companies signed five-year agreements in which they would pay double the tuition for each student in order to cover the costs. Hewlett-Packard has become the largest personal computer manufacturer in the world, and transformed the home printing market when it released the first ink jet printer in 1984. In addition, the tenancy of Eastman Kodak and General Electric made Stanford Industrial Park a center of technology in the mid-1990s.

Silicon transistor

In 1953, William Shockley left Bell Labs in a disagreement over the handling of the invention of the transistor. After returning to California Institute of Technology for a short while, Shockley moved to Mountain View, California in 1956, and founded Shockley Semiconductor Laboratory. Unlike many other researchers who used germanium as the semiconductor material, Shockley believed that silicon was the better material for making transistors. Shockley intended to replace the current transistor with a new three-element design (today known as the Shockley diode), but the design was considerably more difficult to build than the "simple" transistor. In 1957, Shockley decided to end research on the silicon transistor. As a result, eight engineers left the company to form Fairchild Semiconductor. Two of the original employees of Fairchild Semiconductor, Robert Noyce and Gordon Moore, would go on to found Intel.

Venture capital firms

By the early 1970s there were many semiconductor companies in the area, computer firms using their devices, and programming and service companies serving both. Industrial space was plentiful and housing was still inexpensive. The growth

was fueled by the emergence of the venture capital industry on Sand Hill Road, beginning with Kleiner Perkins in 1972; the availability of venture capital exploded after the successful \$1.3 billion IPO of Apple Computer in December 1980.

The rise of software

Although semiconductors are still a major component of the area's economy, Silicon Valley has been most famous in recent years for innovations in software and Internet services. Silicon Valley has significantly influenced computer operating systems, software, and user interfaces.

Using money from NASA and the U.S. Air Force, Doug Engelbart invented the mouse and hypertext-based collaboration tools in the mid-1960s, while at Stanford Research Institute (now SRI International). When Engelbart's Augmentation Research Center declined in influence due to personal conflicts and the loss of government funding, Xerox hired some of Engelbart's best researchers. In turn, in the 1970s and 1980s, Xerox's Palo Alto Research Center (PARC) played a pivotal role in object-oriented programming, graphical user interfaces (GUIs), Ethernet, PostScript, and laser printers.

While Xerox marketed equipment using its technologies, for the most part its technologies flourished elsewhere. The diaspora of Xerox inventions led directly to 3Com and Adobe Systems, and indirectly to Cisco, Apple Computer and Microsoft. Apple's Macintosh GUI was largely a result of Steve Jobs' visit to PARC and the subsequent hiring of key personnel. Microsoft's Windows GUI is based on Apple's work, more or less directly. Cisco's impetus stemmed from the need to route a variety of protocols over Stanford's campus Ethernet.

Internet bubble

Silicon Valley is generally considered to have been the center of the dot-com bubble which started from the mid-1990s and collapsed after the NASDAQ stock market began to decline dramatically in April 2000. During the bubble era, real estate prices reached unprecedented levels. For a brief time, Sand Hill Road was home to the most expensive commercial real estate in the world, and the booming economy resulted in severe traffic congestion.

Even after the dot-com crash, Silicon Valley continues to maintain its status as one of the top research and development centers in the world. A 2006 Wall Street Journal story found that 13 of the 20 most inventive towns in America were in California, and 10 of those were in Silicon Valley. San Jose led the list with 3,867 utility patents filed in 2005, and number two was Sunnyvale, at 1,881 utility patents.

2.6.2 Answer the questions

- 1 What is the origin of the term “Silicon Valley”?
- 2 What way do we translate the term in Russian?
- 3 What is the mistake?
- 4 What American firms do you know?
- 5 What does each of them deal with?

- 6 What University has played a major role in the evolution of this area?
- 7 When did **Hewlett-Packard** release the first ink jet printer?
- 8 Who believed that silicon was the better material for making transistors?
- 9 What has Silicon Valley been most famous in recent years for?

2.6.3 Retell the text adding more information you can find in the Internet

2.7 Text VI “One of Technology centers in United Kingdom: Silicon Fen”[4]

2.7.1 Read and translate the text

Silicon Fen (sometimes the Cambridge Cluster) is the name given to the region around Cambridge, England, which is home to a large cluster of high-tech businesses, especially those related to software, electronics, and biotechnology. Many of these have connections with Cambridge University, and the area is now one of the most important technology centres in Europe.

It is called "Silicon Fen" by analogy with Silicon Valley in California, and because of the large area of drained fenland to the north of Cambridge.

It is claimed that Silicon Fen is the second largest venture capital market in the world, after Silicon Valley. In 2004, 24 % of venture investment in the UK and 9 % in Europe was received by Silicon Fen companies, according to the Cambridge Cluster Report 2004 produced by Library House and Grant Thornton.

The name is also a deliberate rhyme with "Silicon Glen", a pre-existing high-tech enclave in Scotland.

Business growth

In 2004, 24 % of venture investment in the UK and 9 % in Europe was received by Silicon Fen companies, according to the Cambridge Cluster Report 2004 produced by Library House and Grant Thornton.

The so-called Cambridge phenomenon, giving rise to start-up companies in a town previously only having a little light industry in the electrical sector, is usually dated to the founding of the Cambridge Science Park in 1970: this was an initiative of Trinity College, Cambridge and moved away from a traditional low-development policy for Cambridge.

The characteristic of Cambridge is small companies (as few as three people, in some cases) in sectors such as computer-aided design. Over time the number of companies has grown; it has not proved easy to count them, but recent estimates have placed the number anywhere between 1,000 and 3,500 companies. They are spread over an area defined perhaps by the CB postcode (which is highly sought after), or more generously in an area bounded by Ely-Newmarket-Saffron Walden-Royston-St. Neots-Huntingdon.

In February 2006, the Judge Business School reported estimates that suggested that at that time, there were around 250 active start-ups directly linked to the University, valued at around US\$6 billion. Only a tiny proportion of these companies

have so far grown into multinationals: ARM and Autonomy Corporation are the most obvious examples, and more recently CSR has seen rapid growth due to the uptake of Bluetooth.

Area characteristics

The region does have one of the most flexible job markets in the technology sector, meaning that the same people are often retained in other companies in the Cambridge area after a start-up fails. One explanation for the area's success is that after a while such an employment market is self-sustaining, since employees are willing to move to an area that promises a future beyond any one company. Another factor is the high degree of 'networking', enabling people across the region to find partners, jobs, funding, and know-how. Organisations have sprung up to facilitate this process, for example the Cambridge Network.

Another explanation is that because of the academic pre-eminence of Cambridge University, the high standard of living available in the county, its closeness to Stansted Airport and London, the low incidence of social problems such as crime and hard drug use. Many graduates from the university choose to stay on in the area, giving local companies a rich pool of talent to draw upon. The high-technology industry has little by way of competition, unlike say in Oxfordshire where plenty of other competing industries exist. Because Cambridgeshire was not until recently a high-technology centre, commercial rents were generally lower than in other parts of the UK, giving companies a head-start on those situated in other more expensive regions; this has, however, recently changed and Cambridgeshire now has one of the highest costs of living in the UK outside London.

Not long after the first wave of new technology companies began congregating in the hinterland of Cambridge, this stretch of East Anglia too flat and featureless ever to be mistaken for Silicon valley started becoming known as a Silicon Fen. Taking this increasingly popular epithet as its title, Silicon Fen is a three-year program of digital art works exploring themes of landscape and technological innovation in relation to the history and geography of the East Anglian Fenland. Working in collaboration, Norwich School of Art and Design and Film and Video Umbrella will be commissioning seven new art works, each of them produced in partnership with galleries located in or around the Fenland region. Contrasting the distinctively haunting, empty landscapes of this historically remote part of the country with images of a wired-up, networked future generated by its increasing technological development, Silicon Fen will consider some of these contemporary changes in the context of earlier influences. As the science parks and research campuses spread from Cambridge out to Ely and beyond, these new centres of innovation are drawn into proximity with an engineering phenomenon that, four centuries earlier, was the technological marvel of its day: the system of sluices, dykes and ditches, constructed by the Dutch architect Cornelius Vermuyden, to drain and protect the vast agricultural basin of the Fens. Much of this area of East Anglia is now being bisected by an information infrastructure of high-speed networks and broadband links that rivals that earlier system of canals and ditches for ambition, scope and intricacy. Working closely with the new digital technologies that are

shaping and connecting this newly emerging information-rich-environment, the selected artists draw on a range of techniques and approaches, from digital photography and video to artists websites and multimedia installations. Highlighting the age-old and enduring relationship between land and water, and extending it with new themes of media inundation and information flow, this ongoing series of artists commissions sets out to capture the many changing facets of this unique and fascinating part of the world.

Cambridge's status as a top European incubator for technology ventures is under threat because it has failed to get under the recent hail of cash chucked at web companies, warn figures out today.

The share of European technology venture capital dished out in Silicon Fen has plummeted from 9.3 per cent in 2005 to 5.6 per cent in the first half of this year, according to Library House's Cambridge Cluster Report.

"This can be largely accounted for by a structural shift in the direction of venture funding towards so-called 'soft innovation', in particular the service and retail sector, which can be closely related to the emergence of web-enabled products and mediatech," the authors write.

Silicon Fen's natural bread and butter thanks to the university is "hard" technology, such as chip maker ARM and biotech ventures, which require big money to get started.

The report complains that Cambridge's steep property prices put off too many cash-strapped early stage tech companies and young talent. Library House calls for "modest expansion" of the compact city, which would likely be fiercely opposed locally.

The drop in Cambridge investment has, however, been accompanied by a rise in capital splurged on web entrepreneurs in London - a city not known for its bargain housing. In startup land, big money sell-offs like Last.fm, based in Shoreditch, are bound to attract similar ideas.

To remain relevant, Silicon Fen needs to become more integrated with the wider technology scene in the South East, the Cluster Report authors argue. We wrote at length on the issues in summer.

Only a tiny proportion of these companies have so far grown into multinationals: ARM and Autonomy Corporation are the most obvious examples, and more recently Cambridge Silicon Radio has seen rapid growth due to the uptake of Bluetooth.

2.7.2 Answer the questions

- 1 What is home to a large cluster of high-tech businesses, especially those related to software, electronics, and biotechnology?
- 2 What University have many of these businesses connections with?
- 3 Why is it called "Silicon Fen"?
- 4 Whose initiative was it?
- 5 How many companies were there around and how much did they valued?
- 6 What is one explanation for the area's success?

7 Why is Cambridge's status as a top European incubator for technology ventures under threat?

8 What does Silicon Fen need to remain relevant?

9 What companies have so far grown into multinationals?

10 What do they mean when say that the region does have one of the most flexible job markets in the technology sector?

11 What is the explanation for the area's success?

2.8 Text VII “Silicon Glen”. Now you are going to read some texts about Silicon Glen. Do it thoroughly and compare the texts. Summaries the facts and retell the text [5]

2.8.1 Text 1 “High tech sector of Scotland”

Silicon Glen is a nickname for the high tech sector of Scotland. The name is applied to the Central Belt triangle between Dundee, Inverclyde, and Edinburgh, and includes Fife, Glasgow and Stirling; although electronics facilities outwith this central area may also be included in the term.

It does not represent a *glen* as it covers a much wider area than just one valley (perhaps *strath* would be a more accurate adjective), however the name was probably based upon "Silicon Valley" and has been in use in Scotland since the 1980s. History

Silicon Glen had its origins in the electronics business with IBM being one of the first companies to set up when it established a manufacturing base in Greenock in 1951. Indeed this was typical of much of the early days of Silicon Glen, which were dominated by electronics manufacturing for foreign companies much more than software development or the establishment of home grown companies.

The emphasis on electronics came about due to the decline in traditional Scottish heavy industries such as shipbuilding and mining. The government development agencies saw electronics manufacturing as being a positive replacement for people made redundant through heavy industry closures and the associated training and reskilling was relatively easy to achieve. Like the bedrock of Silicon Valley was in semiconductors, Silicon Glen also had a significant influence in semiconductor design and manufacturing starting in 1960 with Hughes Aircraft establishing its first facility outside the US in Glenrothes to manufacture germanium and silicon diodes.

In 1965 Elliott Automation established a MOS research laboratory and production facility in Glenrothes. This was followed in 1969 by the establishment of wafer fabs by General Instrument in Glenrothes, Motorola in East Kilbride and National Semiconductor in Greenock. There were some other notable successes such as the large Sun Microsystems plant in Linlithgow and the Digital Equipment Corporation manufacturing plant in South Queensferry where the pioneering 64 bit Alpha processor was made. Digital also started an office in Livingston developing their flagship VAX/VMS operating system. It was estimated that the manufacturing sector produced approximately 30% of Europe's PC's, 80 % of its Workstations, and 65 % of its ATM's.

Silicon Glen in Glasgow



An industrial complex in suburban Glasgow dubbed "Silicon Glen" is the center of Scotland's thriving technology industry. The complex is home to numerous companies that manufacture silicon chips, personal computers, and other sophisticated electronic goods. High technology exports are a major source of Scotland's export earnings.

2.8.2 Text 2 "Today"

The heavy dependency on electronics manufacturing hit Silicon Glen hard after the collapse of the hi-tech economy in 2000. Viasystems, National Semiconductor, Motorola and Chunghwa all laid off substantial numbers of employees or closed factories completely. Digital sold their Alpha facility to Motorola who eventually closed it down. Motorola also closed their factory in Bathgate and the substantial NEC plant in Livingston was also closed.

However, there are many promising signs as well as a recognition that diversification away from electronics and manufacturing produces a more balanced and stronger economy. There is also more of an interest in encouraging home grown talent.

In order to diversify away from electronics and manufacturing, the development agencies now see Call Centres as being a potential area of growth, but there is also substantial interest in the software development industry, including Rockstar North, developers of the market leading Grand Theft Auto series.

There is also a dynamic and fast growing electronics design and development industry, based around links between the universities and indigenous companies like Wolfson, Linn, Nallatech and Axeon, and projects like Alba Campus.

However, the software sector has also notably attracted Amazon.com to set up a software development centre in Edinburgh, the first such centre outside the US. There remains a significant presence of global players like National Semiconductor, IBM and Motorola.

Today Silicon Glen based companies directly employ over 41,000 people in the sector.

2.8.3 Text 3 “Silicon Glen Кремниевая долина в Шотландии”

Бывают все-таки удивительно символические совпадения: Silicon Glen в Шотландии объединяют с калифорнийской Silicon Valley не только одинаковые по смыслу названия. На территории между Эдинбургом и Глазго производится 40 % выпускаемых в Европе компьютеров, 66 % рабочих станций, 70 % ноутбуков. Мало-помалу здесь обосновываются представители практически всех мировых фирм электронной индустрии. Их резоны более чем очевидны: Шотландия предоставляет, пожалуй, самые выгодные в Европе условия для размещения производства. Помимо относительно недорогой и квалифицированной рабочей силы (в сравнении с Германией час работы здесь дешевле более чем в два раза) и благоприятного для работодателей рабочего права, прекрасной инфраструктуры и уже существующего первоклассного научно-исследовательского сектора (Эдинбургский университет входит в первую десятку мировых исследовательских центров в сфере информатики), обладающего прочными и отработанными прямыми связями с производителями, здесь еще и относительно невысокие цены на землю и недвижимость. Гэри Смит, исследователь рынка из Калифорнии, считает, что “Silicon Valley переполнена”. Фирмы и люди сбегают оттуда от ужасающих цен на землю (дом в Долине стоит в два раза дороже, чем где бы то ни было в Америке), от хаоса на дорогах, от необходимости добираться до работы более чем за 200 км, от потери чувства собственной значимости. Предприятия континентальной Европы тоже находят климат в шотландской долине весьма привлекательным для своей деятельности: в 1997 г. европейские инвестиции здесь увеличились на 95 % в сравнении с предыдущим годом. Уже 578 иностранных предприятий представлены в Silicon Glen. Как долго продержится этот бум - сказать трудно. Смит, например, пророчесствует, что “вскоре вы не найдете в Шотландии дома дешевле миллиона долларов и движение на дорогах превратится в кошмар”.

2.8.4 Text 4 “Silicon Glen “

The region around **Livingston, Scotland** [before 1985] also applied more generally to the entire stretch from **Edinburgh to Glasgow**.

From *Randy Enger* <enger@rational.com>: "Sun Microsystems set up a manufacturing plant in the Glasgow area maybe in 1988 or 1989, and the term *Silicon Glen* was being used then."

From *Per Stymne* <pstymne@hotmail.com>: "The nickname *Silicon Glen* for the area between Glasgow and Edinburgh in Scotland is much older than from 1988-89. I and a colleague wrote a series of articles about Silicon Glen in 1985, and the expression was quite well established long before that."

From *Ron Leckie* <ron@infras.com>: "I was born and raised in Edinburgh, and started work in 1970 at one of the early silicon manufacturing plants in Scotland - - Signetics at Linlithgow. This is only 18 miles to the west of Edinburgh, and, by the way, to correct the earlier input from Randy Enger, Sun's plant is in Linlithgow - near Edinburgh, not Glasgow."

The term Silicon Glen was coined I believe some time late in the 1970's. I left Silicon Glen for Silicon Valley in 1976, and I do not recollect the name being used until after I had been in California for a few years. The Scottish Development Agency (now called "Locate In Scotland") commissioned an artist, David Gray, to create a caricature map of the 'Glen.

This map is similar to the 'Valley caricature map and depicts the hundreds of high tech companies in the 'Glen. Edinburgh and Glasgow are less than 50 miles apart, but "Silicon Glen" stretches beyond each city from east coast to west coast for about 80 miles."

2.8.5 Text 5 “Scotland’s Internet Guide - founded 1994”

About Silicon Glen

Silicon Glen is the name given to the Scottish computing and technology sector and especially the central belt of Scotland. This part of Scotland is home to a large number of companies from startups to established multinationals, including Amazon's first development centre outside the US. Scotland is also a major manufacturing base - if you're looking for a computer to buy, try our computer shops page, alternatively use our partner site to look for and buy laptop computers.

In addition, Silicon Glen in Scotland is also home to a large number of universities in the area, which produce world class graduates for local businesses. Scotland produces more university and college graduates per-head of population than anywhere else in Europe. View the movie about Silicon Glen.

About Scotland

The Scots have a worldwide reputation for engineering excellence. Scotland also has an excellent quality of life. As the home of golf, whisky (whiskey), the world's biggest arts festival, hogmanay, Gretna Green, some of the world's finest traditional music and the "auld country" for anyone interested in tracing their Scottish roots, we have much to offer culturally too. There's also all the usual tartan and bagpipe information including information on plaid, tartan traditions, kilts, haggis and the popular highland games. For information on tourist trips to Scotland the priceline site will allow you to search and book accommodation.

About SiliconGlen.com

This site has generated media enquiries from ABC News, World News Tonight, Sky News and the BBC and enquiries from companies wanting to invest here. We've even helped The Weakest Link set questions about Scottish culture!

SiliconGlen.com was set up and developed by Craig Cockburn. Craig lives and works in West Lothian, Scotland as a security cleared project manager on enterprise level websites and applications, is a director of SiliconGlen.com Ltd, and has researched for TechCrunch and worked as Project Manager for the Tesco.com Grocery site and as CIO for a Techcrunch40 startup. He has an interest in search engines and occasionally does search engine optimisation. He is currently very interested in being contacted about new opportunities for Software managers, CTO, CIO level positions etc. You can view his profile on LinkedIn, or read about the PageLink browser he invented in 1990. Siliconglen.com Ltd works in close partnership with companies outside Scotland such as Elite Training (Belfast), CrowdSpirit (France), The CIO Council (Central government - London), Vanquish (USA) and Barracuda Networks (USA). In his spare time, Craig enjoys promoting traditional culture, especially Gaelic song. Mail Craig. Craig is married to Joscelin and they have three daughters, Cairistiona, Finola and Lucina.[5]

3 Section III Office Work

3.1 Трудности перевода инфинитива, герундия и причастия

Синтаксические трудности при переводе с английского языка на русский возникают главным образом из-за различия в грамматическом строе английского и русского языков.

В английском языке шире, чем в русском, употребляются конструкции с инфинитивом, причастные обороты; кроме того, существуют герундиальные обороты, которых нет в русском языке.

При переводе инфинитива и конструкций с инфинитивом могут представлять трудность следующие случаи:

а) употребление инфинитива в функции обстоятельства цели, когда английский инфинитив нельзя передать в переводе той же формой; он переводится с помощью придаточного предложения цели с союзами *чтобы* или *для того чтобы*, а в некоторых случаях - сочетанием *для + существительное*.

б) употребление инфинитива в качестве определения, который в таких случаях чаще всего переводится на русский язык придаточным определительным предложением.

в) конструкция *to be likely (unlikely) + инфинитив* переводится следующим образом: вероятно, по всей вероятности (маловероятно, чтобы)...

Герундий переводится на русский язык:

- а) существительным;
- б) инфинитивом;

в) деепричастием;

г) глаголом в личной форме, причем герундий в форме SIMPLE - указывает на одновременность действия, а в форме PERFECT - на предшествование и в последнем случае переводится на русский язык формой прошедшего времени.

They insisted on the question being re-considered.

Они настаивали на том, чтобы вопрос был пересмотрен.

При переводе герундия в оборотах **the engineer coming, the engineer's coming** необходимо помнить, что в обороте с существительным в общем падеже подчеркивается скорее процесс действия, а в обороте с существительным в притяжательном падеже основной акцент делается на действии как на факте.

При переводе *причастия* необходимо учитывать следующие моменты:

а) **Present participle active** может переводиться причастием или деепричастием, как действительного, так и страдательного залога.

	покупающий
buying-	покупавший
	покупая
	купив

when (while) + причастие можно переводить с помощью существительного с предлогом:

- when sending - при *посылке* (= *посылая*);

- while discharging the vessel - при *разгрузке судна* (= *разгружая*);

б) Perfect Participle указывает на предшествование, поэтому глагол русского предложения должен стоять в прошедшем времени;

в) самостоятельный причастный оборот переводится различными обстоятельственными придаточными предложениями.

Некоторую трудность для перевода представляют самостоятельные причастные обороты с предлогом **with**. Переводятся они либо придаточными предложениями причины, вводимым союзом *так как*, либо придаточным предложением сопутствующих обстоятельств, начинающихся со слов *причем*, возможны так же следующие варианты перевода: *при наличии, учитывая, так как; ввиду того, что*;

г) причастный оборот, начинающийся с **Past Participle**, в русском языке обычно соответствует придаточному предложению условия или причины и вводится словами: *учитывая, при наличии, при условии*.

Иногда сказуемое в английском предложении далеко стоит от подлежащего. В тех случаях, когда сказуемое является составным именным или глагольным, либо сложным по структуре, вспомогательный глагол может далеко отстоять от именной или глагольной части, либо от остальной части сказуемого. А сказуемое в русском предложении может предшествовать подлежащему, поэтому прежде чем делать перевод, необходимо найти сказуемое.

3.2 Text I “Automation and office worker”

3.2.1 Check up your pronunciation

Mechanization, although, assumption necessitate, cleanliness, consequence, fatigue, procedure, standardize.

3.2.2 Learn the words

virtually – фактически
expand – расширяться, распространяться
routine – заведенный порядок
assumption – принятие
simplify – упрощать
clerical – очищенный
promote – продвигать
expansion – расширение, увеличение
hiring – наем
affect – воздействовать
undergone – подвергаться
beneficial – выгодный
requirement – требование
efficiency – производительность
entail – отстающий
pace – темп
fatigue – усталость
pressure – давление
eliminate – уничтожать
pattern – образец, модель
impact – сталкиваться
semi – skilled – полу - квалифицированный
trend – тенденция
standardize - стандартизироваться

3.2.3 Find the word stems

Mechanization, revolutionary, inconvenient, discussion, basically, organization, clerical commercial, cleanliness, unfavorable, development.

3.2.4 Read the text and ask some questions

While the mechanization of office work has been going on for over half a century, a revolutionary development has taken place in the last twenty years. Electronic equipment has been applied to virtually all branches of office work and its use is steadily expanding. The most important piece of equipment is the computer. A great deal of office work can be reduced to simple routine and routine operations are

easy to automate. In some ways office work is easier to automate than the production of goods: figures and letters have none of the inconvenient natural properties of materials.

Although automation has been an important subject of discussion, it is often assumed that it does not differ basically from earlier forms of mechanization. This assumption is not justified. The early office machines were designed to simplify and speed up particular operations, and involved little or no change in organization. Both punched card machinery and electronic equipment necessitate the introduction of a computably rationalized system of work organization which eliminates many old jobs. Automation also encourages the trend toward the centralization of administrative and clerical functions, promoting the development of government, commercial and educational data processing centers. Further, there are growing possibilities for small and medium sized firms to use computers with the expansion of facilities for the hiring of the time on a computer. All this will affect the working life of an increasing number of office - workers.

The physical environment and working conditions of office – workers have undergone many changes during this century. The automation of office work does have some beneficial effects on the physical environment and working conditions of employees. Lighting, space and cleanliness requirements are usually specified to ensure efficiency and low maintenance costs. But there are some unfavorable consequences. The office environment becomes much more like a factory, with a constant high level of noise and vibration from the equipment. Employees have to spend much more time on their feet and the speed with which the equipment operates frequently entails a rapid, continuous working pace.

Electronic equipment does not produce physical fatigue, as some mechanical equipment does. However, there is pressure for fast work in the preparation of data to maximize the volume of work carried out by the equipment.

In the past there have been several changes in the nature of office work and in the type of skills required of office employees. The early machines eliminated a great deal of laborious routine work but did not displace skilled work. But the introduction of automation necessitates an entire reorganization of work procedures and computably changes the patterns of skill requirements in the office. The impact depends largely on the previous degree of mechanizations. Where a computer system is introduced directly into a manually operated office, the change will radically alter the organization of work procedures, produce very different skill requirements and substantially reduce the size of the staff. Where a computer system is introduced into an office having punched card machinery, there will not be so many changes and the reduction in the size of the staff will not be so great. In the automated office there is no need for a large number of semi – skilled workers. There is a need for a small number of skilled technical workers. In future the number of this will diminish as the highly skilled work is simplified and standardized.

Such development raises the problem of training and retraining for employment in the automated office. [1]

3.2.5 Read the text once more, what questions can you answer?

3.2.6 Find the sentence with the main idea

1 Electronic equipment has been applied to virtually all branches of office work and its use is steadily expanding.

2 Automation is often assumed that it does not differ basically from earlier forms of mechanization.

3 The automation of office work does have some beneficial effects on the physical environment and working conditions of employees.

4 In the automated office there is no need for a large number of semi – skilled workers.

3.2.7 Find the equivalents

- | | |
|-------------------------|---|
| 1) revolutionary | a) much, many, a lot |
| 2) electronic equipment | b) get rid of |
| 3) office work | c) bringing about fundamental change |
| 4) a great deal of | d) effective operation |
| 5) discussion | e) computer |
| 6) to simplify | f) something done for another |
| 7) efficiency | g) a formal treatment of a topic in speech or writing |
| 8) fatigue | h) to diminish |
| 9) employee | i) the temporary loss of power |
| 10) eliminate | j) a worker |
| 11) punched card | k) a card with holes |

3.2.8 Agree or disagree with the following statements

- | | |
|--------------|-----------------------------|
| I agree | I disagree |
| I think so | I don't think so |
| I suppose so | I'm afraid I don't agree... |
| Certainly | I couldn't agree with... |

1 Electronic equipment does not produce physical fatigue, as some mechanical equipment does.

2 The early machines eliminated a great deal of laborious routine work.

3 Computers did not displace skilled work.

4 In the automated office there is no need for a small number of semi – skilled workers.

5 Automation encourages the trend towards the centralization of administrative and clerical functions.

3.2.9 Make up a plan of the text. Retell the text according to the plan

3.3 Text II “The History of @”

3.3.1 Read the text all through for general understanding before you try to do the task

3.3.2 Read the options carefully. They may all have the same grammatical form (e.g. clauses) or may be a set of different forms. Three of the options do not fit into the text at all

3.3.3 Look carefully for words and phrases which refer forwards and backwards in the text (e.g. pronouns, relatives, linkers, conjunctions, etc.)

3.3.4 When you've finished, read through the whole text again to check

3.3.5 For questions 1-6, read the following text and then choose from the list A-J given below the best phrase to fill each of the numbered spaces. Write one letter (A-J) in the correct box on your answer sheet. Each correct phrase may only be used once. Some of the suggested answers do not fit at all. The exercise begins with an example (0). Example: 0 – J

Question 1:

Even though all the options have the same grammatical form, option B, which already ends with 'of', can be ruled out grammatically.

Question 2:

Look for the most logical use of jars.

Question 4:

Which option includes the 'contemporary meaning' of the symbol?

Question 6:

Look earlier in the paragraph; what are people in a 'race' to find?

The universal symbol of Internet era communications, the @ sign used in e-mail addresses (0)...., is actually a 500-year-old invention of Italian merchants, a Rome academic has revealed. Giorgio Stabile, a science professor at La Sapienza University, claims (1).... of the symbol's use, as an indication of a measure of weight or volume. He says the sign represents an amphora, a measure of capacity based on the terracotta jars used (2) ... in the ancient Mediterranean world.

The professor unearthed the ancient symbol in the course of research for a visual history of the 20th century, (3).... The first known instance of its use, he says, occurred in a letter written by a Florentine merchant on May 4, 1536. He says the sign made its way along trade routes to northern Europe, where it came (4) ..., its contemporary accountancy meaning.

Professor Stabile believes that Italian banks may possess even earlier documents bearing the symbol lying forgotten in their archives. 'The oldest example could be of great value. It could be used for publicity purposes and (5) ...,' he says. The race is on between the mercantile world and the banking world (6) [6]

- A to describe the now omnipresent squiggle
- B to represent 'at the price of'
- C to see who has the oldest documentation of @
- D to transport grain and liquid
- E to save space and work
- F to be published by the Treccani Encyclopedia
- G to learn how popular it has become
- H to have stumbled on the earliest known example
- I to enhance the prestige of the institution that owned it
- J to signify the word 'at'

3.3.6 Read the text “Как появился символ @, и почему мы называем его «собака»?” to get more information

Наталья Романова

21.10.2007 Техника и Интернет

Вряд ли среди интернет-аудитории встретится человек, которому незнаком этот символ @. На сетевых просторах он используется в качестве разделителя между именем пользователя и именем хоста в синтаксисе адреса электронной почты.

Некоторые деятели интернет-пространства называют этот символ «одним из главных поп-символов современности, сигнатом нашего общего коммуникационного пространства». Несколько высокопарно, на мой взгляд, но о всемирном признании этого символа, и как даже иногда отмечают, «канонизации» свидетельствует следующий факт. В феврале 2004 года Международный союз электросвязи ввёл в азбуку Морзе код для символа @ (• — — • — •), для удобства передачи адресов электронной почты. Код совмещает латинские буквы А и С и отражает их совместное графическое написание.

Поиски истоков символа @ уводят нас по меньшей мере в XV век, а возможно, еще дальше, хотя лингвисты и палеографы до сих пор расходятся во мнениях по этому вопросу.

Профессор Джорджио Стабиле (Giorgio Stabile) выдвинул такую гипотезу. В документе XVI в., написанном флорентийским купцом, упоминалась «цена одной А вина» (возможно, амфоры). При этом буква А, по тогдашней традиции, была украшена завитком и выглядела как @. Американский ученый Бертольд Уллман выдвинул предположение, что знак @ был изобретен средневековыми монахами для сокращения латинского слова «ad», которое часто употреблялось в качестве универсального слова, означающего «на», «в», «в отношении» и т.п.

В испанском, португальском, французском языках название символа происходит от слова «арроба» – староиспанская мера веса, ок. 15 кг., которая сокращённо обозначалась на письме знаком @.

Современное официальное название символа «коммерческое at» берёт своё происхождение из счетов, например, 7 widgets @ \$2 each = \$14, что переводится как 7 шт. по 2\$ = 14\$. Поскольку этот символ применялся в бизнесе, он был размещён на клавиатурах пишущих машинок и оттуда перекочевал на компьютер.

Распространением данного символа на сетевых просторах мы обязаны праотцу электронной почты Томлинсону. Именно он был тем самым человеком, который выбрал символ @. Когда уже намного позднее его спросили, почему он выбрал этот конкретный значок, он ответил просто: «Я искал на клавиатуре знак, который не мог встретиться ни в одном имени и вызвать путаницу».

Такой символ понадобился Томлинсону в тот период, когда он работал над созданием системы сообщений в сети Arpanet (предшественнице Internet). По сути он должен был придумать новую схему адресации, которая бы идентифицировала не только получателей, но и компьютеры, на которых находились их почтовые ящики. Для этого Томлинсону понадобился разделитель, и его, в общем-то, случайный выбор пал на знак @. Первым сетевым адресом был tomlinson@bbn-tenexa.

В России пользователи чаще всего называют символ «@» «собакой», из-за чего e-mail адреса, образованные от личных имен и фамилий, иногда приобретают нелицеприятную окраску. Любопытно, что данный символ используют в своем творчестве как народные таланты (например, шутка: «Пропала собака, @ не предлагать»), так и официальные хохмачи – КВНщики (например, «chubajs@sveta.net»).

Но все же: почему именно «собака»? Существует несколько версий происхождения этого забавного названия.

Во-первых, значок действительно похож на свернувшуюся калачиком собачку.

Во-вторых – отрывистое звучание английского «at» немного напоминает собачий лай.

В-третьих, при изрядном воображении вы можете рассмотреть в начертаниях символа практически все буквы, входящие в слово «собака», ну разве что, за исключением «к».

Но самой романтичной является следующая легенда: «Давным-давно, когда компьютеры были большими, а дисплеи – исключительно текстовыми, жила-была популярная игра с немудрящим названием «Adventure» («Приключение»). Смыслом ее было путешествие по созданному компьютером лабиринту в поисках сокровищ и сражения с вредоносными подземными тварями. При этом лабиринт на экране был нарисован символами «!», «+» и «-», а играющий, клады и враждебные монстры обозначались различными буквами и значками. Причем по сюжету у игрока был верный помощник – пес, которого можно было отправлять в катакомбы на разведку. И обозначался он, конечно же, значком @».

Это ли стало первопричиной общепринятого ныне названия, или, наоборот, значок был выбран потому, что уже так назывался, – об этом легенда умалчивает.

Справедливости ради надо отметить, что в России «собака» называется также собачкой, лягушкой, плюшкой, ухом, бараном и даже крякозяброй.

В других странах этот символ ассоциируется с разными предметами. Ниже приведен далеко не полный список того, как называют символ «@» в других странах.

Болгария – кльомба или маймунско а («обезьяна А»),

Нидерланды – apenstaartje («обезьяний хвостик»),

Израиль – «штрудель»,

Испания – как и мера веса «arroba»,

Франция – та же мера веса «arrobase»,

Германия, Польша – обезьяний хвост, обезьянье ухо, скрепка, обезьяна,

Италия – «chiocciola» – улитка,

Дания, Норвегия, Швеция – «snabel-a» – «рыло а» или слоновый хобот,

Чехия, Словакия – рольмопс (сельдь под маринадом),

Америка, Финляндия – кошка,

Китай, Тайвань – мышонок,

Турция – розочка,

в Сербии – «чокнутая А»,

во Вьетнаме – «скрюченная А»,

на Украине – «равлик» (улитка), «песик» или опять же «собака».

Как видите, у многих народов знак @ вызывает ассоциацию с уютно устроившимся зверьком, у некоторых с аппетитным штруделем или селедочным рулетом, поэтичные турки сравнили с цветком, а вот дисциплинированные японцы используют английское «attomark» без всяких поэтических сравнений.

[7]

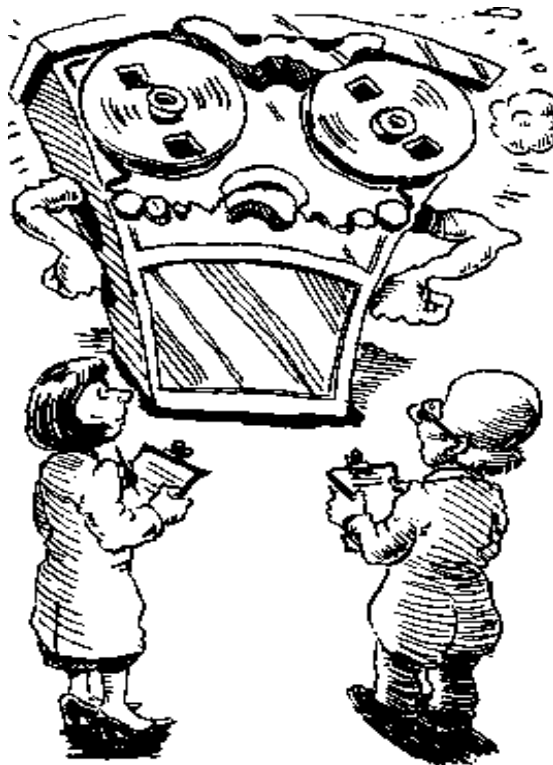
3.4 Text III “Computer Tantrums”

3.4.1 Refer to the words in brackets and put in the right nouns

A clever computer built at Imperial College, London, often suffers from (bore)¹⁾ *boredom*. The computer was built to find out about human (communicate)²⁾

The computer acquired a simple vocabulary in the same way as babies do: through (babble)³⁾ It is common (know)⁴⁾ ... that when babies babble, it is a (prepare)⁵⁾ ... for speech. When babies make sounds like real words, they are encouraged to remember them. With (encourage)⁶⁾ ... from their parents, babies quickly build up their vocabulary. In the same way, the clever computer learnt to use real words. For example, it learnt to identify a black cat. It was then shown a white cat to test how good it was at (recognize)⁷⁾ It refused to co-operate because the (solve)⁸⁾ ... to the problem was too easy. At first this (refuse)⁹⁾ puzzled scientists, but then they decided the computer was having a tantrum. 'It just sits there and goes

on strike,' a (science)¹⁰⁾ ... said. These clever computers must also be taught good (behave)¹¹⁾ [8]



The computer was having a tantrum!

3.5 Text IV “Types of translation demand”

3.5.1 Read the text and be ready to answer the questions:

- 1 How many basic types of translation demand are there?
- 2 What do you think the main demand is?
- 3 What translation software do you use?

When giving any general overview of the development and use of machine translation (MT) systems and translation tools, it is important to distinguish four basic types of translation demand. The first, and traditional one, is the demand for translations of a quality normally expected from human translators, i.e. translations of publishable quality – whether actually printed and sold, or whether distributed internally within a company or organisation. The second basic demand is for translations at a somewhat lower level of quality (and particularly in style), which are intended for users who want to find out the essential content of a particular document – and generally, as quickly as possible. The third type of demand is that for translation between participants in one-to-one communication (telephone or written correspondence) or of an unscripted presentation (e.g. diplomatic exchanges.) The

fourth area of application is for translation within multilingual systems of information retrieval, information extraction, database access, etc.

The first type of demand illustrates the use of MT for dissemination. It has been satisfied, to some extent, by machine translation systems ever since they were first developed in the 1960s. However, MT systems produce output which must invariably be revised or 'post-edited' by human translators if it is to reach the quality required. Sometimes such revision may be substantial, so that in effect the MT system is producing a 'draft' translation. As an alternative, the input text may be regularised (or 'controlled' in vocabulary and sentence structure) so that the MT system produces few errors which have to be corrected. Some MT systems have, however, been developed to deal with a very narrow range of text content and language style, and these may require little or no preparation or revision of texts.

In recent years, the use of MT systems for dissemination purposes has been augmented by developments in translation tools (e.g. terminology databases and translation memories), integrated in authoring and publishing processes. These 'translation workstations' are more attractive to human translators. Whereas, with MT systems translators see themselves as subordinate to the machine, in so far as they edit, correct or re-translate the output from a computer, with translation workstations (or workbenches) the translators are in control of computer-based facilities, which they can accept or reject as they wish.

The second type of demand – the use of MT for assimilation – has been met in the past as, in effect, a by-product of systems designed originally for the dissemination application. Since MT systems did not (and still cannot) produce high quality translations, some users have found that they can extract what they needed to know from the unedited output. They would rather have some translation, however poor, than no translation at all. With the coming of cheaper PC-based systems on the market, this type of use has grown rapidly and substantially.

With the third type – MT for interchange – the situation is changing quickly. The demand for translations of electronic texts on the Internet, such as Web pages, electronic mail and even electronic 'chat' lists, is developing rapidly. In this context, the possibility of human translation is out of the question. The need is for immediate translation in order to convey the basic content of messages, however poor the input. MT systems are finding a 'natural' role, since they can operate virtually or in fact in real-time and on-line and there has been little objection to the inevitable poor quality. Another context for MT in personal interchange is the focus of much research. This is the development of systems for spoken language translation, e.g. in telephone conversations and in business negotiations. The problems of integrating speech recognition and automatic translation are obviously formidable, but progress is nevertheless being made. In the future – still distant, perhaps – we may expect on-line MT systems for the translation of speech in highly restricted domains.

The fourth type of MT application – as components of information access systems – is the integration of translation software into: (i) systems for the search and retrieval of full texts of documents from databases (generally electronic versions of journal articles in science, medicine and technology), or for the retrieval of bibliographic information; (ii) systems for extracting information (e.g. product

details) from texts, in particular from newspaper reports; (iii) systems for summarising texts; and (iv) systems for interrogating non-textual databases. This field is the focus of a number of projects in Europe at the present time, which have the aim of widening access for all members of the European Union to sources of data and information whatever the source language. [9]

3.5.2 Tell a few words about your own experience of machine translation

3.6 Text V “Types of computers”

3.6.1 Read the passages carefully. Choose the key word or sentence that best sums up the main idea of each paragraph. Title the paragraphs

There are two types of computers, the analogue and the digital. Basically, today's analogue computer is a device-for measuring such physical quantities as lengths and voltages and, through a mechanical linkage, exhibiting the measurement as a numerical value. However, the analogue computer is limited to special classes of problems and when most people say "computer" today, they mean the digital computer, which is a marvel of precision and accuracy, for it works with specific units rather than approximations.

The modern electronic digital-computer counts with incredible speed using only two numbers-the one and zero of what mathematicians call the binary system. The counting ability of the computer is used to feed it information. But first the information is translated into a code. The information is then stored in a memory bank made of magnets. The direction in which electrical signals run through the magnets means one or zero, yes or no off and on. Each magnet contains one piece of information called a bit. A large computer system can store hundreds of millions of such information bits. But information by itself is useless. The computer must be told what to do with it - to add, subtract, multiply, or divide the coded pulses stored in its memory. Parts of that memory contain instructions, prepared by a human brain, that provide the computer with the road to follow in order to solve a problem. These instructions are called the program.

What makes the computer different from an adding machine is that the computer can modify its instructions. If a problem cannot be solved by following one route, the computer can search its memory for another set of instructions until the solution is found. And it does all this at superhuman speeds. The on-off switching of the computer's logic circuits has been locked a billionth of a second. That is to one second what one second is to thirty years

But the computer cannot actually think, performs all of its functions by route. Once an answer is achieved, another program within the memory tells the computer how to display the solutions, to type it out on paper, display it as pictures or words on a television screen, or perhaps even to speak the answer in words a man can hear in every field of human endeavor the body of knowledge is being swollen to the bursting point by a flood of new facts, which by their existence help to generate still more facts until the mass of information threatens to engulf us. But the problem can

be controlled and reduced to usable proportions by the computer. All that is required is a human mind at one end of the system with enough sense to say "Halt! I've learned just about all I want to know about wickets." This will become the touchstone to the computerized library of the 21st century, in which requests for information will be answered instantly and as fully as the user wants.

3.6.2 Look through the passages and find the English equivalents for the following Russian phrases

механическая связь; численные значения; чудо точности; точные единицы, а не приближенные значения; невероятная скорость; следуя по одному маршруту; система команд; синхронно; как только получит ответ; оселок (пробный камень)

3.6.3 Find in B the equivalents or words meaning more or less the same as the words in A

A 1 digit; 2 linkage; 3 store; 4 brain; 5 marvel; 6 route; 7 to perform; 8 to swell; 9 to engulf; 10 accuracy.

B a) intellect; b) anything wonderful; c) to do; d) a system of connections; e) to expand; f) integer under 10; g) way to be followed; h) to swallow up; i) memory; j) precision.

3.6.4 Fill in the blanks with the information taken from the text

- 1 There are two types of computers—the ... and the....
- 2 The ... computer is limited to special classes of problems, while the ... computer is widely used.
- 3 The digital computer counts with incredible speed using the ... system of two numbers the ... and the....
- 4 Before feeding the information is translated into a....
- 5 The information is stored in a ... bank.
- 6 The mathematical operations performed by a computer are ..., and a....
- 7 A piece of information is called a....
- 8 A program is a set of... to be followed.
- 9 A computer performs all its functions by....
- 10 Once an answer is achieved, it may be displayed either ... or... or....

3.6.5 Think and say about

- 1 Types of computers and their applications;
- 2 Memory of a computer and computerized library;
- 3 Programs and their routes;
- 4 Means of displaying the output

3.7 Text VI “Great strides in computer technology”

3.7.1 Read the text, translate it

Still faster means of getting at computer-stored information must be developed. The problems of communicating with the computer are becoming increasingly apparent. Punch cards, typewriter terminals, and paper tapes all demand special codes and computer languages. Such a situation can no longer be accepted, for computers already calculate at a blinding pace, and their speeds are steadily increasing.

The great leap forward in computer technology was attained in 1947 with the development of the transistor. Transistors can perform all of the functions of vacuum tubes but are flea-sized by comparison and require only a fraction as much power to operate. The transistor is made of a semiconductor, a crystal that conducts electricity better than glass, though not as well as metal. The manufacture of a transistor starts with a single pure crystal of semiconductor, such as germanium. The addition of very small amounts of a chemical impurity such as arsenic introduces excess electrons into the crystal lattice. These electrons can move easily to carry electricity. Other atomic impurities such as boron soak up electrons from the lattice and thus create deficiencies, or holes, -where there are no electrons. The hole, in effect, is a positive charge, the opposite of a negatively charged electron. Both holes and electrons skip through the material with ease.

Arsenic- and boron-doped crystals are sliced into wafers and then sandwiched together so that alternating layers containing either free electrons or holes face each other. Holes and electrons, carrying opposite electrical charges, are attracted to each other and a few drift across the junction, creating an electrical field.

By adding electrical contact points to each of the layers in the sandwich, a transistor is created.

Current flowing between two of the contact points can be controlled by sending an electrical signal to a third point. The signal can thus be amplified from fifty to forty thousand times. Moreover, the current keeps step with the incoming signal, so that when it is pumped back out again, the signal is a precisely amplified image of the original signal.

By 1955 the transistor was replacing the vacuum tube in computers, shrinking their size and increasing their speed. The transition from vacuum tubes to transistors was but the first step however. Integrated circuits that combine both amplifiers and other electrical components on slivers of material far smaller than even transistor are shrinking the size of the computer still further. The integrated circuits (IC) conserve space, and they also save time and the effort of linking up individual components. This means that a quarter-inch chip containing five or six complete circuits can move information across its route faster than a transistorized circuit because every element within it is closer than are the elements of transistors. On the horizon is yet another shrinkage, which will be made possible by a process, still undeveloped, called large-scale integration, or LSI. An LSI chip will be only a tenth of an inch square and will carry as many as one hundred circuits. The difference between an LSI chip and a IC chip may seem like hairsplitting, but on such negligible differences are built great

strides in computer technology.

The limiting speed on computers is the speed of light. Computer engineers used this fact to create a standard measure—the light-foot—by which to clock computer speeds. It is defined as the distance about twelve inches that light travels in a billionth of a second. Miniaturization will narrow the gap between circuits and so reduce the number of light-feet that must be traversed through the logic circuits. But there are still other limitations that must be overcome before computer processing will be rapid enough to satisfy the demands of perfectionists.

3.7.2 Read the passage and answer the question

How many and what steps were there in the computer technology development?

3.7.3 Look through the passage and find the English equivalents for the following Russian phrases

с ослепительной скоростью; постоянно возрастают; большой скачок вперед; размером с блоху; химическая примесь; избыточные электроны; кристаллическая решетка; кристалл, легированный мышьяком; разрезать на полупроводниковые пластины; перемежающиеся слои; экономит время и усилия; мелочный педантизм; пренебрежимо малые различия; большие успехи в технологии; предельная скорость; люди, занимающиеся совершенствованием

3.7.4 Match each word in A with that in B which means the opposite

A

excess,
off,
purity
subtract,
divide,
pure,
nonsense

B

on,
impurity,
deficiency,
sense,
add,
multiply,
doped

3.7.5 Answer the following questions based on the information found in the text or on your own experience and thinking

- 1 How many great leaps forward were made in the development of the computer technology?
- 2 What was the technology of the first generation of computers'?
- 3 Why were the first computers so bulky and speed-limited?
- 4 When were transistors invented?
- 5 What were the advantages of transistor technology?

- 6 What is the technology of a transistor?
- 7 What further still greater leap forward in the computer technology was made after 1955?
- 8 What still greater opportunities did the IC technology provide?
- 9 What does LSI means?
- 10 How many circuits does a single LSI chip carry?
- 11 What other problems do there remain in computer technology?
- 12 How this problems be solved?
- 13 What is the limiting speed on computers?
- 14 What can reduce the number of light-feet that must be traversed through the logic circuits?

3.7.6 Think and say about

- 1 The history of the computer technology;
- 2 The process of transistor manufacturing;
- 3 The advantages of modern IC and LSI technologies.

3.8 Text VII “Stages of programming”

3.8.1 Read the international words and guess their meaning

fundamental, principle, student, routine, actual, list, planning, coding, programming, symbolic, final, procedure.

3.8.2 Read the text and translate it

The fundamental principles of coding and programming are connected with the stages of programming.

The terms «coding and programming" are often used as synonyms. However, "a code" is more specifically a short list of instructions that direct the computer to perform only a part of the entire calculations, whereas the term "program" refers to the complete list of instructions used for the problem. Hence the term "programming" usually includes the over-all planning of the use of the computer for a particular problem as well as the writing of the instructions lists, or codes, whereas 'coding' is usually limited in meaning to the writing of the instructions lists. Sometimes a code is called a routine.

There are five stages of programming. First, the computations to be performed must be clearly and precisely defined. The over- all plan of the computations is diagramed by means of so-called flow chart. The second stage is the actual coding. It is often best to write a code in terms of a symbolic language first, for then changes are easily made. Numbers are assigned for the symbols, and the final code is prepared. In the third stage some procedure is used to get the code into the memory of the computer. The fourth stage consists of debugging the code, i.e., detecting and correcting any errors.

The fifth and final stage involves running the code on the computer and tabulating the results. In fact, it is well known that a single error in one instruction invalidates the entire code. Hence, programming is a technique requiring attention to details without losing sight of the over-all plan.

3.8.3 Retell the text

3.9 Text VIII "Short History of the Computer"

3.9.1 Read the text

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In the beginning

The history of computers starts out about 2000 years ago, at the birth of the abacus, a wooden rack holding two horizontal wires with beads strung on them. When these beads are moved around, according to programming rules memorized by the user, all regular arithmetic problems can be done. Another important invention around the same time was the Astrolabe, used for navigation.

Blaise Pascal is usually credited for building the first digital computer in 1642. It added numbers entered with dials and was made to help his father, a tax collector. In 1671, Gottfried Wilhelm von Leibniz invented a computer that was built in 1694. It could add, and, after changing some things around, multiply. Leibniz invented a special stopped gear mechanism for introducing the addend digits, and this is still being used.

The prototypes made by Pascal and Leibniz were not used in many places, and considered weird until a little more than a century later, when Thomas of Colmar (A.K.A. Charles Xavier Thomas) created the first successful mechanical calculator that could add, subtract, multiply, and divide. A lot of improved desktop calculators by many inventors followed, so that by about 1890, the range of improvements included:

- 1 Accumulation of partial results;
- 2 Storage and automatic reentry of past results (A memory function);
- 3 Printing of the results.

Each of these required manual installation. These improvements were mainly made for commercial users, and not for the needs of science.

Babbage

While Thomas of Colmar was developing the desktop calculator, a series of very interesting developments in computers was started in Cambridge, England, by Charles Babbage (of which the computer store "Babbages" is named), a mathematics professor. In 1812, Babbage realized that many long calculations, especially those needed to make mathematical tables, were really a series of predictable actions that were constantly repeated. From this he suspected that it should be possible to do these automatically.

He began to design an automatic mechanical calculating machine, which he called a difference engine. By 1822, he had a working model to demonstrate with. With financial help from the British Government, Babbage started fabrication of a difference engine in 1823. It was intended to be steam powered and fully automatic, including the printing of the resulting tables, and commanded by a fixed instruction program.

The difference engine/ although having limited adaptability and applicability/ was really a great advance. Babbage continued to work on it for the next 10 years, but in 1833 he lost interest because he thought he had a better idea — the construction of what would now be called a general purpose/ fully program-controlled/ automatic mechanical digital computer. Babbage called this idea an Analytical Engine. The ideas of this design showed a lot of foresight/ although this couldn't be appreciated until a full century later.

The plans for this engine required an identical decimal computer operating on numbers of 50 decimal digits (or words) and having a storage capacity (memory) of 1,000 such digits. The built-in operations were supposed to include everything that a modern general - purpose computer would need, even the all important Conditional Control Transfer Capability that would allow commands to be executed in any order, not just the order in which they were programmed.

The analytical engine was soon to use punched cards (similar to those used in a Jacquard loom), which would be read into the machine from several different Reading Stations. The machine was supposed to operate automatically, by steam power, and require only one person there.

Babbage's computers were never finished. Various reasons are used for his failure. Most used is the lack of precision machining techniques at the time. Another speculation is that Babbage was working on a solution of a problem that few people in 1840 really needed to solve. After Babbage, there was a temporary loss of interest in automatic digital computers.

Between 1850 and 1900 great advances were made in mathematical physics, and it came to be known that most observable dynamic phenomena can be identified by differential equations (which meant that most events occurring in nature can be measured or described in one equation or another), so that easy means for their calculation would be helpful.

Moreover, from a practical view, the availability of steam power caused manufacturing (boilers), transportation (steam engines and boats), and commerce to prosper and led to a period of a lot of engineering achievements. The designing of

railroads and the making of steamships, textile mills, and bridges required differential calculus to determine such things as:

- center of gravity,
- center of buoyancy,
- moment of inertia,
- stress distributions.

Even the assessment of the power output of a steam engine needed mathematical integration. A strong need thus developed for a machine that could rapidly perform many repetitive calculations.

Use of Punched Cards by Hollerith

A step towards automated computing was the development of punched cards/ which were first successfully used with computers in 1890 by Herman Hollerith and James Powers, who worked for the US. Census Bureau. They developed devices that could read the information that had been punched into the cards automatically, without human help. Because of this, reading errors were reduced dramatically, work flow increased, and, most importantly, stacks of punched cards could be used as easily accessible memory of a most unlimited size. Furthermore, different problems could be stored on different stacks of cards and accessed when needed.

These advantages were seen by commercial companies and soon led to the development of improved punch-card using computers created by International Business Machines (IBM), Remington (yes, the same people that make shavers), Burroughs, and other corporations. These computers used electromechanical devices in which electrical power provided mechanical motion — like turning the wheels of an adding machine. Such systems included features to:

- feed in a specified number of cards automatically,
- add, multiply, and sort,
- feed out cards with punched results

As compared to today's machines, these computers were slow, usually * processing 50 - 220 cards per minute, each card holding about 80 decimal numbers (characters). At the time, however, punched cards were a huge step "forward. They provided a means of I/O, and memory storage on a huge scale.

For more than 50 years after their first use, punched card machines did most of the world's first business computing, and a considerable amount of the computing work in science.

Electronic Digital Computers

The start of World War II produced a large need for computer capacity/ especially for the military. New Weapons were made for which trajectory tables and other essential data were needed. In 1942, John O. Eckert, John W. Mauchly and their associates at the Moore school of Electrical Engineering of University of Pennsylvania decided to build a high - speed electronic computer to do the job. This machine became known as ENIAC (Electrical Numerical integrator And Calculator)

The size of ENIAC's numerical "word" was 10 decimal digits, and it could multiply two of these numbers at a rate of 300 per second, by finding the value of

each product from a multiplication table stored in its memory. ENIAC was therefore about 1,000 times faster than the previous generation of relay computers.

ENIAC used 18,000 vacuum tubes, about 1,800 square feet of floor space, and consumed about 180,000 watts of electrical power, it had punched card I/O, 1 multiplier, 1 divider/square rooter, and 20 adders using decimal ring counters, which served as adders and also as quick-access (.0002 seconds) read-write register storage. The executable instructions making up a program were embodied in the separate "units" of ENIAC/ which were plugged together to form a "route" for the flow of information.

These connections had to be redone after each computation, together with presetting function tables and switches. This "wire your own" technique was inconvenient (for obvious reasons), and with only some latitude could ENIAC be considered programmable. It was, however, efficient in handling the particular programs for which it had been designed.

ENIAC is commonly accepted as the first successful high - speed electronic digital computer (EDC) and was used from 1946 to 1955. A controversy developed in 1971, however, over the patentability of ENIAC's basic digital concepts, the claim being made that another physicist, John V. Atanasoff, had already used basically the same ideas in a simpler vacuum - tube device he had built in the 1930's while at Iowa State College. In 1973 the courts found in favor of the company using the Atanasoff claim.

The Modern Stored Program EDC

Fascinated by the success of ENIAC, the mathematician John Von Neumann undertook, in 1945, an abstract study of computation that showed that a computer should have a very simple, fixed physical structure, and yet be able to execute any kind of computation by means of a proper programmed control without the need for any change in the unit itself.

Von Neumann contributed a new awareness of how practical, yet fast computers should be organized and built. These ideas, usually referred to as the stored - program technique, became essential for future generations of high - speed digital computers and were universally adopted.

The Stored - Program technique involves many features of computer design and function besides the one that it is named after. In combination, these features make very - high - speed operation attainable. A glimpse may be provided by considering what 1,000 operations per second means. If each instruction in a job program were used once in consecutive order, no human programmer could generate enough instruction to keep the computer busy.

Arrangements must be made, therefore, for parts of the job program (called subroutines) to be used repeatedly in a manner that depends on the way the computation goes. Also, it would clearly be helpful if instructions could be changed if needed during a computation to make them behave differently.

Von Neumann met these two needs by making a special type of machine instruction, called a Conditional control transfer - which allowed the program sequence to be stopped and started again at any point - and by storing all instruction

programs together with data in the same memory unit, so that, when needed, instructions could be arithmetically changed in the same way as data.

As a result of these techniques, computing and programming became much faster, more flexible, and more efficient with work. Regularly used subroutines did not have to be reprogrammed for each new program, but could be kept in "libraries" and read into memory only when needed. Thus, much of a given program could be assembled from the subroutine library.

The all - purpose computer memory became the assembly place in which all parts of a long computation were kept/ worked on piece by piece, and put together to form the final results. The computer control survived only as an "errand runner" for the overall process. As soon as the advantage of these techniques became clear/ they became a standard practice.

The first generation of modern programmed electronic computers to take advantage of these improvements were built in 1947. This group included computers using Random - Access - Memory (RAM), which is a memory designed to give almost constant access to any particular piece of information.

These machines had punched - card or punched tape I/O devices and RAM's of 1,000 - word capacity and access times of .5 Greek MU seconds (5×10^{-6} seconds). Some of them could perform multiplications in 2 to 4 MU seconds. Physically, they were much smaller than ENIAC. Some were about the size of a grand piano and used only 2,500 electron tubes, a lot less than required by the earlier ENIAC. The first - generation stored - program computers needed a lot of maintenance, reached probably about 70 to 80 % reliability of operation (ROO) and were used for 8 to 12 years. They were usually programmed in ML, although by the mid 1950's progress had been made in several aspects of advanced programming. This group of computers included EDVAC and "UNIVAC, the first commercially available computers.

Advances in the 1950's

"Early in the 50's two important engineering discoveries changed the image of the electronic - computer field, from one of fast but unreliable hardware to an image of relatively high reliability and even more capability. These discoveries were the magnetic core memory and the Transistor - Circuit Element. These technical discoveries quickly found their way into new models of digital computers. RAM capacities increased from 8,000 to 64,000 words in commercially available machines by the 1960's, with access times of 2 to 3 MS (Milliseconds).

These machines were very expensive to purchase or even to rent and were particularly expensive to operate because of the cost of expanding programming. Such computers were mostly found in large computer centers operated by industry, government, and private laboratories - staffed with many programmers and support personnel. This situation led to modes of operation enabling the sharing of the high potential available.

One such mode is batch processing, in which problems are prepared and then held ready for computation on a relatively cheap storage medium. Magnetic drums, magnetic - disk packs, or magnetic tapes were usually used. When the computer

finishes with a problem it "dumps" the whole problem (program and results) on one of these peripheral storage units and starts on a new problem.

Another mode for fast powerful machines is called time - sharing. In time - sharing, the computer processes many jobs in such rapid succession that each job runs as if the other jobs did not exist, thus keeping each "customer" satisfied. Such operating modes need elaborate executive (EXE) programs to attend to the administration of the various tasks.

Advances in the 1960's

In the 1960's, efforts to design and develop the fastest possible computer with the greatest capacity reached a turning point with the LARC machine, built for the Livermore Radiation Laboratories of the University of California by the Sperry - Rand Corporation, and the Stretch computer by IBM. The LARC had a base memory of 98,000 words and multiplied in 10 Greek MU seconds. Stretch was made with several degrees of memory having slower access for the ranks of greater capacity, the fastest access time being less than 1 Greek MU Second and the total capacity in the vicinity of 100,000,000 words.

During this period, the major computer manufacturers began to offer a range of capabilities and prices, as well as accessories such as:

- Consoles
- Card Feeders
- Page Printers
- Cathode - ray - tube displays
- Graphing devices

These were widely used in businesses for such things as:

- Accounting
- Payroll
- Inventory control
- Ordering Supplies
- Billing

CPU's for these uses did not have to be very fast arithmetically and were usually used to access large amounts of records on file, keeping these up to date. By far, the most number of computer systems were sold for the more simple uses, such as hospitals (keeping track of patient records, medications, and treatments given). They were also used in libraries, such as MEDLARS, the National Medical Library retrieval system, and in the Chemical Abstracts.

Recent advances

Microprocessors equipped with read-only memory (ROM), which stores constantly used, unchanging programs, now performed an increased number of process-control, testing, monitoring, and diagnosing functions, like automobile ignition systems, automobile-engine diagnosis, and production-line inspection duties.

Cray Research and Control Data Inc. dominated the field of supercomputers, or the most powerful computer systems, through the 1970s and 1980s. In the early

1980s, however, the Japanese government announced a gigantic plan to design and build a new generation of supercomputers.

This new generation, the so-called "fifth" generation, is using new technologies in very large integration, along with new programming languages, and will be capable of amazing feats in the area of artificial intelligence, such as voice recognition.

Progress in the area of software has not matched the great advances in hardware. Software has become the major cost of many systems because programming productivity has not increased very quickly.

New programming techniques, such as object-oriented programming, have been developed to help relieve this problem. Despite difficulties with software, however, the cost per calculation of computers is rapidly lessening, and their convenience and efficiency are expected to increase in the early future.

The computer field continues to experience huge growth. Computer networking, computer mail, and electronic publishing are just a few of the applications that have grown in recent years.

Advances in technologies continue to produce cheaper and more powerful computers offering the promise that in the near future, computers or terminals will reside in most, if not all homes, offices, and schools.

4 Section IV News track

4.1 Порядок слов в предложении

4.1.1 Зависимость порядка слов от «центра высказывания» («логического ударения») предложения

Согласно порядку слов английского предложения центр высказывания, т.е. новое, о чем сообщается в предложении, находится в начале предложения.

A man came into the room.

Это предложение переводится на русский язык следующим образом:

В комнату вошел человек.

В русском предложении слово *человек* стоит последним. В нем "центр тяжести" переместился на конец предложения. В английском предложении слово *man* было употреблено с неопределенным артиклем - оно было центром сообщения.

Теперь возьмем другое английское предложение:

The man came into the room.

Определенный артикль свидетельствует о том, что читателю уже известно о существовании данного человека. Здесь предмет сообщения - куда вошел человек. Русский перевод данного предложения будет следующим:

Человек вошел в комнату.

В этом случае порядок слов русского и английского предложения совпадает.

Итак, центр высказывания английского предложения находится в начале предложения, русского - в конце предложения. Наличие неопределенного или определенного артикля перед подлежащим предложения влияет на порядок слов в русском переводе.

People are changed, a new man and woman is necessary for life in a new society.

Меняются люди, для жизни в новом обществе нужен новый человек.

4.1.2 Изменение порядка слов в зависимости от сказуемого

Очень часто в тех случаях, когда сказуемое английского предложения стоит в пассивном залоге либо является составным именным или глагольным, при переводе на русский язык меняется порядок слов. В русском предложении сказуемое предшествует подлежащему.

In recent years important international construction project *have been started* among the countries.

За последние годы в странах *началось* строительство крупных международных объектов.

В тех случаях, когда в качестве глагола-связки выступают глаголы **to seem, to make, to look, to leave** и некоторые другие, именная часть сказуемого может отделяться от глагола группой слов или даже придаточным предложением. При переводе на русский язык порядок слов необходимо изменить, так как в некоторых случаях составное именное сказуемое английского предложения переводится простым глагольным сказуемым.

Elimination of trade barriers *made* commercial relations between different countries *easier*.

Устранение торговых барьеров *облегчило* торговые связи между различными странами.

4.1.3 Изменение порядка слов в связи с различиями синтаксических функций некоторых частей речи

В практике перевода нередко приходится встречаться с **атрибутивными сочетаниями**. Изучение структурно-семантических особенностей атрибутивных групп в современном английском языке обнаруживает больший, по сравнению с русским языком, диапазон смысловых связей между членами словосочетания.

В английском языке в качестве определения к существительному часто служит существительное в общем падеже, тогда как в русском языке в именительном падеже стоит только подлежащее. Из-за отсутствия падежных окончаний, даже в том случае, когда сочетание содержит два компонента, оно может представлять трудность для перевода. Переводчику приходится проделывать определенную аналитическую работу, чтобы правильно передать в переводе смысловые связи между элементами атрибутивных конструкций.

Перед определяемым словом может стоять целая цепочка существительных определений, и в этом случае в первую очередь нужно найти определяемое слово, а затем постепенно на основании логической связи между самими словами - определениями, переводить все сочетание, изменяя соответствующим образом порядок слов. Особенно много таких сочетаний в технических текстах.

Anti-friction bearing layout diagram - *схема расположения подшипников качения;*

Атрибутивные сочетания могут состоять из существительного и причастия прошедшего времени, которые в таких случаях пишутся через дефис:

President-proposed measures *меры, предложенные президентом*

British -made computers *компьютеры английского производства*

Распространены атрибутивные сочетания с прилагательным в сравнительной или превосходной степени:

Lower-level production *производство на более низком уровне*

Best-known samples *самые известные образцы*

Иногда в качестве определения к существительному выступает целое предложение, все слова которого пишутся через дефис.

Joint-at-all-costs ...

Любой ценой....

Некоторые атрибутивные сочетания представляют трудность для перевода в связи с тем, что определение по смыслу относится не к определяемому, а к другому слову, которое не называется, но подразумевается. В таких случаях английский вариант более лаконичен, чем русский:

Bilateral countries - *страны, имеющие двусторонние соглашения*

4.2 Text I “Show me the money”

4.2.1 Read the text. Find the sentence with the main idea

Infrastructure companies, *including* those in *networking*, telecommunications, Internet service, and PC *manufacturing*, rack up average revenue of \$ 308,708 per employee, a University of Texas study finds. By contrast, commerce companies average \$ 211,401 per worker. Though the largest number of jobs and about one – third of the revenue in the entire U.S. economy are in the commerce sector, the Internet engineers are the kings – for now. The cause: *Networking* and hardware companies are *growing* faster because traditional business are *spending* billions to get online, as well as keep up with the demands of super – high – speed Net access and Internet backbones.[10]

4.2.2 Find the antonyms

Except, obstacle, unemployed, expenses, lose, spend money, slow, surpass.

4.2.3 Explain the function of – ing forms

4.3 Text II “European online Explosion”

4.3.1 Read the text making notes like this

Things, I knew already ...

Things I didn't know...

Things I don't understand ...

Business use of the Internet in Europe grew by 91 % in 1998, with more than 20 million users having Net access at work, according to a report from market research firm Data quest. Overall online use in Europe grew from 17.7 million in 1997 to more than 35 million in 1998. The report predicts Internet penetration across Europe will reach 17 % by year's end, adding that in order for the Internet to function as a viable sales channel, Net penetration has to reach 20 %.

Many Nordic countries have already hit the 20 % threshold; in Austria, Germany, the Netherlands, Switzerland, and U.K., Net penetration is nearing that level. Germany had the highest number of Internet users in Europe, going from more than 5 million in 1997 to more than 8 million last year. [10]

4.3.2 Explain the usage of the underlined nouns

4.3.3 Translate the text

4.3.4 Give back translation of the text “European online Explosion”

4.4 Text III “SPAM REPORT”

4.4.1 Read the text

One in three Internet users report getting six to 20 unsolicited bulk email messages a week, reports a survey commissioned by Bright Lights an email fettering company in San – Francisco. And the longer you have an email address, the higher the probability you will get spammed – from 63 % at two months to 96 % for those online four or more years. The most frequent unwanted messages were get – rich – quick schemes, adult ads, and software offers. [10]

4.4.2 Answer the questions

1 What is the disadvantage of having e-mail address?

2 How many unwanted messages can you get being an email addresser?

3 What are the most frequent unwanted messages?

4.4.3 Make up questions to the underlined words

4.5 Text IV “Air communication breakdown”

4.5.1 Read the text and find the main idea

For the second time in a week in June, the computer that handles all flights entering British airspace broke down, causing local air traffic chaos, as well as delays and cancellations elsewhere in Europe, reports Agency France – Press. Controllers had to revert to time – consuming manual backup systems, delaying hundreds of arrivals and departures for an average of three hours before the computer was fixed. The air traffic service promised a thorough investigation. [10]

4.6 Text V “No sale”

4.6.1 Read the text, retell it

The Internet’s potential to sell cars is exaggerated, says a report published by the Economist Intelligence unit. According to the study, car-retailing sites have proliferated in the U.S. and in Europe but are now struggling to grow fast enough to survive. Automotive researcher J.D. Power – LMC says only 4 % of deals in the US in 1999 were conducted entirely over the Net. Bottom line: People use the Internet to gather information and intelligence on prices, but conclude the deal; they keep searching for the reassurance of the impersonal buy. [10]

4.6.2 Find the antonyms in the text

underestimate, reduce, cut down, to die, to throw about, to dissolve, distrust

4.6.3 Say if you had the experience of buying things by the Internet

4.7 Text VI "Top 10 signals You’re tired of the Internet Business”

4.7.1 Read the text. What facts can you agree with?

1 You start checking your email every 1-2 minutes, rather than every 23 seconds.

2 You stop calling your family “my team”.

3 When you hear the term “VC”, your first thought is “Viet Cong”.

4 You see venture capitalist John Doerr at a conference and don’t kiss up to him.

5 You no longer love your Palm Pilot more than your dog.

6 You’re eating your entire lunch without making a single cell – phone call.

7 You no longer want to be the “Yahoo of the [fill in the blank]” but to be bought out by Yahoo.

8 You stop using the following terms: “monetize”, “first – leader advantage”, “revenue”.

9 When you hear the word “options”, you think “Chinese or Thai for dinner”.

10 You toss out a magazine with Internet moguls on the cover and read People’s “50 most Beautiful People” issue instead. [10]

4.8 Text VII “How to Become As Rich As Bill Gates” [11]

4.8.1 Read the text “A strange offshoot of the Bill Gates Personal Wealth Clock” by Philip Greenspun

As a graduate student in computer science at MIT earning a \$1600/month research stipend, I feel amply qualified to instruct the entire Internet on the art of becoming as rich as Bill Gates (check the [Wealth Clock](#) to see how much he has right now). I get my confidence from Dr. Leo Buscaglia, author of [Love](#), [Born for Love : Reflections on Loving](#), [Living, Loving and Learning](#), and [Bus 9 to Paradise](#). Dr. Buscaglia, our nation's most prominent lecturer on the subject of love, turns out to be divorced ("it was a very loving divorce").

Lesson 1: Choose Your Grandparents Carefully

"There are three ways to make money. You can inherit it. You can marry it. You can steal it."- conventional wisdom in Italy

William Henry Gates III made his best decision on October 28, 1955, the night he was born. He chose J.W. Maxwell as his great-grandfather. Maxwell founded Seattle's National City Bank in 1906. His son, James Willard Maxwell was also a banker and established a million-dollar trust fund for William (Bill) Henry Gates III. In some of the later lessons, you will be encouraged to take entrepreneurial risks. You may find it comforting to remember that at any time you can fall back on a trust fund worth many millions of 1998 dollars.

Lesson 2: Choose Your Parents Carefully

"A young man asked an old rich man how he made his money. The old guy fingered his worsted wool vest and said, "Well, son, it was 1932. The depth of the Great Depression. I was down to my last nickel. I invested that nickel in an apple. I spent the entire day polishing the apple and, at the end of the day, I sold the apple for ten cents. The next morning, I invested those ten cents in two apples. I spent the entire day polishing them and sold them at 5 pm for 20 cents. I continued this system for a month, by the end of which I'd accumulated a fortune of \$1.37. Then my wife's father died and left us two million dollars."

William Henry Gates, Jr. and Mary Maxwell were among Seattle's social and financial elite. Bill Gates, Jr. was a prominent corporate lawyer while Mary Maxwell was a board member of First Interstate Bank and Pacific Northwest Bell. She was also on the national board of United Way, along with John Opel, the chief executive officer of IBM who approved the inclusion of MS/DOS with the original IBM PC.

Remind your parents not to send you to public school. Bill Gates went to Lakeside, Seattle's most exclusive prep school where tuition in 1967 was \$5,000 (Harvard tuition that year was \$1760). Typical classmates included the McCaw

brothers, who sold the cellular phone licenses they obtained from the U.S. Government to AT&T for \$11.5 billion in 1994. When the kids there wanted to use a computer, they got their moms to hold a rummage sale and raise \$3,000 to buy time on a DEC PDP-10, the same machine used by computer science researchers at Stanford and MIT.

Note: Recall that in the 1980s we venerated Donald Trump and studied his "art of the deal". If Donald Trump had taken the millions he inherited from his father and put it all into mutual funds, you'd never have had to suffer through one of his books. But he'd be just about as rich today.

Lesson 3: Acquire Research Results by Hiring and Buying

Conventional (loser) economic wisdom holds that monopolies should spend heavily on research because they are in a position to capture the fruits of the research. But if you want to become as rich as Bill Gates, you have to remember that it is cheaper to wait for a small company to come up with something good and then buy them. In the old days, antitrust laws kept monopolies from buying potential competitors. But not anymore. When Microsoft products were threatened by network computers and Web-based applications, they simply bought WebTV and Hotmail.

Another good strategy is to hire the right people. Some of the guys who wrote Microsoft Windows had previously worked on window systems at Xerox PARC. So Xerox paid for the research; Microsoft paid only for development.

In the long run a tech company without research probably can't sustain its market leadership. So you'll eventually need to build something like research.microsoft.com (check out netscan.research.microsoft.com to see some interesting online community research).

Lesson 4: Let Other People Do the Programming

If you're a great engineer, it can be frustrating to rely on other people to translate your ideas into reality. However, keep in mind that the entire Indian subcontinent is learning Java. And that if Microsoft, Oracle, SAP, and Sun products simply worked and worked simply, half of the world's current IT workers would be out of a job. You're not going to get rich being "just a coder." Especially working in painful low-level imperative languages such as C or Java. It might be worth writing your own SQL queries and HTML pages since these tend to be compact and easier than precisely specifying the work for another person to do. But basically you need to get good at thinking about whether a piece of software is doing something useful for the adopting organization and end-user. Bill Gates does code reviews, not coding.

[If you aren't sure that you need to be filthy rich and like to do some coding, see [this old misguided article](#) for more about what it might mean to be a great software engineer.]

Lesson 5: Train your new CEO

If you're an intelligent curious person it can be painful to run a company of more than 50 people. You spend more time than you'd like repeating yourself, sitting in boring meetings, skimming over long legal documents in which you know there

are errors but aren't sure how serious, etc. The temptation is to hand over the reins to the first "professional manager" who comes along. And that's what the standard venture capitalist formula dictates. But Bill Gates didn't do that. He hired Steve Ballmer in 1980 and gave him the CEO job 20 years later. Making money in the software products business requires domain expertise and a commitment to solving problems within that domain. Great tech companies are seldom built by non-technical management or professional managers who aren't committed to anything more than their paycheck. Adobe is another good example. The two founders were PhD computer science researchers from Xerox PARC who were passionate about solving problems in the publishing and graphics world. They are still guiding operations at Adobe.

Note that this is a principle that Old Economy companies have long understood. Jack Welch joined GE in 1961 and became CEO 20 years later. Sometimes an Old Economy company may pull in a few outsiders to senior positions but, because they have such stable bureaucracies underneath, they can more easily afford this than startups.

See Charles Ferguson's [*High Stakes, No Prisoners*](#) (1999) for a longer explanation of how hired-gun CEOs manage to kill software products companies.

Lesson 6: Focus on Profit

"At Hewlett-Packard, people, materials, facilities, money, and time are the resources available to us for conducting our business. By applying our skills, we turn these resources into useful products and services. If we do a good job, customers pay us more for our products than the sum of our costs in producing and distributing them. This difference, our profit, represents the value we add to the resources we utilize."

-- David Packard in [*The HP Way*](#)

Remembering to make a profit was tough in the dotcom 1990s but it turns out that Hewlett and Packard's ideas were right. Most of the management teams at dotcom businesses, by being disorganized, unintelligent, and ignorant, were subtracting value from the resources that they controlled.

How does one make money in the software products business? Simple. The necessary step is to build something that becomes part of information systems that generate value for organizations and end-users. Once you've created value you can extract a portion in lots of ways. You can be closed-source and charge a license fee. You can be open-source and charge for training, service, support, and extensions. But if you aren't getting your software product into important information systems, you don't have a prayer, no matter how slick your marketing materials.

If you're creative and diligent the software products business is extremely lucrative. If you're losing money, ask yourself what you're doing wrong. The answer is probably "plenty".

Lesson 7: Let the Venture Capitalists Schmooze Wall Street ...

... but don't let them run your company. A profitable Microsoft Corporation brought in venture capitalists (VCs) at the last minute. They didn't need or spend the

money but used the VCs to boost their valuation at the initial public offering, thus getting more money for the shares that they sold. Venture capitalists are dangerous because even the most successful might not know anything about business. Remember that there are tens of thousands of venture capitalists in this world. Assuming that they make random choices of companies in which to invest there will be a Gaussian curve of performance. Some firms will do consistently better than average even if everyone is guessing. Imagine that thousands of monkeys are flipping coins; some of the monkeys will get 10 heads in a row. These are the monkeys that will be celebrated for their insight. These are the monkeys whose track records will lead to uncritical cheerleading by underwriters and public investors. In bull markets such as we had in the 1990s nearly all the monkeys will be fairly consistent winners. But remember your next-door neighbor who made money in the stock market in 1985. He convinced himself that he had special insight and ability when actually he was only holding high-beta stocks in a rising market. So his foray into the commodities futures market wiped him out in the crash of '87.

Bottom line: successful software products companies spend most of their time listening to their customers and users rather than to venture capitalists.

[See ["Money, Money, Money \(and Investing\)"](#) for how the Gaussian curve works for mutual fund managers and also read Princeton Professor Burton Malkiel's [A Random Walk Down Wall Street](#).]

Lesson 8: Self-Esteem is Not Job 1

Gentility, politesse, decorum, and high self-esteem are wonderful. You can achieve all of these things within your organization. And then watch it be destroyed by competitors where frank and, if necessary, harsh criticism is encouraged. Technical people, even (and especially) those fresh out of school are always convinced that whatever they've developed, no matter how hare-brained, is perfect. It takes a technical person with good judgment to notice the flaws and it may require repeated and increasingly harsh delivery for the, uh, pinhead to realize his or her mistake.

Example: I once encountered a group of 6 people who called themselves "engineers." To solve what they thought was a new problem, they were going to build their own little database management system with their own query language that was SQL-like without being SQL. I pointed them to some published research by a gang of PhD computer scientists from IBM Almaden, the same lab that developed the RDBMS and SQL to begin with in the 1970s. The research had been done over a five-year period and yet they hadn't become aware of it during several months of planning. I pointed them to the SQL-99 standard wherein this IBM research approach of augmenting a standard RDBMS to solve the problem they were attacking was becoming an ISO standard. They ignored it and spent another few months trying to build their enormously complex architecture. Exasperated, I got a kid fresh out of school to code up some Java stored procedures to run inside Oracle. After a week he had his system working and ready for open-source release, something that the team of 6 "engineers" hadn't been able to accomplish in 6 months of full-time work. Yet they

never accepted that they were going about things in the wrong way though eventually they did give up on the project.

A 1994 *New Yorker* article about Microsoft relates "If he strongly disagrees with what you're saying, [Gates] is in the habit of blurting out, 'That's the stupidest fucking thing I've ever heard!'" Jennifer New, a former Microsoft contractor, writes "Meetings with Bill or one of his top people are often replete with a barrage of expletives and other disdainful comments." (*Salon*, September 1997) My friends who work or have worked at Microsoft tell similar tales. But how different is this from other elite organizations?

When I arrived at MIT as a first-year graduate student in electrical engineering and computer science, I asked a professor for help with a research problem. He said "The reason that you're having trouble is that you don't know anything and you're not working very hard." A friend of mine was a surgery resident at Johns Hopkins. He complained to one of his teachers that he was having trouble concentrating because he'd been up all night for several nights in a row. The professor replied "Oh... does your pussy hurt?" According to *Business Week*, Jack Welch "encouraged near-brutal candor in the meetings he held [at GE]".

The bottom line: self-esteem is great but beware of creating a cozy home for unproductive people with bad ideas.

More. Plato addresses some of these issues in the first book of *The Republic* (available online from <http://www.gutenberg.net/>). Socrates asserts that people who've inherited fortunes tend to be light with their money but that people who've made their fortunes "have a second love of money as a creation of their own, resembling the affection of authors for their own poems, or of parents for their children, besides that natural love of it for the sake of use and profit which is common to them and all men. And hence they are very bad company, for they can talk about nothing but the praises of wealth."

Socrates asks Cephalus, a wealthy old man, "What do you consider to be the greatest blessing which you have reaped from your wealth?" Cephalus replies that "The great blessing of riches, I do not say to every man, but to a good man, is, that he has had no occasion to deceive or to defraud others, either intentionally or unintentionally."

In the [Decameron](#), Boccaccio writes "If you really want to make the big bucks, what you really need is a monopoly on the desktop operating system. But the Sherman Antitrust Act, 15 U.S.C. § 1 and 2, and Clayton Antitrust Act, 15 U.S.C. § 25, are real bitches." [11]

4.9 The text VIII "Gates: U.S. Shutting Out Generation of Einsteins" [12]

4.9.1 Read the text thoroughly

Microsoft Chairman **Bill Gates** brought his dire warnings about the future of American competitiveness to the Senate this morning, telling **Sen. Edward "Ted" M. Kennedy's** [Committee on Health, Education, Labor and Pensions](#) that tight visa policies are costing the United States some of the world's brightest thinkers.

"America has always done its best when we bring the best minds to our shores," Gates testified. "Scientists like Albert Einstein were born abroad but did great work here because we welcomed them. The contribution of such powerful intellects has been vital to many of the great breakthroughs made here in America."

Gates called for the U.S. government to overhaul its immigration system for high-skilled workers, warning that the country already faces a "critical shortage" of scientific talent. "Unfortunately, our immigration policies are driving away the world's best and brightest precisely when we need them most," he said.

Gates told the committee that he had already seen the detrimental effects at Microsoft of the country's 15-year-old visa policies. He noted that the government's annual allotment of H1B visas, given to foreign professionals employed by U.S. companies and universities, ran out within the first four months of 2007. He predicted the supply for 2008 will be exhausted even sooner, meaning that Microsoft for the first time will not be able to get H1B visas for any graduating students this year.

During his remarks, Gates also called for improved education and training, especially in math and science, and more government support for research, development and protection of intellectual property.

"We have had the amazing good fortune to live through a period of incredible innovation and prosperity," he said in concluding his prepared testimony. "We must not squander this opportunity to secure America's continued competitiveness and prosperity."

By Alan Sipress| March 7, 2007; 11:30 AM ET [12]

4.9.2 Read these people's opinion about Bill Gates' point view on the problem of immigrants. Which of them do you agree or disagree? Don't pay attention on possible mistakes – some authors are not native English speakers [13]

1 I agree with Bill Gates that we shut out some of the brightest minds from our shores. But I wish that Gates had talked more about developing the brightest minds in THIS country by making college more affordable to those without the means. I was fortunate. Went to UCal Berkeley in the 1950's. \$45 for tuition. Sure minimum wage was \$1.00 and gas was 25 cents per gallon. Minimum wage is now over \$5.00 and tuition is much more than \$225 per semester. When public universities cost thousands for tuition and books are \$100 a piece, what chance does a middle class kid have whose parents don't make enough to send that son/daughter to college but too much to allow that same offspring to get a scholarship based on need. Sure, California has a great JC system which helps for two years and state universities and the the US system abound to such abundance as to allow almost all to commute. But what about states like Oregon where Junior Colleges are few and far between and there are almost no colleges other than on the I-5 corridor. Gates needs to look to help people in the US, not complain about Visa programs from abroad. As we outsource our high tech jobs, there are fewer Americans getting degrees in those fields. Obviously with fewer Americans getting degrees in engineering, etc., more jobs are outsourced.

Microsoft has not been particularly innovative - look at Vista. Bill employs plenty of geniuses now, where's the beef? He really wants to keep China and India from producing competing products.

Posted by: Tomcat | March 7, 2007 1:42 PM

2 I'm pretty sure Einstein wasn't here on an H-1B visa. Don't talk about the "best minds" in connection with workers you underpay and overwork on threat of revoking visa sponsorship.

H-1B is a tool for dumping larging numbers of warm bodies into an already flooded labor market, not acquiring the "best minds".

In the meantime, the next generation of Americans "Einsteins" are turning away from scientific and technical fields, as it becomes obvious that they provide slim chance of a successful career.

- Mike.

Posted by: Mike | March 7, 2007 1:56 PM

3 I have personally seen Americans replaced by offshore outsourcing on the basis of cost. On top of that, these Americans were required to write "knowledge transfer" documents for their replacement "experts." If they chose not to, their severances would be effected.

Also use google to find how many offshore research and development offices and operations are being developed by Microsoft, IBM, HP, etc. It is far easier for these companies to leave the states than any American can... and why SHOULD Americans want to leave the US to find better employment opportunities?

If he is having problems getting H1-Bs for new graduates, perhaps we should be making sure more of those slots are open to US students. Problem solved - other than universities seeking foreign income.

If one studies the job requirements for IT workers, you will see that often an incredible amount of training needs to be invested in skills. But - many companies are not training people - they would much rather pilfer from those who do. Often the IT person will invest their own money in getting training - so it is an incredible gamble of family money on what is going to be "the hot" technology of the next year. Often these technologies cost 10's of thousands of dollars (we're not talking about MS Word or something) so one cannot simply run down to the store and "start learning at home" with this software.

Some places will see a candidate experienced with a previous version of the same software and deny the resume! A candidate will have experience on similar software/hardware and be denied. (Is there really that big of a difference between AIX, HPUX, and Solaris?)

Right now I am rewriting software that came from India. I'm not complaining but I do have to deal with the complaints of a company that wants something to work and yet wants to change as little as possible to save their investment. Sometimes it just doesn't work that way.

The summation of my points - US companies are creating their own problems with hiring qualified workers.

They like the idea of supply and demand when the price is in their favor but start squawking to the government for regulations when someone might be able to make a buck for their intelligence and training.

Thousands of kids from Silicon Valley to Boston's Route 128 watched their parents get fired and laid off from technical positions and we wonder why technology isn't considered a viable career choice anymore. I can guarantee kids are hearing about Gates call for non-Americans for these jobs right now over dinner tonight.

Between football players making millions for throwing a ball, an ex-stripper married to a billionaire putting her face all over the news from her death, as well pop-singers raking in millions - American technology has bigger problems to deal with than hiring older people (who actually INVENTED THE INTERNET THANK YOU) and their demands for better working conditions and pay.

Posted by: Scott Auge | March 7, 2007 2:49 PM

4 Underemployment is indeed a problem. I have a degree in physics and chemistry and have never had a good job in my life. I have seen for a long time that employers would rather hire someone with McDonald's experience than someone who stayed in school and did his or her homework. They would rather hire an illegal alien. Employers and personnel managers include many stupid people who aren't even able to recognize, much less value, a good education or an intelligent mind.

Posted by: Martian76 | March 7, 2007 3:29 PM

5 Some of the greatest minds of this young generation are already in this country, Bill, but they simply do not choose to become computer programmers or engineers. It is not because they do not enjoy computer programming, they just understand that the labor market is such that becoming a lawyer, doctor, or teacher is usually a much more lucrative and/or fulfilling career choice. If Microsoft, Google, and other software companies provide the quality of life or job satisfaction that these careers provide, you will not have any problem attracting the cream of the crop.

Posted by: Matt | March 7, 2007 3:49 PM

6 As a college student in Engineering today, I can see that most of the best students in this country are turning away from fields in science and technology to work in other industries. This is because science and engineering are probably the hardest to study but the earnings are only average at best.

For example, at my school, most of the engineers with the highest GPAs are turning to the financial industry because they can get paid a lot more (at least twice as much for the first year alone, and it goes widens).

Therefore, as we are losing these young engineers and scientists, how can America still hope to maintain its lead on innovation? And without innovation, how can America continue to maintain its lead economically?

I fully support what Bill Gates said, any skilled worker who is needed, who is willing to come legally, should be supported. This will help the US and the world because we are allowing the brightest minds to work in the best environment. I think it is time we let PhD students do research instead of bussing dishes at a restaurant.

Posted by: Cornellian | March 7, 2007 4:36 PM

7 It's a fact that most of the students in Computer Engineering departments are non American and even the few Americans who do graduate go into Financial services or law following the money. That leaves the companies with three choices. Hire the non American graduating students, send the development offshore or hire people off the street and train them. Now the people who spent their youth having frat parties and Spring break orgies would like the companies to take the third option and train people at their own expense. However companies would like to opt for the first two options so it boils down to keeping the development in USA by reforming the visa regime or watch entire development efforts go abroad. When this happens it doesn't hurt the frat boys as they continue to get their social security checks (yes programmers guild that's you I am talking about) but it does hurt the few American programmers who were working on the project. e.g. If there are 10 people needed for a project and you found 5 qualified and willing Americans and you could hire the other 5 on visas you would keep the project in US but if you didn't have the visas you would send the entire project abroad and fire the 5 Americans you did find.

Posted by: Prabuddha | March 7, 2007 5:18 PM

8 If engineers and scientists are in such short supply, wouldn't it make sense that their salaries would be much higher? If you know your skills are in short demand, don't you try to leverage that by asking for more money? The argument that there aren't enough engineers and scientists goes against the law of supply and demand, because (as the engineering student above pointed out) their salaries have not increased as demand has increased. The reason is obvious - instead of paying the market rate for these employees, businesses import the labor via the H-1B and depress wages! While businesses claim that the engineers and scientists are the backbone of their companies, they don't want to compensate them as such. The whole argument about a shortage is a sham! If they were that hard to get, they would be paid a lot more, and more citizens would be going into those fields!

Instead, we educate foreign students while denying the same education to our own citizens, then complain that our citizens don't have the skills! Companies do this too - send the cheap H-1B's to training instead of the citizens! Soon not only will we not have the skills, we won't have the companies or the education either. It's a race to the bottom, and we're winning.

Posted by: TM | March 7, 2007 5:24 PM

9 The lie of bill gates...First of all, his foundation has nothing to do with promoting U.S. students in Computer Science. Go to Gates website.

Second. Microsoft's issue isn't that there isn't enough programmers, they're complaining that programmers want too much money.

Third. I like it when smart minds come from overseas. But. If we believe this is a person who is that skilled, give him/her a green card right away. But companies don't want this because H1-B is set up so that if the person complains, or tries to go to

a different company, they're essentially deported. If they were given a green card right away, they would work at the prevailing U.S. wage.

Fourth. Microsoft (and the Gates Foundation has nothing to do with Microsoft) has done nothing to help this issue except beg congress for more cheap labor from overseas. I'll bet they've spent more on lobbying congress than on paying the prevailing U.S. Wage.

Posted by: Tom | March 7, 2007 9:40 PM

10 Fact: Einstein did very little, if any, innovative work as a US resident. He published the Special Theory of Relativity in 1905 and the General Theory of Relativity in 1916. Heck, he retired twelve years after coming to the US -- and he would never have come in the first place had the Nazis not come to power. Einstein didn't even participate in the Manhattan Project. Robert Oppenheimer (born in the US) led the scientific end of the project. Yes, Szilard and Fermi were instrumental, but again, they came to the US because of political persecution, not because the US offered them better jobs.

Gates knows how to make money -- period. He should leave science policy and immigration policy to those who know more about it. And Mike (in high school), you'd BETTER know jack before you take others to task.

Posted by: historian | March 7, 2007 9:57 PM

11 I've worked at Microsoft as a contractor. They do not even attempt to hire the best and brightest. Their MO was to hire on the cheap and make their workers put in 80 hour weeks. For me it was no problem as I got paid by the hour. For the direct employees with families it totally sucked. They would go home and bring their kids back to work with them so they could see them. The kids roamed the halls while the parents were still in their offices slaving away. Bill Gates it a total hypocrite!

Posted by: Kg | March 7, 2007 10:19 PM

12 How dare Bill Gates try to deceive the public in making a comparison between Albert Einstein's circumstances and those of Microsoft today.

Einstein did NOT come to America on an H-1B visa. He came here for humanitarian reasons to avoid religious persecution. Einstein was a Jew in Germany in 1932 - a bad situation since Adolf Hitler was beginning his implementation of the Jewish holocaust. Wisely he decided to stay in America. Congress must remember, Bill Gates represents the best interests of Microsoft and their shareholders, NOT the best interests of the American public.

Posted by: spf | March 8, 2007 8:07 AM

13 Bill Gates is a businessman and he would do anything to increase his profits. He is lying to the public saying increasing H1-B is good for the country. I don't believe that's true. I am an Indian working on H1-B here in US. Although I get paid similar to my American colleagues in the company, an increased supply of H1 visa holders hurts us all as real wages for IT engineers (irrespective of nationality) continues to increase by miniscule amounts.

I don't believe there is a shortage of well qualified IT engineers in the US. The current 85,000 visas per year (including 20K for US Masters degree holders) is more than sufficient to meet the demands of the economy. Business leaders like Bill Gates are motivated with the desire to suppress labor costs by increasing the available pool of H1 visa holders in the country. The H1-b visa program is being abused by body-shoppers and Indian IT companies like Satyam, Wipro, Infosys, TCS, HCS, and CTS. They are filing thousands of H1 visa applications this year for their employees from India to come down to the US, get knowledge transfer from their American colleagues and go back taking the project/development work offshore to India ultimately leading to loss of American jobs here. The whole system sucks.

Posted by: James | March 8, 2007 11:35 AM

14 Excellent job by Bill Gates. I am totally agree with him. Inviting and retaining high skilled immigrants is in interest of this great nation. Today, skilled legal immigrants who are already in the US job market facing deadly backlog of green card and made thousands of legal skilled immigrants frustrated. Our lawmakers are almost ready to give amnesty to 12 millions illegals who broke the law and not paying any taxes. This will give very bad message to rest of the world and more and more illegal immigrants try to enter illegally in coming years. On the other hand, potential high skilled people who want USA as permanent home will get negative message; "USA is no more heaven for best and brightest people" high skilled immigrant who are waiting for green card are not taking away jobs of US citizens. Labor certificate process for Employment based green card is very tough; DOL determines prevailing wage, 30 days job posting on state govt job bank, internal posting, two Sunday ads in leading news paper, two more ads in professional journal, company web. After this process, if they don't find US citizen for that job, DOL approves labor certificates.

Is it fair to make some one wait for 5 to 10 years for green card?

Posted by: raj | March 8, 2007 12:19 PM

15 It is good to see people clamoring for higher pay so that they can have a "good" standard of living. I am sure that these people will not think twice about going to Walmart and buying cheap Chinese stuff. After all, why pay \$35 for a pair of jeans when you can get one for \$10 at Walmart? Why pay \$3.50 for a gallon of milk at the local Mom and Pop store when Walmart sells the same stuff for \$2.09 a gallon. Different brand maybe, but milk is milk, isn't it? For all those people who complain about having to train "replacements" - do you realize that there are many people from America who are heading to India because of lower Health Care costs? Why don't they stay here and support the American economy by paying "high" prices to the American doctors? These people are no big business folks like Bill Gates - they are ordinary middle class Americans. Ofcourse, no one is making a big deal out of it because being highly self-centered, Americans do not care that they are ruining the quality of life of other people in other countries. They just know how to cry when someone "replaces" them, and just like Bill Gates, they don't care that by going to

India for "lower healthcare prices", they actually deprive Indian people of affordable healthcare.

Posted by: Dude | March 8, 2007 12:53 PM

16 I came to USA, with 2 years of work experience after my Bachelor's degree on H1B visa. After working couple of years here, got employed by a Fortune 20 company and started my green card in EB3, as I'll NOT be able to file under EB1/EB2 as I'd less than 5 yrs work experience with Bachelors degree at that time. Now, I am stuck in this greencard mess, due to retrogression. Without a green card and due the complex green card process, my employer is not able to promote me to the lead position, Also not able to refile under EB1/EB2 category cause, USCIS does not count the experience gained with the GC filing employer, After spending 8 years, I think not wise to wait anymore, and If I do not get my greencard by this year end, I've decided to move back to India, this after I got 6 patents approved. I already talked to my manager, as my employer already have operations in India, my US Employer is now willing to promote me to higher management position and is willing to assist to setup up a center in India for our group, and work is in progress. I already made couple of visit flying Business Class. Reason, we are not getting qualified prople here in USA and are not able to get people from other countries due to poor immigration system. Now, I'm not only going back to India after being in USA for 8 years, I'm taking 80+ jobs with me and guess what with a fat wallet too... and the offer is too good. Read in previous posts, some one posted "USA is no more heaven for best and brightest people", is now a REAL BITTER TRUTH these days. Also as a bonus, I already got my Australina PR in less than 18 months (Entire Process), Thanks for the US Dollars that helped me apply for this and easy & good Australian Immigration System.

Posted by: Suresh | March 8, 2007 1:02 PM

17 The main problem with H1B visa process is that it restricts a foreign worker from transferring jobs easily and the ties Green Card process to a sponsoring employer. I understand that this was done to protect US employer. However, this exact (red tape laden -bureaucratic-intermingled) protectionism has resulted in misery to many tech American citizens and H1B visa holder alike. This has created huge business opportunities for consulting/body shop companies providing off shoring and onsite development services by taking advantage of bureaucratic bottlenecks, quota system and multi-year processing delays.

The fact is that US companies (not including consulting companies) requiring IT resources have different hiring timelines and their need to hire may not coincide with the H1B quota announcement date. The consulting companies take all the numbers in few weeks of announcement. Then when US companies are in actual need of recourses they are forced to hire resources from the consulting companies, which further entice the US businesses to sign package deal for onsite/offshore services. This provides perceived cost savings to the US enterprises and this perception of cost savings motivates US businesses to replace US Citizens who may have been in the job for a while.

The Consulting business is simple. It's a numbers game. The onsite resource is charged at a US market rate and offshore resource is charged at approximately 30-40% of the local US rate. The H1B worker gets Salary as determined by DOL, which in many cases is disproportionate to the market rate, thus enabling the consulting companies to have a huge markup per candidate. The consulting company also has an advantage to move the H1B candidate offshore after the project until the H1B resource becomes billable again.

Now because the H1B candidate cannot change jobs easily and their green card is tied to their visa sponsoring employer, many H1B consultants do not change employers. In addition to restriction on changing employers, the candidates also are stuck in the Green Card processing rut for many years at same salary level. This provides a perfect opportunity for consulting companies and some US companies to profit from bureaucratic process that surrounds this H1B & Green Card issue. As matter of fact this protectionism has caused more pain and misery to American citizens and done disservice to genuine American companies needing additional resources to fulfill their IT requirements.

The solution is to this issue:

(1) Make H1B portable (without paper work hassles) and tie it to an individual (not company). That way the H1 candidate can compete openly in the job market and the market will determine skill set levels and compensation for eligible candidates. If the H1 candidates are unable to compete in the US job market, they will go back to their home country. INS will also save on operational and processing costs and time.
(2) Let an applicant file their own green card after few years of being gainfully employed. American businesses will also benefit from reduced operational and processing costs and time.

Posted by: John | March 8, 2007 1:17 PM

18 I'm sick of hearing about all of the H-1B's who have to eventually leave the country! The H-1B was meant as a TEMPORARY visa! If they are the 'best and brightest', why do they have such a hard time understanding that? The H-1B is NOT an automatic path to a green card!

Maybe they should change the rules so that people on an H-1B visa CAN'T qualify for a green card. Then companies won't be so quick to bring people in on an H-1B and train them. They know they will eventually lose them! Most of them do anyway, because when the green card arrives a lot of them break away ASAP from their handcuffs! Every H-1B I know is so anxious to get the green card so they can leave their employer! That's why so many companies use the L-1 now - if they can get it!

Could I go to India or China and work? What's the visa process like there? Last I heard, I wouldn't be allowed to do anything but menial labor even though my skills would be in high demand there! SAP is in high demand there, and all they have are people who get suckered into paying lots of money for 'training institutes,' of which MAYBE 10% get jobs in the field!

Posted by: Eddie | March 8, 2007 1:48 PM

19 First time, Bill Gates raised the importance of skilled legal immigrants for competitiveness of the United States and problem this community is facing due to long backlog of Green Card. Today, every where people, media, and lawmakers are talking about illegal immigrants. Skilled immigrants are overlooked by lawmakers and media. First time, Bill Gates throw the light on skilled immigrants. Democrats are more than eager to award path to citizenship to 12 millions illegals, who broke the law, proved burden on the system and not paying any tax. skilled immigrants do not have any problem with this amnesty but skilled legal immigrants should give priority. Democrats don't want to give any relief to skilled immigrants out of CIR bill which is on big dispute and do not have common ground and bipartition support. Businesses, University, Hospitals and some grass root organizations like Immigrationvoice tried to get some relief since last couple of years but Congress leadership is holding off it as they think support of CIR will be weaken. They are concerned about illegals but not to skilled legal immigrants who are contributing to economy, paying all taxes including social security and totally obeying law.

Now United States in not heaven for best and brightest talent but it is heaven for illegal immigrants.

Posted by: raj | March 8, 2007 8:42 PM

20 Bill Gates does not ask for the best and brightest. He asks for hundreds of thousands of fresh BS graduates in engineering. If he wanted the best and brightest he would be asking for Masters and PhDs...This is a war for control of our American government:

Mega-rich vs. Middle-class

For more info, read:

<http://www.computerworld.com/blogs/node/5136>

Posted by: Anon | March 10, 2007 3:45 PM

21 I've worked with, trained, and put up with H1 folks for 10 years. They are definitely NOT the best and the brightest, just the cheapest. Many have big egos, phony resumes, certified in technologies they never really used (read a book, passed a test), and poor communications skills. Most were rookies when they started with some basic technical knowledge but very little actual experience. (That's why we had to train them). Don't be fooled by Gates. This is what's really happening out there today.

Most of the jobs in my previous 3 companies were outsourced to these guys. It was counterproductive and put a lot of good American folks out of work. This is what happens when accountants run IT, CIO bonuses based on how many jobs they outsource, and dumb politicians listen to people like Mr. Bill (the evil one) Gates.

If Gates is so concerned about education, maybe he should go back and finish HIS college degree. Microsoft would not hire him today. He is undereducated and wants too much money.

Posted by: Gary F | March 11, 2007 4:37 PM

22 There is no shortage and there never was. Emergency: Every American tech and engineering worker MUST prepare for rapidly arriving unemployment and bankruptcy if the bill to raise the H1B visa cap passes.

How do I know? Because that's what happened the last time the H-1b cap was raised. Hundreds of thousands of foreign workers were imported here for a period of several years until the visa cap went back down. During those same years, hundreds of thousands of competent, productive American workers were let go, because foreigners could be employed for less.

Contrary to popular belief, there are NO protections for American workers in the existing law. What makes us think this time will be any different?

Bill Gates is absolutely lying when he says that skilled Americans have no trouble finding work and when he insists that there is some sort of 'shortage' that needs to be remedied.

I am an American IT professional, and I know what I am seeing. Salaries have been stagnant, and opportunities few and far between, ever since the H-1b cap was first raised.

Why on earth should any American student major in engineering, computer science, or any related field when these professions are being turned over to low-paid foreign workers?

Posted by: Babs | March 23, 2007 2:17 PM

23 I've been watching developments in the H1B area for the last few months. I have a very vested interest, as I am one of the 150,000 applicants with an application at USCIS. I wanted to share some of my story to show how this potentially affects us and others.

My wife and I both came to the US from New Zealand in 2005 on independent work visas. My wife has a PhD in neuroscience and works as a post doctoral researcher. Her work involves research towards finding a cure for Parkinson's disease and other neuro-degenerative disorders. I have masters of engineering degree in artificial intelligence and work as the senior software architect for a \$500M/yr global corporation that manufactures GPS navigation systems for cars. I have been in this company for seven years both in the US and New Zealand and built much of the global technology team that exists today. I have personally created jobs and employed people from all over the world, including the US. Diversity in our team is a great strength.

Together my wife and I earn about \$160,000 per year which is more than the market salary in our respective jobs. Last year in 2006 we moved the majority of our capital to the US and purchased an apartment.

I am presently on an L1B specialist knowledge visa, and my wife is on an H1B. Why separate visas? Because this provides some robustness; if something should go wrong we can be together in the US with at least one of us working. I say "at least one" because the fact that you are married does not necessarily mean you can work in the US because your husband or wife is working. Whether you can depends on the subtleties of the different visa categories.

All is not well however; the company that I work for (and effectively started) is being sold, and because I am here on L1B that affects my visa status. Hopefully since this is happening globally the visa can be simply amended with the name of the purchasing company. However, this is not guaranteed, and to increase my chances, the purchasing company is also applying for an H1B visa at the same time. Like the L1B there is no guarantee that this will be approved, especially since this category was oversubscribed on the first day applications for 2008 were received. The entire process is costing around \$10,000 with no guarantee of success. It is a very stressful time for people like me where my future path depends on what happens with some paperwork.

Both my wife and I are highly educated, highly skilled, individuals of considerable means from an advanced country. We are here because both our specialist careers depend on access to markets or facilities of a very particular type; a type that does not necessarily exist where we come from owing to differences in population size. We are also here because living and working in a slightly different culture affords us a different perspective on the world and enriches our cultural experience. So far I have to say it has been a great experience by and large.

I'd just like to remind readers not to tar all immigrants with the same brush. There is a difference between legal and illegal immigration, there is a difference between skilled and unskilled workers, and there are many reasons why people come to the US. We will play by the rules although the processes and systems in place do not necessarily make this pleasant or easy. We believe that a system based on individual merit rather than generalization would be fair and reasonable. We hope that our contribution to US society is valued and that we can continue to make it.

Posted by: Matt | April 5, 2007 11:01 AM

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5 Section V Freedom of Information

5.1 Text I “A Force for Democracy, or Global Free-For-All?” [14]

5.1.1 Read the text

Broadcasting and newspapers make it more difficult for repressive regimes to keep their people ignorant of national and international events. Even in countries where the press and media are tightly controlled, newspapers from free countries are smuggled in news from the outside world. Telephones and fax machines enable information to travel more easily across borders from one person to another. The Internet takes this process of freeing information from control further. It not only supports person-to-person communication by e-mail, it also enables a whole population to tap into international news and current affairs and to search for information on particular topics.

Some governments are so worried about the Internet and what their people might learn by using it that they are actively trying to stop people from accessing it. In North Korea, it is illegal for private citizens to use the Internet. In Burma, anyone who wants to use the Internet has to register with the police. In Malaysia, Internet cafes must keep a record of all customers using their Internet terminals. In other countries, including China, Vietnam and Saudi Arabia, access to web sites that the government disapproves of for political, religious or moral reasons, is blocked. But even if the government closes down a web site in one country, new versions of the site may be set up in other parts of the world. The Internet is very difficult for governments to censor.

In democratic societies people often disagree with some of the things their governments do.

Minorities, who cannot achieve political change through the ballot box, may seek other ways to realize their ambitions. The Internet has become important to them too. Political activists seek to obtain coverage in the national press and broadcast news media to gain support for their aims. One way of ensuring coverage is to attract people to high-profile demonstrations. More people mean greater coverage. To that end, there are web sites carrying news of forthcoming protests and demonstrations in the hope that like-minded people will see where and when the next event is to happen and attend it. Some groups who receive news coverage are unhappy about the way filmed reports are edited and broadcast, so they are fighting back by making their own video reports and releasing them on the Web, thus bypassing the broadcast media. [14]

5.1.2 Find the main idea of the text

5.1.3 Discuss the problem of Freedom of Information

5.2 Text II “The language barrier”

5.2.1 Read the text

If you speak English, cyberspace is a wonderful place. But what if you don't? English is most widely used language on the Internet, because the Internet developed first and fastest in English-speaking countries. But it is predicted that Net users who are not native English speakers will dominate the Net by 2002. So English speakers surfing the Net are increasingly likely to come across web sites in non-English languages. Web sites often offer two or more language options. Usually one of them is English, so English-speaking surfers can access web sites originating from, say, Japan, or most Western European and Scandinavian countries.

There are computer programs that can translate one language into another. There are also web sites that enable text to be translated between the world's major languages. In future, on-line interpreters might be able to translate any web site from one language to another in real time – so that, say, for a Spanish speaker logging on

to a German web site the site would appear translated automatically into Spanish. [14]

5.2.2 Answer the questions

- 1 Is it easy for you to surf the Internet?
- 2 What other languages are used in the Internet?

5.3 Text III “Rare languages”

5.3.1 Read the text

Hundreds of rare or lesser used, languages are spoken by a minority of people compared to the world’s major languages. These languages include Catalan (spoken mainly in Spain and France), Sardinian (spoken on the island of Sardinia), Romansh (spoken in Switzerland) and Sami (spoken in northern Finland). The growth of the Internet, which encourages people to communicate in English, could drive these little-used languages out of existence. Alternatively, the Internet might have the opposite effect. It might actually save some of these endangered languages from extinction more of the people who speak them to communicate and keep them alive.

The cost of Internet access once prevented many people from going on-line. But now easier Internet access and, in some places, free access is bringing the Net within the reach of more people in both developed and developing nations. In Denmark, for example, the public can access the Internet free of charge at most public libraries. Anyone who can’t afford to buy their own equipment can buy time on terminals at Internet bars and cafes. And access through televisions and mobile phones may also make the Internet available to people who don’t want, or cannot afford, to buy a computer.

The situation is different in the developing world, where extreme poverty still prevents millions of people from joining the global on-line community. These people could benefit from basic information about health, hygiene and medicine. Parents could be helped with child care advice. Farmers could receive help with agricultural problems. But villagers, parents and farmers in the developing world rarely own computers or surf the Web.

A problem in Africa is that there are relatively few telephone lines, and many of the remote communities and sparsely inhabited places may never be cabled for communications. But there are hundreds of local radio stations across Africa and many of them have Internet access. They broadcast advice and information received via the Web to villagers who have radio sets. They can also relay answers to specific questions and appeals for help. In future, satellites may provide the communications services that are essential for widespread Internet connection across the African continent. [14]

5.3.2 Get to know more about Nationalities and Languages

1 What do we call the people who come from these countries?

*Japan America Chile Sweden Holland Spain Italy Greece Germany France
Brazil Canada Australia India Hungary Czech Republic China Poland Norway
Portugal Turkey Iran Nigeria Egypt Uruguay*

2 What other nationalities do you know?

3 What languages do the nationalities above speak?

5.4 Text IV “Health and Ergonomics: Fact or Fancy?”

5.4.1 Read the text

The wrist brace seems to be a sign of the times. Once worn mainly by athletes and jackhammer operators, we now see it worn by supermarket cashiers, office workers, and other who perform repetitive wrist motions. The culprit in most instances seems to be a keyboard that is too high and that requires constant flexion of the wrist. The resulting trauma, whether carpal tunnel syndrome or another disorder, sometimes becomes severe enough to require surgery. Lowering the keyboard is a simple but often ignored preventative measure; some new keyboards have been designed to allow typing with a more natural position for the hands, arms, and shoulders.

Other health-related questions have to do with the placement of the monitor, the chair, and the desk.

Will the operator have to squint or stoop?

Is his or her back supported properly?

Is there radiation from the front of the monitor on our desk or from the back of the monitor behind us?

What will the effect be in the short term?

The long term?

Will working in this environment cause unbearable stress?

Sterility?

Migraine headaches?

What about the noise of half-a-dozen impact printers all going at once?

Are there harmful fumes escaping from the laser printer or the copy machine?

Is the air circulation adequate?

How well is the office designed?

What are the safety features?

Should employers be required to supply furniture designed ergonomically (that is, with the comfort and safety of people in mind)?

These are real questions. They deserve real answers. [14]

5.4.2 Answer the questions at the end of the text

5.5 Text V “Adopt the Correct Posture”

5.5.1 Read the text

Close work with a computer screen is often the root of postural problems such as fatigue, cramp and pain in certain muscles and tendons. The areas of the body that are mainly affected are the neck, the shoulders, and the small of the back the wrist and the hand. The main factors that contribute to muscle-skeletal pains are the incorrect posture adopted by many computer users? Linked with the non-ergonomic arrangement of the work area and the problems associated with the keyboard.

The main reason for the onset of most pains is that many computer workers adopt one of the following incorrect positions: neck leaning forward, back bent, shoulders lifted, arms outstretched, and forearms and hands lifted. However, a simple adjustment of your chair and desk will allow for more comfort in the workspace:

- The monitor should be at eye level;
- Things should be horizontal, feet flat on the floor or on a foot rest;
- The angle between the hand and the forearm should never be less than 90 degrees, and the hand should be aligned with the forearm.

The back should be straight in order to ease the tension of the shoulders and the strain on the neck muscles. Adjust the back of your chair or use a cushion to enhance an upright position.

However, no ideal position may be kept for a long time: maintaining the same position for a prolonged period leads to immobility of the limbs and, since this is in effect a muscular strain, it will make you tired. So stand up every hour and take a break.

Allow your body to move, walk a few steps regularly. Periodically adjust the focus of your eyes, the range of your thoughts, and then go back to computing. You will be more refreshed and more efficient.

Position of a keyboard can also be one of the main reasons for aches in the working place. Keeping the wrist at an uncomfortable angle can cause harm or provoke pain. If possible, adjust the keyboard upwards or downward in order to make your typing more comfortable.

Try not to use a keyboard which is too deep, and experiment with a wrist bar. Less forceful typing will reduce muscular tension. So-called ergonomic keyboards may reduce the strain on wrists, as these keyboards are specially adapted to the natural position of the hand and wrist limit movements of the head and eyes by keeping documents closer to the screen; try using a document holder. Be wary of reflections which may force you to adopt a less comfortable position in order to read the screen.

Drs Bowers and Putz, physical therapists from the Moscow Adventist Health Center, mention other factors at play in muscular-skeletal troubles. “Computing can complicate already pre-existing problems: it may not be the entire cause. Problems

concerning the back, shoulders and neck are complicated by computer use. So when treating these pains, the most important thing to do first is to assess the problem».

[14]

5.6 Text VI “Microsoft”

5.6.1 Read and translate the text

Bill Gates is the head of the software company Microsoft and is one of the world's wealthiest men. Gates and [Paul Allen](#) founded Microsoft in the 1970s, though Allen left the company in 1983. Gates oversaw the invention and marketing of the MS-DOS operating system, the Windows operating interface, the Internet Explorer browser, and a multitude of other popular computer products. Along the way he gained a reputation for fierce competitiveness and aggressive business savvy. During the 1990s rising Microsoft stock prices made Gates the world's wealthiest man; his wealth has at times exceeded \$75 billion, making Gates a popular symbol of the ascendant computer geek of the late 20th century. In June of 2006, Gates announced that he would step down from day-to-day involvement in Microsoft by July of 2008. He said he would then remain chairman of the Microsoft board while focusing on his charitable foundation, the Bill and Melinda Gates Foundation.

Gates married Melinda French, a Microsoft employee, on 1 January 1994. The couple have three children: daughters Jennifer Katharine (b. 1996) and Phoebe Adele (b. 2002) and son Rory John (b. 1999)... Gates's personal charitable initiative, the Bill and Melinda Gates Foundation, has focused on global health issues, especially on preventing malaria and AIDS in poor countries... For their philanthropic activities, *Time* magazine named Bill and Melinda Gates (along with rock star and activist [Bono](#)) its Persons of the Year for 2005.

Cofounder and chairman, Microsoft Corporation

Born: October 28, 1955, in Seattle, Washington.

Education: Attended Harvard University, 1973-1975.

Family: Son of William Henry Gates II (attorney) and Mary Maxwell (teacher); married Melinda French (Microsoft manager), January 1, 1994; children: three.

Career: Lakeside Programming Group, 1968-1969, founder; Traf-O-Data, 1970-1973, founder; Microsoft Corporation, 1975, founder and chairman; 1975-2000, CEO; 1992-1998, president.

Awards: U.S. National Medal of Technology, 1993; Chief Executive of the Year, *Chief Executive*, 1994; President's Medal of Leadership Award, New York Institute of Technology, 1995; Louis Braille Gold Medal, Canadian National Institute for the Blind, 2002; Knight Commander of the Order of the British Empire, 2004.

Publications: *The Road Ahead* (with Nathan Myhrvold and Peter Rinearson), 1995; *Business @ the Speed of Thought*, 1999.

Address: Microsoft Corporation, 1 Microsoft Way, Building 8, North O, Redmond, Washington 98052-6399; <http://www.microsoft.com>.

William Henry Gates III cofounded the Microsoft Corporation in 1975, built his software company into the one of the most successful businesses in the world, and established himself in the process as the world's richest man. Although Bill Gates started Microsoft as a small business based on a single innovative software program that he had helped to develop, his real genius was his business [acumen](#). As the long-time CEO of Microsoft, Gates was able to borrow and integrate other computer programmers' innovations and sell them to a new and rapidly expanding home computer market. In 1985, 10 years after Microsoft was founded, it had \$140 million in revenue, which grew to \$28 [billion](#) by 2002. One of the pioneers of home computing, Gates proved himself to be a technological [visionary](#) and software applications guru. According to industry analysts, he also demonstrated that he was a [shrewd](#) marketing strategist as well as an aggressive corporate leader.

A Precocious Pioneer

Gates grew up in a prosperous area of Seattle, Washington, with his parents and two sisters. The son of a lawyer and a [schoolteacher](#), Gates attended a public grade school and then the Lakeside School, a private college preparatory institution. It was at Lakeside that he first became interested in the relatively new field of computer programming, met his friend and future business partner Paul Allen, and developed his first computer software program at the age of 13.

In 1968 the Lakeside School was still purchasing computer time on a machine owned by General Electric, as computers were extremely expensive in the late 1960s. Gates and his friends from Lakeside became [fascinated](#) with the machines and formed the Lakeside Programmers Group to try to make money in the computer field. The Programmers Group primarily earned its founders free computing time on machines owned by a company in Seattle. Gates and Allen then formed a company that they called Traf-O-Data. They put together a small computer for measuring traffic flow and made about \$20,000. The company remained in business until Gates and Allen graduated from high school. Although Gates was interested in computers, he enrolled at Harvard University with the intention of becoming a lawyer like his father. By the time he was a sophomore in 1975, however, Gates was more interested in computers and electronics than in his pre-law studies.

What became the Microsoft Corporation grew out of two college undergraduates' bluff and [bravado](#). Gates's old friend Allen showed him an advertisement for a kit to build a home computer. The two called the computer's manufacturer, MITS, saying that Gates had taken a primary computer language called BASIC and adapted it for the machine. When MITS expressed interest, Gates and Allen ignored their studies and spent the next four weeks frantically working on turning their boast into reality. In an interview in *Money*, Gates later recalled, "One little mistake would have meant the program wouldn't have run. The first time we tried it was at MITS, and it came home without a [glitch](#)" (July 1986).

Having written the first computer language for a personal computer, Gates and Allen established the Microsoft Corporation in 1975. The name "Microsoft" was formed from the words "[microcomputer](#)" and "software." Gates then dropped out of Harvard in 1976 and focused on building the new business. He believed that there

was a market for computer software and that the market was going to expand rapidly as affordable computers were developed for home use.

Right Place at right Time

Although Gates rightfully earned credit for building one of the fastest-growing and most profitable companies ever established, Microsoft started out on a [shaky](#) foundation. Gates and Allen had sold their first commercially developed software for \$3,000 and royalties. Before long, however, Microsoft found itself unable to cover its overhead. Even though Gates and Allen received royalties, their software was also pirated by computer hackers. This piracy led Gates to write an "Open Letter to Hobbyists," which said that computer software should not be copied by the then relatively small computer community without the developer's permission. Gates also recognized at this point in time that the future of computer software lay in owning a standard software package to be used on most computers.

By the late 1970s the computing giant IBM had plans for marketing a personal computer for home use. They approached Microsoft to develop the standard operating system for their home computer models. Gates and Allen then went out and purchased for \$50,000 an operating system called Q-Dos, which had been developed by Seattle Computer. Q-Dos was compatible with the Intel processor that IBM intended to use. The two then adapted the Q-Dos system and presented it to IBM. *Money* magazine quoted Gates as recalling, "We bet all our resources on that system" (July 1986).

Gates had learned well his early lessons in the software business. He insisted that IBM make Microsoft the exclusive software [licensee](#) for their home computers, meaning that all IBM products would have Microsoft operating systems. Furthermore, Gates negotiated a contract that allowed Microsoft to retain the right to manufacture and license the software, which he and Allen had named MS-DOS, to other manufacturers. Because there were three other operating systems for microprocessors at that time, Gates didn't own the sole industry standard. But he was well on his way. He and Allen made MS-DOS the most attractive system to computer manufacturers because Microsoft offered a flat-fee license rather than a per-unit contract. Gates and Allen also encouraged software developers to create programs that would [broaden](#) their system's capabilities. Their strategy was a huge success because manufacturers initially saved money. In addition, the software developers had an easier job designing such single applications as word processing for use on computers made by other manufacturers.

These negotiations demonstrated that Gates was willing to [defer](#) immediate earnings for much greater future profits. His plan was based on building a mass of users for Microsoft products, which would mean the company would own the industry standard. Once Gates's company owned the standard, it could then [revert](#) to selling its software at per-unit prices rather than general licenses.

While the contract with IBM placed Microsoft on its way to legendary business growth, it also established a precedent for what some considered Gates's [unsavory](#) business practices. When he and Allen had approached Seattle Computer, the software's original developer, they omitted to mention that they were in negotiations

with IBM to develop their operating system. Seattle Computer later sued Microsoft on the grounds that it had hidden its relationship with IBM in order to purchase Seattle's system at what turned out to be a bargain-basement price. The two companies came to an out-of-court settlement without Gates or Microsoft admitting to any guilt or [duplicity](#) in the original purchase.

Marketing Trumps Challengers

Paul Allen, who had been serving as Microsoft's head of research and new product development, left the company in 1982 after being diagnosed with Hodgkin's disease. The following year, Gates faced a major challenge to Microsoft's domination of operating systems for home computers when a company called VisiCorp developed a mouse-driven computer system with a user interface based on graphics rather than the keyboard-based and text-driven system of MS-DOS. Gates quickly recognized that VisiCorp's system would be the wave of the future because it was much easier for technologically [unsophisticated](#) people to use. Even though Microsoft did not have such a system in the works at that point, Gates started an advertising campaign with an announcement at the Plaza Hotel in New York City that a new Microsoft operating system with graphical user interface (GUI) would soon be marketed. This next-generation system was to be called "Windows."

Gates's announcement was a bluff; the truth was that Microsoft was nowhere near developing such a system. But the marketing [ploy](#) worked because people preferred to wait for a system designed to be compatible with their existing Microsoft products rather than undergo the trouble and expense of installing an entirely new operating system. Furthermore, Windows allowed users to avoid buying new software applications to replace the DOS-compatible programs they currently owned. Windows 1.0 was finally released in 1985. That same year Microsoft reported \$140 million in revenue, including \$46.6 million from overseas users.

Microsoft's growth continued to be relatively smooth in spite of several challenges, in part because the fiscally conservative Gates had financed most of the company's expansion entirely from its earnings. This cautious approach to financing, however, did not reflect an unwillingness to take risks. In January 1986 Gates launched an ambitious long-term project to develop a new data storage system based on a compact disk, or CD-ROM, that could hold any type of computer file, including music and visual files. In March of that same year, he took the company public. His 40 percent ownership of Microsoft shares made his net worth \$390 million by June 1986.

Gates had effectively cornered the market for operating software for the vast majority of personal computers (PCs) as well as developing a wide range of other popular programs. He effectively became a [billionaire](#) in March 1987, when his company's stock rose to \$90.75 per share, up from \$21.50 per share when the company went public. Brian O'Reilly commented a few months later in *Fortune*, "[Gates] apparently has made more money than anyone else his age, ever, in any business" (October 12, 1987).

Gates Switches Gears

Industry analysts had praised Gates for guiding his company on a path of growth that saw its revenue stream increasing by more than 50 percent per year in a extremely competitive, even [cutthroat](#), market. They credited much of this success to Gates's ability to capitalize early and effectively on industry trends and his [willingness](#) to take risks on such [fledgling](#) technologies as Microsoft's CD-ROM-based software packages, which became industry standards. Furthermore, Gates had organized the company's structure so that it worked concurrently on all phases of a software product's business cycle from development to distribution. Larry Michels, an early software developer, told Mary Jo Foley of *Electronic Business*, "Other software vendors have modeled themselves after the hardware business. Microsoft created its own model of how to do business" (August 15, 1988).

Although Gates had established himself as a visionary, he did not always hit the mark. For years he had paid little attention to the business potential of the Internet, which led him to say later that he regretted not having focused more closely on Microsoft's capabilities for e-mail and networking. In 1995, however, he did an about-face and began to redirect the company's efforts in this area. His success was measured by the fact that Microsoft's Internet Explorer Web browser had become the industry leader by 2000. Gates's success in developing a competitive Internet browser, as well as coming out on top of the desktop-database and office-suite wars of the 1990s, proved that he had formed a company [nimble](#) enough to jump into a market that others were developing and take the lead away from the competition.

In 1998 Gates announced a new phase in Microsoft's expansion that would allow him to concentrate his energies on strategy and product development. At the same time the company funneled larger amounts of money into improving customer support and feedback. Gates planned to direct the company's work in such areas as intelligent telephones and television, as well as the integration of such new computer input techniques as speech, vision, and [handwriting](#). Although Windows had already gone through several upgrades, Gates wanted to continue improving its ease of use and reliability. To free himself up for this work, he stepped down as president, a position he had held since 1992, but remained Microsoft's chairman and CEO.

Showdown With the Government

Microsoft earned \$19.75 billion in revenue during the fiscal year 1999. Bill Gates had become an icon not only in the computer and business worlds but also in the eyes of the general public. His ghostwritten book *The Road Ahead*, which outlined his vision of the future, topped many best-seller lists for more than three months. In spite of Gates's financial and literary success, however, he found himself facing his biggest challenge yet as the 1990s came to an end.

The challenge came this time from the United States government rather than from Microsoft's competitors. Gates and Microsoft had come under increasing [scrutiny](#) for [unfair](#) business practices from the time of the court case that followed Microsoft's purchase of the Q-Dos operating system from Seattle Computer in 1980. In 1993 the U.S. Justice Department began an investigation into Microsoft's contracts with other computer manufacturers that led to an agreement from Gates in 1994 to

eliminate some of Microsoft's restrictions on the use of its products by other software makers. In 1997, however, the Justice Department sued Microsoft for forcing computer makers to sell its Internet browser as a condition of using the Windows system—a [de facto](#) violation of the 1994 consent decree. In December 1997 a U.S. district judge issued a preliminary [injunction](#) forcing Microsoft to temporarily stop requiring manufactures who sold Windows 95 "or any successor [program]" to install its Internet Explorer.

Microsoft appealed the injunction, but the following year the Justice Department and 20 state attorneys general sued Microsoft, charging that it illegally thwarted competition to protect and extend its software monopoly. Although Microsoft won its initial appeal in 1998 to reverse the 1997 decision, Gates soon found himself being questioned for 30 hours over a three-day period in a videotaped deposition for the upcoming [antitrust](#) trial. The government finally rested its case on January 13, 1999, and the Microsoft defense team ended its case on February 26. The final oral arguments from each side were presented on September 21, 1999.

After the judge presented his findings of fact on the case on November 5, Gates issued a response disagreeing with many of the findings that went against Microsoft. In a statement released to the press as reported by *Court TV Online*, Gates noted, "Microsoft competes vigorously and fairly. Microsoft is committed to resolving this case in a fair and a factual manner, while ensuring that the principles of consumer benefits and innovation are protected" (November 6, 1999).

U.S. District Judge Thomas Penfield Jackson ruled in June 2000 that Microsoft was a monopoly which had illegally exploited the dominance of Windows, at that point installed on over 95 percent of the world's personal computers. Judge Jackson then ordered Microsoft to be broken up into several smaller companies. It was the most severe antitrust ruling since the breakup of AT&T in 1984. Jackson's decision was reversed on appeal, however, and the company received a far less severe punishment directed toward restricting some of its business practices. In spite of this relatively favorable outcome, however, Gates continued to battle competitors in American courtrooms over Microsoft's business practices. In addition, he found himself subjected to [litigation](#) in Europe, where Microsoft was once again accused of exploiting its monopoly of Windows to control other computer-related industries, including media-player and server software companies.

Despite the controversy over whether Gates had created a company that used its dominance of the desktop computer system to obtain unfair control of newer computer-related markets, Microsoft continued to prosper. Gates stepped down as CEO in 2000 but kept his position as chairman of Microsoft as well as its chief software architect. In 2004 he doubled the company's research and development budget to \$6.8 billion and began pushing a new Windows personal computer operating system code-named [Longhorn](#).

Management Style: Workaholic

Although Gates was long known as a "boy wonder" in the computer and business worlds, his management style was anything but [immature](#). As was noted in a *BBC News* article, "Gates has come to be known for his aggressive business tactics

and confrontational style of management" (January 26, 2004). Although he was considered a charismatic leader within his own company, he was also extremely tough—he fired Microsoft's first company president after only 11 months on the job.

An intense businessman who typically put in 16-hour days and took only two three-day vacations in the first five years after establishing the corporation, Gates was demanding and strong-willed about implementing his vision. Coworkers, clients, and industry analysts also remarked, however, that he did not surround himself with yes-sayers but was more than willing to change his mind if someone convinced him of a better alternative. Analysts also observed that one of the keys to Gates's success was his ability to focus on the fundamentals of the business while keeping office politics or his own ego from getting in the way. "Most of what I do is leading," Gates once said in *Electronic Business*. "Managing applies to the people who work directly for me" (August 15, 1988).

Gates was known from the beginning of his career as the [epitome](#) of a hard-driving businessman respected by his allies and feared by his competitors. It was his vision that guided Microsoft's immense success. In addition, Gates had an [uncanny](#) ability to [tackle](#) both the [managerial](#) and technical sides of Microsoft's operations. He was especially noted for his success as a marketing strategist who priced his products for the mass market rather than computer specialists. In 1999 the *Journal of Business Strategy* listed Gates among a handful of people who had the greatest influence on business strategy over the last century.

Gates also had his fair share of critics. In addition to accusations of [predatory](#) and possibly illegal business practices, some analysts remarked that Gates did not really foster in-house product innovation but tended to focus his attention instead on blocking advances by other companies.

On the other hand, supporters of Gates's managerial style and business acumen pointed out that Microsoft continued to prosper even in the midst of the 2002 information technology [slump](#), growing at 20 percent each quarter and posting a [phenomenal](#) 35 percent after-tax profit margin. Despite all his financial success, however, Gates remained a fiscal conservative. He was renowned for his penny-pinching traveling habits, demanding that his schedule be filled for the entire day when he was on the road promoting his company.

No Time to Rest

Gates was still the world's wealthiest person in early 2004, with a personal fortune estimated at \$60.56 billion. He remained a hands-on leader at Microsoft, however, maintaining an active work schedule as the company's chairman and chief software architect. As noted by Ron Anderson in *Network Computer*, "... no doubt his presence [at the company] will make itself known well into the decades ahead" (October 2, 2000).

In addition to extending Microsoft's success, Gates also turned his attention to [philanthropy](#), including the establishment of the Bill and Melinda Gates Foundation. Gates and his wife endowed the foundation with \$24 billion to support [philanthropic](#) initiatives in the areas of global health and learning. For example, Gates made plans in February 2004 to donate \$82.9 million for research to develop a new [vaccine](#)

against [tuberculosis](#). In addition to his duties at Microsoft and his efforts in philanthropy, Gates sat on the board of ICOS, a company that specialized in protein-based and small-molecule therapeutics. [15]

5.7 Get acquaintance with Gates' biography

5.7.1 Read the Quotes By Bill Gates. Do you agree with him?

1 "Often you have to rely on intuition."

2 "We all learn best in our own ways. Some people do better studying one subject at a time, while some do better studying three things at once. Some people do best studying in structured, linear way, while others do best jumping around, surrounding a subject rather than traversing it. Some people prefer to learn by manipulating models, and others by reading."

3 "There are no significant bugs in our released software that any significant number of users want fixed".

5.7.2 Discuss the problems mentioned above

5.7.3 Read the text about Bill Gates, translate it and be ready to retell it

William Henry Gates III (born [October 28, 1955](#)) is an [American entrepreneur](#), [philanthropist](#) and [chairman](#) of [Microsoft](#), the software company he founded with [Paul Allen](#). During his career at Microsoft he has held the positions of [CEO](#) and [chief software architect](#), and he remains the largest individual shareholder with more than 8 % of the [common stock](#).

Gates is one of the best-known entrepreneurs of the [personal computer](#) revolution. Although he is widely admired, his business tactics have been criticized as anti-competitive and in some instances ruled as such in court. Since amassing his fortune, Gates has pursued a number of [philanthropic](#) endeavors, donating large amounts of money to various charitable organizations and scientific research programs through the Bill & Melinda Gates Foundation, established in 2000.

The annual [Forbes](#) magazine's list of [The World's Billionaires](#) has ranked Gates as the richest person in the world from 1995 to 2007, with recent estimates putting his net worth near \$59 billion.^[1] When family wealth is considered, [his family](#) ranks second behind the [Walton family](#), heirs of [Wal-Mart](#) founder [Sam Walton](#). In July 2007, [Fortune](#) Magazine reported that the increase in value of Mexican billionaire [Carlos Slim](#)'s holdings of stock caused him to surpass Bill Gates as the world's richest man. [Forbes](#) however, maintains that Slim is still second to Gates as of its last calculation of billionaire fortunes. Forbes does not plan to recalculate Slim's wealth until next year.

Early life

William Henry Gates III was born in [Seattle, Washington](#) to [William H. Gates, Jr.](#) (now *Sr.*) and [Mary Maxwell Gates](#). His family was wealthy; his father was a

prominent lawyer, his mother served on the board of directors for First Interstate Bank and the United Way, and her father, J. W. Maxwell, was a [national bank](#) president. Gates has one older sister, Kristi (Kristianne), and one younger sister, Libby. He was the fourth of his name in his family, but was known as William Gates III or "[Trey](#)" because his father had dropped his own "III" suffix. Several writers claim that Maxwell set up a million-dollar [trust fund](#) for Gates. A 1993 biographer who interviewed both Gates and his parents (among other sources) found no evidence of this and dismissed it as one of the "fictions" surrounding Gates's fortune. Gates denied the trust fund story in a 1994 interview and indirectly in his 1995 book *The Road Ahead*.

Gates excelled in elementary school, particularly in [mathematics](#) and the [sciences](#). At thirteen he enrolled in the [Lakeside School](#), Seattle's most exclusive preparatory school. When he was in the eighth grade, the school mothers used proceeds from Lakeside's [rummage sale](#) to buy an [ASR-33 teletype terminal](#) and a block of computer time on a [General Electric](#) computer. Gates took an interest in programming the GE system in [BASIC](#) and was excused from math classes to pursue his interest. After the Mothers Club donation was exhausted he and other students sought time on other systems, including [DEC PDP minicomputers](#). One of these systems was a [PDP-10](#) belonging to Computer Center Corporation, which banned the Lakeside students for the summer after it caught them exploiting bugs in the [operating system](#) to obtain free computer time.

At the end of the ban, the Lakeside students (Gates, [Paul Allen](#), [Ric Weiland](#), and Kent Evans) offered to find bugs in CCC's software in exchange for free computer time. Rather than use the system via teletype, Gates went to CCC's offices and studied [source code](#) for various programs that ran on the system, not only in BASIC but [FORTRAN](#), [LISP](#), and [machine language](#) as well. The arrangement with CCC continued until 1970, when it went out of business. The following year Information Sciences Inc. hired the Lakeside students to write a [payroll](#) program in [COBOL](#), providing them not only computer time but [royalties](#) as well. At age 14, Gates also formed a venture with Allen, called [Traf-O-Data](#), to make [traffic counters](#) based on the [Intel 8008](#) processor. That first year he made \$20,000; however, when his age was discovered, business slowed.

As a youth, Bill Gates was active in the [Boy Scouts of America](#) where he achieved its second highest rank, Life Scout. According to a press inquiry, Bill Gates stated that he scored 1590 on his [SATs](#). He enrolled at [Harvard College](#) in the fall of 1973 intending to get a [pre-law](#) degree, but did not have a definite study plan. While at Harvard, he met his future [business](#) partner, [Steve Ballmer](#), whom he later appointed as CEO of Microsoft. At the same time, he co-authored and published a paper on algorithms with computer scientist [Christos Papadimitriou](#).

Microsoft

After reading the January 1975 issue of [Popular Electronics](#) that demonstrated the [Altair 8800](#), Gates contacted [MITS](#) (Micro Instrumentation and Telemetry Systems), the creators of the new microcomputer, to inform them that he and others were working on a [BASIC](#) interpreter for the platform. In reality, Gates and Allen did

not have an Altair and had not written code for it; they merely wanted to gauge MITS's interest. MITS president [Ed Roberts](#) agreed to meet them for a demo, and over the course of a few weeks they developed an Altair [emulator](#) that ran on a minicomputer, and then the BASIC interpreter. The demonstration, held at MITS's offices in Albuquerque, was a success and resulted in a deal with MITS to distribute the interpreter as [Altair BASIC](#). Paul Allen was hired into MITS, and Gates took a leave of absence from Harvard to work with Allen at MITS, dubbing their [partnership](#) "Micro-soft" in November 1975. Within a year, the hyphen was dropped, and on [November 26, 1976](#), the tradename "Microsoft" was registered with the [USPTO](#).

Microsoft's BASIC was popular with computer hobbyists, but Gates discovered that a pre-market copy had leaked into the community and was being widely copied and distributed. In February 1976, Gates wrote an [Open Letter to Hobbyists](#) in the MITS newsletter saying that MITS could not continue to produce, distribute, and maintain high-quality software without payment. This letter was unpopular with many computer hobbyists, but Gates persisted in his belief that software developers should be able to demand payment. Microsoft became independent of MITS in late 1976, and it continued to develop programming language software for various systems.

According to Gates, people at Microsoft often did more than one job during the early years; whoever answered the phone when an order came in was responsible for packing and mailing it. Gates oversaw the business details, but continued to write code as well. In the first five years, he personally reviewed every line of code the company shipped, and often rewrote parts of it as he saw fit.

IBM partnership

In 1980 [IBM](#) approached Microsoft to make the BASIC interpreter for its upcoming personal computer, the [IBM PC](#). When IBM's representatives mentioned that they needed an [operating system](#), Gates referred them to [Digital Research](#) (DRI), makers of the widely used [CP/M](#) operating system. IBM's discussions with Digital Research went poorly, and they did not reach a licensing agreement. IBM representative Jack Sams mentioned the licensing difficulties during a subsequent meeting with Gates and told him to get an acceptable operating system. A few weeks later Gates proposed using [86-DOS](#) (QDOS), an operating system similar to CP/M and which [Tim Paterson](#) of [Seattle Computer Products](#) had made for hardware similar to the PC. Microsoft made a deal with SCP to become the exclusive licensing agent, and later the full owner, of 86-DOS, but did not mention that IBM was a potential customer. Gates never understood why DRI had walked away from the deal, and in later years he claimed that DRI founder [Gary Kildall](#) capriciously "went flying" during an IBM appointment, a characterization that Kildall and other DRI employees would deny. After adapting the operating system for the PC, Microsoft delivered it to IBM as [PC-DOS](#) in exchange for a one-time fee Gates insisted that IBM let Microsoft keep the [copyright](#) on the operating system, because he believed that other hardware vendors would clone IBM's system.^[28] They did, and the sales of MS-DOS made Microsoft a major player in the industry.

Strategy and management

From Microsoft's founding in 1975 until 2006, Gates had primary responsibility for Microsoft's product strategy. He aggressively broadened the company's range of products, and wherever Microsoft achieved a dominant position he vigorously defended it. Many decisions that led to [antitrust](#) litigation over Microsoft's [business practices](#) have had Gates' approval. In the 1998 [United States v. Microsoft](#) case, Gates gave deposition testimony that several journalists characterized as evasive. He argued with examiner [David Boies](#) over the definitions of words such as: *compete*, *concerned*, *ask*, and *we*. *BusinessWeek* reported:

Early rounds of his deposition show him offering obfuscatory answers and saying 'I don't recall' so many times that even the presiding judge had to chuckle. Worse, many of the technology chief's denials and pleas of ignorance were directly refuted by prosecutors with snippets of e-mail Gates both sent and received.

Gates later said that he had simply resisted attempts by Boies to mischaracterize his words and actions. As to his demeanor during the deposition, he said "Whatever that penalty is should be levied against me: rudeness to Boies in the first degree." Despite Gates' denials, the judge ruled that Microsoft had committed monopolization and tying, blocking competition, in violation of the [Sherman Act](#).

As an executive, Gates met regularly with Microsoft's senior managers and program managers. Most firsthand accounts of these meetings portray him as hostile, berating managers for perceived holes in their business strategies or their proposals which place the company's long-term interests at risk. He has been described shouting at length at employees before letting them continue, with such remarks as "That's the stupidest thing I've ever heard!" and "Why don't you just give up your options and join the [Peace Corps](#)?" However, he was also known to back down when the targets of his outbursts responded frankly and directly. When subordinates appeared to be procrastinating, he was known to quip, "Do you want me to do it over the weekend?"

Gates' role at Microsoft for most of its history was primarily a management and executive role. However, he was an active software developer in the early years, particularly on the company's [programming language](#) products. He has not officially been on a development team since working on the [TRS-80 Model 100 line](#), but he wrote code as late as 1989 that shipped in the company's products. On [June 15, 2006](#), Gates announced that he would transition out of his day-to-day role over the next two years to dedicate more time to philanthropy. He divided his responsibilities between two successors, placing [Ray Ozzie](#) in charge of day-to-day management and [Craig Mundie](#) in charge of long-term product strategy. One of his last initiatives before announcing his departure was the creation of a [robotics](#) software group at Microsoft.

Personal life

Gates married [Melinda French](#) of [Dallas, Texas](#) on [January 1, 1994](#). They have three children: Jennifer Katharine Gates (1996), Rory John Gates (1999) and Phoebe Adele Gates (2002). [Bill Gates' house](#) is one of the most expensive houses in the world, and is a modern 21st century [earth-sheltered home](#) in the side of a hill overlooking [Lake Washington](#) in [Medina, Washington](#). According to [King County](#) public records, [as of 2006](#), the total assessed value of the property (land and house) is

\$125 million, and the annual property tax is \$991,000. Also among Gates' private acquisitions is the [Codex Leicester](#), a collection of writings by [Leonardo da Vinci](#), which Gates bought for USD \$30.8 million at an auction in [1994](#).

Gates' e-mail address has been widely publicized, and he received as many as 4,000,000 e-mails in 2004, most of which were [spam](#). He has said that much of this junk mail "offers to help [him] get out of debt or get rich quick", which "would be funny if it weren't so irritating".

Wealth and investments

Gates has been number one on the "[Forbes 400](#)" list from 1993 through to 2006 and number one on *Forbes* list of "[The World's Richest People](#)" from 1995 to 2006 with 57 billion U.S. dollars. In 1999, Gates's wealth briefly surpassed \$100 billion causing him to be referred to in the media as a "centibillionaire". Since 2000, the nominal value of his Microsoft holdings has declined due to a fall in Microsoft's stock price after the [dot-com bubble](#) and the multi-billion dollar donations he has made to his charitable foundations. In May 2006, Gates said in an interview that he wished that he were not the richest man in the world, stating that he disliked the attention it brought. A July 3, 2007 report by [Mexican](#) financial journalist Eduardo Garcia indicated that Gates' position as the wealthiest person in the world has in fact been usurped by [telecommunications](#) magnate [Carlos Slim HelÃ](#)°.

Gates has several investments outside Microsoft, which in 2006 paid him a salary of US\$966,667. He founded [Corbis](#), a digital imaging company, in 1989. In 2004 he became a [director](#) of [Berkshire Hathaway](#), the investment company headed by longtime friend Warren Buffett. He is a client of Cascade Investment Group, a [wealth management](#) firm with diverse holdings.

Philanthropy

In 2000, Gates and his wife founded the charitable [Bill & Melinda Gates Foundation](#). The generosity and extensive philanthropy of [David Rockefeller](#) has been credited as a major influence. Bill Gates and his father have met with Rockefeller several times and have modeled their giving in part on the [Rockefeller family](#)'s philanthropic focus, namely those global problems that are ignored by governments and other organizations.

The foundation's grants have provided funds for college [scholarships](#) for under-represented minorities, [AIDS](#) prevention, diseases prevalent in [third world](#) countries, and other causes. In 2000, the Gates Foundation endowed the [University of Cambridge](#) with \$210 million for the [Gates Cambridge Scholarships](#). The Foundation has also pledged over \$7 billion to its various causes, including \$1 billion to the [United Negro College Fund](#). According to a 2004 *Forbes* magazine article, Gates gave away over \$29 billion to charities from 2000 onwards. These donations are usually cited as sparking a substantial change in attitudes towards [philanthropy](#) among the very rich, with philanthropy becoming the norm.

Transition

On [June 16, 2006](#), Gates announced that he would move to a part-time role within Microsoft (leaving day-to-day operations management) in July 2008 to begin a full-time career in [philanthropy](#), but would remain as [chairman](#). Gates credited Warren Buffett with influencing his decision to commit himself to charitable causes. Days later, Buffett announced that he would begin matching Gates' contributions to the Gates Foundation, up to \$1.5 billion per year in stock.

Awards and recognition

[Time Magazine](#) named Gates one of the 100 people who most influenced the 20th century, as well as one of the 100 most influential people of 2004, 2005, 2006 and again in 2007. Gates and Oprah Winfrey are the only two people to make [all four lists](#). *Time* also collectively named Gates, his wife [Melinda](#) and U2's lead singer [Bono](#) as the 2005 [Persons of the Year](#) for their humanitarian efforts. In a list compiled by the magazine [New Statesman](#) in 2006, he was voted eighth in the list of "Heroes of our time". Gates was listed in the [Sunday Times](#) power list in 1999, named CEO of the year by *Chief Executive Officers magazine* in 1994, ranked number one in the "Top 50 Cyber Elite" by *Time* in 1998, ranked number two in the [Upside](#) Elite 100 in 1999 and was included in [The Guardian](#) as one of the "Top 100 influential people in media" in 2001.

Gates has received four [honorary doctorates](#), from the [Nyenrode Business Universiteit, Breukelen, The Netherlands](#) in 2000, the [Royal Institute of Technology, Stockholm, Sweden](#) in 2002, [Waseda University, Tokyo, Japan](#) in 2005, and a fourth in June 2007, from [Harvard University](#). Gates was also given an [honorary KBE \(Knighthood\)](#) from [Queen Elizabeth II](#) of the [United Kingdom](#) in 2005, in addition to having [entomologists](#) name the Bill Gates flower fly, [Eristalis gatesi](#), in his honor.

Bill delivered the keynote address at the Fall [COMDEX](#) in 1983, 1985, 1988, 1990, 1994, 1996, 1997, 1998, 1999, 2000, 2001, 2002, and 2003.

Bill and Melinda received the [Prince of Asturias Award](#) for International Cooperation on [May 4, 2006](#), in recognition of their world impact through charity giving. In November 2006, he and his wife were awarded the [Order of the Aztec Eagle](#) for their philanthropic work around the world in the areas of health and education, particularly in Mexico, and specifically in the program "Un paÃs de lectores".[15]

5.7.4 Retell the text

5.8 Text VII "Online auctions named the number one Internet fraud complaint for 1998" [16]

5.8.1 Discuss the questions

- 1 Have you ever bought anything through the Internet? If so, what did you buy?
- 2 How did you pay for the goods you bought? Did you receive them safely?
- 3 What guarantee did you have that you would get what you paid for?

5.8.2 Understanding main points. Read the text about Internet fraud for the first time and answer these questions

- 1 What are the main types of investment fraud reported in the text?
- 2 How does the text define *cyberspace*?
- 3 Which four uses of the Internet does the text mention?
- 4 Anonymity - not being identified, or traced by your real name - is important for criminals. How does the Internet help them ?
- 5 Which organisations could you inform if you were a victim of a scam on the Internet?
- 6 Which crime has increased most in the last year or so, according to the text?
- 7 Do most victims of fraud use traditional payment methods?
- 8 What does the acronym IFW stand for?
- 9 An escrow service is a safe way of paying for Internet transactions. How does this work?

5.8.3 Understanding details. Answer these questions

- 1 How do households get exposed to fraudulent schemes in cyberspace?
- 2 How can the price of stocks and shares be easily manipulated over the Internet?
- 3 What are the five most common types of Internet fraud, according to Internet Fraud Watch?
- 4 Mail and telemarketing fraud pre-dated Internet fraud. True or false?
- 5 Are cyberspace frauds really any different from frauds committed through more traditional communication channels?

5.8.4 Read the text once more

Cyberspace fraud and abuse

Unwary investors are in danger today of being taken for a ride on the information superhighway. State securities regulators around the US are concerned about the explosion in illicit investment schemes now flourishing on commercial bulletin board services and the informal web of computer networks that make up the Internet. Households that already have access to online services are being exposed to hundreds of fraudulent and abusive investment schemes including stock manipulations, pyramid scams and Ponzi schemes¹.

Cyberspace, as the online world is known, has the potential to educate investors and help them become better consumers. Any computer and modem is a few keystrokes away from research data and financial news.

¹Buyers are persuaded to invest money in dishonest 'businesses' in return for promises of quick profits.

However, State securities regulators emphasise that the problem of illicit and abusive online investment schemes has the potential to spread like wildfire through the Internet, using increasingly popular commercial bulletin board services, live discussion groups (chats), e-mail, and information web pages, all of which can maintain the anonymity of cyberspace. This is exploited to the hilt by those who promote fraudulent investment schemes.

New frauds are emerging, too. According to Internet Fraud Watch, complaints about fraud on the Internet have risen 600 % since 1997, and online auction complaints were the number one fraud complaint only one year later, a dramatic rise.

The majority of payments in these fraud cases were made offline, by cheque or money order sent to the company. 'Requesting cash is a clear sign of fraud. Pay the safest way. If possible, pay by credit card because you can dispute the charges if there is a problem,' says the Director of Internet Fraud Watch. IFW recommends that buyers use escrow services: they take payment from the buyers and only pass money along to the sellers after verification that the goods or services were satisfactory. Some auction companies have programmes to insure transactions.

The top 10 scams were, according to the National Consumer League:

1 Web auctions: items bid for but never delivered by the sellers, the value of items inflated, shills¹ suspected of driving up bids;

2 General merchandise: sales of everything from T-shirts to toys, calendars and collectibles, goods never delivered or not as advertised;

3 Internet services: charges for services that were supposedly free, payment made online and Internet services that were never provided or were falsely represented;

4 Hardware or software computer equipment: sales of computer products that were never delivered or were misrepresented;

5 Business opportunities like multi-level marketing or pyramid schemes, in which any profits were made from recruiting others, not from sales of goods and services to end-users;

6 Business opportunities or franchises: empty promises of big profits with little or no work by investing in pre-packaged businesses or franchise opportunities;

7 Work-at-home plans: materials and equipment sold with the false promise of payment for 'piece work' performed at home;

8 Advance fee loans: promises of loans contingent on the consumer paying a large fee in advance. Once the fee is paid, the loans are never disbursed;

9 Credit 'repair': fraudulent promises to remove accurate but negative information from consumer credit reports;

10 Credit card issuing: false promises of credit cards to people with bad credit histories on payment of up-front fees. (From www.fraud.org. The National Consumer League).

¹Someone who cooperates in an auction scam by pretending to want to buy goods and so raising the bids.

Legal brief

The National Fraud Information Centre was set up in 1992 to fight telemarketing fraud. In **1996** the National Consumers League in the US decided to expand its efforts to cover fraud in **cyberspace**. By contacting the website at www.fraud.org, consumers from all over the world can **get tips on** how to avoid 'seams' (fraudulent tricks) and can report fraud. The site receives **70,000 visits and 1,300 e-mails** weekly.

5.8.5 Match the definitions with the scams listed (1-10) in the text

- a) charging for Internet services that are supposed to be free or which fail to appear; (3)
- b) promising loans of large sums of money after a small fee has been received;
- c) tempting people to invest in franchise businesses by promising quick profits;
- d) getting people involved in schemes that work by recruiting a network of other salespeople but not selling any goods;
- e) selling materials for making-up at home but never selling the things which clients have made;
- f) falsely guaranteeing that bad credit ratings can be removed from the records;
- g) taking money for falsely promising credit cards to people with bad-risk ratings;
- h) receiving money for all kinds of goods that are never delivered;
- i) selling computer equipment that fails to arrive or is not what was ordered;
- j) auctioning goods online then not sending the goods, or sending faulty or overpriced articles.

5.8.6 Understanding expressions. Choose the best explanation for each of these words or phrases from the text

1 illicit

- a) unhealthy
- b) legal
- c) against the law

2 stock manipulations

- a) moving cattle
- b) selling securities
- c) illegally influencing share prices

3 spread like wildfire

- a) destroy by fire
- b) spread very rapidly
- c) lose your temper

4 to the hilt

- a) to maximum advantage
- b) part time
- c) electronically

5 piecework

- a) working for the community
- b) working in a factory
- c) being paid for each item produced

6 contingent on

- a) in front of
- b) dependent on
- c) next to

7 disbursed

- a) paid money out
- b) collected money
- c) advertised

8 up-front fees

- a) fees that increase as time passes
- b) money paid after receiving goods
- c) money paid before receiving goods

6 Section VI Future developments [14]

6.1 Translate the texts below using the words. Learn the words by heart

1 Infringement –	нарушение (закона, обязательства, клятвы и т. п.) посягательство (на права, свободу и т. п. - of, on);
2 Undoubted –	бесспорный, несомненный, очевидный;
3 Counterfeit –	подделка, фальсификация, жульничество;
4 Advertise –	афишировать, рекламировать;
5 Tip-off –	а) намек, предупреждение; б) выдача конфиденциальной информации (особ. о криминальной деятельности);
6 Swiftly –	без промедления, поспешно;
7 Track down –	выследить (и поймать);
8 Steal –	воровать, красть, похищать, грабить;
9 Share –	акции;
10 Commit –	совершать (обычно выходящее за какие-л. рамки действие и т. п.);
11 Speed up –	увеличивать скорость, ускорять (ся), убыстрять (ся);
12 Fraud –	обман, мошенничество, жульничество, подделка;
13 Offensive –	1) обидный, оскорбительный, 2) отвратительный, неприятный, противный;
14 Rumour –	молва, слух, слухок, слухи, толки;
15 Deposit –	депозит, вклад (в банке);
16 Censor –	проверять, просматривать, подвергать цензуре;
17 Explicit –	ясный, подробный, подробно разработанный, высказанный до конца, явный, определенный, точный;
18 Concern –	отношение, касательство;
19 Leap –	помеха, преграда, препятствие;
20 Responsible -	ответственный, несущий ответственность, отвечающий (за что-л.);
21 Deliberately	взвешенно, сознательно, осознанно, обдуманно;
22 Hold –	схватывание, захват, сжатие, удержание;
23 Fake –	хитрость, обман, мошенничество;
24 Suggest –	предлагать, советовать;

25 Force –	насилие, принуждение;
26 Involve –	втягивать, вовлекать, запутывать;
27 Cheating –	мошенничество;
28 Bill –	счет;
29 Produce –	изделие, изделия, продукт, продукция;
30 Toward –	происходящий, будущий, грядущий, предстоящий;
31 Raise –	поднимать;
32 To weed –	очищать, избавлять;
33 Scam –	афера, жульничество;
34 Supply –	снабжение, поставка;
35 Unless –	пока не, если не;
36 Flow –	течение, движение;
37 Same way –	тот (же) самый, одинаковый, равный, равносильный, тождественный, идентичный;
38 Safeguard –	охранять, защищать предохранять;
39 Scrap –	клочок, кусочек, обрывок, обрезок;
40 To vet –	исследовать, изучать, рассматривать проверять, проверять благонадежность;
41 Restrictive –	ограничивающий, ограничительный.

6.1.1 Text I “Following the Sun”

International businesses with offices all round the world have discovered a way of using the Internet to increase their problem-solving power. Problems are a daily occurrence, especially in high technology companies. A problem that arises at one office is worked on at that office. If it isn't solved by the end of that day, it's posted on the company's intranet (a network that works in the same way as the Internet, but can be accessed only by the company that created it, not by the public).

As the Earth turns and the Sun goes down, one office shuts and another one elsewhere opens for business. The staff looks at any problems posted on the company's intranet, and add their thoughts. The Sun sets and that office close. Yet another opens and so on. By the time the office that originally posted the problem opens again the next day, the problem has been worked on round the clock and probably solved by people in several different countries. [14]

6.1.2 Text II “Taking risks”

The Internet enables people to do things for themselves that used to be done with the help of professionals and experts. Booking holidays on-line, instead of using an expert adviser such as a travel agent, involves few extra risks. There are some on-line services, however, that are much more risky - share dealing for example.

One way of investing money, in order to make more money, is to buy shares in a company. Share buyers are entitled to share in a company's profits (and losses). If the value of the company rises on the stock market, share owners can sell their shares for a higher price than they paid and make a profit. The value of a company rises or falls from minute to minute throughout the day. It is set according to the number of people wanting to invest in the company and how much money they are prepared to pay. If lots of people want to buy shares, the company's value rises. If people start selling their shares, its value falls.

Shares used to be bought and sold by agreement between professional share dealers, called brokers, who contacted each other in person or by telephone. It took time to make deals. But share buying and selling has gone electronic and on-line. It's now easier than ever for ordinary people to buy and sell shares. However, share dealing is a form of gambling and if the gambles don't pay off, there can be substantial losses. So just because a service is available on the Net doesn't mean that it is advisable for surfers to use it.

Millions of shares are also bought and sold using computers programmed to react more quickly to changes in share values than human dealers can. These computers protect the companies who have bought the shares, and prevent them from losing money by buying or selling shares before anyone else can react to changing prices. The computers can trigger an avalanche of instant share selling, which may make share values drop like a stone. The Internet's ability to connect these computers worldwide can amplify the effect and turn a fall in prices into a stock market crash. Hackers also know that some organizations have very tight computer security, but fail to look utter 'traditional' security. An employee may sometimes write down a password on a scrap of paper and leave it in a desk drawer - just in case they forget it. A criminal who gets into an office, perhaps posing as a cleaner or workman, may be able to find these password notes and use them later to access the system remotely via the Internet.

Companies and web sites can be attacked and forced off-line without having their security measures breached. In February 2000, a number of well-known on-line companies, including the search engine Yahoo and the bookseller Amazon, were forced off-line for several hours at a time by the sheer number of 'hits' (visits from surfers) they were receiving. Every web site is operated by computer systems called servers and communications switches called routers, which can only make a certain number of telephone connections at a time. Malicious surfers appeared to be using computer programs to bombard these web sites with so many hits that their systems could not cope.

This is a very worrying development, because it means that any web site can be attacked at any time. At first thought it appears to be the cyber equivalent of what has

always happened in the real world. Any shop, office, company, laboratory or military establishment may find itself targeted by protesters who can bring work to a halt. But there is a big difference between the two. People who protest and demonstrate in person usually have a reason they want to publicize in order to exercise more leverage on the organization they are protesting against. But cyber attacks are more like aimless vandalism. They seem to come from nowhere from people who may just be doing it out of malice. Such attacks are much more difficult to combat. [14]

6.1.3 Text III “Copyright”

Almost everything that is written, drawn, sung, performed or photographed is owned by someone. Or, rather, the right to publish it or sell it is owned by someone. For example, a newspaper is only allowed to publish a photograph or part of a book if it has the permission of the copyright owner, who might well ask for payment. Using someone's work without permission is called copyright infringement, and is against the law. Clip art sold to computer users is one exception. This can be used for free. Now that it is possible to distribute text, pictures and music around the world digitally, it can be very difficult to keep track of who is using them and where, and if they are entitled to do so. Pop music in particular is at risk of illegal copying across the Internet.

The biggest copyright infringement problem is undoubtedly software piracy. Computer programs and the packaging they are sold in are very easy to copy. The US Software Publishers Association estimates that about \$ 7.4 billion worth of software was lost to piracy in 1998. The Association also found more than 1,500 examples of illegal software being offered for sale on the Internet.

In 1999, Europe's biggest software piracy operation was traced to Denmark and shut down. It had produced 125,000 counterfeit CD-ROMs containing \$ 237 million worth of various well-known computer programs. The pirate programs were advertised for sale on the Internet. Investigators received a tip-off that illegal CD-ROMs were being sold through a Danish web site. The Danish police acted swiftly to close down the Internet outlets and arrest the criminals. Leading software producers take the problem of piracy so seriously that they have set up an international investigation team to track down software pirates. [14]

6.1.4 Text IV “Fraud”

Fraud is a crime that involves cheating people out of money or goods. Fraud can take many forms, but some cases involve the illegal use of credit cards on the Internet. Buying something on the Internet by giving a credit card number is very straightforward. Unfortunately, criminals can get hold of genuine credit card numbers very easily. They might steal numbers from shopping receipts or credit card bills, or they might use a card number generator site on the Web. (Card number generators can automatically produce a valid-looking credit card number.) The card numbers are then used to buy things and the cost is charged to the cards' real owners. Credit card companies are trying to improve security to stop this. They are working towards real-

time, on-line card authorization, with goods only being dispatched to the card account address; this would weed out fraud involving false card numbers, stolen card numbers and stolen cards.

Another financial scam made easier by the Internet involves manipulating the value of a company's shares. Rumors that a company is doing particularly well or badly, or that it is about to take over another company or be taken over itself, can send share values up or down. One type of share fraud involves buying shares in a company, starting rumors that raise share values and then selling the shares to make a profit.

Now anyone can buy and sell shares on the Internet. And e-mails can place rumors on the right people's computer screens. Sounds unlikely? In 1999, an American computer engineer was arrested for first known example of this crime. When he faked an Internet news story of a rumored billion dollar take-over a company, its share value rose by thirty-one per cent. He owned shares in the company and allegedly planned to sell them to make a profit. He was identified by FBI agents, who tracked his activities on the Internet.

The international nature of the Internet makes fraud easy to commit. In Europe a popular scam involves taking deposits for high-value goods, such as cars are sourced in one country, where car prices are low, and supplied to customers in another country, where the same models sell for much higher prices. There are legitimate companies that specialize in this service, but it is also an area in which criminals operate. Buyers attracted by advertisements on web sites operated by fake import companies are kept waiting for weeks, sometimes months, while the criminals continue to collect deposits. Then the criminals simply disappear. [14]

6.1.5 Text V “Sex on the Net”

There is a lot of sexually explicit material on the Internet. But, in the same way that offensive books, magazines and videos don't leap into your hands as soon as you walk into a shop, sexually explicit images on the Net don't usually appear on a computer screen unless someone goes looking for them. The international nature of the Internet and the freedom of information flowing across national borders create problems for police forces dealing with crimes associated with sexually explicit material. As the Net is international, and laws governing sexually explicit material vary greatly from country to country, it is possible to view and download images that are legal in the place in which they are created and stored, but illegal in the place where they are accessed. Parents who are-concerned that their children might access this material, whether deliberately or not, can use safeguards provided either by their Internet Service Provider or by a separate program to block it.

Some people have suggested that Internet Service Providers should be held legally responsible for the material communicated across their networks, or that they should censor it before it is made available to the public. This is rather like saying that the post office should be prosecuted for delivering letters that contain offensive material and that they should check every letter and take out anything that is pornographic. ISPs say that it is practically impossible to vet every web site, every

scrap of downloaded material and every e-mail on their systems. Checking all this data in real time as it whizzes across the Net would slow down the whole network at a time when the ISPs are under great pressure to speed up access. And to make all the material acceptable everywhere, the standard of acceptability would presumably have to be set according to the most restrictive laws in any territory where the material could end up. It would destroy freedom of expression on the Net. [14]

6.2 Text VI “Full of Hope, or Full of Fear?”

We look to the future as explorers standing on the shore of an uncharted ocean. Science, technology, politics, fashion and world events all affect the course it will take. For that reason, crystal ball gazers often get it wrong. But perhaps there are a few things we can be reasonably sure about.

The growth of e-commerce is changing traditional high street shops and businesses. Internet business worldwide is valued at about \$1 trillion, and it is growing fast. Some of that will be new business, because it's just so easy to buy and sell on-line. But a lot of it will be at the expense of traditional high street shops. The businesses that will be affected most will probably be suppliers of video, music and text - the easiest products to deliver digitally.

The trip to the store to borrow a video could be a thing of the past within ten years. Cable and satellite television companies already offer pay-per-view blockbuster movies to their customers, but viewers have to wait until the next time the movie is transmitted. Now, one company has developed a digital video archive. There is no need to move from your armchair if you want to 'borrow' a film. Just select the movie from a menu on the TV screen and it is delivered digitally when you want it.

The music business is likely to be transformed more than most. The Internet enables record companies to sell music direct to customers without any need to make CDs and ship them to record shops. At least one major recording company is already considering doing this. But the record companies themselves could be in trouble. Big stars in the music business no longer need a record company to promote their music to the public. The singers and groups can sell music direct to people worldwide through their own web sites. Some new groups who are unable to get a recording contract are already doing this.

Oddly, book publishing, which you think would suffer most from the advent of the digital market place, has probably benefited more from it than any other medium to date. One of the first successful product-selling businesses on the Web was Amazon, a company that sells books on-line. It is possible to dispense with publishers and printers altogether and publish on the Web instead. *Riding the Bullet*, a story by best-selling author Stephen King, was published exclusively on the Web in March 2000. But demand exceeded the capacity of the web sites to deliver. When two million people tried to access the story, the web sites crashed.

In the near future, however, on-line publishing is unlikely to replace books. Even in this digital age, a book is still quite an efficient way to store large amounts of information in an easily accessible form. And the pleasure of holding a real book and

leafing through its pages is not matched by gazing at words on a computer screen. But later generations may think differently. Perhaps they will be glad to be rid of dusty, bulky books in favor of text on discs or delivered on-line. Perhaps the future of book publishing is already here. At the beginning of 2000, software giant Microsoft and bookseller Barnes and Noble announced plans to develop electronic books that can be read on a palm-sized computer. The computer will be able to store several books at a time. In future, books might be downloaded from the Internet. [14]

6.3 Text VII “Machines on-line”

The biggest growth in Internet traffic will not be from people, but from machines going on-line! About 500 million devices are on-line now, including 100,000 cameras. That figure is set to explode as more and more ordinary everyday devices are manufactured with built-in Internet links. Some will be connected to the telephone line while others will use mobile telephone technology to get on-line by radio. People have been predicting washing machines that can send reports of their own faults to the manufacturer and remote-controlled central heating systems for years, but Internet-linked machines might just be about to make all this finally come true. And, as the number of machines on-line grows and exceeds the number of people on-line, Web companies who now compete for human surfers' attention will begin to target machines. [14]

6.4 Text VIII “Money, money, money”

Until now, money on the move has always had to travel through banks or other established financial institutions. The Internet changes that. In future, money could flow from smart card to smart card across the Internet without going through a bank. Freeing money from the banking system would certainly let money travel faster and more easily, but the Internet is unregulated, uncontrolled. It has none of the safeguards that are built into the international banking system to protect money from misuse. Money moving across the Internet electronically, out of the control of banks and other financial institutions, is more liable to fall prey to the attention of Internet fraudsters. And of course, direct cash transfers across the Internet make it more difficult for governments to tax the money and impossible for banks to make charges for handling it. [14]

6.5 Text IX “A Telephone Pioneer: Henry Hunnings”

6.5.1 For questions 1-6 read through the following text and then choose from the list A-J below the best phrase to fill each of the spaces. Write one letter (A-J) in the correct box on your answer sheet. Some of the suggested answers do not fit at all. The exercise begins with an example (0). Example: 0 – J

6.5.2 Read your answer carefully, checking grammar and punctuation

Question 2: Which phrase gives an example of gadgets?

Question 3: Which words often follow 'asked'?

Question 4: What was the purpose of forming the company?

Most people have heard of Alexander Graham Bell, who invented the telephone in 1876. But it was a little-known English priest called Henry Hunnings (0)..... Bell's model could transmit a voice up to about 23 km. A year after its invention, Thomas Edison improved on the model by attaching a solid-carbon button inside the mouthpiece. But Hunnings decided to experiment with granular carbon (1) This improved the voice clarity and extended the voice-transmission distance to about 72 km. Hunnings was granted a patent for his invention in December 1878.

Hunnings was born in 1843 near London. He became a priest in Yorkshire and although much of his time was taken up with Church matters, he had a profound interest in all sorts of gadgets, (2)..... A friend of Hunnings with similar interests, called Cox Walker, built a telephone receiver. In 1880 an American called Anders visited England and asked Walker (3)..... . He was impressed and offered Hunnings £1,000 for the patent. The offer was accepted and the Globe Company was formed (4)..... . In 1881 Hunnings was granted two patents in the United States for his invention. But by this time so many people and companies were involved in telephone design and manufacture (5)..... There was a famous court case in 1882 when the United Telephone Company took the Globe Company to court for an alleged infringement of its patents. At first it failed to have the Hunnings patent declared invalid (6)..... It then bought the rights to the entire patent from Hunnings. [17]

- A which few people had known about
- B instead of solid carbon
- C but later it partially succeeded
- D except that Hunning's invention was superior
- E in breach of copyright
- F to make telephones in England
- G that conflict resulted
- H particularly those that dealt with magnetism and electricity
- I if he could inspect the Hunnings transmitter
- J who made the first big improvement

6.6 Text X “What is the Internet?” [18]

It would appear that we have reached the limits of what it is possible to achieve with computer technology, although I should be careful with such statements, as they tend to sound pretty silly in 5 years. John von Neumann, circa 1949

We live in the age of the computer, and there are growing demands on almost everyone, including teachers, to become technologically literate. You may already use computer programs to create materials for students, but you may feel confused, or intimidated, by the publicity about the Internet and the jargon people use to talk about it. The Internet - alias the Net - is also known as cyberspace, the information superhighway, the online community, the electronic library and the digital revolution: all a series of creative metaphors trying to define it. It has been hyped as the most significant development in communication tools since the invention of the printing press and then condemned as the end of civilisation as we know it. So, what is it?

Basically, the Internet is a network of people and information, linked together by telephone lines which are connected to computers. In fact, more than 100,000 independent networks - public and private - are currently connected to form this vast global communications system. This is the 'road' of the information superhighway.

There are many ways to transport information on this highway, through the various application programs such as e-mail and the World Wide Web. All of these applications are based on a client/server relationship, in which your computer is the client, and a remote computer is the server. Your computer asks for files, and formats the information it receives. The information is actually stored on a remote computer, and is sent to you over the telephone line at your request, usually at the click of a mouse.

All you need to join this system is a computer, a normal telephone line, a modem and an account with an Internet Service Provider (ISP).

Computer: almost any computer can be used to connect to the Internet. However, this is your personal lane on the information superhighway. The slower your computer is, the slower the traffic in your lane will be when sending and receiving information. To take advantage of the multimedia components that are available — the video, audio and interactive elements of the Net - it is almost mandatory to have a powerful PC or Apple home computer because multimedia files are much larger than pure text files.

Telephone line: your computer will use your normal telephone line to transport data while you are connected. There is no need to have a second line installed, though there are some obvious disadvantages to having only one line. The size of your telephone line can also seriously affect the quality and speed of your access. A couple of alternatives to the traditional telephone connection are described in Chapter 4 in the section on access speeds.

Modem: this is a small piece of equipment that translates the digital language your computer speaks into the analogue language used by the telephone, thereby enabling you to send and receive data. The name is a shortened form of modulate demodulate (translation to analogue - translation to digital). Most new computers are sold with a modem already installed. If yours was not, you will need to do a bit of research into the latest models, to get the best speed and compatibility.

Internet Service Provider: an ISP is a company that acts as a toll gate between you and the Internet. You pay them an annual fee for unlimited use of the Net, or monthly charges according to the amount of time you are actually connected. These companies do not control the content of the Internet, nor how any of it functions, but

they offer you access to the Internet.

Most countries have a wide range of ISPs on offer, so it is best to shop around before you choose one. You should look for an ISP with a local telephone number or you will be paying long-distance telephone call rates. In addition, you will need a supportive company to start with, one that gives you all the software, help setting it up, at least one e-mail account and perhaps even free space to have your own site on the World Wide Web.

And that's really all you need to become a part of the online community.

A bit of history

So how did this modern wonder come into existence? In a nutshell, the first version of the Internet was started during the 1960s in the United States as ARPANET, a defence department network. One computer was linked to another to share information. Gradually, more computers were added to the network, and people began to send simple messages over the network to distant colleagues. This, at that time, incredible communications platform was adopted by the academic community and, with vast improvements added by European computer wizards, became the friendly tool we refer to as the Internet today.

As a form of international communication, the Internet has been in constant expansion since 1973, when the ARPANET was first connected to the United Kingdom and Norway. Much of northern Europe was connected to the Net in the early 1980s. Japan and Canada soon followed suit. A special link was established between Germany and China at about the same time. And then in the late 1980s the real growth began as Australia, Iceland, Israel, Italy, Mexico, New Zealand and Puerto Rico joined the Net.

The early 1990s saw many countries in South America and Asia, as well as Eastern Europe, gain access to the Net. The first countries connected from the African continent were Tunisia and South Africa, but others soon followed. By 1992, even Antarctica was officially online. Currently every nation has some type of connection to the Internet, though access may be highly restricted and extremely expensive.

Because of its origin in the United States, most of the communication via the Internet takes place in English, in spite of, or perhaps due to, the multilingual nature of its user base. Researchers suggest that this will change as the Internet becomes more popular, but for the moment English is the common language. This is what makes it such a perfect tool for English language teaching.

Applications and their uses

Like many of the modern conveniences we now take for granted, the Net had primitive beginnings. (The Model T, the camera obscura and the wireless telegraph were all innovations that initially required expert handling. Despite this, almost all of us can now drive a car, take a photograph or use the phone.) Most of the current

text-only Internet tools are leftovers from a bygone era of more primitive computer technology.

As the Net incorporates more and more multimedia features some of these text-only applications become obsolete, some are superseded by more user-friendly programs, and others are adapted. The key text-based applications that remain are:

- E-mail: This is the electronic postal service.

Its traditional counterpart is known as snail mail, so at first glance the most obvious benefit of using e-mail is speed. It is so fast that you can send written messages back and forth to people several times a day. It is a cost-effective, reliable form of communication that lets you send notes to other Internet users around the globe from the comfort of your own computer. You can also attach enormous documents to that same note so you do not need to send these through the post either. Although they are basically a text-based medium, e-mail programs now make it possible to attach large files, graphics, video or sounds to notes. Some e-mail programs even feature voice-mail so you can listen to your messages. We will take a closer look at how to use basic e-mail later in this chapter.

- Mailing lists: These are an automated exchange of e-mail messages about a chosen topic, each one being a kind of supervised discussion group. They are often called discussion lists or listservs. We consider mailing lists in detail, and explain how to join lists related to teacher development, in Chapter 2.

- Newsgroups: The system of newsgroups is a worldwide network of open discussion groups on thousands of subjects. They are 'open' in that they are not usually supervised or moderated and can be read by anyone that is interested. They are interesting spaces for debate, and there are several dedicated to educational themes. You will find more information on newsgroups in Chapter 2 and in Appendix B.

- Chat: This kind of program is a popular way to communicate in real time, that is, instantaneously. Whatever you type into a chat program is immediately visible to the other participants on their computers. You can chat to strangers from around the world who share your hobbies or interests, or even arrange to meet family or friends for a virtual reunion. MOO: This is a meeting place on the Net, one of several kinds of multi-user environments that have evolved from adventure games and role-playing simulations. MOOs are also used for serious educational purposes; some have special areas with interaction at a slower pace set up for EFL students from around the world.

Multimedia uses of the Internet require up-to-date computers and several extra bits of hardware and software. Not everyone has access to these applications, but they have been the real force behind the growth of the Internet over the past several years. They are:

- Videoconferencing: This is communicating via a live video link over the Internet. Conferencing and telephony applications usually cost no more to use than a local phone call, whether you are speaking to someone across town or on the other side of the world. However, they require a very fast, stable connection to the Net, special software; and of course, a video camera, microphone and speakers. Teachers have been making active use of this technology for several years now, especially in distance education and cross-curricular project work.

- The World Wide Web (WWW or Web for short): This is a multimedia resource and communications tool based on hypertext, a system of clickable links. When you click on a highlighted word or picture you are magically transported to that location - perhaps the next page in the document or another document altogether. Links are also used to view large pictures and to download video or audio files to your computer. This user-friendly application is the real driving force behind the Internet boom of the 1990s. In fact, it is so popular that you may hear people use the terms Web and Internet interchangeably. This is not so inaccurate as it may seem at first glance, since access to most of the older forms of the Internet is now built into the software for viewing the Web, called a web browser. You can read your e-mail, view newsgroup messages, do videoconferencing - and gain entry to many other useful programs we have not mentioned here - directly through your web browser.

Are teachers using the Internet?

No one really knows how many people are using the Internet. The figures published in the media are quite often just a mixture of informed guesswork and surveys. So how can we know whether teachers are using this technology? And if so, how is it being used by language teachers?

According to teachers' comments - at conferences, in papers and on the Internet mailing lists dedicated to ELT - they seem to use it for just about everything: development, updating language skills, finding materials, learning about computer applications, keeping in touch with friends and colleagues, teaching, working on class projects and activities, and just having fun.

Here are some adapted extracts from a study done by the Agora Language Marketplace. Since 1994, this organisation has been surveying language professionals - teachers, translators and interpreters - about their use of the Internet, and the findings show how teachers' use is increasing in parallel with the tremendous general growth in use of the Web.

Several trends seem to be emerging. Computers are becoming increasingly available in schools around the globe. Governments, teachers and parents are advocating the networking of these computers, and making long-range plans for their use at all levels of education. New demands are then being made on teachers to use the technology creatively, leading to a steep rise in the membership of relevant mailing lists and the number of available Internet training courses for teachers. Still, there are many parts of the technology that are not yet being exploited to their full potential, namely the audio and video components, and there is a real lack of substantial research into the pedagogical implications of the technology. However, teachers are showing some clear preferences towards two applications: e-mail and the Web.

How to use basic e-mail?

When Queen Elizabeth II sent her first e-mail message in 1976, she did it from an enormous supercomputer with a team of experts to help her. Two decades later the

technology has improved so much that we can use it from the privacy of our homes. The interface, the bit of the program you interact with, is so friendly that even small children can send e-mail by themselves. There are two common ways to get e-mail:

- If you travel frequently, or want to read your e-mail in several different locations, you might want to register with one of the hundreds of companies that provide e-mail access through the Web. There is no charge for this service, since advertisers cover most of the operating costs, but there are two definite drawbacks to using Web-based e-mail. Firstly, the services are so popular that access to your mail can be very slow, and secondly, because you must usually be online to use the service, you will be paying telephone and ISP charges for the entire time it takes you to read and reply to your messages.

- The customary way of using e-mail is by getting the service from your Internet Service Provider. Most ISPs offer you several e-mail accounts and the software to access them as part of their connections package. This is called POP mail. The only time you need to be online is to retrieve or send new messages. You can read and write the replies while you are disconnected from the Internet, saving lots of time and expense. For example: e-teacher@e-mail.ru, where e-teacher – the first bit is your name, or the user name given to you by your ISP; @ - the ‘at’ symbol divides the user name from the domain name; mail – this is the name of the company that provides your e-mail address: usually your ISP, or a free Web-based e-mail service; .ru – the last bit is the country or type of organization you have your e-mail with (.com = commercial provider, .edu = academic, .ac.uk = academic in the United Kingdom).

So if I were telling you my address I would say ‘My address is e dash teacher at e dash mail dot ru.’

E-mail addresses can be much longer of course. But reading them from left to right you will notice that they move from the specific to the general: individual_account@department.organization_name.organization_typexcountry

The dots are used to separate the domain name (the text after the @ sign) into these sections. Careful typing is needed to ensure you make no mistakes, such as leaving extra spaces, transposing letters or changing the case. E-teacher and e-teacher may be different people altogether.

Once you have the address of someone to write to you are pretty well set, and you write a message just as you would type any letter. E-mail then breaks the message down into bite-size packets of information before shipping them around the world at incredible speed to be reunited in the mailbox at the recipient's end. But let's take a closer look at how to begin.

The format of an e-mail message is similar to that of a memo or a fax. Messages are usually short and to the point, and the language is chatty and informal without being discourteous. One way to familiarise yourself with the writing style is to hang around a mailing list for a while and read other peoples messages.

It is always considerate to fill in the subject line with a concise description of the contents of the message, since that may be the only information the recipient has about your message as they sort through their e-mail.

When you have written your message, click on the Send or Queue button to send it to your out-box, a special file for mail waiting to be sent. When you have finished composing several messages, you can connect and send them all at once.

Receiving mail is just as simple. Click on Check Mail from within the File menu. After the program retrieves new messages to your in-box, you can read them at your leisure. To open a message just double-click on it.

After a while you may want to organise the messages you receive into folders called mailboxes. To begin with, an e-mail program usually provides you with an Inbox, for mail you have received; a Sent Items box, for mail you have sent; and a Trash (or Deleted Items) folder, for messages you do not want to keep. You can create as many specific mailboxes as you like, and folders within mailboxes, moving incoming messages to these folders once you have read them.

A favourite e-mail program among language teachers is Eudora Light. It costs nothing, is very simple to use and has excellent help files to get you started, which must be why it is so popular.

What is Netiquette?

There are some generally recognised conventions for sending electronic communications, which are collectively known as Netiquette. These standards are basically just common sense mixed with a bit of courtesy, and have developed over the years so that no one forgets that there is a human being at the other end of the telephone line. Here is a rough outline of accepted protocol:

1 **DON'T CAPITALISE EVERYTHING**: It looks as if you are shouting, and it is difficult to read. Save this technique for stressing important points.

2 **Spelling and grammar**: Before you send a message, read through it again and run it through a spell checker. But remember that e-mail is a high speed, multicultural form of communication, so be tolerant of other people's errors. People are generally more concerned with getting their message across than worrying about the details.

3 **Length**: Try to imagine yourself as the recipient of the message. How could you make it more concise? Avoid quoting long texts from other people just to say that you agree with them. Shorten your signature file to no more than four lines. Everyone is busy, and some people have to pay for e-mail by the line, or by the size of the file.

4 **Multiple recipients**: Being able to send the same message to more than one recipient is a very useful tool, but it can be considered abusive if used too much. Avoid cross-posting — sending duplicate messages to various mailing lists and newsgroups - as this can be very annoying for members of those groups. Don't send mass mailings of unsolicited material. This is called spamming, and it is condemned by the entire Internet community.

5. **Criticism**: Be careful what you read into other people's messages, because in the absence of para linguistic information it is easy to misinterpret what others are saying. This is why smiles, or emoticons, were invented - as simple ways to express intention. There are many different styles of smiley (you have to tilt your head to the left to understand them!):

:-) simply happy;

8^o surprised, worried or concerned;
=-(sad or cross.

Avoid meting out sharp criticism, which is called flaming. A simple dry comment could escalate quite rapidly into an all-out war just because the person at the receiving end cannot read your body language or does not share your cultural references.

Since no one entity owns or polices the Net, it is not mandatory to follow any particular rules. However, this advice might help make your experience of the Internet more pleasant. And if you are planning on using the Internet with students, it might be a good idea to run through these notes with them before they go online for the first time.

What is web browser?

The second application that teachers commonly use is the World Wide Web, a revolutionary idea based on a simple computer coding called **HTML**, hypertext markup language. This language makes it possible to integrate text with photos and multimedia - and connect it all too similar documents with clickable words called **hyperlinks** or **links**.

The bits between < > are called tags, and they tell the software what the web page is supposed to do: link to another page within the web site, have a yellow background, show pictures of friends, play a song. In order to read pages written in this code you need a web browser. A web browser reads these HTML tags, and presents you with a formatted document you can read.

There are many web browsers, but the two most popular are Netscape Navigator and Microsoft Internet Explorer. They are both freeware, meaning that they are software programs distributed free of charge. You should receive at least one of these programs bundled into the connection package from your ISP. If not, you will find browsers are often included on the CD-ROMs accompanying computer magazines and books.

Once you have a web browser on your computer, it is easy to download a newer version of it from the Internet. This will be handy later, when you run across multimedia files that require a specific browser or helper application.

How to use web browser?

When you first open your browser it will often connect to the Internet automatically, taking you right onto the Web. The web page that opens each time you connect is the browsers **home page**, the index page of your program's web site, so that you can get instant help and bulletins about updates to the software you are using.

You will notice that the browser creates a kind of frame around the web page you are viewing. The top part of the frame, which has drop-down menus and a toolbar, looks a bit like a word-processing program.

Here you can also find the address box, where the address of the web site appears when you open the browser. To change the address - and visit another web site - you double-click on the text in the box to highlight it, and then just type the new address on top. The moment you start typing the old text disappears. Hit the Enter key and your browser connects to the Internet to find that web site. Once it retrieves it, or downloads it, the new web page will appear in the frame.

The address, or **URL** (uniform resource locator), can be broken down into sections, like the e-mail address we looked at earlier. Here is the address for the home page at the Pearson Education web site: <http://www.pearsoned-ema.com>

http – hypertext transfer protocol. This means that you are looking for a Web document with links and multimedia files.

pearsoned-ema.com is the domain name: the **server**, plus the type of organization (in this case commercial).

:// - This symbol just divides the type of document or protocol from the domain name on the right.

www – the World Wide Web.

Names designed for computers can be very long and complex. There are some tricks to speed up the entry process. For example, if an address reads <http://www.teeler.com> all you need to really type in is 'teeler' and the browser assumes the rest. This is the default setting for web browsers, since most companies use this format for their address.

But why type in the address at all? Usually you can just click on a link from the page you are visiting, or cut-and-paste the address from an e-mail message or any other computer document. And to really save time you can click on one of the buttons on the toolbar: **bookmarks**.

The **bookmarks** file, called **favorites** in *Internet Explorer*, allows you to create a shortcut from your browser to a specific page within a web site. If you visit a web page more than two or three times, it is sensible to 'bookmark' it, that is, to flag it for later reference. To do this, click on Bookmarks and select Add to Bookmarks. This places the address in the bookmarks file. Later you can edit your file to give the bookmarks memorable names, file them into separate folders or even automatically update the addresses that have changed. Bookmarking is a wonderful feature when you are using the Web with students because you can bookmark lots of web pages in advance, in a folder labelled with the class's name. When students come in, they open the bookmarks file, find the folder for their class and click on the page name to quickly open that page in the browser.

Another option, Font, allows you to change the appearance of the web page on your screen. You can make the text larger or smaller by clicking on Font, which can be really useful if you are working on a small screen.

You can also turn the images off to navigate the Web more quickly. This is a great money saver because you can load pages more quickly, but it also takes a lot of the joy out of using the Web.

You can turn the toolbar off (make it disappear) and also the address box if they are taking up too much of your viewing space, using the Options menu in Netscape Navigator or the View menu in Internet Explorer. You repeat the procedure to make

them reappear. Most of the other features of the toolbar are for navigation. Back and Forward buttons do just what they say: move one step backwards to where you have just been, or one step forwards from a page you went back to. But if you right-click on the same button, a menu drops down to show you all the places you have visited while online that day. Click on the name of a page in this menu to jump directly to it. You can also go back to sites you have already visited by clicking on an arrow to the right of the address box (on some browsers), or by clicking on History. This opens the history folder, a record of all the web sites you have visited in the last week or month.

Your browser stores, or **caches**, all the web pages you visit in a part of your computer called the cache. This means that when you click on a page in the history folder it loads the page faster because it opens the site directly from the information in the cache first. The cache takes up a lot of space on your computer so your browser empties it periodically to free up memory.

However, sometimes the information on a page from the cache is outdated. When you need to see a newer version of a web page - for example, a newspaper that changes every day - you click the Reload or Refresh button. The browser will now skip the version in the cache and load a fresh copy from the Internet.

The Home button takes you directly back to the web browser's home page. You can change this option easily, and select any web page you like as your default home page - that is, the page that will open automatically each time you connect to the Web.

Details of the specific features of your web browser can be found in the browser's help file, in the drop-down help menu on the toolbar. So if you are using the Web for the first time, you can read through it.

So the toolbar forms the top part of the frame around a web page. The other three sides of the frame are composed of: the scroll bar on the right, which you use to move up and down a page that is too long for your screen; the status bar at the bottom, which tells you what the browser is doing; and a function-less side on the left.

Navigating the Web

Navigating round a web site itself is very easy. It is what is called **point-and-click** technology. You point your mouse at a link and click, which transports you to another page within the web site or to another location altogether. How do you know if something is a link?

- **Links** are usually highlighted in a different colour from the rest of the text, and they may be underlined. This system of links is called hypertext. When you visit a link it should change colour, to remind you later that you have already seen it.

- If you pass your mouse over different bits of text and pictures the cursor will change, normally from an arrow to a hand. The hand means that you can click there because it is a link. You can tell where the link will take you by watching the address change in the status bar, at the bottom of the browser.

Links can lead to other things as well. You can download software by simply clicking on a link and following the instructions that appear. Links can also be

connections to audio and video files, which use special software programs that are integrated into the browser to play them back. These are called helper applications or **plug-ins**.

Although the technology is easy, it takes a while to become comfortable with the general format of a web page. You will soon begin to know just where to look for links and how to find the information you need on the page. And as you browse around the Web you will grow familiar with the various styles and designs that are popular, and you will almost certainly run across both extremes of the spectrum: long pages of nearly unformatted text and truly spectacular multimedia extravaganzas.

For many users there is little more to the Internet than this, the ubiquitous Web, with e-mail running a distant second. But there are many other applications besides, some of which are useful to English language teachers. As we examine the different ways the Internet can be used in English language teaching, we will look at a few of these other applications. [18]

6. 7 Text XI “Molecular Technology Today” [19]

6.7.1 Read and translate the first part of the text

Coal and diamonds, sand and [computer chips](#), cancer and healthy tissue: throughout history, variations in the arrangement of [atoms](#) have distinguished the cheap from the cherished, the diseased from the healthy. Arranged one way, atoms make up soil, air, and water; arranged another, they make up ripe strawberries. Arranged one way, they make up homes and fresh air; arranged another, they make up ash and smoke.

Our ability to arrange atoms lies at the foundation of technology. We have come far in our atom arranging, from chipping flint for arrowheads to machining aluminum for spaceships. We take pride in our technology, with our lifesaving drugs and desktop computers. Yet our spacecraft are still crude, our computers are still stupid, and the molecules in our tissues still slide into disorder, first destroying health, then life itself. For all our advances in arranging atoms, we still use primitive methods. With our present technology, we are still forced to handle atoms in unruly herds.

But the laws of nature leave plenty of room for progress, and the pressures of world competition are even now pushing us forward. For better or for worse, the greatest technological breakthrough in history is still to come.

6.7.2 Compare the given translation and your own one. Match sentences from the previous exercise with the following ones. Whose translation is better?

Уголь и алмазы, песок и компьютерные чипы, раковая опухоль и здоровая ткань - на протяжении всего развития, в зависимости от упорядочения атомов, возникало дешевое или драгоценное, больное или здоровое. Упорядоченные по-разному, атомы образуют почву, воздух и воду; а еще - спелую землянику; дома и воздух; золу и дым.

Наша способность упорядочивать атомы лежит в основе развития технологий. Мы многому научились, упорядочивая атомы так или иначе, с заточки кремня для наконечников стрел до обработки алюминия для космических кораблей. Мы гордимся нашими технологиями; нашими лекарствами, спасающими жизнь и настольными компьютерами. Однако наши космические корабли всё ещё неуклюжи, наши компьютеры всё ещё глупы, а молекулы в наших тканях всё ещё со временем приходят в беспорядок, вначале разрушая здоровье, а затем и саму жизнь. При всех наших успехах в упорядочении атомов мы всё ещё используем примитивные методы упорядочения. При наличии современных технологий мы всё ещё вынуждены манипулировать большими, плохо управляемыми группами атомов.

Но законы природы дают много возможностей для прогресса, а мировая конкуренция двигает нас вперед. На счастье или на беду, но самое большое технологическое достижение в истории всё ещё нас ожидает впереди.

6.7.3 Continue reading the text and find the main sentences

Two Styles of Technology

Our modern technology builds on an ancient tradition. Thirty thousand years ago, chipping flint was the high technology of the day. Our ancestors grasped stones containing trillions of trillions of atoms and removed chips containing billions of trillions of atoms to make their axheads; they made fine work with skills difficult to imitate today. They also made [patterns on cave walls in France](#) with sprayed paint, using their hands as stencils. Later they made pots by baking clay, then bronze by cooking rocks. They shaped bronze by pounding it. They made iron, then steel, and shaped it by heating, pounding, and removing chips.

We now cook up pure ceramics and stronger steels, but we still shape them by pounding, chipping, and so forth. We cook up pure silicon, saw it into slices, and make patterns on its surface using tiny stencils and sprays of light. We call the products "chips" and we consider them exquisitely small, at least in comparison to axheads.

Our microelectronic technology has managed to stuff machines as powerful as the room-sized computers of the early 1950s onto a few silicon chips in a pocket-sized computer. Engineers are now making ever smaller devices, slinging herds of atoms at a [crystal](#) surface to build up wires and components one tenth the width of a fine hair.

These microcircuits may be small by the standards of flint chippers, but each transistor still holds trillions of atoms, and so-called "microcomputers" are still visible to the naked eye. By the standards of a newer, more powerful technology they will seem gargantuan.

The ancient style of technology that led from flint chips to silicon chips handles atoms and molecules in bulk; call it [bulk technology](#). The new technology will handle individual atoms and molecules with control and precision; call it molecular technology. It will change our world in more ways than we can imagine.

Microcircuits have parts measured in micrometers - that is, in millionths of a meter - but molecules are measured in nanometers (a thousand times smaller). We can use the terms "nanotechnology" and "molecular technology" interchangeably to describe the new style of technology. The engineers of the new technology will build both nanocircuits and nanomachines. [19]

6.7.4 Read the next part and then retell it

Molecular Technology Today

[One dictionary](#) definition of a machine is "any system, usually of rigid bodies, formed and connected to alter, transmit, and direct applied forces in a predetermined manner to accomplish a specific objective, such as the performance of useful work." Molecular machines fit this definition quite well.

To imagine these machines, one must first picture molecules. We can picture atoms as beads and molecules as clumps of beads, like a child's beads linked by snaps. In fact, chemists do sometimes visualize molecules by building models from plastic beads (some of which link in several directions, like the hubs in a Tinkertoy set). Atoms are rounded like beads, and although molecular bonds are not snaps, our picture at least captures the essential notion that bonds can be broken and reformed.

If an atom were the size of a small marble, a fairly complex [molecule](#) would be the size of your fist. This makes a useful mental image, but atoms are really about 1/10,000 the size of [bacteria](#), and bacteria are about 1/10,000 the size of mosquitoes. (An atomic [nucleus](#), however, is about 1/100,000 the size of the atom itself; the difference between an atom and its nucleus is the difference between a fire and a nuclear reaction.)

The things around us act as they do because of the way their molecules behave. Air holds neither its shape nor its volume because its molecules move freely, bumping and ricocheting through open space. Water molecules stick together as they move about, so water holds a constant volume as it changes shape. Copper holds its shape because its atoms stick together in regular patterns; we can bend it and hammer it because its atoms can slip over one another while remaining bound together. Glass shatters when we hammer it because its atoms separate before they slip. Rubber consists of networks of kinked molecules, like a tangle of springs. When stretched and released, its molecules straighten and then coil again. These simple molecular patterns make up passive substances. More complex patterns make up the active nanomachines of living [cells](#).

Biochemists already work with these machines, which are chiefly made of protein, the main engineering material of living cells. These molecular machines have relatively few atoms, and so they have lumpy surfaces, like objects made by gluing together a handful of small marbles. Also, many pairs of atoms are linked by bonds that can bend or rotate, and so protein machines are unusually flexible. But like all machines, they have parts of different shapes and sizes that do useful work. All machines use clumps of atoms as parts. Protein machines simply use very small clumps.

Biochemists dream of designing and building such devices, but there are difficulties to be overcome. Engineers use beams of light to project patterns onto silicon chips, but chemists must build much more indirectly than that. When they combine molecules in various sequences, they have only limited control over how the molecules join. When biochemists need complex molecular machines, they still have to borrow them from cells. Nevertheless, advanced molecular machines will eventually let them build nanocircuits and nanomachines as easily and directly as engineers now build microcircuits or washing machines. Then progress will become swift and dramatic.

Genetic engineers are already showing the way. Ordinarily, when chemists make molecular chains - called "polymers" - they dump molecules into a vessel where they bump and snap together haphazardly in a liquid. The resulting chains have varying lengths, and the molecules are strung together in no particular order.

But in [modern gene synthesis machines](#), genetic engineers build more orderly polymers - specific [DNA](#) molecules - by combining molecules in a particular order. These molecules are the nucleotides of DNA (the letters of the genetic alphabet) and genetic engineers don't dump them all in together. Instead, they direct the machine to add different nucleotides in a particular sequence to spell out a particular message. They first bond one kind of [nucleotide](#) to the chain ends, then wash away the leftover material and add chemicals to prepare the chain ends to bond the next nucleotide. They grow chains as they bond on nucleotides, one at a time, in a programmed sequence. They anchor the very first nucleotide in each chain to a solid surface to keep the chain from washing away with its chemical bathwater. In this way, they have a big clumsy machine in a cabinet assemble specific molecular structures from parts a hundred million times smaller than itself.

But this blind assembly process accidentally omits nucleotides from some chains. The likelihood of mistakes grows as chains grow longer. Like workers discarding bad parts before assembling a car, genetic engineers reduce errors by discarding bad chains. Then, to join these short chains into working genes (typically thousands of nucleotides long), they turn to molecular machines found in bacteria.

These protein machines, called restriction enzymes, "read" certain DNA sequences as "cut here." They read these genetic patterns by touch, by sticking to them, and they cut the chain by rearranging a few atoms. Other [enzymes](#) splice pieces together, reading matching parts as "glue here" - likewise "reading" chains by selective stickiness and splicing chains by rearranging a few atoms. By using gene machines to write, and restriction enzymes to cut and paste, genetic engineers can write and edit whatever DNA messages they choose.

But by itself, DNA is a fairly worthless molecule. It is neither strong like Kevlar, nor colorful like a dye, nor active like an enzyme, yet it has something that industry is prepared to spend millions of dollars to use: the ability to direct molecular machines called ribosomes. In cells, molecular machines first transcribe DNA, copying its information to make [RNA](#) "tapes." Then, much as old numerically controlled machines shape metal based on instructions stored on tape, ribosomes build proteins based on instructions stored on RNA strands. And proteins are useful.

Proteins, like DNA, resemble strings of lumpy beads. But unlike DNA, protein molecules fold up to form small objects able to do things. Some are enzymes, machines that build up and tear down molecules (and copy DNA, transcribe it, and build other proteins in the cycle of life). Other proteins are hormones, binding to yet other proteins to signal cells to change their behavior. Genetic engineers can produce these objects cheaply by directing the cheap and efficient molecular machinery inside living organisms to do the work. Whereas engineers running a chemical plant must work with vats of reacting chemicals (which often misarrange atoms and make noxious byproducts), engineers working with bacteria can make them absorb chemicals, carefully rearrange the atoms, and store a product or release it into the fluid around them.

Genetic engineers have now programmed bacteria to make proteins ranging from human growth hormone to rennin, an enzyme used in making cheese. The pharmaceutical company [Eli Lilly \(Indianapolis\)](#) is now marketing Humulin, human insulin molecules made by bacteria. [19]

6.7.5 Existing Protein Machines

These protein hormones and enzymes selectively stick to other molecules. An enzyme changes its target's structure, then moves on; a hormone affects its target's behavior only so long as both remain stuck together. Enzymes and hormones can be described in mechanical terms, but their behavior is more often described in chemical terms.

But [other proteins serve basic mechanical functions](#). Some push and pull, some act as cords or struts, and parts of some molecules make excellent bearings. The machinery of muscle, for instance, has gangs of proteins that reach, grab a "rope" (also made of protein), pull it, then reach out again for a fresh grip; whenever you move, you use these machines. Amoebas and human cells move and change shape by using fibers and rods that act as molecular muscles and bones. A reversible, variable-speed motor drives bacteria through water by turning a corkscrew-shaped propeller. If a hobbyist could build tiny cars around such motors, several billions of billions would fit in a pocket, and 150-lane freeways could be built through your finest [capillaries](#).

Simple molecular devices combine to form systems resembling industrial machines. In the 1950s engineers developed machine tools that cut metal under the control of a punched paper tape. A century and a half earlier, Joseph-Marie Jacquard had built a loom that wove complex patterns under the control of a chain of punched cards. Yet over three billion years before Jacquard, cells had developed the machinery of the [ribosome](#). Ribosomes are proof that nanomachines built of protein and RNA can be programmed to build complex molecules.

Then consider viruses. One kind, the [T₄ phage](#), acts like a spring-loaded syringe and looks like something out of an industrial parts catalog. It can stick to a bacterium, punch a hole, and inject viral DNA (yes, even bacteria suffer infections). Like a conqueror seizing factories to build more tanks, this DNA then directs the cell's machines to build more viral DNA and syringes. Like all organisms, these

viruses exist because they are fairly stable and are good at getting copies of themselves made.

Whether in cells or not, nanomachines obey the universal laws of nature. Ordinary chemical bonds hold their atoms together, and ordinary chemical reactions (guided by other nanomachines) assemble them. Protein molecules can even join to form machines without special help, driven only by thermal agitation and chemical forces. By mixing viral proteins (and the DNA they serve) in a test tube, molecular biologists have assembled working T₄ viruses. This ability is surprising: imagine putting automotive parts in a large box, shaking it, and finding an assembled car when you look inside! Yet the T₄ [virus](#) is but one of many [self-assembling structures](#). Molecular biologists have taken the machinery of the ribosome apart into over fifty separate protein and RNA molecules, and then combined them in test tubes to form working ribosomes again.

To see how this happens, imagine different T₄ protein chains floating around in water. Each kind folds up to form a lump with distinctive bumps and hollows, covered by distinctive patterns of oiliness, wetness, and electric charge. Picture them wandering and tumbling, jostled by the thermal vibrations of the surrounding water molecules. From time to time two bounce together, then bounce apart. Sometimes, though, two bounce together and fit, bumps in hollows, with sticky patches matching; they then pull together and stick. In this way protein adds to protein to make sections of the virus, and sections assemble to form the whole.

Protein engineers will not need nanoarms and nanohands to assemble complex nanomachines. Still, tiny manipulators will be useful and they will be built. Just as today's engineers build machinery as complex as player pianos and robot arms from ordinary motors, bearings, and moving parts, so tomorrow's biochemists will be able to use protein molecules as motors, bearings, and moving parts to build robot arms which will themselves be able to handle individual molecules. [19]

6.7.6 Designing with Protein

How far off is such an ability? Steps have been taken, but much work remains to be done. Biochemists have already mapped the structures of many proteins. With gene machines to help write DNA tapes, they can direct cells to build [any protein they can design](#). But they still don't know how to design chains that will fold up to make proteins of the right shape and function. The forces that fold proteins are weak, and the number of plausible ways a protein might fold is astronomical, so designing a large protein from scratch isn't easy.

The forces that stick proteins together to form complex machines are the same ones that fold the protein chains in the first place. The differing shapes and kinds of stickiness of [amino acids](#) - the lumpy molecular "beads" forming protein chains - make each protein chain fold up in a specific way to form an object of a particular shape. Biochemists have learned rules that suggest how an amino acid chain might fold, but the rules aren't very firm. Trying to predict how a chain will fold is like trying to work a jigsaw puzzle, but a puzzle with no pattern printed on its pieces to show when the fit is correct, and with pieces that seem to fit together about as well

(or as badly) in many different ways, all but one of them wrong. False starts could consume many lifetimes, and a correct answer might not even be recognized. Biochemists using the best computer programs now available still cannot predict how a long, natural protein chain will actually fold, and some of them have despaired of designing protein molecules soon.

Yet most biochemists work as scientists, not as engineers. They work at predicting how natural proteins will fold, not at designing proteins that will fold predictably. [These tasks may sound similar](#), but they differ greatly: the first is a scientific challenge, the second is an [engineering](#) challenge. Why should natural proteins fold in a way that scientists will find easy to predict? All that nature requires is that they in fact fold correctly, not that they fold in a way obvious to people.

Proteins could be designed from the start with the goal of making their folding more predictable. Carl Pabo, [writing in the journal Nature](#), has suggested a design strategy based on this insight, and some biochemical engineers have designed and built [short chains of a few dozen pieces](#) that fold and nestle onto the surfaces of other molecules as planned. [They have designed from scratch a protein](#) with properties like those of melittin, a toxin in bee venom. They have modified existing enzymes, [changing their behaviors in predictable ways](#). Our understanding of proteins is growing daily.

In 1959, [according to biologist Garrett Hardin](#), some geneticists called genetic engineering impossible; today, it is an industry. Biochemistry and computer-aided design are now exploding fields, and as [Frederick Blattner wrote in the journal Science](#), "computer chess programs have already reached the level below the grand master. Perhaps the solution to the protein-folding problem is nearer than we think." [William Rastetter](#) of [Genentech](#), writing in [Applied Biochemistry and Biotechnology](#) asks, "How far off is de novo enzyme design and synthesis? Ten, fifteen years?" He answers, "Perhaps not that long."

Forrest Carter of the [U.S. Naval Research Laboratory](#), Ari Aviram and Philip Seiden of [IBM](#), Kevin Ulmer of Genex Corporation, and other researchers in university and industrial laboratories around the globe have already begun theoretical work and experiments aimed at developing molecular switches, memory devices, and other structures that could be incorporated into a protein-based computer. The U.S. Naval Research Laboratory has held [two international workshops on molecular electronic devices](#), and a meeting sponsored by the [U.S. National Science Foundation](#) has [recommended support for basic research](#) aimed at developing molecular computers. Japan has reportedly begun a multimillion-dollar program aimed at developing self-assembling molecular motors and computers, and [VLSI Research Inc.](#), of San Jose, [reports](#) that "It looks like the race to bio-chips [another term for molecular electronic systems] has already started. [NEC](#), [Hitachi](#), [Toshiba](#), [Matsushita](#), [Fujitsu](#), [Sanyo-Denki](#) and [Sharp](#) have commenced full-scale research efforts on bio-chips for bio-computers."

Biochemists have other reasons to want to learn the art of protein design. New enzymes promise to perform dirty, expensive chemical processes more cheaply and cleanly, and novel proteins will offer a whole new spectrum of tools to biotechnologists. We are already on the road to protein engineering, and as Kevin

Ulmer notes in the quote from Science that heads this chapter, this road leads "toward a more general capability for molecular engineering which would allow us to structure matter atom by atom." [19]

6.7.7 Second-Generation Nanotechnology

Despite its versatility, protein has shortcomings as an engineering material. Protein machines quit when dried, freeze when chilled, and cook when heated. We do not build machines of flesh, hair, and gelatin; over the centuries, we have learned to use our hands of flesh and bone to build machines of wood, ceramic, steel, and plastic. We will do likewise in the future. We will use protein machines to build nanomachines of tougher stuff than protein.

As nanotechnology moves beyond reliance on proteins, it will grow more ordinary from an engineer's point of view. Molecules will be assembled like the components of an erector set, and well-bonded parts will stay put. Just as ordinary tools can build ordinary machines from parts, so molecular tools will bond molecules together to make tiny gears, motors, levers, and casings, and assemble them to make complex machines.

Parts containing only a few atoms will be lumpy, but engineers can work with lumpy parts if they have smooth bearings to support them. Conveniently enough, some bonds between atoms make fine bearings; a part can be mounted [by means of a single chemical bond](#) that will let it turn freely and smoothly. Since a bearing can be made using only two atoms (and since moving parts need have only a few atoms), nanomachines can indeed have mechanical components of molecular size.

How will these better machines be built? Over the years, engineers have used technology to improve technology. They have used metal tools to shape metal into better tools, and computers to design and program better computers. They will likewise use protein nanomachines to build better nanomachines. Enzymes show the way: they assemble large molecules by "grabbing" small molecules from the water around them, then holding them together so that a bond forms. Enzymes assemble DNA, RNA, proteins, fats, hormones, and chlorophyll in this way - indeed, virtually the whole range of molecules found in living things.

Biochemical engineers, then, will construct new enzymes to assemble new patterns of atoms. For example, they might make an enzyme-like machine which will add carbon atoms to a small spot, layer on layer. If bonded correctly, the atoms will build up to form a fine, flexible [diamond fiber](#) having over fifty times as much strength as the same weight of aluminum. Aerospace companies will line up to buy such fibers by the ton to make advanced composites. (This shows one small reason why military competition will drive molecular technology forward, as it has driven so many fields in the past.)

But the great advance will come when protein machines are able to make structures more complex than mere fibers. These programmable protein machines will resemble ribosomes programmed by RNA, or the older generation of automated machine tools programmed by punched tapes. They will open a new world of

possibilities, letting engineers escape the limitations of proteins to build rugged, compact machines with straightforward designs.

Engineered proteins will split and join molecules as enzymes do. Existing proteins bind a variety of smaller molecules, using them as chemical tools; newly engineered proteins will use all these tools and more.

Further, organic chemists have shown that chemical reactions can produce remarkable results even without nanomachines to guide the molecules. Chemists have no direct control over the tumbling motions of molecules in a liquid, and so the molecules are free to react in any way they can, depending on how they bump together. Yet chemists nonetheless [coax reacting molecules](#) to form regular structures such as cubic and dodecahedral molecules, and to form unlikely-seeming structures such as molecular rings with highly strained bonds. Molecular machines will have still greater versatility in bondmaking, because they can use similar molecular motions to make bonds, but can guide these motions in ways that chemists cannot.

Indeed, because chemists cannot yet direct molecular motions, they can seldom assemble complex molecules according to specific plans. The largest molecules they can make with specific, complex patterns are all linear chains. Chemists form these patterns (as in gene machines) by adding molecules in sequence, one at a time, to a growing chain. With only one possible bonding site per chain, they can be sure to add the next piece in the right place.

But if a rounded, lumpy molecule has (say) a hundred hydrogen atoms on its surface, how can chemists split off just one particular atom (the one five up and three across from the bump on the front) to add something in its place? Stirring simple chemicals together will seldom do the job, because small molecules can seldom select specific places to react with a large molecule. But protein machines will be more choosy.

A flexible, programmable protein machine will grasp a large molecule (the workpiece) while bringing a small molecule up against it in just the right place. Like an enzyme, it will then bond the molecules together. By bonding molecule after molecule to the workpiece, the machine will assemble a larger and larger structure while keeping complete control of how its atoms are arranged. This is the key ability that chemists have lacked.

Like ribosomes, such nanomachines can work under the direction of molecular tapes. Unlike ribosomes, they will handle a wide variety of small molecules (not just amino acids) and will join them to the workpiece anywhere desired, not just to the end of a chain. Protein machines will thus combine the splitting and joining abilities of enzymes with the programmability of ribosomes. But whereas ribosomes can build only the loose folds of a protein, these protein machines will build small, solid objects of metal, ceramic, or diamond - invisibly small, but rugged.

Where our fingers of flesh are likely to bruise or burn, we turn to steel tongs. Where protein machines are likely to crush or disintegrate, we will turn to nanomachines made of tougher stuff. [19]

6.7.8 Universal Assemblers

These second-generation nanomachines - built of more than just proteins - [will do all that proteins can do, and more](#). In particular, some will serve as improved devices for assembling molecular structures. Able to tolerate acid or vacuum, freezing or baking, depending on design, enzyme-like second-generation machines will be able to use as "tools" almost any of the reactive molecules used by chemists - but they will wield them with the precision of programmed machines. They will be able to bond atoms together in virtually any stable pattern, adding a few at a time to the surface of a workpiece until a complex structure is complete. Think of such nanomachines as [assemblers](#).

Because assemblers will let us place atoms in [almost any reasonable arrangement \(as discussed in the Notes\)](#), they will let us build almost anything that the laws of nature allow to exist. In particular, they will let us build almost anything we can design - including more assemblers. The consequences of this will be profound, because our crude tools have let us explore only a small part of the range of possibilities that natural law permits. Assemblers will open a world of new technologies.

Advances in the technologies of medicine, space, computation, and production - and warfare - all depend on our ability to arrange atoms. With assemblers, we will be able to remake our world or destroy it. So at this point it seems wise to step back and look at the prospect as clearly as we can, so we can be sure that assemblers and nanotechnology are not a mere futurological mirage. [19]

6.7.9 Read the text and then correct the sentences below

Nailing Down Conclusions

In everything I have been describing, I have stuck closely to the demonstrated facts of chemistry and molecular biology. Still, people regularly raise certain questions rooted in physics and biology. These deserve more direct answers.

Will the uncertainty principle of quantum physics make molecular machines unworkable?

This principle states (among other things) that particles can't be pinned down in an exact location for any length of time. It limits what molecular machines can do, just as it limits what anything else can do. Nonetheless, calculations show that the uncertainty principle places few important limits on how well atoms can be held in place, at least for the purposes outlined here. The uncertainty principle makes electron positions quite fuzzy, and in fact this fuzziness determines the very size and structure of atoms. An atom as a whole, however, has a comparatively definite position set by its comparatively massive nucleus. If atoms didn't stay put fairly well, molecules would not exist. One needn't study quantum mechanics to trust these conclusions, because molecular machines in the cell demonstrate that molecular machines work.

Will the molecular vibrations of heat make molecular machines unworkable or too unreliable for use?

Thermal vibrations will cause greater problems than will the uncertainty principle, yet here again existing molecular machines directly demonstrate that molecular machines can work at ordinary temperatures. Despite thermal vibrations, [the DNA-copying machinery in some cells](#) makes less than one error in 100,000,000,000 operations. To achieve this accuracy, however, cells use machines (such as the enzyme DNA polymerase I) that proofread the copy and correct errors. Assemblers may well need similar error-checking and error-correcting abilities, if they are to produce reliable results.

Will radiation disrupt molecular machines and render them unusable?

High-energy radiation can break chemical bonds and disrupt molecular machines. Living cells once again show that solutions exist: they operate for years by [repairing and replacing radiation-damaged parts](#). Because individual machines are so tiny, however, they present small targets for radiation and are seldom hit. Still, if a system of nanomachines must be reliable, then it will have to tolerate a certain amount of damage, and damaged parts must regularly be repaired or replaced. This approach to reliability is well known to designers of aircraft and spacecraft.

Since [evolution](#) has failed to produce assemblers, does this show that they are either impossible or useless?

The earlier questions were answered in part by pointing to the working molecular machinery of cells. This makes a simple and powerful case that natural law permits small clusters of atoms to behave as controlled machines, able to build other nanomachines. Yet despite their basic resemblance to ribosomes, assemblers will differ from anything found in cells; the things they do - while consisting of ordinary molecular motions and reactions - will have novel results. No cell, for example, makes diamond fiber.

The idea that new kinds of nanomachinery will bring new, useful abilities may seem startling: in all its billions of years of evolution, [life has never abandoned its basic reliance on protein machines](#). Does this suggest that improvements are impossible, though? Evolution progresses through small changes, and evolution of DNA cannot easily replace DNA. Since the DNA/RNA/ribosome system is specialized to make proteins, life has had no real opportunity to evolve an alternative. Any production manager can well appreciate the reasons; even more than a factory, life cannot afford to shut down to replace its old systems.

Improved molecular machinery should no more surprise us than alloy steel being ten times stronger than bone, or copper wires transmitting signals a million times faster than nerves. Cars outspeed cheetahs, jets outfly falcons, and computers already outcalculate head-scratching humans. The future will bring further examples of improvements on biological evolution, of which second-generation nanomachines will be but one.

In physical terms, it is clear enough why advanced assemblers will be able to do more than existing protein machines. They will be programmable like ribosomes, but they will be able to use a wider range of tools than all the enzymes in a cell put together. Because they will be made of materials far more strong, stiff, and stable

than proteins, they will be able to exert greater forces, move with greater precision, and endure harsher conditions. Like an industrial robot arm - but unlike anything in a living cell - they will be able to rotate and move molecules in three dimensions under programmed control, making possible the precise assembly of complex objects. These advantages will enable them to assemble a far wider range of molecular structures than living cells have done.

Is there some special magic about life, essential to making molecular machinery work?

One might doubt that artificial nanomachines could even equal the abilities of nanomachines in the cell, if there were reason to think that cells contained some special magic that makes them work. This idea is called "[vitalism](#)." Biologists have abandoned it because they have found chemical and physical explanations for every aspect of living cells yet studied, including their motion, growth, and reproduction. Indeed, this knowledge is the very foundation of biotechnology.

Nanomachines floating in sterile test tubes, free of cells, have been made to perform all the basic sorts of activities that they perform inside living cells. Starting with chemicals that can be made from smoggy air, biochemists have built working protein machines without help from cells. [R. B. Merrifield, for example, used chemical techniques](#) to assemble simple amino acids to make bovine pancreatic [ribonuclease](#), an enzymatic device that disassembles RNA molecules. Life is special in structure, in behavior, and in what it feels like from the inside to be alive, yet the laws of nature that govern the machinery of life also govern the rest of the universe.

The case for the feasibility of assemblers and other nanomachines may sound firm, but why not just wait and see whether they can be developed?

Sheer curiosity seems reason enough to examine the possibilities opened by nanotechnology, but there are stronger reasons. These developments will sweep the world within ten to fifty years - that is, within the expected lifetimes of ourselves or our families. What is more, the conclusions of the following chapters suggest that a wait-and-see policy would be very expensive - that it would cost many millions of lives, and perhaps end life on Earth.

Is the case for the feasibility of nanotechnology and assemblers firm enough that they should be taken seriously? It seems so, because the heart of the case rests on two well-established facts of science and engineering. These are (1) that existing molecular machines serve a range of basic functions, and (2) that parts serving these basic functions can be combined to build complex machines. Since chemical reactions can bond atoms together in diverse ways, and since molecular machines can direct chemical reactions according to programmed instructions, assemblers definitely are feasible. [19]

- 1 Particles can be pinned down in an exact location for any length of time.
- 2 High-energy radiation can break present computers and machines.
- 3 Somebody's laziness seems reason enough to examine the possibilities opened by nanotechnology.
- 4 Assemblers definitely are useless in modern computers.

5 Scientists, biochemists, have built working protein machines with the help from polluted air.

10 Biologists have proved that cells contained some special magic that makes them work.

6.7.10 Read the text and answer the questions below

Nanocomputers

Assemblers will bring one breakthrough of obvious and basic importance: engineers will use them to shrink the size and cost of computer circuits and speed their operation by enormous factors.

With today's bulk technology, engineers make patterns on silicon chips by throwing atoms and photons at them, but the patterns remain flat and molecular-scale flaws are unavoidable. With assemblers, however, engineers will build circuits in three dimensions, and build to atomic precision. The exact limits of electronic technology today remain uncertain because the quantum behavior of electrons in complex networks of tiny structures presents complex problems, some of them resulting directly from the uncertainty principle. Whatever the limits are, though, they will be reached with the help of assemblers.

The fastest computers will use electronic effects, but the smallest may not. This may seem odd, yet the essence of computation has nothing to do with electronics. A digital computer is a collection of switches able to turn one another on and off. Its switches start in one pattern (perhaps representing $2 + 2$), then switch one another into a new pattern (representing 4), and so on. Such patterns can represent almost anything. Engineers build computers from tiny electrical switches connected by wires simply because mechanical switches connected by rods or strings would be big, slow, unreliable, and expensive, today.

The idea of a purely mechanical computer is scarcely new. In England during the mid-1800s, [Charles Babbage invented a mechanical computer built of brass gears](#); his co-worker [Augusta Ada, the Countess of Lovelace](#), invented computer programming. Babbage's endless redesigning of the machine, problems with accurate manufacturing, and opposition from budget-watching critics (some doubting the usefulness of computers!), combined to prevent its completion.

In this tradition, Danny Hillis and Brian Silverman of the [MIT Artificial Intelligence Laboratory](#) built a special-purpose mechanical computer able to play tic-tac-toe. Yards on a side, full of rotating shafts and movable frames that represent the state of the board and the strategy of the game, it now stands in the [Computer Museum in Boston](#). It looks much like a large ball-and-stick molecular model, for it is built of Tinkertoys.

Brass gears and Tinkertoys make for big, slow computers. With components a few atoms wide, though, a simple mechanical computer would fit within 1/100 of a cubic micron, many billions of times more compact than today's so-called microelectronics. Even with [a billion bytes of storage, a nanomechanical computer could fit in a box a micron wide](#), about the size of a bacterium. And it would be fast.

Although [mechanical signals](#) move about 100,000 times slower than the electrical signals in today's machines, they will need to travel only 1/1,000,000 as far, and thus will face less delay. So a mere mechanical computer will work faster than the electronic whirl-winds of today.

Electronic nanocomputers will likely be thousands of times faster than electronic microcomputers - perhaps hundreds of thousands of times faster, if [a scheme proposed by Nobel Prize-winning physicist Richard Feynman](#) works out. Increased speed through decreased size is an old story in electronics. [19]

- 1 What makes possible to shrink the size and cost of computer circuits?
- 2 What have engineers reached the exact limits of electronic technology with?
- 3 Who invented a mechanical computer built of brass gears?
- 4 Who was the first programmer?
- 5 Where is the Computer Museum?
- 6 Do you believe in a computer about the size of a bacterium?

6.7.11 Read the next part and make a plan

Disassemblers

Molecular computers will control molecular assemblers, providing the swift flow of instructions needed to direct the placement of vast numbers of atoms. Nanocomputers with molecular memory devices will also store data generated by a process that is the opposite of assembly.

Assemblers will help engineers synthesize things; their relatives, [disassemblers](#), will help scientists and engineers analyze things. The case for assemblers rests on the ability of enzymes and chemical reactions to form bonds, and of machines to control the process. The case for disassemblers rests on the ability of enzymes and chemical reactions to break bonds, and of machines to control the process. Enzymes, acids, oxidizers, alkali metals, [ions](#), and reactive groups of atoms called [free radicals](#) - all can break bonds and remove groups of atoms. Because nothing is absolutely immune to corrosion, it seems that molecular tools will be able to take anything apart, a few atoms at a time. What is more, a nanomachine could (at need or convenience) apply mechanical force as well, in effect prying groups of atoms free.

A nanomachine able to do this, while recording what it removes layer by layer, is [a disassembler](#). Assemblers, disassemblers, and nanocomputers will work together. For example, a [nanocomputer](#) system will be able to direct the disassembly of an object, record its structure, and then direct the assembly of perfect copies. And this gives some hint of the power of nanotechnology. [19]

6.7.12 Read the last part of the text and try to guess which word is missed

The World Made New

..... will take years to emerge, but their emergence seems almost inevitable: Though the path to has many steps, each step will bring the next in reach, and each will bring immediate rewards. The first steps have already been taken, under the names of "genetic engineering" and "biotechnology." Other paths to seem possible. Barring worldwide destruction or worldwide controls, the technology race will continue whether we wish it or not. And as advances in computer-aided design speed the development of molecular tools, the advance toward will quicken.

To have any hope of understanding our future, we must understand the consequences of, disassemblers, and nanocomputers. They promise to bring changes as profound as the industrial revolution, antibiotics, and nuclear weapons all rolled up in one massive breakthrough. To understand a future of such profound change, it makes sense to seek principles of change that have survived the greatest upheavals of the past. They will prove a useful guide. [19]

7 Section VII Curious about the Internet

7.1 Text I “Curious about the Internet” [20]

Read this chapter to satisfy your general curiosity about what the Internet is and what it can be used for. The answers include these:

- It's a network.
- It's a loose organization.
- It's a coffee house.
- It's a mailbox.
- It's a business tool.
- It's a library.
- It's a software shop.
- It's a newspaper.
- It's a living thing.

For starters, though, here's the basic answer: The Internet is a loose organization of thousands of computers all over the world that can communicate with one another to exchange messages and share information. The Internet offers roughly 20 million people — from nearly every country and from many different walks of life — a way to correspond with one another, do research, learn stuff, and fool around. Physicians use it to heal, journalists use it to report, activists use it to activate, and everyday folks use it to do everyday things.

The computers that constitute the Internet come in just about every size, shape, and type in use. They're spread all over the world — in every continent, including Antarctica. According to the Internet Society, a volunteer organization, the number of

computers on the Internet is almost doubling every year. A million new computers got hooked into the Internet in the first half of 1994 alone! (See Table 1)

Table 1 -The breadth of the Internet, July 1994

<i>Country/Type of Organization</i>	<i>Host Computers</i>	<i>Percent of Total</i>
<i>1</i>	<i>2</i>	<i>3</i>
U.S.-educational (higher)	856,234	27
U.S.-commercial	774,735	24
U.S.-government	169,248	5
U.S.-defense	130,176	4
U.S.-non-profit organization	66,459	2
U.S.-network operator	30,993	1
U.S.-local	16,556	1
Total U.S.	2,044,401	63
United Kingdom	155,706	5
Germany	149,193	5
Canada	127,516	4
Australia	127,514	4
Japan	72,409	2
France	71,899	2
Netherlands	59,729	2
Sweden	53,294	2
Finland	49,598	2
Switzerland	47,401	1
Norway	38,759	1
Italy	23,616	1
Spain	21,147	1
Austria	20,130	1
South Africa	15,595	<1
New Zealand	14,830	<1
Korea	12,109	<1
Denmark	12,107	<1

Продолжение таблицы 1(Table 1)

1	2	3
Belgium	12,107	<1
Taiwan	10,314	<1
Hong Kong	9,141	<1
Poland	7,392	<1
Brazil	5,896	<1
Czech Rep	5,639	<1
Hungary	5,390	<1
Mexico	5,164	<1
Portugal	4,518	<1
Singapore	4,014	<1
Chile	3,703	<1
Ireland	3,308	<1
Iceland	3,268	<1
Russian Fed. (SU)	3,145	<1
Greece	2,958	<1
Czech&Slovak (CS)	1,869	<1
Malaysia	1,322	<1
Turkey	1,204	<1
Thailand	1,197	<1
Slovakia	868	<1
Croatia	838	<1
Estonia	659	<1
Slovenia	574	<1
Costa Rica	544	<1
Romania	453	<1
Luxembourg	420	<1
Venezuela	399	<1
Ukraine	339	<1
China	325	<1
Russian Fed. (RU)	322	<1

Продолжение таблицы 1(Table 1)

1	2	3
International organizations	315	<1
India	316	<1
Kuwait	297	<1
Ecuador	256	<1
Argentina	248	<1
Latvia	180	<1
Colombia	144	<1
Uruguay	101	<1
Bulgaria	79	<1
Peru	75	<1
Philippines	65	<1
Indonesia	54	<1
Lithuania	53	<1
Egypt	52	<1
Tunesia	46	<1
Cyprus	38	<1
Liechtenstein	27	<1
Panama	24	<1
Nicaragua	23	<1
Algeria	7	<1
Fiji	5	<1
Iran	4	<1
Antarctica	4	<1
Moldova	2	<1
Saudi Arabia	1	<1
Total International:	1,180,77	37

It's a Network

The computers on the Internet can talk to one another because they are networked; they are connected in some way so that they can exchange information

with one another electronically. On the Internet, the connections take many different forms. Some computers are directly connected to others with wire or fiber-optic cables. Some are connected through local and long-distance telephone lines, and some even use wireless satellite communications — the same types used today for some long-distance phone services and cellular phones — to communicate with other computers on the Internet.

Curious About the Word?

A network is made up of two or more computers that are connected so that they can exchange messages and share information.

An internetwork is two or more networks that are connected so that they can exchange messages and share information.

The Internet is the world's largest internetwork. It includes computers hooked together in networks, those networks hooked together in internetworks, and those internetworks hooked together in still bigger internetworks. There are at least 18,000 networks within the Internet today.

Networks and internetworks

Because the Internet is an internetwork, each computer is not necessarily directly connected to every other computer. In other words, any computer on the Internet can talk to any other, but the message may have to travel through several other computers on its way there.

Think of it like air travel. From Indianapolis, you can fly anywhere in the world. For some destinations, however, you can't get a non-stop flight. You have to fly to Chicago or Cincinnati first, then from there to your destination. Information makes its way around the Internet similarly.

It's a Loose Organization

Although most people talk about the Internet as if it were some giant company or club, it really isn't. No single entity or organization controls it. The computers on it are controlled by their owners — MIT controls its computers, the Library of Congress controls its, the University of Pisa controls its, and so on.

Did You Know . . .

Many discrete organizations on the Internet have their own rules for which types of activities are allowed on their computers and which aren't. These rules are called Acceptable Use Policies, and usually they're not very carefully enforced. There isn't a single set of Acceptable Use Policies that covers the whole Internet.

Nobody controls the Internet — people simply join up and participate. It's like a neighborhood where people communicate because they're able to, but they haven't established a formal organization with rights, rules, and leaders.

Just as each computer on the Internet is under its owner's control, some networks that make up a large part of the Internet are controlled by their owners. For example, the Internet today arose, in part, from a project called NFSnet, a network of researchers and universities created by the National Science Foundation. The NFSnet and other federally funded networks that are part of the Internet set their own Acceptable Use Policies. But again, although government and industry control pieces of the Internet, nobody controls the whole, nor is anybody likely to do so soon.

Really Curious?

The Internet as a whole is unlikely to be brought under any single point of control — if such a thing were even possible, considering the number and variety of different people and organizations who use it. Because of the lack of central control, different resources on the Internet require different steps and skills — which is what makes using the Internet difficult.

People are working on better software to make the Internet (or parts of the Internet, anyway) appear as one smooth system to its users. (You'll learn more about that in later chapters.)

Also, efforts are underway to smooth out the wrinkles between the many networks run by federal agencies and to hook them together with the entire academic and research community, forming one, high-speed network. This early step in the creation of the Information Superhighway will effectively put much of the policymaking power for a big slice of the Internet under U.S. government control. For more about this issue, see Chapter 9.

Looseness is the Internet's blessing, but also its curse. Because it's been so open and so free, it has evolved on its own into a giant resource that probably never could have come about if the U.S. government, IBM, Kraft Foods, or Walt Disney Productions were holding the reins. Unfortunately, because nobody's in charge, the Internet is inconsistent and sometimes difficult to use. As people use it to access different computers and services, they find that not everything operates the same way on the Internet. There are some general rules that people follow — a sort of traditional Internet etiquette. These rules are very general and are loosely followed, at that.

The Internet is, in effect, a democratic, egalitarian, and consensus-driven thing. It doesn't work as efficiently as a top-down, totalitarian machine—but who wants that?

Did You Know . . .

Although no single group really controls the Internet, there are groups that influence it.

Two volunteer groups — a council called the Internet Architecture Board and a technical advisory team called the Internet Engineering Task Force — work together to enforce minor rules to keep the whole thing working, such as deciding which kinds of communications languages should be supported by the network. Although the

Internet includes many different types of computers and networks, it can't work unless everybody observes a few basic rules in their underlying communications technologies. These volunteer groups develop those rules to keep the Internet running smoothly.

People who want to use the Internet, but can't access it through computers at their company or school, often have to pay a commercial dial-in service for access to the Internet. (Dial-in and other types of Internet connections are explained in Chapter 5.) The Internet itself is free and open to all (although lately some fee-based services have appeared on the Internet), but some people have to pay a service provider to open the door. You'll learn more about that in Chapter 5.

It's a Coffee House

Well, maybe it's not a coffee house. Maybe it's a tavern, a barber shop, or a city park. The point is that several of the most important Internet resources enable users to exchange information in an open, public way. These resources provide a forum where users can write and post messages for other users and where they can read messages posted by others. In that sense, these resources play the open-air-exchange-site role played by a coffee house or other public meeting place. The coffee-house-type of resources actually comes in several different types, each of which is used differently. (You'll learn more about the specific types — such as newsgroups, mailing lists, and bulletin boards — later in this chapter and in Chapters 6 and 7.)

Each coffee-house-type resource typically handles a specific topic or area of interest. Some are for professional specialists, some are for hobbyists, some are for fans, some are for the generally curious. Because these resources are divided by subject, users can easily find messages related to their interests and can post messages where the messages will be read by people who share the user's interests. For example, a user interested in the Central Intelligence Agency can read messages about the CIA in the resource that covers it. He or she can also respond to or comment on those messages or write messages for other CIA buffs to see.

Even though they're divided by subject, the coffee-house resources can become overcrowded; they can pile up hundreds of messages, which make keeping up with them or finding any particular message difficult. Often, people who use these resources have access to a special computer program that helps them find messages on a particular topic. They can instruct the program to sort through the messages and show only the messages that match a very specific interest. This helps people find what they're looking for quickly, without having to wade through an overwhelming pile of messages. Users can also browse through messages, looking for something of interest.

It's a Mailbox

Without question, the most-used Internet facility is electronic mail, also known as e-mail.

Curious About the Word?

Electronic mail, or e-mail, is the practice of writing messages — memos, letters, and so forth — on a computer, then transmitting them to another computer so that the addressee can read them on a computer screen. E-mail skips the whole process of printing messages on paper and hand-carrying them to the addressee — which saves paper, time, and energy.

Traditionally, all you could include in an e-mail message was words, and that's still true today for most Internet e-mailing. With the increased use of graphical computing environments such as Windows and the Macintosh, however, people are beginning to include pictures (and sometimes even video clips or sound) in e-mail messages.

Everyone who uses the Internet has a unique Internet name, called — quite accurately — an address. Like any address, an Internet address is made up of several words or partial words, and it typically includes the person's name and location. Increasingly, people are listing their Internet addresses on their business cards and stationery. (You can see a sample Internet address in Chapter 5.)

No two Internet users have the same address, so to send a message to an Internet user, anywhere in the world, all the sender has to know is the address of the recipient. The sender types up a message in his or her favorite word processing or e-mail software program, hops onto the Internet, types in the address, and sends the message on its way.

In theory, the message should arrive at the recipient's computer almost instantly — after all, it's traveling through wire at nearly the speed of light. Remember, though, that there isn't always a straight line between any two computers on the Internet. The message may have to pass through a gaggle of networks and computers before it reaches its destination and it could get held up, temporarily, anywhere along the way. In a little while though, the message is delivered to the addressee's computer.

It's a Business Tool

Or is it? This is one of the big debates raging across (and beyond) the Internet. No doubt, given the increasingly global business climate and the great extent to which big companies rely on computers, the Internet looks like a great vehicle for national and international business communication. It is certainly cheaper and more flexible than building a private, global computer network from scratch.

There are, however, reasons why business use of the Internet has been heavily restricted through the years. Much of what is now the Internet began as an experimental research network for the defense department, evolved into a project of the federally funded National Science Foundation (NSF), and is now evolving into a new federally sponsored network of government agencies and academia, dubbed NREN. (See Chapter 9.)

What that boils down to is that the U.S. government has sunk a lot of money into the domestic parts of the Internet, and is sinking still more. Taxpayers are

generally agreeable about money spent "in support of research or education," which is what the NREN portion of the Internet is chartered to do (after all, that stuff makes our kids smarter and cures diseases). But ugly arguments sometimes ensue when the likes of Wal-Mart and PepsiCo are permitted to use a tax-subsidized network for the benefit of their own bottom line.

There are still more problems in doing business on the Internet, including the fact that the precise laws and policies regarding copyrights, monetary transactions, international currency conversion, taxes and exchange, privacy, and security have yet to be ironed out to everyone's satisfaction.

Thus, the rule for the parts of the Internet subsidized by government has long been "no commercial traffic," as described by the NSF's Acceptable Use Policy for its NSFnet, which by itself comprises a big chunk of the Internet. Many smaller government and academic networks have similar policies, and even beyond these networks there has been a traditional discouragement of commercial activity. Business users, like anyone else, have always been welcome to use the Internet for research. But when they begin to use it to send their purchase orders from sales offices to headquarters, or as an e-mail system for the overseas marketing staff, or as a junk-mail delivery system, Internet purists cry foul.

Yet, the commercialization of the Internet has been growing rapidly for the last several years. The policies restricting business activity have been little enforced, despite the grumbling of some purists. In 1991, some of the government restrictions on commercial use were lifted. That opened the door for a dozen networking companies to set up their own major sections of the Internet to support commercial traffic while working around the NFSnet and its no-business policy. The "anything goes" commercial networks set up by this group are called the Commercial Internet eXchange (CIX). CIX supports a wide range of business activities, with more to come.

A few examples? In addition to the obvious examples of on-screen advertising and e-mail, businesses already use the Internet to

- Sell real estate, books, concert tickets, handmade dolls, and flowers.
- Provide credit reports, legal services, consulting services, and customer support.
- Publish newspapers, newsletters, and magazines that can be read on the computer screen and are paid for by reader subscriptions, advertising, or both.

Most Internet watchers agree that commercial use of the Internet will continue to expand, and will do so far more rapidly than will the research uses. Already, more than half of all Internet users are in commercial enterprises. As you may have noticed in Table 1.1, the number of U.S. business computers on the Internet is second only to the number in educational institutions, and it is expected to exceed the number of educational computers within a few years.

It's a Library

Well, in fact, it's several libraries — at least 500 of them — all over the world.

Among the earliest and most avid users of the Internet were colleges and universities. Many have their whole computer network tied into the Internet — including the computerized card catalog for the university library.

These schools use the Internet to operate interlibrary loan programs. When a student or professor requests a book that's not in the stacks, the library can locate the book at a branch campus, another university, or even at a public library or private research collection, and can have it sent from there. Of course, the university pays for that privilege by making its own collection available to all the other libraries it borrows from.

All this interlibrary networking leaves many public, private, government, and academic catalogs accessible to any Internet user. Curious readers can plumb the collections of the great universities to find exactly the material they're looking for. The choices include public and private libraries, and specialized libraries for medicine, law, and other subject areas.

There are hundreds of libraries on the Internet, including many public libraries. Here's a sampling:

- The U.S. Library of Congress
- The Environmental Protection Agency Library
- The U.S. Food & Drug Administration Library
- The Law Library at Columbia University
- Yale University
- Harvard University
- University of Massachusetts
- University of Minnesota
- Dartmouth College
- Cleveland Public Library System
- Detroit Public Library System
- New York Public Library System
- Seattle Public Library System

Now, of course, whether or not an Internet user can actually borrow anything is depends on library. Different libraries enforce different policies about who can borrow and who can't. Some libraries do allow people to order a title right over the Internet, to be delivered by mail. For those that don't, Internet users can usually go to their own local university or public library and ask a librarian to make the request. (Libraries are pretty friendly about loaning to other libraries; they stick together that way.)

No matter how they finally get their hands on the book, the value of the Internet is that it lets users find the book — almost no matter where it's stacked. To help, there are bibliographic indexing services on the Internet that list where materials on certain subjects can be found.

In the information age, there is, however, another kind of library. The text of reports, papers, and even whole books can be (and usually is) stored in computer files. There are literally millions of files of information out on the Internet that users can locate and then copy — right over the Internet — from the distant computer to

their own, where they can read the information on their computer screens or print it on a printer.

Next to e-mail, this may be the most often used and most valuable resource on the Internet. It allows researchers (or the merely curious) to acquire the latest and most detailed information about every topic imaginable. In fact, much of the information available this way may not be published in any book — the Internet offers people access to information that's unavailable to them in any other way.

Did You Know . . .

As more and more computers today acquire multimedia capabilities — the capability to show pictures and play video and sound clips from computer files — more stuff has appeared on the Internet to serve those machines. Although most of the computer files on the Internet contain just words (which users can read by opening the files in their word processing programs), a growing group holds pictures, video, and sound.

You can, in fact, find entire books in computer files on the Internet, in many different places. Perhaps the best known source is Project Gutenberg, a volunteer project to transfer important reference works and works of literature to computer files and make them widely available. Already through Project Gutenberg, people can copy from the Internet the following:

- Anything from Shakespeare
- Roget's Thesaurus
- Moby Dick
- The Book of Mormon
- The CIA World Fact Book

There are other electronic book providers on the Internet, such as the Online Book Initiative (OBI).

Of course, the same Internet power that enables users to retrieve Paradise Lost also enables them to copy beer recipes from the American Homebrewer's Association's computer. To each his own.

It's a Software Shop

If computer files containing books can be copied across the Internet, so can files containing anything else — including, of course, computer software.

Curious About the Word?

Software most commonly describes a computer program — a word processor, a personal finance program, a game, and so on. Keep in mind, though, that there are other types of software. Most importantly, there are software files that contain images, video, music, or other types of information that can be viewed or played through a computer program that knows how to work with them. This other type of software is available on the Internet, just as programs are.

Curious About the Word?

Software available through the Internet comes in three basic types.

Freeware software is absolutely free of charge and available to all.

Shareware is offered on a "try before you buy" plan. Users can copy the software and try it out for free, but they are instructed to send a nominal fee (usually \$10 to \$50) to the programmer if they intend to use the software regularly.

Commercial software is like the packaged software sold in stores (but without the box) and is offered by the same commercial software companies. Commercial software requires payment up front; typically, the user must supply a credit card number before copying the software files.

There's software available on the Internet for almost any type of computer and for almost any purpose — business programs, personal programs, games, and so on. Among the most popular programs found on the Internet are tools that help people use the Internet more easily or effectively. Often available as freeware, programs such as Mosaic help people use the inconsistent, difficult-to-navigate Internet as if it were a much smoother system.

It's a Newspaper

Just as the coffee-house-type resources on the Internet can keep users informed about Michael Bolton, or Star Trek, they can also serve up hard news about specific topics.

There are resources that keep Internet users abreast of the latest events in every country from Afghanistan to Zaire. Sometimes, these services are the best (or only) way to get current and complete information about a particular region. It's often told that, during the Soviet coup attempt in 1991, a small electronic mail company in Russia was about the only way to get news out of the region. Through e-mail, that company served news through the Internet to the likes of CNN and the Associated Press and, of course, to others on the Internet.

Internet users can tap into resources that supply up-to-date news and discussion on every imaginable topic. In addition to the various country- and region-specific resources, there are others that supply news about environmental events, sports, global and U.S. politics, party politics (separate groups for Democrats, Republicans, Libertarians, and the like), civil rights, the economy, and much more.

In addition to what the coffee-house resources offer, there are actual newspapers, magazines, and newsletters that users can access through the Internet and read through their computer screens. Some are scholarly or scientific journals, but a growing number are general interest, consumer publications. Some were created just for the Internet, but some are special electronic versions of publications that are also available in print.

Finally, there are even general-purpose national and world news services on the Internet. Among others, Cable News Network (CNN) publishes the text of the stories it broadcasts as CNN Headline News. These are updated several times a day.

Using these resources, Internet users can acquire more timely, more detailed news about their areas of interest than they could ever find in the national broadcast or print media. Perhaps more importantly, in many cases they can respond to the news, add to it, or ask questions about it. It's that kind of power that's getting people hooked on the Internet.

It's a Living Thing

To appreciate where the Internet is going, you have to understand where it's been. The Internet that exists today began in 1969 as an experiment of an agency of the U.S. Department of Defense. The agency hooked various defense department computers, defense contractors, and universities doing defense research into a classified network that accomplished two things. First, it enabled users to share expensive computing resources, which saved money, and second, it gave the defense department a network upon which to test various methods for keeping military networks operational in times of war.

Throughout the 1970s and early 1980s, that network grew, and portions of it were declassified. During the same period, other, separate networks were established to hook together university researchers and scientists.

In 1986, the National Science Foundation established its network, NFSnet, to allow researchers across the country to share access to a few expensive supercomputers (the fastest and most powerful type of computer for scientific applications). Quickly thereafter, the various, separate research networks began hooking to NFSnet, and therefore, in effect, to each other. In 1990, the original defense department network was retired, its work having been taken over by NFSnet. Eventually, the resulting internetwork got hooked into the various internetworks abroad, and Voila! The global Internet we know today had congealed from a lot of separate parts.

So, although you may hear much praise for the value and potential of the Internet, you must remember that the whole thing is an unplanned, disorganized, rattletrap contraption — an information-age afterthought, a mutant, a casserole made from leftovers. It has no real purpose or mission, except perhaps the somewhat fuzzy goal of enabling communication. It's really more a patchwork of links between lots of separate networks and organizations that — despite their participation in the Internet — still have their own way of doing things and don't feel particularly pressured to conform what anybody else on the Internet is doing. "Wanna use our computer?" they say. "Fine, go ahead. Just do it our way."

As the Internet has grown like crazy, that hasn't changed. As of this writing, estimates say that the Internet picks up 1,000 new users a day, and it is nearly doubling the number of users every year. Nobody really knows for sure; in fact, nobody even knows exactly how many people are on the Internet. Recent guesses say about 20 million and counting.

The Internet is a living thing, growing its own way, at its own pace, perhaps according to a divine design, but not according to any earthly plan. Anything that big, involving that many people, and behaving that unpredictably is very threatening to

some folks. In the coming years, you'll hear increasing concern over the global economic, political, and cultural implications of the Internet.

So Now You Know . . .

The Internet is a network, or more accurately, an inter- network, a vast collection of different types of computers all over the world that can share messages and information with one another.

Each computer on the network is controlled by its owner, and large parts of the network are overseen by the U.S. government or its agencies. The Internet as a whole, however, is under the direct authority of no one — which makes the Internet open and free, but also complex and inconsistent.

Using the Internet, people are able to perform a range of activities for work, pleasure or even simple curiosity. These include:

- Posting and reading public messages to exchange news and information about certain topics or areas of interest.
- Sending messages to, and receiving messages from, other Internet users through electronic mail (e-mail).
- Conducting research by reading or copying information stored on other computers.
 - Receiving news updates about specific events or topics.
 - Finding books and other resources stored in libraries all over the world.
 - Reading newspapers, newsletters, and magazines.
 - Copying computer software.

You also know that the Internet can be used for academic or government research, personal pleasure, or business — and that the latter two uses are newer and evolving quickly. In fact, it is the business and personal aspects that will have the major role in shaping the Internet into the 21st century.

Who Uses the Internet, and for What?

Read this chapter to satisfy your curiosity about who's out there on the Internet and what those folks accomplish on it. The answers include:

- Scientists use it to solve.
- Educators use it to educate.
- Professionals use it to consult.
- Businesses use it to compete.
- Governments use it to disseminate.
- Activists use it to activate.

For each of these groups, this chapter offers a description of how the Internet serves them and which Internet resources each typically uses.

First, though, take note: these groups overlap. There are scientists and professionals in business, activists who are scientists, government workers who study business, and so on. That's OK because few resources on the Internet are restricted to one type of user (though indeed, some are). Just because a resource is especially

useful to ornithologists doesn't necessarily mean it can't be used by birdwatchers, bird-seed companies or, for that matter, birds — as long as they can get an Internet account. Just keep in mind who the primary users of certain resources are while also remembering that most resources can be applied in many different ways.

That brings up the other, fluffier answer to the question this chapter asks: Everybody uses the Internet for everything. Unfortunately, that provides little structure to hang a book chapter on. But it's really the way people need to begin thinking about the Internet.

So one final group needs to be added to the list of who uses the Internet and what for. Near the end of the chapter, you'll discover that:

- Miscellaneous folks use the Internet for miscellaneous reasons.

It's a squishy category, but as you'll see, there's much about the Internet that defies pigeonholes.

Scientists Use It to Solve

As the original Internet surfers, scientists may benefit more from the Internet than anyone else. The great (as well as the mediocre) scientists of this world usually hole up in universities and other institutional think-tanks, nearly all of which have Internet connections.

If there's one thing scientists hate, it's duplication of effort. In embarking upon a scientific investigation, they try to start out with what others have already learned from previous studies and experiments. Then they move forward from that work, building on it and adding to the body of scientific knowledge about a subject.

Historically, scientists have published findings in journals for exactly that reason — so other scientists could build on that work instead of reinventing the wheel. But information in journals can be hard to locate and incomplete (it's often summarized to fit), and it falls out of date quickly. The Internet provides an intermediate solution to that problem by giving scientists a way to publish journals right on the Internet. Because they don't have to be printed and mailed, the journals can be kept more current than printed journals. Beyond the electronic journals, scientists can get even more complete and up-to-date information by simply accessing one another's work directly. What, the querying scientist may ask, have the folks at MIT learned about nuclear fusion in the time since they last published their findings?

The Internet offers scientists a way to gain access to each other's work, including the latest research results and papers about them. (Obviously, scientists keep some stuff secret, in which case it's stored in the computer in a way that keeps it off-limits to the general Internet public.) And they can also exchange e-mail messages to ask and answer questions and get up-to-the-minute information.

Really Curious?

Internet users most often exchange information through e-mail messages or public postings. But when necessary, users can have an actual "live" interactive

discussion through the Internet. Through a facility called Talk, two users can establish a connection with one another so each can see everything the other types, as it's being typed. Talk splits the screen in half so that each user's typing appears on only one side. Both can type merrily away — discussing, arguing, and even interrupting each other. Scientists no doubt use the Talk facility for heated discussions on weighty issues, as do many others.

Using the Internet, scientists can do their work better and more efficiently by picking the brains of the best minds in their fields and by avoiding duplication of work somebody else already did (unless, of course, they want to duplicate the work to prove their colleagues wrong!).

Specifically, scientists use the Internet to

- Query and collaborate with their colleagues all over the world (through e-mail or posted messages) on matters of scientific importance. For example, geneticists from various institutions are collaborating on a project to map all of the 100,000 or more human genes. Each institution is taking a part of the job, but they're all sharing information and consolidating their findings through the Internet.
- Run special scientific programs that are not available on their own computers. For example, the National Center for Atmospheric Research (NCAR) offers a service that allows Internet users (sometimes for a fee) to use the sophisticated atmospheric modeling programs on NCAR's computers for their own research.
- Tap libraries and databases at other universities, research institutions, or government agencies to consult stored files of scientific papers, studies, reports, and abstract data from experiments and studies.

Curious About the Word?

Data is simply another word for information.

A database is a store of information from which one can extract specific pieces of information. A phone book is a database; it's a big pile of information that's set up so that your brain (a pretty good computer) can locate and extract specific pieces of information: telephone numbers.

Computerized databases such as those on the Internet enable researchers to use their computers to locate and extract specific pieces of information quickly, or to locate entire computer files of information that can be copied across the Internet into the researcher's computer for local use.

There are Internet resources available for every conceivable scientific discipline.

Educators Use It to Educate

Teachers have a huge variety of potential information sources on the Internet.

Among those specific to education is the Federal Information Exchange, which details federal programs for education, scholarships, and more. Teachers also use a

service run by the U.S. Department of Education to keep them informed about department projects. Another Internet resource called Learning Link, run in part by the Public Broadcasting System, supplies information and activities to support grade K-12 teachers, such as conferences with other teachers around the country. A resource called AskERIC supplies information about teaching methods and technologies. Teachers tap AskERIC to consult the vast body of educational literature compiled by the Educational Resources Information Center (ERIC).

Teachers also benefit from Internet resources designed to actually teach their students. Provided their schools are equipped with computers and Internet connections, teachers can get their students involved in fun, educational projects such as

- Academy One, which involves students in interactive science projects, such as space shuttle simulations.
- KidLink, which supplies interaction and projects between U.S. students ages 10-15 and other students from around the world, to nurture the students' global awareness.
- The JASON Project, an Internet version of an ongoing initiative to get kids more involved in science.

University professors, of course, also make use of the vast array of Internet services covering subjects of academic and cultural interest: social issues, linguistics, politics and culture in other countries, music, art — the works. They also use it to communicate with colleagues and to publish (and co-publish) scholarly articles. When all else fails, there are even Internet resources that help professors locate new jobs.

Professionals Use It to Consult

It's impossible to list here the Internet services available to help various professionals do their jobs better. Perhaps it's enough to say I can't think of a profession for which there are no services on the Internet. And I can think of many for which there are rich service choices.

Professionals who use the Internet have the ability to stay up to date about developments in their fields, and to network with their colleagues the world over via e-mail and posted messages.

The Internet offers resources for many more professionals — musicians, writers, genealogists, and more. For each of these, and for each of the above professionals, there are resources that cover information and issues related to the field and offer professionals an open exchange of ideas with their colleagues.

Businesspeople Use It to Compete

The use of the Internet for business is a subject of some controversy (see Chapter 4), but no one can deny that the Internet is a useful business tool today, and will only grow in importance over the next several years. In a time when businesses increasingly

- Do business internationally and globally.
- Require rapid communication.
- Require up-to-the-minute information.
- Form inter-company collaborations for certain projects.
- Seek new markets, new groups of potential customers, wherever they may be.

The traditional rules about what business can and can't do on the Internet are still evolving at this writing. Businesses can do four things on the Internet without getting into any trouble:

1 Look stuff up. They're as welcome as anybody else to look at the public information on the Internet.

2 Make their own information available to others. If a company wants to set up its own service that Internet users can access to get information about the company's products, that's fine. (What's important is that the Internet users must deliberately go to the company's service; the company may not reach out and fish for customers.)

3 Use e-mail for inter-company and intra-company communications. This capability is becoming especially popular among telecommuters, workers who do their jobs on computer at home and communicate with the office by computer, phone, and fax.

4 Post brief, non-intrusive public announcements in subject-specific Internet resources whose users may have a specific interest in the company or its products.

Companies are not supposed to send out unsolicited advertisements via e-mail. Actually, because the Internet isn't controlled by any organization, there's nothing to stop companies from breaching etiquette and advertising through e-mail, other than the wrath of Internet users who have been known to punish advertisers by burying them in e-mail or overloading their fax machines.

Nevertheless, the use of the Internet for advertising is growing dramatically (see Chapter 1). The Internet is also becoming a popular place to sell products and services. Companies set up "electronic malls" or "storefronts," Internet resources in which users can read product descriptions and place orders. Because these uses of the Internet are evolving quickly and are still somewhat experimental, many businesses will wait for the technology and other aspects of Internet business to mature before taking the plunge.

In the meantime, there's plenty of business to be done right now.

Business Research: Business thrives on all kinds of general information. Demographic and statistical information is essential for planning sales and marketing strategies. There are resources that supply listings of (and access to) major business libraries and to pending business-related legislation. And of course, any of the general-purpose information on the Internet may be of use to some businesses. In particular, marketers may gain insight into potential customer bases by scouting out the message activity in Internet resources covering certain topics.

Financial research: The type of information big business likes best is information about big business, and there's plenty. The Internet offers several ways to

get current stock quotes and stock histories, Securities & Exchange Commission filings, mutual fund performance data, U.S. Department of Commerce reports, and financial/business newsletters.

Legal Research: As mentioned earlier in this chapter, the Internet offers a range of resources of special interest to lawyers, including several law libraries and databases of laws and court decisions. These are as available to corporate lawyers as to any other type.

E-mail: Most large companies have their own, private e-mail networks for intercom any communication. But businesses today form lots of partnerships — big and small, temporary and permanent. Cooperative development deals, subcontracting and outsourcing — when a company contracts another company to provide some basic operational service, such as secretarial work or data processing — are on the rise, and they demand rapid, efficient intra-company communications, which the Internet provides.

Governments Use It to Disseminate

As you may already have noticed, there's a ton of government information on the Internet. The government is in the business of creating unspeakable mounds of information, most of which it is required to make available to citizens. The government will continue to print material for those who want it, but it hopes to reduce the amount of printing by encouraging people to acquire government information through the Internet.

Internet users have access to the complete text of the federal budget, to thousands (yes, thousands) of reports and updates about goings-on at NASA, to complete reports from the National Science Foundation, to publications from the Social Security Administration and the Federal Communications Commission, to the rules enforced by the Occupational Safety & Health Administration.

So Now You Know. . .

People in science, various other professions, commercial enterprise, and exploit the resources on the Internet to stay informed, do research, make announcements, and exchange messages with colleagues, partners, and opponents. You also know that the U.S. government uses the Internet as an electronic publishing house, making staggering amounts of detailed government data available to the politically curious.

Perhaps most importantly, you know that the Internet is too big, open, and varied to be boiled down into any reasonable set of categories. Professional interests overlap, and a growing number of Internet services have no clear professional purpose — other than to satisfy the curiosity of Internet users who, while thus engaged, also seem to have no professional purpose. Even those who have Internet access for professional reasons have been known to fool around on it when nobody's looking.

Like a town square, the Internet has evolved into a public meeting place. Business and politics happen there, and they reign the square in. But in the square itself, people interact as they please, and enjoy discussing subjects of infinite number and variety.

How Does the Internet Make the World a Better Place?

Read this chapter to satisfy your curiosity about good things the Internet fosters. The answers include these:

- It supports scientific discovery.
- It exposes the truth.
- It gives away free stuff.
- It creates new business opportunities.
- It accommodates the disabled.
- It brings people and nations together.
- It plays Cupid.
- It makes people laugh.
- It turns people on.

As someone who's curious about the Internet, you're going to notice a lot of discussion about it in the media and perhaps among your friends and acquaintances. Two extremes will frame the discussions you encounter:

1 The Internet is the best thing since sliced bread.

2 The Internet is Big Brother waiting to happen, a sinister conspiracy that destroys our privacy, steals our freedoms, and reduces us all to electronic ink.

As with most debates, the truth lies somewhere in-between. To help you develop your own perspective on the debate, this chapter and the next present a sort of point-counterpoint. Here, you'll get a wholly partisan look at what's good about the Internet. In Chapter 4, you'll get a tough dose of unalloyed Internet paranoia. My hope is that by examining the two extremes separately, you'll equip yourself to find your own middle ground on this complex — and ongoing — controversy.

Now, I have to point out that this chapter is only about half as long as Chapter 4, which would tend to create the impression that I think the "cons" of the Internet outweigh the "pros." Well, I'm not telling what I think — I don't want to influence your judgment. But I will explain that Chapter 4 is longer because it is the only chapter that really covers the potential downside of the Internet. The chapter you're reading, on the other hand, has help. By showing you all the wonderful things people can do on the Internet, Chapters 1, 2, 5, 6, 7, and 8 are all pro-Internet, in effect.

With that in mind, here we go. I will now put on my "I © the Internet" hat, and take inspiration from the Internet's biggest booster, the Vice President.

It Supports Scientific Discovery

As discussed in Chapter 2, the Internet helps scientists and researchers do their jobs more effectively by giving them access to exhaustive, up-to-date information compiled by other scientists and researchers.

The Internet also gives scientists access to equipment that they do not have at their own institutions. For example, an observatory in New Mexico has a telescope that scientists in other countries can actually aim and look through (by looking at computer graphics sent to their computers) by way of the Internet.

Also made possible by the Internet are parallel, or collaborative, research projects. Teams of scientists located all over the country or over the world can work individually on portions of a larger research project, using the Internet to share and consolidate their findings.

Major projects that would exceed the resources (staff, equipment, and computing power) of the largest institutions in the world can be undertaken this way, with each participating institution performing the part that it is best equipped to handle.

A good example of parallel research is the Humane Genome Project. Funded in part by the Federal Government and involving the world's best genetics labs, the project is a massive 15-year plan to identify all 100,000 or more human genes, possibly unlocking the secrets to preventing many birth defects and genetically influenced diseases, such as cancer.

Fifteen years is a long time, but scientists have commented that such a project conducted by a single research lab could take a century. That's another 85 years of preventable human suffering.

Other cooperative initiatives that use the Internet are the initiatives for curing AIDS and other infectious diseases, developing alternative fuels, predicting earthquakes and volcanic eruptions, and saving species from extinction — and all that's just the beginning.

It Exposes the Truth

There's a stubborn freedom-of-information tenet to Internet culture. Many Internet users believe (correctly, if you ask me and Thomas Jefferson) that secrets are anathema to freedom and democracy. These folks sometimes make themselves into investigative reporters who keep an eye out for important, unreported information and then spill the truth out onto the Internet. In particular, they're opposed to gag orders that prevent the media from reporting about certain stories. When the print and broadcast media's hands are tied, the Internet community kicks into high gear.

A good example involved the trials of Karla Homolka and her husband Paul Bernardo in Ontario, as reported in *The Nation*. In her trial, Homolka pled guilty to two gruesome murders, and while she was at it, she said Bernardo — who was scheduled to be tried later — made her do it. To prevent potential jurors for Bernardo's trial from learning too much about the case, the Canadian court forbade the media from reporting the details of Homolka's trial.

Offended that their government would dare to censor coverage of a public court proceeding, Internet users in Toronto created an Internet resource to which they posted daily updates about the trial, which were read the world over.

The Canadian Government went to great lengths to stop the Internet users. The police left threatening messages on the bulletin board (the mounted police, no less;

presumably they use the Internet from saddle-mounted PCs), and the resource had to be renamed after all the Canadian universities switched off local access to it under pressure from the government. (The universities couldn't prevent Internet access to it, though, because to do so, they would have had to sever the university from the Internet entirely.) Ultimately, the Internet users were able to continue funneling information while successfully eluding the Canadian police.

It Gives Away Free Stuff

Using the Internet is free, but not really. Be that as it may, there's stuff users can get from the Internet that they don't have to pay for. So although the Internet isn't really free, the stuff really is. It Creates New Business Opportunities. Business use of the Internet is controversial. Still, there's no doubt people are making money on, through, and around the Internet.

For example, a company called the Internet Shopping Network makes its database of information about the computers and software it sells available on the Internet. Customers can get their answers without costing the Shopping Network a printed catalog or live sales associate. Customers can also place orders through the Internet. The company uses the savings to underprice its competitors. There will be a steady growth in the number of such services, and they'll be joined by new ventures such as electronic banking, magazine subscriptions and classified advertising. Visionary entrepreneurs will use the resources and community of the Internet to open new markets, design new products, and stimulate the economy.

An emerging new business model, called the Virtual Corporation (VC), may depend heavily on the Internet. In the VC, the large company staffed with permanent workers is replaced by a small team of executives who manage an ever-changing field of freelancers who are hired and let go as needed. The VC can respond more rapidly to changing business needs than can a traditional corporation, and it can operate more efficiently by only paying workers when there's a specific project for which they're required. Advocates say the VC will make businesses more competitive, and will also bring about a huge upswing in self-employment, which many people find more satisfying than traditional employment. The Internet will help make the VC possible by making it easy for managers to find, hire, and communicate with the best freelancers, wherever they may be located.

It Accommodates the Disabled

People with certain disabilities can find traditional written communication difficult. For example, the blind can't read written paper mail, and those with motor impairments sometimes have trouble with letters and envelopes.

There are dozens of products that enable the disabled to use computers: Braille keyboards and finger-readers for the blind, and mouth sticks and other gadgets for the motor-impaired. For both the blind and the motor-impaired, there are voice-response systems that enable the computer to respond to voice commands and also enable it to speak words that appear on the computer screen. These tools empower disabled

people to do anything that can be done with a computer. (Of course, typewritten communication by computer has obvious benefits for the deaf and hearing impaired — with no special accessories required.)

It Plays Cupid

Let's see, ways to meet potential life-mates, bars, adult education classes, and singles retreats, community theatre. Telephone party lines. The Internet.

Yes, people meet and fall in love on the Internet, though I've heard it's rare. They can meet anywhere on the Internet, but a few resources are specifically set aside for posting "personals" to help people find one another. I suppose it's a pretty big step when the relationship moves past the personals and to the e-mail stage.

It Makes People Laugh

Did you hear the one about the Internet user who took a job on a fishing boat because he liked the net work? ("Net work!" Get it?)

Plenty of jokes can be had on the Internet. As in any conversation, Internet messages are often punctuated with jokes. Because the messages are written rather than spoken, however, the users have time to try to be clever and to polish their material before sending it out. This results in more bad jokes than good.

Several newsgroups are dedicated to humor. Internet users can visit these when they need a quick shot of silliness, but unfortunately, these newsgroups are not reliable sources of humor for most people's tastes. For reasons I do not know, the majority of jokes in these resources are of the Beavis & Butthead level. By that I don't mean the sly, satirical humor sometimes served up by the Beavis & Butthead show. I mean the kind of jokes Beavis and Butthead themselves would snicker at — adolescent, tasteless, crude, sick, dumb. Worse yet, many are also sexist or racist. Efforts have been made to clean up these resources by putting them under the supervision of a moderator, but they've not improved much.

Did You Know . . .

When injecting humor into their correspondence and other Internet message writing, Internet users are not unaware that written jokes lack the benefits of inflection and timing that often make spoken jokes funny. Over time, they've adopted an elaborate code of little typed symbols, called smileys, to expand the expressive range of written communication. Among the symbols used in the smiley language are those shown in the following list. To see the little faces of the smileys, you have to tilt your head to the left. (See Table 2)

Table 2 - Smileys

1	2
-)	A basic smile, denoting happiness or sarcasm

Продолжение таблицы 2 (Table 2)

1	2
:)	Also a smile
;-)	Wink
:-D	Laughing
:-}	Grin
:-P	Plbbbt!
:-(Sad face
8-)	Wide-eyed
B-)	Wearing glasses
:-X	Close mouthed

The first five smileys are often typed adjacent to jokes, just so the reader can tell they're jokes even if they fail to be funny.

So Now You Know . . .

The world is made better in part by the Internet and the people who use it. There are the big reasons, such as the free exchange of news and information and the support of science, and the little reasons, like laughs and love.

In any case, 20 million people can't be wrong. There's a lure to the depth of resources available on the Internet. And once people get hooked on knowing, they don't give up easily. [20]

8 Section VIII World Wide Web - Beyond the Basics

8.1 Text I “World Wide Web”[21]

8.1.1 Read and translate the text. Discuss the text with your groupmates

People work together on specific tasks and activities in their day-to-day lives. Whether we're toiling at work, going to school, or shopping at the mall, each of us come into contact with numerous people on a daily basis. In our interactions with others, we often collaborate to achieve a joint goal or to serve a common purpose. For each of us, our acquisition and evolution of collaborative skills play a crucial part in our social being and development.

Computer systems are intended to support and enhance the activities and tasks that people perform. Unfortunately, most computer systems have been developed with the view that the user performs activities and tasks in isolation. Realistically, people perform many activities and tasks in collaboration with others. The design of

computer systems should reflect, support, and enhance the natural ways that people collaborate to accomplish work.

In designing and developing collaborative systems, we must consider how people communicate and work together to accomplish objectives. How does computer technology enhance or degrade people's abilities to collaborate? What are the social and organizational impacts? Collaboration is an important aspect of work activity and it should be studied, supported, and incorporated into the enabling technologies that computer science provides.

Because of its ability to connect users from around the world, the WWW provides a logical infrastructure from which collaborative work and activities may be spawned. We should take advantage of the WWW's immense reach, connectivity, and popularity to introduce computer-mediated collaborative technology and to facilitate collaborative work among the masses.

To talk coherently about collaboration on the WWW, we first need to define a few terms:

- Collaboration - the act of participants working as a group to strive towards a common purpose or to achieve a common goal. Implicit in group interaction is multi-way communications and mutual awareness among collaborating group members.
- Computer-Supported Cooperative Work (CSCW) - "the sharing of software and hardware among groups working together so as to optimize the shared technology for maximum benefit to all those who use or are affected by it ([Preece, 1994](#))."
- Groupware - "software designed to be used by more than one person ([Preece, 1994](#))."

In a sense, any interaction over the WWW is a form of collaboration. In the general case where a WWW user locates and views a Web page, the collaboration is one where a WWW developer publishes Web pages for general consumption and a WWW user collects and assimilates the information for his/her personal benefit. This typical interaction, however, represents a very weak level of collaboration. The WWW publisher and reader do not directly communicate. They are not necessarily cognizant of each other nor do they necessarily share a common purpose or goal.

Our view of collaboration is one where multiple WWW users share common objectives and collectively work to accomplish those objectives. Participants of a collaboration are aware of each other and they directly communicate. Relationships among the participants are clearly elucidated. Each participant has a defined role that carries particular duties, tasks, and expectations.

In this chapter, we examine how users collaborate over the WWW. First, we examine the various kinds of computer-mediated communications mechanisms, shared artifact mechanisms, and collaboration frameworks that are required to support collaborative interaction. Next, we survey the WWW to identify various forms of collaboration in which WWW users participate. We seek to identify the kinds of collaborative activities and work that users perform over a computer network. Finally, we present and examine some of the underlying social and organizational issues associated with computer-supported collaboration.

Lectures and Presentations

In today's classroom, the most common teaching style is didactic teaching. The goal of didactic teaching is to transfer knowledge from the teacher to the student. The teacher acts as the keeper and disseminator of knowledge while the student acts as the assimilator of knowledge. Under this traditional form of pedagogy, the teacher typically gives lectures to relay and reinforce concepts and facts. The student learns by listening and absorbing information.

Although the role of the student appears somewhat passive in didactic teaching, communications does flow in both directions between the teacher and student. For example, the teacher may call on students to give answers to questions. Alternatively, students may seek clarification from the teacher by asking questions of their own. A number of Web-based applications have been developed to support this kind of lecture style approach. Examples of such Web-based applications include:

- [KMi Stadium](#) supports a collaborative lecture-based forum where teachers and experts give presentations. Students may ask questions by sending e-mail which is received by the speaker during the course of the presentation. During the presentation, students see a synchronized slide show and listen to real-time audio of the speaker. KMi Stadium attempts to mimic the mood and environment of a particular setting by augmenting the audio with sounds of clapping, laughing, shouting, and whispering. The simulated setting may either be a classroom, an auditorium, or a stadium. ([Eisenstadt, 1995](#))
- [Virtual Summer School](#) allows college students to remotely attend various cognitive psychology courses. The student selects a building and room from a graphical campus map. When attending class, the student may listen to a lecture from the professor and ask questions over a synchronous audio or video teleconferencing link. ([Eisenstadt, 1994](#))
- [Diversity University](#) represents another virtual college campus in which college students attend various classes. Unlike Virtual Summer School, Diversity University is self-contained within a MOO. Consequently, communications among students and teachers are strictly text-based via IRC. ([Diversity University, 1996](#))

The Future of Collaboration on the WWW

The collaborative technology described in this chapter reflects various levels of integration with the WWW. CMC mechanisms such as IRC, bulletin boards, and e-mail have been well-integrated into WWW browsers.

These mechanisms have been incorporated into many WWW groupware applications available today. Other CMC mechanisms such as synchronous audio and video teleconferencing are much less common on the WWW. As for collaboration frameworks, newsgroups and discussion groups, graphical virtual worlds, and review and annotation systems have experienced moderate to high levels of integration with the WWW while MUDs and MOOs have experienced minor levels of integration.

In the near future, we should see increased development and application of collaborative technologies over the WWW. Asynchronous audio capabilities are

rapidly becoming available on the WWW today through CMC applications such as [CoolTalk \(Netscape, 1996b\)](#) and [Conference \(Netscape, 1996a\)](#). Video conferencing applications such as [LiveMedia \(Netscape, 1996d\)](#) are in the midst of development. Fully-integrated Web-based MUDs and MOOs are being explored in research projects such as [Xerox's Jupiter project \(Frahmann, 1995\)](#).

As collaborative technology evolves over the WWW, we must shift our focus on the technology from its development to its use. We must consider how to best utilize collaborative technology to allow remote users to effectively work together. We must evaluate how computer-supported collaborative environments deviate from natural environments.

Can we improve the level of collaboration over natural forms? Does collaborative technology inherently impose constraints that necessarily impede collaboration? How do users perceive collaborative technology? Do they find it natural or artificial? These are the types of questions that become important to answer as collaborative technology establishes a foothold on the WWW.

From a social standpoint, we expect that the user's perspective of the WWW will change. No longer will the WWW be viewed just as the super-highway to massive amounts of information, but also as a gateway to real people with interconnected needs and goals. The WWW will evolve from a massive information database to a dynamic, living organism that encompasses the knowledge and capabilities of its users. The human element of the WWW will increasingly be emphasized. Collaborative applications should not be developed for and installed on the WWW merely for the purpose of advancing technology. Such applications have human consequences. As responsible scientists and technologists, we must come to understand the social and organizational impact of this technology, for it will forever change the way that people work, interact, and communicate. [21]

9 Section IX Vocabulary

A	
abundant	обильный, изобилующий
access	доступ
accomplishment	достижение
advantage	польза
afford	позволить себе
anticipate	ожидать
assemble	созывать
average	средняя величина
acceptable Use Policies	Принятые Правила Пользования
acquire	приобрести
ARCHIE	специальная служба Интернет для поиска файлов на FTP-серверах
awareness	осведомлённость, компетентность

accompanying	сопутствующий
across - the board	все, все подряд
advanced	1 а) выдвинутый вперед, находящийся впереди; передовой the б) (о возрасте) преклонный, пожилой 2 а) современный, передовой б) развитый; отлаженный, отработанный 3 а) продвинутый; повышенного типа б) успевающий (об ученике) 4 повышенный, увеличенный (о количестве)
advocate	1 а) защитник; сторонник (точки зрения, метода, образа жизни) б) адвокат, защитник 2 [v] защищать, поддерживать, пропагандировать (взгляды и т. п.)
agent	1 деятель, личность 2 агентура 3 действующая сила; фактор; вещество
API I Application Programming Interface	1 интерфейс прикладного программирования (набор функций, предоставляемый для использования в прикладных программах) 2 программный интерфейс приложения (набор функций, предоставляемый некоторой программой)
API II Application Platform Interface	интерфейс прикладных базовых систем, спецификация API (Ассоциации по интерактивным мультимедийным системам)
apparently	1 очевидно, несомненно 2 вероятно, видимо, по-видимому, предположительно
applied	практический, прикладной
approach	1 а) приближение; наступление 2 подход, подъезд, подступ; подступы, подходы (к позициям противника) 3 приближение, сближение (по качеству, характеру и т. п.) 4 подход (к решению проблемы, задачи и т. п.)
architecture	1 архитектура, зодчество 2 архитектурный стиль

	3 построение (процесс, принцип, структура организации чего-либо)
associated	1 связанный; сцепленный; объединенный, соединенный 2 действующий совместно; взаимодействующий
B	
backbone	основа, суть
back up system	система дублирования
bottom	нижний
break down	полный упадок сил
bulk	объем
boil down	сводиться к чему-либо
bulletin board	доска объявлений
bundled software	стандартное ПО (поставляемое вместе с компьютером)
backward compatibility	обратная совместимость: а) гарантия того, что существующие приложения будут работать в новом окружении б) гарантия того, что новая версия приложения сможет работать с файлами, созданными предыдущей версией продукта
bar	полоса железа или дерева; засов, задвижка; стойка, прилавок; кабаk, адвокатура
behavioral	поведенческий
bookkeeping	бухгалтерия, бухгалтерский учет
bust (burst)	лопнуть, взорвать, взломать
C	
cancellation	отмена
cancer	рак
cause	причина
cell	ячейка
cell-phone	сотовый телефон
commerce	торговля
commission	комиссионная продажа
conclude	заключать
conduct v	вести

consume v	расходовать
controller	инспектор
cure	средство
cut down	сокращать
canned software	стандартное программное обеспечение
CIX (Commercial Internet eXchange)	Биржи коммерческого Информационного обмена
classify	секретный
commercial software	коммерческое программное обеспечение
cyberspace	киберпространство
capitalize	капитализировать, превращать в капитал
coin	вымышлять, создавать (новые слова), чеканить, создавать, изобретать
collaboration	1 сотрудничество; участие, совместная работа (особ. в литературе, искусстве, науке) 2 предательское сотрудничество с врагом, коллаборационизм
collaborative	общий, объединенный, совместный
controls - I view controls II	средства управления директивы
converge	1 сходиться (о линиях, дорогах и т. п.); сводиться в одну точку (on); встречаться 2 собираться вместе, объединяться (общими интересами) 3 стремиться (к пределу) 4 конвергировать
cooperation	взаимодействие, связь
corrupt	испорченный, гнилой, развращенный, испорченный ошибками, недостоверный; портить, развращать (ся), искажение
D	
delay	замедление
demand	требование
discrete	раздельный
dial in	набор номера
dial-in access	наборный доступ
dial-in connection	метод, который позволяет компьютеру

	без непосредственного прямого подключения получить доступ к Интернет
definition	1 а) определение, формулирование (процесс) б) дефиниция, формулировка 2 отчетливость, разборчивость; ясность, понятность 3 резкость, четкость
descriptor	1 дескриптор; описатель; описание 2 паспорт; идентификатор 3 признак (в ассоциативном ЗУ)
design	разработанный (предназначенный)
designed	1 предназначенный, проектный 2 приспособленный 3 спланированный, намеренный, предумышленный
detection	- выявление, обнаружение, открытие; регистрация; расследование
devastate	истощать, опустошать, разорять
dictate	1 а) веление, предписание (моды, морали и т.п.); веление, голос (разума, сердца и т.п.) б) безапелляционное решение, строгий приказ; диктат (тж. навязываемых условий и т.п.) 2 а) начитывать, диктовать (текст и т. п.) б) диктовать, навязывать (условия и т. п.; to)
E	
effectiveness	1 эффективность 2 вступление в силу
endpoint	конечная точка
evident	явный, очевидный; ясный, наглядный, несомненный; неприкрытый, откровенный, открытый (to)
evolve	развертывать, развивать
execution	1 выполнение (работ, обязанностей, функций и т.п.); свершение, достижение; использование 2 исполнение музыкального

	<p>произведения; мастерство, техника такого исполнения</p> <p>3 а) выполнение формальностей; оформление (документов)</p> <p>б) приведение в исполнение (решения суда и т. п., о действиях и обязанностях судебного исполнителя); арест имущества судебным исполнителем</p> <p>в) казнь; уничтожение, разрушение, разорение, опустошение</p> <p>4 произведение впечатления</p>
exploit	<p>1 деяние, подвиг</p> <p>2 а) пользоваться, использовать, эксплуатировать</p> <p>б) играть (на чьих-либо чувствах, слабости и т.д.), пользоваться (чем-л. в своих интересах)</p> <p>в) разрабатывать (шахты, копи, месторождения и т.д.)</p>
explosive	<p>1 а) взрывчатый; разрывной, взрывной (о снарядах, боеприпасах, веществах и т.д.)</p> <p>2 а) несдержанный, горячий, взрывной (о характере человека)</p> <p>б) взрывной (о согласном)</p> <p>3 взрывной согласный</p>
extendable	растяжимый, эластичный
employee	служащий, работающий по найму
exaggerate	преувеличивать
except	исключать
expense	трата, расход
exposure	выставление, разоблачение;
F	
fitter	сборщик
fix	устанавливать, назначать
frequent	частый
fuel	топливо
FIE (Federal Information Exchange)	Федеральная Информационная Биржа файлов между хост - компьютерами
Freeware software	свободные программные средства (программы без исходного кода,

	которые можно свободно распространять)
FTP (File Transfer Protocol)	протокол передачи файлов (используемый в Internet протокол передачи)
facilitate	облегчать; содействовать; способствовать; помогать, продвигать
feature	1 особенность, характерная черта; 2 деталь, признак, свойство; 3 свойства, особенности, общий вид
fellow	товарищ, приятель, собрат; член колледжа; стипендиат; земляк
firewall	брандмауэр (аппаратно-программные средства межсетевой защиты)
flexible	1 гибкий; гнущийся; мягкий, эластичный; 2 а) податливый, легко приспособляемый; гибкий; б) покладистый; сговорчивый, уступчивый; легко поддающийся влиянию
foster	1 воспитывать, обучать, растить, проявлять родительскую заботу (о ком-л.) 2 затаить, питать (какое-л. чувство); лелеять (надежду) 3 поощрять, побуждать, стимулировать; одобрять
freak	причуда, каприз;
G	
grasp	хватка, власть
Gopher	распределённая запросно-поисковая система, обеспечивающая доступ к иерархическим информационным хранилищам в сети Интернет через гоферовский сервер посредством простого протокола
generation	поколение: а) все представители одной из ступеней семейного генеалогического древа б) одна из стадий развития каких-либо

	(автоматических) систем
granular	- гранулярный, зернистый
granularity	1 глубина [степень] детализации 2 крупность разбиения (напр., программы на модули) 3 уровень модульности (системы)
grid	решетка, сетка
growth	1 развитие, рост (in) 2 прирост, увеличение 3 выращивание, культивирование; культура 4 плод, продукт; урожай
Н	
handle	управлять, регулировать
harm	ущерб
header	1 заголовок; рубрика; "шапка" - header file 2 головная метка 3 (верхний) колонтитул 4 монтажная (многоконтактная) колодка 5 контактирующее приспособление; групповой пробник (напр., для подключения логического анализатора к ИС, установленной на плату)
helpless	1 а) беспомощный (не имеющий возможности действовать, реагировать) б) не могущий удержаться (от чего-л.) 2 а) беззащитный; безоружный б) нуждающийся 3 невыгодный, нерентабельный
hide	I 1 а) кожа, шкура б) кожа (человека) 2 а) свежевать (тушу); сдирать шкуру б) отлупить, спустить шкуру II 1. а) укрытие; тайник, убежище 2 а) тайник, тайный склад (напр., оружия) б) тайный запас, что-л. припрятанное 3 hid; hidden прятать (ся); скрывать (ся) (behind; from)

	III хайд, надел земли; мера земельной площади (= 100 акрам)
hit	ударять, попадать в цель, попасть в точку
hold	проводить, держать
hook	1 крюк, крючок 2 приманка, западня (то, на что можно "поймать" в прямом и переносном смысле) 3 а) кривой нож; серп б) садовые ножницы, секатор 4 багор 5 , шип, игла 6 руки; пальцы; "грабли" 7 крутой изгиб; излучина реки 8 вор, жулик; уголовный преступник
I	
include	включать
in person	обезличенный
Information superhighway	высококласная магистраль передачи информации
Interlibrary loan program	программа межбиблиотечных абонементов
ironed out	сгладить
idle	ленивый, беспечный; праздный, бесцельный
implement	1 а) инструмент, прибор; орудие, средство б) принадлежности, утварь; инвентарь 2 а) выполнять, осуществлять; обеспечивать выполнение, приводить в исполнение б) снабжать, обеспечивать инструментами
incident	1 а) случай, случайность; происшествие, событие, эпизод б) инцидент, неприятное происшествие; столкновение; 2 эпизод (в поэме, пьесе) 3 обязанности или привилегии, связанные с пребыванием в какой-л. должности

	4 а) свойственный, присущий, характерный (to) б) падающий (upon - на)
increasingly	все больше и больше, в большей степени, в большей мере
in-depth	всесторонний, всеохватывающий, глубокий, тщательный
infect	заражать (тж. перен.; with)
initiative	1 а) инициатива, первый шаг, почин б) предприимчивость, инициативность, способность к самостоятельным активным действиям в) законодательная инициатива; право законодательной инициативы (право вносить проекты законов в законодательный орган с обязательностью для последнего обсудить их и принять решение) 2 а) начальный; вводный, предварительный, исходный, положивший начало б) инициативный, предприимчивый, способный к самостоятельным действиям
inline	применяется для часто используемых функций с целью оптимизации, т.к. при компиляции вызов такой функции заменяется ее кодом)
intruder	1 а) навязчивый, назойливый человек б) незванный гость 2 человек, незаконно присваивающий чужое владение или чужие права; самозванец
intrusion	1 вторжение, насильственное проникновение 2 внедрение, интрузия 3 то, что вторгается инородный элемент; intrusiveness - навязчивость (агрессивное, вызывающее поведение, характеризующееся стремлением вмешиваться в чужие дела, высказывать свои мысли без приглашения и т. п.; в маркетинге термин обычно относится к рекламной деятельности, достигшей такого

	уровня, на котором она вызывает раздражение у покупателей и начинает отрицательно влиять на продажи)
К	
keep up	поддерживать
L	
listserv	почтовый реестр (в электронной почте)
loan	заем
lack	1 а) недостаток, нужда; б) отсутствие (чего-л.) 2 а) нужда, стесненные обстоятельства б) голод 3 а) испытывать недостаток, нуждаться; не иметь (for) б) не хватать, недоставать
largely	1 в значительной степени; почти совершенно 2 весьма, значительно, сильно, чрезвычайно 3 много, обильно, щедро 4 пышно, помпезно; величественно
logging	1 заготовка и транспортировка леса; количество срубленного леса 2 снятие, запись показаний (с прибора)
linking	1 связывание 2 сцепление; зацепление 3 редактирование связей 4 связывание (в OLE - метод связывания документа-контейнера и документа-сервера, при котором данные сервера сохраняются в своем файле, а в файле контейнера хранится лишь ссылка на них, ср. embedding)
layered driver	уровневый драйвер (любой из драйверов, реагирующих на один и тот же пакет запроса прерывания)
leverage	1 а) действие рычага; система рычагов б) сила, усилие (достигаемые благодаря принципу рычага)

	<p>в) средство для достижения цели</p> <p>г) использование кредита для каких-л. финансовых сделок</p> <p>2 а) усиливать, использовать рычаги (для усиления)</p> <p>б) использовать кредит для каких-л. финансовых сделок</p>
legitimate	<p>I 1 а) законнорожденный, рожденный в браке;</p> <p>б) законный, легальный; легитимный;</p> <p>2 разумный, правильный, логичный; приемлемый; допустимый;</p> <p>2 истинный, настоящий, неподдельный;</p> <p>II [v] а) узаконивать;</p> <p>б) признавать законным;</p> <p>в) оправдывать, находить оправдание, подтверждать.</p>
M	
Mall	<p>пассаж (совокупность документов WWW, характеризующая коммерческие программные продукты и услуги, предоставляемые конкретным поставщиком услуг Интернет)</p>
MUD I (multi-user dialog)	многопользовательский диалог
MUD II (Multi-User Dungeon)	многопользовательская сетевая игра (с возможностью редактирования и расширения)
Moderator	модератор, координатор (в группе инспектирования программ)
manual	ручной
microscopy	микроскопия
mogul	человек, занимающий высокий пост
monetize	пускать в обращение
manageable	<p>1 а) поддающийся управлению, легко управляемый</p> <p>б) поддающийся дрессировке; послушный, смирный; податливый, покладистый</p> <p>2 выполнимый, осуществимый</p>
mantra	молитва, заклинание (у буддистов,

	индусов)
military	1 а) военный б) воинский, армейский 3) военного образца 2 а) вооруженные силы; войска, военная сила б) (the military) военные, военнослужащие; военщина в) (без артикля) солдатня; солдафоны
N	
NCAR (National Center for Atmospheric Research)	национальный Центр Исследований Атмосферы
Netiquette	сетевой этикет (правила хорошего тона для пользователя Интернет)
NREN (National Research and Education Network)	Государственная Научно-исследовательская и Образовательная Сеть
NSF (National Science Foundation)	Национальный Научный Фонд
Nuclear fusion	ядерный синтез, слияние ядер
Nurture	воспитание, обучение
O	
obstacle	помеха
option	часть
outsourcing	привлечение внешних ресурсов для решения собственных проблем
object machine	(вычислительная) машина для выполнения программ на выходном языке (транслятора); целевая (вычислительная) машина (для которой предназначена оттранслированная программа); объектная (вычислительная) машина
outbound	1 уходящий в дальнее плавание или за границу (о корабле); вылетающий международным рейсом (о самолете) 2 отправляемый за границу, экспортный
outbreak	1 а) прорыв и выброс, извержение, прорыв; взрыв, вспышка; внезапное появление, начало

	<p>б) восстание; бунт, возмущение, в) выброс, выход пласта на поверхность 2 а) вспыхивать, раздражаться (о грозе, огне и т. п.); раздаваться; вырываться б) расцветать, распускаться</p>
Р	
payoff	компенсация
penetration	проникновение
plenary	полный
predict	предсказывать
probability	вероятность
proliferate	распространяться
pace	шаг, темп
plumb	просмотреть
precise	точный, определенный
perfect	<p>1 а) совершенный, безупречный; безукоризненный (без изъяна) б) идеальный, истинный, настоящий (соответствующий некоему абсолютному стандарту, эталону) в) точный, правильный (отвечающий всем требованиям) 2 а) опытный, искусный, гениальный (в какой-либо сфере) б) абсолютный, совершенный 4 точный; абсолютный, полный</p>
peer I	<p>1 а) равный, ровня б) современник; член группы людей одного и того же возраста, одного пола, одного цвета кожи и т.д.; 2 а) лорд, пэр б) человек, принадлежащий к высшим слоям общества 3 а) делать равным б) считать равным в) относиться к определенной категории г) быть равным 4 делать пэром</p>
permissions	полномочия; права
persistent	1 настойчивый, упорный

	2 стойкий; устойчивый; постоянный
pervasive	1 проникающий, распространяющийся повсюду 2 всеобъемлющий, глубокий (о влиянии и т.п.)
plausible	1 благовидный, внешне честный или правдоподобный (о человеке, поступке, поведении и т. п.) 2 похожий на правду, правдоподобный (о каком-л. высказывании и т. п.); внушающий доверие (о внешности кого-л. и т. п.); вполне убедительный (об информации и т. п.)
possibly	возможно
presence	1 присутствие; наличие; 2 присутствие, соседство, непосредственная близость; общество (какого-л. лица); 3 осанка, внешний вид (производящие благоприятное впечатление) 4 нечто таинственное, мистическое, непонятная сила 5 присутствие (военное или какой-л. организации на чужой территории)
proponent	1 лицо, выдвигающее предложение 2 лицо, представляющее завещание на утверждение 3. сторона, представляющая доказательства
proposal	1. а) предложение; план б) предложение о вступлении в брак, предложение руки и сердца 2. заявка (на торгах)
purely	1 чисто, без примесей 2 исключительно, совершенно, только 3 безоговорочно 4 безупречно, безукоризненно; целомудренно, невинно; правильно, верно
purposely	нарочно, специально; преднамеренно, умышленно
R	

rack up	изнурять
raw	сырье
reassurance	уверение
replicate	копировать
reproduce	воспроизводить
retail	розничная продажа
revenue	годовой доход
revert	возвращаться
recipe	рецепт
restrict	ограничивать
rebooting	перезагрузка компьютера
redundancy	1 излишек (часто в смысле сокращения штатов и увольнения) 2 избыточность (пунктов формулы изобретения) 3 отсутствие отношения к делу, иррелевантность
rationale	1 разумное объяснение; логическое обоснование 2 основная причина
REF	1 ссылка 2 опорный [эталонный] уровень 3 опорный сигнал 4 точка отсчёта
refer	обращаться
relatively	1 относительно, сравнительно 2 относительно; в отношении, по отношению к, что касается 3 соразмерно; соответственно; (прямо) пропорционально
rely	1 полагаться, надеяться; доверять, быть уверенным (в чем-л. - on, upon) 2. зависеть (от чего-л. - on, upon)
remote	1. а) отдаленный район б) внестудийная передача, репортаж с места (событий), прямой репортаж; внестудийная видеосъемка 2. а) расположенный на расстоянии друг от друга б) дальний, далекий, отдаленный (от какого-л. места, предмета, человека)
require	1 приказывать, требовать 2 нуждаться (в чем-л.); требовать (чего-л.)

returned	1 возвратный; возвращённый; вернувшийся; 2 избранный, прошедший на выборах
rewrite	1 писать в ответ, отвечать письменно 2 переписать (особ. в другой форме) 3 переделать, переработать Subsystems
router	1 устройство для соединения сетей, использующих разные архитектуры и протоколы; осуществляет выбор одного из нескольких путей передачи сетевого трафика, а также фильтрацию широковещательных сообщений для локальной сети; 2 программа трассировки; алгоритм трассировки, трассировщик.
S	
saleschannel	канал продаж
shotgun	вынужденный
spam	консервированный колбасный фарш
surpass	превосходить
survey	изучать
shareware	программы, для использования копий которых требуется оплатить лицензию, что, однако, редко соблюдается
smooth	гладкий, ровный
stack	книгохранилище
stuff	материалы
scanner	1 сканер; сканирующее устройство; блок сканирования 2 опрашивающее устройство; устройство опрашивания 3 устройство построения развертки 4 лексический блок, блок лексического анализа; сканер (в трансляторах), score-метка, счет; делать отметки, считать
see the light	1 увидеть свет, родиться 2 выйти из печати 3 обратиться (в какую-л. веру и т. п.) 4 понять; убедиться
setup	1 установка; устройство; схема; макет

	<p>2 набор заданных значений</p> <p>3 набор схемы (путем коммутации нужных блоков)</p> <p>4 сборка; монтаж; наладка; настройка</p>
shortsighted	близорукий
sophistication	извращённость
stealth virus	вирус-невидимка (маскирующий присутствие своей копии в тестируемом файле)
sanitate	<p>1 улучшать санитарное состояние; оздоравливать</p> <p>2 оборудовать санузел в помещении</p>
storage	<p>1 а) сохранение, хранение б) накопление; аккумуляирование</p> <p>2 место для хранения вещей : а) база, склад, хранилище б) кладовка</p> <p>3 количество хранимых вещей, содержимое хранилища</p> <p>4 плата за хранение в холодильнике или на складе</p> <p>5 а) запоминание б) запоминающее устройство, память (вычислительной машины)</p>
subvert	свергать, ниспровергать; низвергать, низлагать, разрушать
suitable	годный, подходящий, пригодный, применимый, соответствующий
survive	<p>1 пережить</p> <p>2 а) выдержать, пережить, перенести б) остаться в живых; продолжать существовать; уцелеть</p>
switch	<p>1 а) прут, хлыст</p> <p>2 тип устройства: а) выключатель, переключатель, рубильник; коммутатор б) стрелка</p> <p>3 а) переключение б) поворот, оборот, изменение (темы разговора и т. п.)</p> <p>4 фальшивая коса; шиньон, накладка</p> <p>5 а) вид мошенничества с "куклой" при обмене денег б) надувательство, обман</p>

T	
tear	срывать
threshold	начало
Tax-subsidized	субсидированное налогообложение
Telnet	сетевой теледоступ (протокол виртуального терминала в наборе протоколов Интернет; позволяет пользователям одного хоста подключаться к другому удаленному хосту и работать с ним как через обычный терминал)
technique	1 техника, технические приемы 2 метод; методика, способ
thread	нитка, нить, винтовая нарезка; продевать нитку, нанизывать, пробираться сквозь
total	1 целое, сумма; итог 2 а) весь, целый; общий, совокупный, суммарный 2) абсолютный, полный, совершенный 3) всеобщий, 3. а) подводить итог, подсчитывать б) доходить до, равняться, насчитывать (о сумме, числе) в) разбивать, разрушать, ломать.
trigger	1 а) спусковой крючок б) защелка, собачка в) триггер; пусковая схема г) ядерный заряд 2 а) спускать курок; приводить в действие спусковой механизм или взрыватель б) инициировать, дать начало
typical	1 типичный (для кого-л. - of) 2 символический
tag	петля, ушко; снабжать, прицеплять, подбирать рифмы
U	
unemployee	безработный
usher	проводить

unmanageable	1 неуправляемый, неконтролируемый; трудно поддающийся обработке 2 трудный (о ребенке, о положении и т. п.); непокорный, неподатливый
unprivileged	1 непривилегированный, не имеющий преимуществ 2 не защищённый привилегией 3 не дозволенный законом
upgrade to	повышать (до более высокого уровня)
usable	используемый
V	
venture	рисковать
viable	жизнеспособный
virus scanner	средства обнаружения вирусов
vulnerability	уязвимость
W	
Word-processing software	программные средства обработки текстов
weaknesses	1 слабость, склонность, пристрастие (for - к чему-л.) 2 а) слабое место, недостаток; б) функция, функциональность, опция, (у программного продукта, системы)

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