ICT-STATISTICS

Proposal for a Swedish system for statistics on information and communications technology

Summary

SIKA Report 2001:5

Background

The rapid development of information and communications technology (ICT), its ever increasing use by companies, the public sector and households and the strong growth of the Internet is having a great impact on social and economic life. The interdependency of technology, the economy and welfare issues has increasingly obliged politicians and decision-makers to adopt a multi-sector approach. This in turn has meant that the areas and activities that ICT statistics are to provide information about are very diverse.

In June 1998, SIKA was instructed by the Swedish government to carry out a study of ICT and to draw up a complete system for statistics on information and communications technology. This report is the result of the study.

The concept information and communications technology (ICT) is sometimes used as a synonym for information technology (IT), although it places greater emphasis on the communications component. IT and ICT have both become umbrella terms, which include “techniques for collection, storage, retrieval and communication of data, text, images and speech”.

ICT is used throughout society. In order to be able to analyse and structure the field, a division must be made into different sub-areas and a number of different perspectives applied. The cake can be cut in various ways and several different cuts are needed to be able to construct a statistical model for this area. SIKA has adopted a model with four participants: companies, the public sector, organisations and individuals, together with a categorisation by sub-areas where ICT is present.

The spread of information

SIKA proposes that the system for ICT statistics should include a published compilation of statistics, an information sheet and an information site on the Internet.

Publication

Criticisms have previously been made from various quarters about the unavailability of ICT statistics despite the fact that statistics exist. An important component of the work with ICT-statistics is therefore to publish the statistics in one place and thus make them available and more accessible to a broad sphere of interested parties. The Institute proposes an annual publication in the form of a book presenting a compilation of existing ICT statistics. In SIKA’s view, this

publication should, at least for the next three years, be available both as a printed version and in electronic form. SIKA also recommends that the book be translated into English.

Information sheet

SIKA further proposes a series of information sheets. These information sheets can include short reports or summaries of statistics/investigations relating to ICT and information about the system and other activities of interest. They should be available in printed form and it is also proposed that a common information site on Internet be set up. The sheet should be published about four times a year and subsequently as required.

Information site on Internet

Easily available and rapidly spread information is very important if work with the ICT system is to provide the envisaged benefit to society, in particular as criticisms have been made about the difficulty of finding existing statistics. SIKA is proposing that a common information site/website be set up to serve as an information hub for the system. The information sheets and the ICT publication should be available on this information site. Other information such as the work plan, timetable, information about meetings for ICT networks and the ICT conference should also be available here.

The ICT system

How should the ICT system work? A large number of players and interested parties participate in the system which has and must create different contact surfaces and forms of collaboration. Some of the participants are more affected than others, depending on interest or on the work for which they are responsible and their relationship to the ICT field. However, these participants often have considerable knowledge of their own area of society/specialisation that they can contribute. It should be underlined here that it is important that contact is continuously maintained with all participants and interested parties in the system, not only with those with a more prominent role.

A central ICT network
SIKA proposes that a network be linked to a co-ordinator consisting of representatives of the public authorities that are responsible for statistics of a more prominent and general character in the area of ICT. Among other things, the network should monitor and inform about events in the system, respond to feedback from users/clients and analysts, discuss new investigations/definitions, participate in discussions in preparation for international meetings, and initiate and co-ordinate projects. According to SIKA, the ICT network should also be able to appoint/work with different committees or working groups which can deal with specific issues. This might for instance take place when issues are on the agenda

that either require specialist expertise in particular areas of society or technical fields or methodological or quality issues.

An ICT conference
In order to engage and activate many other participants in this work, it is appropriate that these are "members" of an ICT conference that is called about twice a year. These conferences should provide a venue for exchange of information, presentations, reports on work carried out and plans for the future and discussions on the ICT system, its content and processes.

Assignment of responsibilities within the ECT system

In its work on a recommendation for assignment of responsibilities, SIKA has identified different tasks in a statistical system of the kind in question. SIKA has then grouped these tasks according to different roles: public authority responsible for ICT, development, provision of information, co-ordination, analysis of the surrounding world, and use/specification of requirements. SIKA's proposal on distribution of responsibility is based on this system of roles.

Public authorities responsible for ICT
The concept public authority responsible for ICT includes both the authority responsible for official statistics and the authority responsible for other publicly financed statistics. The tasks of the authority responsible for ICT include client responsibility. This consists of producing or ordering production of statistics as well as methodological work. Client responsibility also includes participating in the dissemination of the results from collection of statistics and investigations. SIKA's proposals on public authorities responsible for statistics are included in the main text in the section on proposals for statisticians.

Representation
Another role that is partly related to communication of results but also to client responsibility is to represent Sweden and the ICT system in various national and international contexts. SIKA recommends that the role as representative be shared between the various public authorities responsible for ICT although with clear co-ordination and control.

Development
The role of developer primarily consists of participating in and initiating various pilot studies or development projects. It also includes initiating and pushing forward method and area development. The developer can also be a producer in the sense that he can carry out a (pilot) survey, for instance, through interviews and surveys. SIKA's recommendation on a responsible authority for development projects is contained in the section on recommendations for statisticians.

Provision of information and analysis of the surrounding world
A further important role in the ICT system is the provision of information. This role includes being responsible for information on the system as a whole being published in the form of a yearbook. This responsibility for information shall also

be include the Information Sheet and for a portal/information site on Internet where information to and from different interested parties is disseminated.

SIKA recommends that the co-ordinator be responsible for publication and the portal. The ICT system must have a clearly defined function of an explorative nature which endeavours to track and take into consideration new phenomena in society and technology. Analysis of the surrounding world is to include "keeping tabs on the situation and developments" and making sure that new investigations are initiated etc. Analysis also includes a wider responsibility for monitoring. It is important to "scan" international developments and try to measure and analyse ICT's influence in different areas. SIKA proposes that the role as analyst be integrated with the role of overall co-ordinator.

Co-ordination
A strong, effective co-ordination of the entire ICT system is needed for a number of reasons. One of these is that the system contains statistics with different principals and forms of financing. Another reason is that since ICT statistics span over many areas of society, a system with the tasks outlined above can "pull in different directions" due to lack of knowledge about what other participants have initiated and are engaged in. A third reason is that ICT is at present viewed in some cases as a policy area but not as a separate statistical area. It can instead be compared with the environmental field, which spans over most areas of society in a similar way. Moreover, the ICT statistical system will be undergoing development in the next few years, which will require overview and co-ordination.

Co-ordination is about creating and running the proposed system with the aid of the central ICT network. It also includes sending out invitations to the regular ICT conferences. This co-ordination is to include information work with the focus on being the "spider in the web". In SIKA's view, the work should also include initiating new projects or development projects with several participants, and working together with analysts and developers. SIKA takes the view that one of the public authorities responsible for ICT should be made responsible for co-ordination. This solution requires a minimum of institutional changes and has the advantage that the work of building up an ICT system can proceed quickly without the risk of slowing down the work of statistical production and information.

SIKA considers that the above tasks, integrated with the responsibility for dissemination of information and analysis of the surrounding world, requires a staff of two – a qualified project manager and another official. It is probably also necessary to ensure continuity in the work of co-ordination.

As regards the co-ordinator, SIKA has identified a list of requirements that the co-ordinator should meet for the proposed tasks to be carried out successfully. These include broad knowledge of ICT, knowledge about the use of statistics and statistical systems, an analytical and explorative approach and an interest and ability to create and maintain good contacts with those specifying requirements, users and other interested parties. SIKA has carried out interviews and discussions with a number of potential candidates for the role as co-ordinator and with other

interested parties. On the basis of these discussions and applying the selection criteria presented above, SIKA notes that three candidates remain: ITPS, Statistics Sweden (SCB) and SIKA.

After further analysis SIKA has concluded that none of the candidates fully comply with the requirements made on the co-ordinator of ICT statistics. However, SIKA considers that all three public authorities mentioned have the requisite qualities to act as co-ordinator. On the basis of the survey and analysis, the Institute has therefore concluded that it is not possible to prefer one authority above the others. In the light of this, SIKA has decided to pass the final decision on the authority to be responsible for co-ordination of the system of ICT statistics to the Government. The Institute wishes to underline the importance of the Government clearly regulating the roles in the proposed statistical system for ICT through instructions, official documents allocating appropriations and special assignments. SIKA considers that this is particularly important as regards responsibility for co-ordination.

Costs

As will be evident, the statistics about ICT proposed by SIKA include complements to existing statistics as well as new investigations. Moreover, SIKA proposes that ICT-related statistics from existing registers are to be reported separately and published. The proposal on spread of information also contains some new tasks.

SIKA proposes a wholly new statistical system with a number of new statistical products, which will accordingly require additional funds. The cost estimates are uncertain in some cases since the proposals in many cases relate to wholly new products that require pilot studies in many cases to assess the feasibility and costs of producing such statistics. SIKA estimates additonal expenditure on statistics of between SEK 10 200 000 and 10 400 000 for the period 2002–2004.

Co-ordination
The work of co-ordination within the ICT system gives rise to three kinds of expenditure: staff costs, expenditure on operation of the co-ordination system and expenditure on external activities, such as special conferences and seminars. SIKA calculates the annual expenditure for this part as between SEK 1 650 000 and SEK 2 250 000.

ICT publication
SIKA's proposal on an annual ICT publication includes a printed version and an electronic version on Internet. Furthermore, SIKA considers that the publication should be translated into English. SIKA estimates the required annual expenditure at between SEK 1 000 000 and SEK 1 200 000.

The Information Sheet
SIKA proposes that a special information sheet for the ICT system be produced and published. SIKA estimates the annual expenditure, excluding staff costs at SEK 200 000 - SEK 250 000.

The Information Site
SIKA proposes that there should be an information site on Internet for ICT statistics and estimates the annual costs of this at between SEK 100 000 and SEK 200 000. Furthermore, special costs occur in the initial phase for an information site – for design, arrangement, etc. A reasonable amount for this expenditure on start-up work should be SEK 50 000 - SEK 150 000 depending on the level of ambition.

Implementation

According to SIKA, the work should start as soon as possible, appropriately at the latest by 1 January 2002. In a report, SIKA has pointed out the need for certain projects to start relatively immediately and that some of the proposed investigations require an initial planning phase.

As shown by the report and SIKA's analysis, the multifaceted nature of the ICT area and the fact that the phenomena cut across most areas of society, make good co-ordination particularly important to achieve a good result as regards the production and dissemination of information. The central ICT network should be quickly established to support the work of the co-ordinator in setting up contact networks, establishing the details of activity plans, etc. An ICT conference should be arranged before summer 2002 in order to gain acceptance for and agree on a work plan, etc. SIKA considers that swift action is also justified in order to lose momentum in the information flow already established between different public authorities responsible for ICT and interested parties, and to reduce the risk for duplication of work.

SIKA considers that the Government should clarify the prerequisites through instructions, official documents allocating appropriations and special assignments for regulating the structure of and production in the proposed system for ICT statistics. Annual reports are to be produced and SIKA furthermore proposes that a more comprehensive evaluation should be made after three years, when the system has been operating for a time. The co-ordinator should be responsible for this evaluation, which should examine the effectiveness of the system, the allocation of roles, the relevance of statistics and assess timetables and expenditure plans. SIKA considers that it is important that representatives of users/specifiers of requirements and other parties are given an opportunity to provide points of view in this assessment. Evaluations should be completed during the first six months of 2005 so that any more important changes can come into effect as from 2006.

Statistics

SIKA proposes that the work of measuring ICT-related investments and expenditure for this purpose be referred to the commission *Översyn av den ekonomiska statistiken (Review of economic statistics)*.

Usage of ICT by companies
SIKA recommends that statistics for this sub-area contain information on access to and usage of ICT by companies. SIKA recommends that new statistics on business use be produced annually as a sample survey. Since the sub-area is still in process of development, the statistics should not yet be included in the official statistics but be financed by public funds. Statistic on business communications should be included as part of the statistics on business use. SIKA recommends that Statistics Sweden be the authority responsible for ICT in this sub-area.

Usage of ICT in the public sector
In order to assess whether the public administration complies with the Government's objective of setting an example as an active user of information and communication technology, information is required about access to and use of ICT. SIKA is proposing that information about the internal use of ICT in the public sector be collected annually. Moreover, work should be started to define how and what is to be measured in order to measure developments and changes in democracy resulting from use of ICT. SIKA also assumes that implementation of the 24-hour authority be followed up. SIKA recommends that the Authority for Administrative Development be made responsible for ICT for the whole sub-area.

Usage of IT by organisations and associations
In order to obtain a total picture of ICT use in society, access to and use of ICT by organisations and associations should also be measured. The issues that are relevant can be found in the section on usage by companies and usage by the public sector. SIKA proposes that ICT use in organisations and associations be investigated and given as a special assignment to Statistics Sweden. A discussion on any continued work should be made after the investigation has been completed. The results of the investigation can be reported in the ICT publication proposed by SIKA or separately.

Usage of ICT by individuals
Individuals must have access to a computer and Internet to be able to use information and communication technology. The statistics are to provide a basis to describe development trends and information about the general public and to survey differences between groups of users/citizens. This applies both at work and outside working hours. SIKA recommends that a survey on individuals be produced annually and include access to and use at home as well as in working life and that SIKA be the responsible authority.

Work
The computer has become our most common aid and tool in working life. The introduction of the computer has affected the working environment in many ways. SIKA is proposing that information about ICT-related occupational injuries continue to be collected. The content of the statistics proposed by SIKA is

existing statistics within the framework of public statistics. SIKA recommends that statistics about occupational injuries related to ICT be collected by the Swedish Work Environment Authority and included in the official statistics on occupational injuries. Furthermore, the definitions should be reviewed.

Crime – Security
Information technology has become the most important component for the provision of information. Information security is a more general concept that includes IT security and administrative security and which is related to processing information in different activities. SIKA recommends that information about incidents be collected by the authority that is made responsible for dealing with IT incidents, the National Post and Telecom Authority (PTS) during the two-year period proposed for the authority and that this be subsequently evaluated. It is also proposed that this information be collected for companies in the form of an investigation carried out by the National Council for Crime Convention.

R&D in the field of ICT
The Swedish R&D system includes a large number of participants in different areas of society. SIKA is proposing that an ICT-related R&D statistic be produced and reported based on the existing R&D statistics. ICT statistics should be produced at the same interval as other R&D statistics. SIKA proposes that Statistics Sweden be responsible for ICT in this sub-area.

Health care
SIKA has opted to divide the sub-area into four different areas. In internal use in the health service: to be included in the section Usage of ICT by the public sector. In-built systems are a central part of control of advanced systems, e.g. robots or X-ray systems. This part can be found in the section In-built systems.

Use of telemedicine. Telemedicine means transfer of medical information and moving images through the telecommunications network or other electronic means of communication. SIKA recommends that a survey of the use and access to telemedicine be initiated and that definitions on telemedicine be clarified. SIKA recommends that the National Board of Health and Welfare be the responsible authority.

IT-based aids and IT support in health care, social services and rehabilitation: The disabled can obtain ICT-based aids and services prescribed. Others in health care, social services and rehabilitation who need them can have access to ICT aids.. Knowledge about the ICT-based aids available, who has access to them and whether the aid is used at work are important. SIKA proposes that statistics about ICT-related aids and services be collected annually and that the National Board of Health and Welfare be the responsible authority.

Built-in systems
Microelectronics is included in an increasing number of industrial products, which means that more and more products contain software. The software content of products corresponds to the concept “embedded (software) systems” which explains the concept embedded and in-built systems. In-built systems mean that the software and hardware are included as an integrated part of a particular

product. SIKA recommends that in-built systems be made a development project in the field of statistics and that Vinnova be made responsible. Furthermore, SIKA is proposing that a survey be initiated on the occurrence, use and investment costs of advanced systems such as computer demography in the health services, among other places. The National Board of Health and Welfare should be made responsible for this.

Infrastructure
With the increased use, new demands are placed on the infrastructure: on increased network capacity, increased coverage and range etc. An increase in the existing capacity is being made in the network at the same time as a large new construction is taking place with government assistance. It is therefore motivated to monitor and evaluate what has been done. SIKA recommends that statistics about the infrastructure in Sweden be produced annually and that the National Post and Telecom Authority be the authority responsible for ICT in the sub-area.

SIKA is further proposing that the Authority for Administrative Development initiate/continue work on definitions and content in the soft infrastructure inter alia and then make recommendations about the statistics that are to be produced in the field.

Pending future development, as regards work with digital signatures, SIKA is not recommending any special statistics on the number of certificates etc. that have been produced other than those produced by the National Post and Telecom Authority in its role of supervisory authority.

Culture
Taken up under the sub-area Usage of ICT by individuals.

Media
Included in Usage of ICT by individuals and in ICT companies.

Environment
Information technology as such does not entail any reduced load on the environment although it but can contribute to a reduction. Use of ICT can make transport more efficient and thus more environmentally friendly. In industry, use of ICT can lead to more efficient energy use and dosage of chemicals. SIKA is proposing that different studies be carried out to examine the linkage between ICT and the environment. Thereafter work should start on producing the measures that are to be applied and on how the statistics are to be collected. SIKA recommends that the National Environmental Protection Authority be made responsible for studying the linkages.

SIKA is also proposing that the National Environmental Protection Authority continue to collect statistics about scrapped electronic products in the framework of the official statistics “review of recycling levels for material/commodity groups with producer responsibility”.

Transport
Transport can be observed from two perspectives, based on the transport sector and its companies and on the basis of travel by individuals.

Use of ICT in the transport sector enables transport systems to be made more efficient. Statistics are required in this area in order to monitor developments and record efficiencies. SIKA is proposing that surveys be initiated to survey usage of ICT by the transport sector and subsequently decide on a more regular collection of statistics. The Institute is proposing that SIKA be given the task of studying the use of the transport sector.

The new communications technology can affect the individual's need of physical journeys. SIKA is therefore proposing that information about he communication habits of individuals continue to be collected and analysed. SIKA is further proposing that statistics become official statistics. Proposals on the content of statistics can be found under Usage by individuals.

Education
Education is one of the areas that are pointed out as particularly important in the assignment. The area includes access to and usage of ICT in education and training and the level of education/training and use of competence.

- Basic education and Municipal adult education

SIKA is recommending that information from "Computers in schools" continue to be collected as a survey investigation every other year. Collection of information about how ICT is used in schools should take place regularly. SIKA is recommending that the National Authority for Education be the responsible authority for this sub-area.

- Universities and other institutions of higher education

From the point of view of society, it is important to know what courses focused on ICT are available, the number of students and how many complete the course successfully. Development has been rapid and ICT is now included in almost all courses in one or another way. SIKA recommends that a separate report be made of the ICT courses offered by universities and other institutions of higher education. It may be necessary for the responsible authority to work on the definition of an ICT course. The number of students and examined should also be separately reported. It is proposed that the responsible authority for the sub-area be the National Authority for Higher Education.

- Other education/training

In order to obtain as comprehensive picture as possible about the level of knowledge and courses offered in the field of ICT, popular education should also be included, labour market training and staff training. From an ICT perspective, it is interesting to know how many ICT-related courses are being offered, the level of these, the persons being trained and also the individuals opportunities to develop their competence. SIKA recommends that the number of ICT-related courses/programmes be collected annually and reported in for instance the ICT-publication and that work be started on deciding what an ICT-related training contains. As regards labour market courses, it is also interesting to see whether these courses lead to employment and if this employment is related to ICT in any

way. SIKA recommends that this work take the form of separate studies. SIKA recommends that the National Council for Cultural Affairs be made responsible for popular education, the National Labour Market Board for labour market programme courses and Statistics Sweden for staff training.

- Distance education

Distance education is a tool to enable students to study who would not otherwise have an opportunity to do so. It is therefore important. It is important to know who is offered distance education (upper secondary or higher education), which courses/subjects are being offered and who takes these/has the opportunity to do so. SIKA is proposing that information about distance education at all levels of education are collected annually. The Institute suggests that DISTUM be the authority responsible for ICT.

- Level of education/training and use of competence

The economic development has consequences for both the business sector and the public sector's need for IT expertise both broad and specialised competence. Broad IT expertise is required to make use of the opportunities offered by ICT. Specialised skills are required, for instance, for research. Since the number with IT training affects Sweden's competitiveness, it is therefore of interest to produce information. SIKA is proposing that information about the number with IT training therefore be reported separately. It may be necessary to review definitions. SIKA is proposing that the Institute for Growth Policy Studies be the authority responsible for ICT.

The ICT industry

In order to measure development of the ICT industry, information is required about companies and the products/services that are produced. SIKA is recommending that information about ICT companies continue to be collected in Corporate Statistics and that this information is reported annually in a report on the ICT industry. The Institute is also proposing that development work take place to determine the industries that are to be included in the concept ICT business. SIKA proposes that Statistics Sweden be the authority responsible for ICT with regard to corporate data.

Moreover, definitions are required of what is an ICT-related service and possibly what are ICT-related products. As regards the activities of electronics companies and IT-related service companies, SIKA is proposing that the Institute for Growth Policy studies be the authority responsible for ICT. Information about all media companies is important although in SIKA's assignment on ICT statistics, the media area is limited to include companies in the audiovisual area. SIKA is proposing that statistics be collected and reported annually and that Radio och TV-verket be the authority responsible for ICT. Moreover, it is proposed that SIKA continue to be responsible for statistics on the telecommunications undertakings.

It should be noted that ICT-related investments required further in-depth work with definition. This work should be referred to the commission on economic statistics, however.

THE SWEDISH INSTITUTE FOR TRANSPORT AND COMMUNICATIONS ANALYSIS

The Swedish Institute for Transport and Communications Analysis, SIKA, is an agency that is responsible to the Ministry of Industry, Employment and Communications. SIKA was established in 1995 and has three main areas of responsibility in the transport and communications sector:

- To carry out studies for the Government
- To develop forecasts and planning methods
- To be the responsible authority for official statistics

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