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Use of ICT in the public sector

**- a questionnaire based survey
of Danish municipalities**

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Summary

The paper presents a new survey of ICT usage in Danish municipalities - and the applied questionnaire. After a general discussions of the problems of delimitation of units, the organization and tasks of the Danish municipalities are outlined. The last part of the paper contains a description of the survey design, the questions and some of the problems encountered. These problems concern mainly the module concerning ICT expenditure.

1. Introduction

As the Information Society is developing constantly, the statistical institutes are confronted with an increasing need for official statistics on the information society. Hence in the past few years an increasing number of countries have produced official statistics on ICT usage in enterprises or in households. At the international level, harmonized statistics on ICT-usage has been developed within the framework of OECD, Eurostat and others, not to forget the Voorburg Group.

The public sector seems now to become the missing link in official ICT statistics. The use of ICT by the public sector is of huge importance for the ICT politics due to the possibilities of producing better and more efficient services to the citizens. First of all, the increased number of households with Internet access has provided *new means of communication* between the public authorities and the citizens. Secondly improved ICT-usage inside the organisation is supposed to offer a *better utilization of resources* in the public sector. The last-mentioned aspects will be of greater importance in the coming years as many countries are facing reduced workforce due to demographic development.

2. Surveying the public sector: A unit problem

The public sector can not be characterized as the easiest area to survey concerning ICT-usage. The most important challenge may be to identify and delimit the single units - and the borders of the public sector as a whole. Internationally these difficulties are multiplied, as the overall organisation of the public sector differs between countries. It concerns the total size of the sector, the prevalence of semi-governmental institutions, division of tasks, size of units and other structural differences.

In many ways the units of the public sector make a problematic starting point concerning creation of international indicators. Where it makes sense to compare number of enterprises with e.g. homepage, it is not at first possible to compare number of authorities with certain web-services because of fundamental structural differences between the public sectors in the different countries.

An approach to solve the problem, as regards statistics on services offered to citizens, might be to look at *coverage of the population* instead. Thus the services offered could be weighted with the number of citizens and raised to total number of potential users in the population. These data could be collected by surveys of public organizations, e.g. municipalities. In some cases scanning of websites could provide the information needed. Household or enterprise surveys could contribute with data on the intensity of the usage of services; with possible breakdown by user-groups.

Still the statistical institutions are facing the unit problem when the surveys are to be conducted. Not only should the relevant units be identified and chosen. Quite often the responding units are only loosely connected to the surveyed units. For example the development of the ICT-strategy might be separated from the acquisition that again is separated from the usage. The more variations in the decentralization, the harder it is to collect these data. Similar problems are also known from surveys of ICT-usage in enterprises (e.g. dealing with enterprise groups) but are more frequent in the public sector because of the organizational complexity.

3. Organization of Danish municipalities

The Danish public sector consists - as in many other countries - of three layers: State, counties (14) and municipalities (275)¹. All three operate at a local level, but the municipalities take care of the majority of local tasks. The counties have their own array of responsibilities, typically concerning a larger geographical area and/or demographic base.

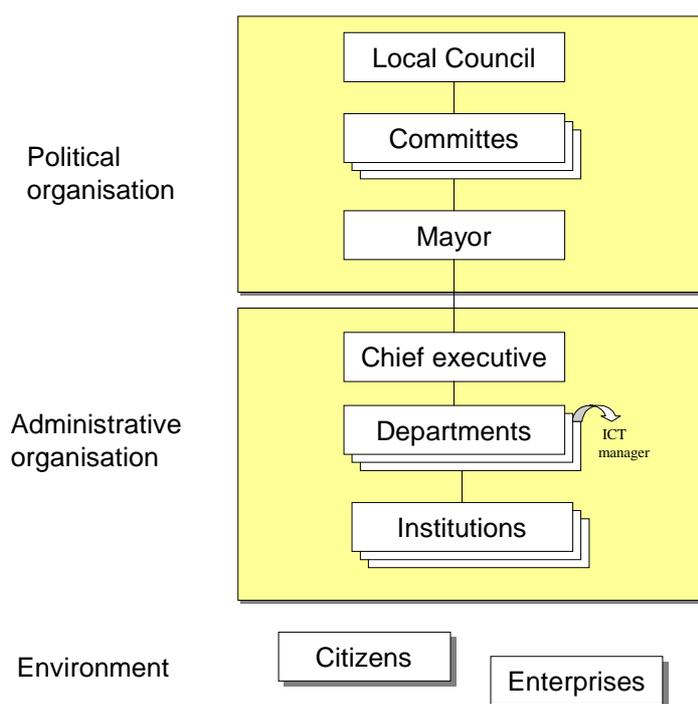
Statistics Denmark's coverage has thus taken its starting point at the municipalities for the following reasons:

- Local authorities have most contacts to the individual citizen
- Local authorities constitute somewhat more alike units compared to the State level
- Local authorities attend to a large part of public sector tasks

Danish municipalities takes care of a broad range of tasks: Schools, kindergartens, libraries, care of the elderly, administration of social security, local infrastructure, water supply etc. The municipalities are in addition largely independent from the state and have the right to impose local taxes. Because of the broad range of task, even the smallest municipalities (around 3000 citizens) equals easily large enterprises in budget, staff and complexity of the organization.

The following figure illustrates the organizational structure of the Danish municipalities.

Figure 1: Organization of Danish local authorities



Though the organizations of the municipalities are alike to some extent, there are local variations concerning number of departments and institutions and the mutual division of task between these. Especially the recent years decentralization of administrative task from the departments to the institutions makes it harder to assemble data in the central administrative organization. The ICT managers will typically be located in the financial department.

¹ Copenhagen and Frederiksberg enjoy dual status as both local and "county" authorities, being at the same time primary local authorities and counties.

On the other hand some aspects of the technological development pulls the opposite direction. For instance design and maintenance of websites often will be coordinated at a centralized level - in some cases by the ICT department. Services offered by municipal web sites seem thus, also for practical reasons, to be an obvious measure of the ICT usage.

4. Survey design

The survey is conducted by mailed questionnaires followed by 2 reminders. Participation in the survey was voluntary and all 275 municipalities were included in the sample. The questionnaire was addressed to the ICT manager, but because of the crosscutting nature of the questionnaire, the chief executive was informed about the survey in a separate letter.

Stages of the survey	Period	Partners involved
Research	May-July	
Pilot testing	August	3 Municipalities, The National Association of Local Authorities in Denmark, 2 software suppliers.
Questionnaire mailed	28 August	275 Municipalities (all)
1. Deadline	7. September	
Written reminder	12. September	
2. Deadline	19. September	
Telephone reminders	24-28. September	
First results	End of October (expected)	

The relative small number of respondents makes it possible to produce fast statistics. The time from the questionnaire was mailed to the first results are published is thus planned to take about 2 month.

5. The general approach of the questionnaire

The questionnaire is based on the same principles as the previous surveys on ICT usage in enterprises:

- A flexible structure with use of modules, allowing features to be updated
- Questions are formed in a general way, allowing for future expansion of coverage, comparisons with enterprises etc.
- All modules, except ICT-expenditure, are based on a qualitative approach which is considered to provide the most reliable answers and the highest response rate

The questionnaire is expected to undergo regular revisions in the future to reflect the rapid changes in the ICT-usage.

6. Content of questionnaire

The benefits from ITC-usage are closely related to the degree of diffusion and integration of the technology. There are two main dimensions in this, looking at the public sector:

1. Internal relations: Efficiency in the workflow etc. inside the organisation
2. External relations: Services aimed at citizens etc.

The questionnaire aims at covering both dimensions. A majority of the questions relates to the internal conditions covering basic indicators on the readiness and organization (intranet, ICT-expenditure and others). The external relations are mainly covered in the module, 'Website'.

The questionnaire is divided into the following modules:

Website/electronic services	<ul style="list-style-type: none"> - Homepage - Information on homepage - Communication via homepage
Intranet	<ul style="list-style-type: none"> - Having Intranet - Organizational coverage - Contents
Other ICT-systems	<ul style="list-style-type: none"> - Electronic filing system ... - EDI
ICT-expenditure	<ul style="list-style-type: none"> - Previous year - Current year - Forecast
Strategy and co-operation	<ul style="list-style-type: none"> - Strategy - Coverage - Co-operation with other municipalities
Barriers to the usage	<ul style="list-style-type: none"> - In general - Electronic services

In the following the considerations behind two of the more difficult modules are described further.

Website/electronic services

The module 'Website' covers aspects of electronic communication with citizens and enterprises. The total number of homepages can be collected from other sources and more than 95% of the municipalities have own homepage today and is only included as a filter-question. It showed up to be onerous to cover the whole range of possible information available at the websites. Besides some basic types of information are covered by an existing ministerial survey. Instead a topic was chosen, namely information concerning the *local democratic process* (e.g. announcements of local council meetings).

Communication and genuine electronic transactions was covered only to some extent in the module. There seems to be two possibilities. The first is to ask for *concrete scopes of application* with direct reference to purpose or content of the transactions. An example could be possibility for citizens to check waiting lists of kindergartens. The second possibility is to ask for *generic formulated indicators* that reflect the technical aspects of the communication (e.g. security).

However the pilot-test of the questionnaire revealed special circumstances that narrowed the choices. Firstly the municipalities take part in *3. part websites*, either jointly with governmental organisations or by using private solutions. These websites offer different services - from downloading of forms to shared databases of libraries. Though the single municipality does not develop these features, such services exist as a reality for the citizen - as links or dynamically integrated content. Hence some of the indicators specify that the functionality refers both to the website itself and to services with use of 'direct links' to external sites.

A second problem is that the municipalities are somewhat on hold concerning use of *digital signatures* because of lack of common standards. Transactions that require this kind of security for legal reasons were therefore not relevant to include in the questionnaire this year.

ICT-expenditure

The module asks for ICT expenditure (including investments) in currency for two years: The financial year 2000 and the present budget of 2001. Finally the respondents were asked to estimate the change from this year's budget to next year in percentage.

The expenditure is divided in 4 areas: *Hardware*, *Software*, *ICT services* and *Communication*. The specification of the expenditure was inspired by the Japanese 2000 questionnaire on 'ICT workplaces' by METI (Ministry of Economy, Trade and Industry).

Expenditure spend in *institutions* (e.g. kindergartens) was included as these are a part of the total budget of the municipality. *Communication* includes ordinary telephony, as the technological convergence makes it difficult and to some extent irrelevant to make a distinction between telephony and other communication. It was on the other hand decided to exclude *salaries* for municipal ICT employees, rent and other internal costs. Experience from the first Danish survey of ICT usage in enterprises (1998) showed that such ICT-related salaries are very difficult to separate from other salaries.

7. Provisional experiences

The response rate before reminders was about 40%. Though the final response rate will be higher, it is a bit below what was expected. It is believed that the questions concerning expenditure have been the main cause of non-response. Another problem is that the time of sending out questionnaires collided with the budget procedure of the municipalities. The respondents has thus to contribute to a lot of other local data collection, which have a higher priority for the respondents.

The questionnaire as a whole seems to work out well, with no or almost no item non-response. A partial exception is the module about ICT expenditure. From the pilot test these questions were expected to be the most difficult. Among the so far encountered problems are:

Some ICT managers does not know the total ICT expenditure;

- ICT is not reflected properly in the official accounting system of the municipalities
 - Significant parts of the ICT acquisition is hidden in decentralized accounts of the institutions
- Often the central administration does not collect the data on ICT expenditure from the institutions. Especially the schools are supposed to account for large, but partly unknown ICT expenditure.

Other ICT managers do know the total municipal ICT expenditure, but are using alternative breakdowns, e.g. expenditure given by local departments. Especially the distinction between 'software' and 'ICT services' caused problems as one major ICT-supplier are selling comprehensive ICT solutions as packages.

Another aspect of the expenditure is that the municipalities are not using depreciation of ICT investments. If the municipality does not equalize these expenditures by leasing, large fluctuations affect the results, creating statistical uncertainty. The above-mentioned circumstances call for careful interpretation of the survey data.

Annex I: Questionnaire

Please return the questionnaire to Statistics Denmark on or before 7. September. Reply envelope enclosed.

August 2001

Municipality No. xxx

Use of Information Technology (ICT) by Danish Municipalities

Information technology (ICT) means firstly computers, PCs, terminals or workstations; secondly, the hardware and software used on such machines.

Website

1. Does the municipality have its own website?

This means that the municipality itself decides the form and contents of the website (possibly outsourcing practical tasks in connection with design and maintenance).

Yes



No → Go to question 5

2. Which of the following pieces of information is available on the website?

Please tick all that apply

- a. Information on services and citizens' rights/duties:
- b. Composition of the local council:
- c. Composition of committees, boards, etc.:
- d. Announcement of local council meetings:
- e. Minutes/resolutions from local council meetings:
- f. Information on municipal and local plans:
- g. Lists of mail received:
- h. None of the above:

3. Are any of the following functions available to the citizens on the municipality's website?

Please tick one box per line

	Available today	Planned for 2001	Planned for 2002	Not planned 2001/2002
a. Order written material from the municipality (eg, brochures, local plans, etc.):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Download and print forms*:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. See personal data from adm. systems* (eg, borrowed books, waiting lists, tax, buildings register, etc.):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Submit personal data for adm. systems* (eg, notification of change of address, GP, etc., tax data):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Registration with Danish Payment Systems (PBS)*:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Online payments through the website (eg, by Dankort):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Electronic subscription to selected news:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Personalised user interface (eg, individual settings of menu, news, etc.):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* Either through function on the website or through direct link to a function on an external site (eg, a joint municipal website)

- - - Website cont.

4. Which of the following groups have e-mail addresses on the website?

Please tick all that apply

- a. Local councillors:
- b. Administrative branches:
- c. Administrative staff (ie, the majority thereof):
- d. Municipal institutions (ie, the majority thereof):
- e. None of the above:

Other ICT systems

5. Does the administration use any of the following systems?

Please tick all that apply

- a. Electronic filing system
(electronic filing of paper documents):
- b. Electronic document handling system
(electronic recording and storage of scanned or own documents):
- c. Geographic Information System, GIS
(ie, for displaying theme maps, etc., based on adm. information):
- d. Integrated care system within home care services
(ie, including as a minimum planning of visits and listing of services granted):
- e. EDI messages to/from ICT systems of other authorities or enterprises
(ie, transmission of structured data - eg, invoices - in EDIFACT or XML format):
- f. Option to send personal, encrypted e-mail to the citizens - eg, via electronic
mailboxes (ie, system with confidentiality and unambiguous identification of the citizen):
- g. None of the above:

Intranet

6. Does the municipality have an intranet, comprising more than one branch of administration?

Available today

Planned for 2001

Planned for 2002

Not planned 2001/2002

Intranet means web pages for internal use, ie, not available to the public



↪ Go to question 9

7. Are one or more of the following municipal units/institutions comprised by the intranet (ie, have access to most of the contents)?

Please tick all that apply

- a. Daycare institutions:
- b. Institutions for the elderly/community care offices:
- c. Local service centres:
- d. Libraries:
- e. Schools:
- f. Local council:
- g. Remote workplaces of adm. staff:
- h. Road authorities:
- i. Utility companies:
- j. *None of the above:*
- k. Others:

8. Which of the following items are comprised by the intranet?

Please tick all that apply

- a. Organisational chart:
- b. Telephone lists:
- c. Lists of mail received:
- d. Composition of administrative committees:
- e. Meeting calendar:
- f. Administrative guidelines:
- g. Electronic discussion groups (eg, experience-sharing): ..
- h. Legislation:
- i. Budgets/accounts:
- j. Rates/prices:
- k. Staff policy:
- l. Internal training:
- m. *None of the above:*
- n. Others:

ICT expenditure

9. Provide an estimate of total municipal ICT expenditure in the following categories:

Including schools and other municipal institutions

Category	Financial year 2000	Budget 2001
	---- ICT expenditure for the year in DKK '000 (excluding VAT) ----	
a. Hardware:	<input type="text"/>	<input type="text"/>
<i>Expenditure on computers and equipment, network components and telephone systems:</i>		
- Purchase, hire or lease	+	+
- Installation and maintenance		
b. Software:	<input type="text"/>	<input type="text"/>
<i>Purchase/hire/licence fees for usage or development of software</i>		
	+	+
c. ICT services:	<input type="text"/>	<input type="text"/>
- Data processing, purchasing of external computer power, access to data.	+	+
- Service and consulting services, incl. purchasing of staff training and hotline		
d. Communications:	<input type="text"/>	<input type="text"/>
<i>Usage and other charges for access to external networks (including all telephony)</i>		
Sum of a. to d.:	= <input type="text"/>	= <input type="text"/>

Note! Salaries for municipal employees, rent and other internal costs should not be included.

Process technology for direct control of mechanical processes (eg, measuring equipment, etc.) should not be included as ICT.

Calculating aggregate ICT expenditure can be difficult. Therefore, we would ask the municipality to:

- Include the expenditure in the broadest category in cases where ICT expenditure cannot be broken down
- Provide an educated estimate where actual expenditure is unknown
- Provide comments in case of doubt

Comments to the above figures:

10. Provide an estimate of the changes in ICT expenditure up to 2002:

Current prices

Category	Expected change from budget 2001 - budget 2002	
<i>(see explanations in previous question)</i>	<i>Please tick '+' if a decrease is expected</i>	<i>Estimate, %</i>
a. Hardware:	÷ <input type="checkbox"/>	_____ %
b. Software:	÷ <input type="checkbox"/>	_____ %
c. ICT services:	÷ <input type="checkbox"/>	_____ %
d. Communications:	÷ <input type="checkbox"/>	_____ %

11. To what extent are the following ICT functions handled by external suppliers and/or own staff?

Please tick one box per line

Function	Who handles the task:				
	Only external suppliers	Mainly external suppliers	Largely equal distribution	Mainly internal staff	Only internal staff
a. Project management at ICT acquisitions:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Development of ICT strategy:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Programming/design of Internet solutions:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Other system development:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Operation of municipal servers:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Operation of PC environments:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. User training:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. User support:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Strategy and cooperation

12. Does the municipality have an ICT strategy?

Yes

No → Go to question 14



ICT strategy means an official, written plan containing objectives and guidelines for acquisition or usage of ICT by the municipality.

13. Which of the following fields are comprised by the strategy?

Please tick all that apply

- a. ICT infrastructure:
- b. ICT security policy:
- c. Citizens services via the Internet:
- d. Electronic purchasing:
- e. Guidelines for citizens' enquiries received by e-mail:
- f. None of the above:

14. Does the municipality cooperate or plan to cooperate with other municipalities in the following fields?

Please tick one box per line

	Cooperates today	Planned for 2001	Planned for 2002	Don't know/not planned 2001/2002
a. Joint website/portal:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Purchasing of ICT infrastructure, etc.:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Development or acquisition of applications:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Operation, maintenance and usage of IT:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Purchasing of products and services through the Internet:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Barriers to ICT usage

15. What impact do the following barriers have on the municipality's usage of ICT in general?

Please tick one box per line

Barriers to ICT in general	----- State effect of barrier -----			
	None	Some	Large	Don't know/not relevant
a. Errors/defects in supplied software:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Lacking flexibility of ICT suppliers:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Lack of integration between applications:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Lack of ICT qualified staff in the municipality:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Difficult to recruit or retain ICT qualified staff (lack of applicants/prohibitive salaries):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Reluctance among staff to use IT:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Municipality lacks updated ICT strategy:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Lack of commitment by management:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. ICT expenditure higher than expected:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Premature introduction of new versions of existing software:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. How important are the following barriers to electronic citizens services via the Internet?

Please tick one box per line

Barriers to electronic citizens services	----- State importance of barrier -----			
	None	Minor	Major	Don't know/not relevant
a. Difficult to release resources for development:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Difficult to adjust municipal work routines:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Risk of hacking, viruses or other unwanted access to municipal data:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Insufficient standards for digital signatures:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Legislation not prepared:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Potential benefits of citizens services on the Internet are not commensurate with the costs:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Difficult to integrate existing systems with the Internet:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you for your assistance!

Thank you for taking the time to fill in this questionnaire.

Would you like to receive the results of this survey? Yes No

Other comments:

Municipal contact person: _____
(Please use block letters)

Telephone No.: _____