SEWERINSPECT
Integrated System for Structural Assessment and Upgrading of SEWERs Based on Input from CCTV INSPECTion

COMMISSION OF THE EUROPEAN COMMUNITIES, DG RESEARCH
Contract No. COOP-CT-2004-512540SEWERINSPECT

Final Activity Report February 2007

PROJECT COORDINATOR:TECNIC Consulting Engineers S.p.A. -TECNIC

PARTNERS: Optimess GmbH
General Underground Services Ltd.-GUS
A. Tsouloftas & Sons Ltd.
The Sewerage Board of Limasol
RISA Sicherheitsanalysen GmbH – RISA
Istanbul Technical University-ITU

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This Report has been produced by TECNIC with contributions from all partners

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1. EXECUTIVE SUMMARY

The objective of this project is to develop an integrated Decision-Support-System (DSS) for the rehabilitation planning of sewers that, based on CCTV inspection results will assess the structural reliability of the inspected sewers as a function of time taking into account sewer deterioration by the various degradation mechanisms (voiding of bedding and backfill, corrosive soils and groundwater, sulphide formation in the wastewater flow, corrosive and erosive industrial wastes), seismic forces and uncertainties (in the estimated wall thickness of the pipe, soil support, loading, etc.), select the best remedial measures, prioritise rehabilitation projects and schedule re-inspection.

This DSS will help municipal engineers establish a defensible planning strategy for sewer rehabilitation investments and help CCTV inspectors to offer a higher quality and more complete service to their clients.

The partners accomplished all of the project objectives.

In August of 2006 the partners asked for a three month extension of the project in order to add features to the Structural module and still have the time to extensively test it. On September 2006 the Commission granted the required extension and specified the new contractual duration in 27 months with the modification of the reporting periods becoming:

P1: from month 1 to month 12 (duration 12 months);

P2: from month 13 to month 27 (duration 15 months).

In August of 2006 the user could only see the final result of the Structural Module, that is, the probability of structural failure over time. The partners felt that it would be useful to be able to additionally see the progress of damage and the decrease in the pipe wall thickness over time. Hence they asked, and received, the above three-month extension to the project.

Since then, no significant deviations from the work plan occurred.

The heart of the developed software is the structural reliability module that provides an assessment of the structural adequacy of the inspected sewer based on sound engineering analyses and now incorporates all of the additional features mentioned above. This Module is unique in the market and the SMEs in the group are hopeful that it will be a commercial success. To this end they have developed concrete plans for the exploitation of results.

2. OBJECTIVES AND ACHIEVEMENTS FOR THE TWENTY SEVEN MONTHS OF THE PROJECT

The overall objective of the work is to develop an integrated DSS for the rehabilitation planning of sewers that, based on CCTV inspection results will assess the structural reliability of the inspected sewers as a function of time taking into account sewer deterioration by the various degradation mechanisms (voiding of bedding and backfill, corrosive soils and groundwater and sulphide formation in the wastewater flow), seismic forces and uncertainties (in the estimated wall thickness of the pipe, soil support, loading, etc.), select the best remedial measures, prioritise rehabilitation projects and schedule re-inspection.

Existing software on sewer evaluation based on CCTV inspection results include rating systems that do no more than act as a coarse filter for a closer examination of the results of CCTV surveys.

The software that was developed in this work provides such a closed examination. In fact, it provides a detailed structural analysis of forces along the axis of the sewer as well as forces vertical to the sewer axis, based on the CCTV inspection results and is unique in the market.

The specific objectives of the project were:

- To develop the project's web site
- To develop a methodology for the deterministic assessment of the structural safety of the damaged sewer
- To develop a methodology for the stochastic assessment of structural adequacy as a function of time
- To establish a Bayesian procedure
- To develop methodologies for rehabilitation project prioritisation and scheduling of re-inspection
- To produce requirements and specifications for the Structural Reliability Module
- To produce requirements and specifications for the Rehabilitation Module
- To produce requirements and specifications for the Prioritisation and Re-Inspection Scheduling Modules
- To produce requirements and specifications for the Expert System, the Data Base, the Data Manager and the GIS
- To produce an Exploitation Plan (draft)
- To produce a Dissemination Plan (draft)
- To code, test and refine the structural Reliability Module
- To code, test and refine the Rehabilitation Module
- To code, test and refine the Prioritization and Re-Scheduling Modules
- To code, test and refine the Expert System, the Data Base, the Data Manager and the GIS Module

- To produce the System Guide and the User Manual
- To evaluate the SEWERINSPECT software in the field
- To produce an exploitation plan (final)
- To disseminate the results
- To organize a workshop and produce the proceedings
- To sign an SME agreement
- To produce a Brochure of the DSS

All of the above objectives have been accomplished.

3. WORKPACKAGE PROGRESS

During the project the following workpackages (W) were planned to be active:

W1: Development of Methodology (started at month no1).

W2: Development of the DSS Module on Structural Reliability (started at month no 10).

W3: Development of the DSS Module on Rehabilitation (started at month no 10).

W4: Development of the DSS Modules on Prioritisation of the Rehabilitation Projects and Scheduling of Re-Inspection (started at month no 1).

W5: Development of the Expert System, Data Base, Data Manager, GIS and Module Integration (started at month no 10).

W6: Field evaluation of the software (started at month no 24).

W7: IPR, Dissemination and Exploitation of Results (started at month no 1).

The following tasks of the above workpackages were planned for the project:

Task	**Planned Activities**	**Actual Work**
1.1	To develop a methodology for the deterministic assessment of the structural safety of the damaged sewer	Has been completed
1.2	To develop a methodology for the stochastic assessment of structural adequacy as a function of time	Has been completed
1.3	To establish a Bayesian procedure	Has been completed
2.1	Requirements and specifications for the Structural Reliability Module	Has been completed
2.2	Design and implementation of the Structural Reliability Module	Has been completed
2.3	Testing and refinement of the Structural Reliability Module	Has been completed
2.4	Definition and execution of the Structural Module's quality assurance plan	Has been completed
2.5	Documentation of the Structural Reliability Module	Has been completed
3.1	Requirements and specifications for the Rehabilitation Module	Has been completed

3.2	Design and implementation of the Rehabilitation Module	Has been completed
3.3	Testing and refinement of the Rehabilitation Module	Has been completed
3.4	Definition and execution of the Rehabilitation Module's quality assurance plan	Has been completed
3.5	Documentation of the Rehabilitation Module	Has been completed
4.1	Development of a methodology for the Prioritisation of Rehabilitation Projects and Re-Inspection Scheduling Modules	Has been completed
4.2.1	Requirements and specifications for the Prioritisation of Rehabilitation Projects and Re-Inspection Scheduling Modules	Has been completed
4.2.2	Design and implementation of the Prioritization and Re-Scheduling Modules	Has been completed
4.2.3	Testing and refinement of the Prioritization and Re-Scheduling Modules	Has been completed
4.2.4	Definition and execution of the Prioritization and Re-Scheduling Modules' quality assurance plan	Has been completed
4.2.5	Documentation of the Prioritization. and Re-Scheduling Modules	Has been completed
5.1	Requirements and specifications for the user interface, the knowledge base, the query manager, he database, the data manager and the GIS Module	Has been completed
5.2	Design and implementation of the Expert system, the Data Base, the Data Manager and the GIS Module	Has been completed
5.3	Testing and refinement of the Expert system, the Data Base, the Data Manager and the GIS Module	Has been completed
5.4	Integration of all Modules in the DSS	Has been completed
5.5	Global system testing	Has been completed

5.6	Definition and execution of the quality assurance plan for the Expert system, the Data base, the Data Manager and the DIS Module	Has been completed
5.7	Production of the System guide and the User Manual	Has been completed
6.1	Preparation of training material	Has been completed
6.2	Data collection	Has been completed
6.3	Installation of the DSS in the offices of SBLA	Has been completed
6.4	CCTV inspections	Has been completed
6.5	Evaluation of the DSS in the field	Has been completed
7.1	Securing the developed code	Has been completed
7.2	Design of the exploitation plan (draft)	Has been completed
7.3	Design of the dissemination plan (draft)	Has been completed
7.4	Production of a market analysis	Has been completed
7.5	Production of the commercialization report	Has been completed
7.6	Production of the exploitation plan (final)	Has been completed
7.7	Preparation and signing of the SME agreement	Has been completed
7.8	Presentation of the results to major customers	Has been completed
7.9	Production of a brochure and a CD demo of the DSS	Has been completed
7.10	Organization of a workshop	Has been completed
7.11	Production of the proceedings of the workshop	Has been completed
7.12	Participation in conferences, workshops and exhibits	Has been completed
7.13	Submission of publications in scientific and trade journals	Has been completed
7.14	Dissemination of the results through teaching	Has been completed

Contractors involved:

W1: OPTIMESS, GUS, A. Tsouloftas & Sons and SBLA provided input to the development of the methodology.

TECNIC provided the deterministic part of the methodology in the absence of seismic forces.

ITU was responsible for the deterministic handling of seismic forces in the methodology while RISA was responsible for the stochastic part and Bayesian updating in the methodology.

W2: OPTIMESS, GUS, A. Tsouloftas & Sons and SBLA provided requirements for the Module on Structural Reliability. Additionally, TECNIC provided specifications for the deterministic part of the above Module in the absence of seismic forces, ITU provided specifications for the deterministic part in the presence of seismic forces and RISA provided specifications for the stochastic part of the Structural Reliability Module and the Bayesian updating. Moreover, TECNIC provided algorithms for a deterministic structural assessment that includes all loads with the exception of seismic loads, ITU developed the finite element models for the deterministic analysis that includes both non-seismic and seismic loads and RISA supplied a software implementation of the methodology developed in W1. Additionally, OPTIMESS, GUS, A. Tsouloftas & Sons and SBLA assessed the Module on Structural Reliability.

W3: OPTIMESS, GUS, A. Tsouloftas & Sons and SBLA provided requirements for the Rehabilitation Module, while TECNIC produced the specifications for this Module. Furthermore, RISA provided input to the Rehabilitation Module, GUS and TECNIC provided the domain knowledge on rehabilitation methods and costs, A. Tsouloftas & Sons provided cost data for Cyprus and TECNIC supplied the code. Additionally, GUS, A. Tsouloftas & Sons, SBLA, TECNIC and RISA assessed the Rehabilitation Module.

W4: OPTIMESS, GUS, A. Tsouloftas & Sons, SBLA and RISA provided requirements for the Prioritisation and Scheduling of Re-Inspection Modules while TECNIC with the help of SBLA produced the specifications for these modules. SBLA and TECNIC identified the economic and non-economic consequences of rehabilitation and neglect, TECNIC provided the codes for the Prioritization and Re-Scheduling Modules and OPTIMESS, GUS, A. Tsouloftas & Sons, SBLA, TECNIC and RISA assessed the Prioritization and Re-Scheduling Modules.

W5: OPTIMESS, GUS, A. Tsouloftas & Sons, SBLA and TECNIC provided requirements for the expert system, the data base, the data manager and the GIS Module. GUS also provided data and the basic GIS Module. Additionally, RISA provided specifications for the expert system, the data base and the data manager, SBLA, ITU and TECNIC provided data, RISA developed the expert system, the data base and the data manager and integrated all modules while TECNIC, RISA and ITU provided global testing of the system.

W6: RISA provided training material and installed the system at SBLA, A. Tsouloftas & Sons provided inspection of selected pipes and OPTIMESS, GUS, A. Tsouloftas & Sons and SBLA evaluated the system.

W7: OPTIMESS produced the exploitation and dissemination plan and the license agreement among the SMEs and RISA organized a workshop and produced the proceedings, produced and maintained the web site, advertised the project and produced a project brochure. Additionally, RISA, ITU and TECNIC submitted publications to scientific and trade journals, ITU presented the work in international conferences and GUS presented the results to major customers and international exhibits.

As can be seen from the above each participant contributed the type of work that was assumed in the original plan.

Deviations from the project workprogramme:

Regarding task 7.1 the partners decided that instead of copyright protection, an encrypton-based distribution of licensed codes will suffice.

Apart from the above no significant deviation from the work plan as determined at the time of the extension occurred.

Deliverables:

Del. No	**Del. Name**	**Workpackage No**	**Date Due**	**Del.On Time (OT)** **Del. Not On Time (NOT)**	
1	Web Site of the Project	7	4	OT	RISA
2	Management Report	8	6	OT	TECNIC
3	Methodology for the Deterministic Assessment of Structural Adequacy	1	6	OT	ITU
4	Methodology for the Assessment of Structural Reliability	1	9	OT	RISA
5	Methodology for the Prioritisation and Re-inspection Scheduling	4	9	OT	SBLA
6	Activity report	8	12	OT	TECNIC
7	Financial report	8	12	OT	TECNIC
7a	Management report	8	12	OT	TECNIC
8	Exploitation Plan	7	12	OT	OPTIMESS
9	Dissemination Plan	7	12	OT	OPTIMESS
10	Req. and Spec. for Module 1	2	12	OT	ITU
11	Req. and Spec. for Module 2	3	12	OT	GUS
12	Req. and Spec. for Modules 3 and 4	4	12	OT	TECNIC
13	Req. and Spec. for the Expert System, the Data Base, the Data Manager and the GIS	5	12	OT	RISA
14	Design and implementation of Module 1	2	15	OT	ITU
15	Module 1	2	15	OT	ITU

16	Design and implementation of Module 2	3	15	OT	TECNIC
17	Module 2	3	15	OT	TECNIC
18	Design and implementation of Modules 3 and 4	4	15	OT	SBLA
19	Modules 3 and 4	4	15	OT	SBLA
20	Design and implementation of the Expert system, the Data Base, the Data Manager and the GIS	5	15	OT	GUS
21	The Expert system, the Data Base, the Data Manager and the GIS	5	15	OT	GUS
22	Testing and refinement of Module 1	2	23	OT	ITU
23	The tested and refined Module 1	2	23	OT	ITU
24	Testing and refinement of Module 2	3	17	OT	TECNIC
25	The tested and refined Module 2	3	17	OT	TECNIC
26	Testing and refinement of Modules 3 and 5	4	17	OT	SBLA
27	The tested and refined Modules 3 and 4	4	17	OT	SBLA
28	Testing and refinement of the Exert system, the Data Base, the Data Manager and the GIS	5	17	OT	GUS
29	The tested and refined Exert system, Data Base, Data Manager and GIS	5	17	OT	GUS
30	DSS integration	5	23	OT	RISA
31	Management report	8	18	OT	TECNIC

32	Market research (draft)	7	18	OT	OPTIMESS
33	Perspective commercialization plan (draft)	7	18	OT	OPTIMESS
34	Brochure and CD demo (draft)	7	24	OT	RISA
35	The integrated DSS – report -	5	24	OT	RISA
36	The integrated DSS	5	24	OT	RISA
37	The quality assurance program	5	24	OT	RISA
38	The system guide and user manual	5	24	OT	RISA
39	Training material	6	24	OT	RISA
40	Results of field testing	6	27	OT	Tsouloftas
41	The final DSS field tested	6	27	OT	RISA
42	Exploitation plan (final)	7	27	OT	OPTIMESS
43	Dissemination of results	7	27	OT	OPTIMESS
44	Brochure and CD demo (final)	7	27	OT	RISA
45	Final activity report	8	27	OT	TECNIC
46	Expenditure report	8	27	OT	TECNIC
47	Final management report	8	27	OT	TECNIC
48	Proceedings of the workshop	7	24	OT	RISA

Additional reports requested for the last period

49	Periodic activity report	8	27	OT	TECNIC
50	Periodic management report	8	27	OT	TECNIC

Milestones:

On month no 9 the methodology for the quantitative assessment of structural reliability. (Was produced on time and was deliverable no. 4).

On month no 15 the prototypes of Modules 1, 2, 3 and 4, the Expert system, the Data Base, the Data Manager and the GIS. (Were produced on time and were deliverables 23,25,27 and 29).

On month no 24 the integrated DSS (Was produced on time and was deliverable 36).

On month no27 the field tested DSS and the final exploitation plan (Were produced on time and were deliverables 41 and 42).

4. CONSORTIUM MANAGEMENT

The following deliverables of W8 (consortium management) were planned for the project:

6 month management report (Del 2)	Has been completed on time
12 month activity report (Del 6)	Has been completed on time
12 month management report (Del 7a)	Has been completed on time
12 month financial report (Del 7)	Has been completed on time
18 month management report (Del 31)	Has been completed on time
Final activity report (Del 45)	Has been completed on time
Expenditure report (Del 46)	Has been completed on time
Final management report (Del 47)	Has been completed on time
Periodic activity report (Report 49)	Has been completed on time
Periodic management report (Report 50)	Has been completed on time

Note: 'On Time' is taken to mean 'within the grace period'.

The participants had the following meetings:

Date	**Type of Meeting**	**Location**	**Participants**
Nov. 24, 2004	Start-Up Meeting	Rome, Italy	All
Jan. 14, 2005	Technical Meeting	Athens, Greece	ITU, TECNIC, RISA
April 14, 2005	Partners' Meeting	Limassol, Cyprus	All
July 15, 2005	Partners' Meeting	Gera, Germany	All
Nov. 25, 2005	Partners' Meeting	Istanbul, Turkey	ITU, RISA, TECNIC, Tsouloftas, GUS, SBLA
Feb. 10, 2006	Technical Meeting	Athens, Greece	ITU, RISA, TECNIC, Tsouloftas, SBLA
May 18, 2006	Technical Meeting	Athens, Greece	ITU, TECNIC, RISA
July 21, 2006	Partners' Meeting	Berlin, Germany	ITU, RISA, TECNIC, Tsouloftas, SBLA
September 28, 2006	Partners' Meeting	Berlin, Germany	RISA, GUS, Tsouloftas, TECNIC, ITU, SBLA
December 12, 2006	Technical meeting	Limassol, Cyprus	RISA, SBLA, Tsouloftas
January 30, 2007	Final meeting	Rome, Italy	RISA, SBLA, GUS, Tsouloftas, ITU, TECNIC

The project has progressed smoothly.

All deliverables have been sent to the Commission within the 45 days of grace period.

5. PROJECT TIMETABLE

Original Project Timetable

Workpackage Descriptions		Duration (months)																							
		1st year												2nd year											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	**Devel. Of Methodology for the Assessment of Structural Reliability**																								
1,1	Devel. Of Method. For the Deterministic Assessment of Structural Adequacy																								
1,2	Devel. Of Method. For the Assessment of Structural Reliability																								
1,3	Establishment of Bayesian Procedure																								
2	**DSS Module 1**																								
2,1	Requirements and Specification																								
2,2	Design and Implementation																								
2,3	Testing and Refinement																								
2,4	Technical Quality Assurance																								
2,5	Documentation																								
3	**DSS Module 2**																								
3,1	Requirements and Specification																								
3,2	Design and Implementation																								
3,3	Testing and Refinement																								
3,4	Technical Quality Assurance																								
3,5	Documentation																								

	Workpackage Descriptions	Duration (months)																							
		1st year												2nd year											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
4	**DSS Modules 3 and 4**																								
4,1	Develompent of the Methodology																								
4,2	Develompent of the Software																								
4.2.1	Requirements and Specification																								
4.2.2	Design and Implementation																								
4.2.3	Testing and Refinement																								
4.2.4	Technical Quality Assurance																								
4.2.5	Documentation																								
5	**Expert System, Data Base, Data Manager, GIS, Module Integration**																								
5.1	Requirements and Specification																								
5.2	Design and Implementation																								
5.3	Testing and Refinement																								
5.4	Integration																								
5.5	Global System Testing and Consolidation																								
5.6	Technical Quality Assurance																								
5.7	Documentation																								
6	**Field Evaluation of the DSS**																								
6.1	Training																								
6.2	Data Collection																								
6.3	Installation of the DSS																								
6.4	CCTV Inspection																								
6.5	Evaluation of the DSS																								
7	**IPR, Dissemination and Exploitation of Results**																								
8	**Consortium Management**																								

Updated Project Timetable at Month No 12

Workpackage Descriptions		Duration (months)																							
		1st year												2nd year											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	**Devel. Of Methodology for the Assessment of Structural Reliability**																								
1,1	Devel. Of Method. For the Deterministic Assessment of Structural Adequacy																								
1,2	Devel. Of Method. For the Assessment of Structural Reliability																								
1,3	Establishment of Bayesian Procedure																								
2	**DSS Module 1**																								
2,1	Requirements and Specification																								
2,2	Design and Implementation																								
2,3	Testing and Refinement																								
2,4	Technical Quality Assurance																								
2,5	Documentation																								
3	**DSS Module 2**																								
3,1	Requirements and Specification																								
3,2	Design and Implementation																								
3,3	Testing and Refinement																								
3,4	Technical Quality Assurance																								
3,5	Documentation																								

	Workpackage Descriptions	Duration (months)																							
		1st year												2nd year											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
4	**DSS Modules 3 and 4**																								
4,1	Development of the Methodology																								
4,2	Development of the Software																								
4.2.1	Requirements and Specification																								
4.2.2	Design and Implementation																								
4.2.3	Testing and Refinement																								
4.2.4	Technical Quality Assurance																								
4.2.5	Documentation																								
5	**Expert System, Data Base, Data Manager, GIS, Module Integration**																								
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5.2	Design and Implementation																								
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6	**Field Evaluation of the DSS**																								
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6.2	Data Collection																								
6.3	Installation of the DSS																								
6.4	CCTV Inspection																								
6.5	Evaluation of the DSS																								
7	**IPR, Dissemination and Exploitation of Results**																								
8	**Consortium Management**																								

Final Project Timetable After the Extension

	Workpackage Descriptions	Duration (months)																										
		1st year												2nd year												3rd year		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	**Devel. Of Methodology for the Assessment of Structural Reliability**																											
1.1	Devel. Of Method. For the Deterministic Assessment of Structural Adequacy																											
1.2	Devel. Of Method. For the Assessment of Structural Reliability																											
1.3	Establishment of Bayesian Procedure																											
2	**DSS Module 1**																											
2.1	Requirements and Specification																											
2.2	Design and Implementation																											
2.3	Testing and Refinement																											
2.4	Technical Quality Assurance																											
2.5	Documentation																											
3	**DSS Module 2**																											
3.1	Requirements and Specification																											
3.2	Design and Implementation																											
3.3	Testing and Refinement																											
3.4	Technical Quality Assurance																											
3.5	Documentation																											

	Workpackage Descriptions	Duration (months)																									
		1st year												2nd year												3rd year		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
4	**DSS Modules 3 and 4**																										
4.1	Develompent of the Methodology																										
4.2	Develompent of the Software																										
4.2.1	Requirements and Specification																										
4.2.2	Design and Implementation																										
4.2.3	Testing and Refinement																										
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6.5	Evaluation of the DSS																										
7	**IPR, Dissemination and Exploitation of Results**																										
8	**Consortium Management**																										

Apart from changes covered under the extension no significant deviations from the work plan occurred. Thus the work plan above accurately describes the timing of the work.

6. CONCLUSIONS

All of the project's goals have been achieved.
The partners have produced an integrated DSS. In addition, they have produced stand alone versions of the Structural and the Rehabilitation Modules.

ANNEX I. USE AND DISSEMINATION OF KNOWLEDGE

WEB SITE

The project web site is: www.sewerinspect.com

The RTD partners will maintain this web site for a year after the end of the project free of charge.

WORKSHOP

A workshop on 'Sewer Evaluation and Rehabilitation and CCTV Inspection' took place on September 29, 2006 in Berlin. The proceedings of this workshop can be found in the Sewerinspect web site above.

ADVERTISING

The project has been advertised in Cordis and the trade journal of 'Water and Waste Treatment'.

PUBLICATIONS (see Reference 1)

- G. Becker, 'Development of a Tool for the Structural Assessment and Upgrading of Sewers Based on Input from CCTV Inspections', to be published in February 2007 in the trade journal of Water and Waste Treatment.
- G. Becker, H. Boduroglu, S. Camarinopoulos,S. Frondistou-Yannas, A. Gedikli, V. G. Kallidromitis, D. Kampranis and C. Sanna, 'Structural Assessment and Upgrading of Sewers Based on Inspection Results', submitted for publication in the ASCE Journal of Infrastructure Systems. ASCE Manuscript no: IS-2007 022609.
- M. H.Boduroglu, A. Gedikli, S. Sirin and M. Ispir, 'Assessment of the Structural Condition of Sewer Pipes Under Seismic and Non-Seismic Loads', to be presented in March 2007, in the commemorative symposium on the Romania earthquake of 1977, to be held in Bucharest, Romania.
- A. Gedikli, M. H.Boduroglu, M. Ispir and S. Sirin, 'Response of Buried Pipelines Subjected to Fault Movement', submitted for publication at the Earthquake Spectra.

PRELIMINARY PRESENTATION OF THE SEWERINSPECT SOFTWARE (see Reference 1)

GUS commissioned C-Products of Hong-Kong to distribute the SEWERINSPECT software in the Asia Pacific Region. C-Products is a specialist waste water utility sales company (www.c-products.com.hk).

Through C-Products association with KRE Camera Systems a brochure presenting an overview of the SEWERINSPECT software was presented and discussed with interested parties from the KRE stand at the 24th International No-Dig 2006 Conference & Exhibition.

No Dig Down Under 2006

Brisbane Convention and Exhibition Centre

Queensland, Australia

29 October – 2 November 2006.

DISSEMINATION THROUGH TEACHING

The Istanbul Technical University –Dept. of Civil Engineering- expects to use the acquired knowledge in courses on earthquake engineering.

ANNEX II: EXPLOITATION OF RESULTS

To facilitate the effective distribution of the SEWERINSPECT software:

- SBLA has field tested the system
- The results have been disseminated (see Ref. 1)
- OPTIMESS undertook to distribute the software in the German market (see Ref. 2)
- GUS has commissioned C-Products to distribute the software in Asia (see Ref. 2)
- A brochure and a CD demo has been produced
- An SME agreement has been signed
- There are modular options to the software
- OPTIMESS and C-Products that will distribute the software have the ability to revise it
- The produced software:
    - follows the WRc inspection guidelines
    - is integrated with a GIS system
    - is scalable (can accommodate activities of different sizes)
    - is updatable (can accommodate client specific requirements)
    - is user friendly

Planned activities include:

- Additional field tests: Lyonnaise Des Eaux is interested in the software and the partners are considering giving the software to this utility for field testing. In return, Lyonnaise Des Eaux will get the right to use the software. Additionally, the software will be field tested by C-Products
- RTD developers will provide maintenance of the software for a year after the end of the project free of charge
- RTD developers will provide maintenance of the web site for a year after the end of the project free of charge
- The SMEs in the group will use the software in their own operations
- The SMEs are considering submitting a research proposal under FP7 capacities- that will expand WERERINSPECT

REFERENCES

1. Integrated System for Structural Assessment and Upgrading of SEWERs Based on Input from CCTV INSPECTion, SEWERINSPECT, Sixth Framework Programme, Horizontal Research Activities Involving SMEs, Co-Operative Research, Contract No. COOP-CT-2004-512540SEWERINSPECT, Deliverable 43, Dissemination Report – Final - , February 2007.

2. Integrated System for Structural Assessment and Upgrading of SEWERs Based on Input from CCTV INSPECTion, SEWERINSPECT, Sixth Framework Programme, Horizontal Research Activities Involving SMEs, Co-Operative Research, Contract No. COOP-CT-2004-512540SEWERINSPECT, Deliverable 42, Exploitation Report – Final - , February 2007.