Deliverables: Management Plan

General rules between Partners:

1. Each consortium member records its implemented project parts in its books.

2. The implemented activity is experimental development that involves the construction of software and tangible assets that are to be activated.

3. Taking the 2nd item into account, the grant constitutes an investment aid, therefore its accounting takes places under the rules of the Accounting Act, which are relevant to these aids.

4. After the completion of the project– or perhaps even during the project – it can be expected that the development will result in sales revenue, by the sale of the right of use of the output products, or by any other means. Therefore VAT paid at the preceding stage in connection with the project can be deducted.

5. Deák Delta Ltd should add certain research and experimental development issues (depreciation) to its accounting policy in connection with the accounts of the project.

6. The leader of the consortium is RISSAC. Deák Delta Ltd. prepares material – with regards to their part of the project - for RISSAC that is needed for the accounts in connection with the grant.

7. The correctness of Deák Delta Ltd's accounts must be confirmed by their auditor by a declaration.

8. Benefiting from corporate income tax or tax base reductions must be in accordance with all applicable laws.

9. Despite the fact that the consortium leader has to prepare the accounts of the first part by 31st of December, 2010, the participants shall prepare part-accounting by 30th of June, 2010, in accordance with the order of the annual accounting.

10. The auditors of the project drew our attention to the accuracy during the preparation of the documentation and the correctness of the content. They highlighted – among other things -the importance of delivery certificates, employment contract supplements and working hours registers.

Processes of Actions:

Action 1

Processes	Action	Objectives	Details	Foreseen periods (Months)	Documentation	Deliverables includes
Overall management of the project	A1	Management	Steering committee meeting	1-3	done on 04/03/2010 see IR Annex 6.7.	report
			Project management structure	1-3	finished see. IR 3.2.	organogram
		Management Plan	Enclosed in Inception Report	1-5	Finished see IR Annex 6.3.	D1
		Feasibility study	Enclosed in Inception Report	1-5	Finished see IR Annex 6.4.	D1
Regular monitoring of the project progress	A1	Monitoring	Meetings organized weekly at which we discussed both technical and administrative problems. Participant Miklós Dombos (project manager), Hambek Tibor (DeákDelta Ltd. and experts). We kept record of these meetings.	1-36		
External audit		Audit	Contract	1-36	See IR 3.3.	
Workshops	A1	Workshops	5 workshops have been planned. The first one has been organized on 15/01/2010	1-36	Finished see IR Annex 6.8..	

Action 2

Processes	Action	Objectives	Details	Foreseen periods (Months)	Documentation	Deliverables includes
A./ Designing of the test version (DESKTOP MODEL)	A2	Design of the mechanical parts of the prototype	-trapping system -housing of sensors, electronics and power supply	1-5	1. blueprint of the trap device (completed)	D2 (Blueprint of the prototype, detailed engineering study –deadline: 31/01/2011
		Design of electronic parts	-characterization of optical sensors -design of electronic circuits	1-5	2. blueprint of the electronic circuits (completed)	D2
		Choosing the materials	-metals are used for housing -optical sensors for mesofauna sensoring	1-5	see blueprints	
		Assembly	-assemblage of mechanical and electronic parts -data processing		3. guide for data processing (completed)	D3 (Software documentation (manual) 1. Commanding of the sensors and initial data processing) – deadline: 31/01/2011
B./Production of test versions	A2	Mechanical and electronic	Developing test pieces of cylinder-shape version: 1. Manufacturing housing of the insect trap	1-5	foto (completed) Annex 6.11	Annex in Annex 6.11 Inception

(DESKTOP MODEL)		parts will be manufactured Production of mechanical test version	by using pressing technology 2. Manufacturing housing of the insect trap by using casting technology 3. Manufacturing housing of the insect trap by using cutting technology 4. Integrating sensors in the housing			Report and D2
C./Production of test versions continued with electronic parts	A2	Production of electronic parts	Production of measuring and data acquisition electronic circuit. microcontroller software/firmware development)	1-5	foto (completed) Annex 6.11	Annex 6.11. Inception Report and D2
Test on running	A2		1. Operational, safety testing, automatic implementation at bench 2. Weather-resistance and aging tests, /water temperature, humidity, etc. / Electrical studies: 3. Lab run test: (10x24 hours) 5x24-hour room continuous test of the order of 10-10 pc in parallel with data collection and GSM unit and the units with solar power supplies.	1-5 6-12 1-12	subsection of the detailed engineer study (partly completed)	D2
Re-design	A2	Possible re-design of mechanical parts	see paragraph A	6-12		
D, Designing further elements of the electronic and data processing parts of the prototypes	A2	Interim Storage		6-12	subsection of the detailed engineer study	D2
		Power Supply	Designing solar panels for power supply: Due to field conditions, no-control (or remote control) operation of Edapholog system's field elements (traps'electronics) can be done only by using high capacity batteries and low consumption electronic parts. This aspect will be considered when designing and manufacturing the elements	6-12	subsection of the detailed engineer study (completed)	D2

			of the system.			
		Data logging		6-12	subsection of the software documentation 1.: Commanding of the sensors and initial data processing (completed)	D3
		Long-term storage		6-12	subsection of the software documentation 1.: Commanding of the sensors and initial data processing (completed)	D3
		GSM Transmission	Electronic circuits for automatic data transmission from soil pin traps by GSM network	6-12	subsection of the software documentation 1.: Commanding of the sensors and initial data processing (prepared)	D3
		Central GSM receiver	The central GSM receiver is planned to receive the soil-pin-traps's signal	6-12	subsection of the software documentation 1.: Commanding of the sensors and initial data processing (prepared)	D3
		Sensor controlling	Data Safety pro-cessing The soil pin traps checked on a regular basis is necessary. A special controlling program will be written for it. During the measurements in soil pin traps at "an unusually rapid, sudden change these tests can be automatically started. Errors in data will be displayed.	6-12	subsection of the software documentation 1.: Commanding of the sensors and initial data processing (prepared)	D3
E, / Design of standardized	A2		Series design : 1. Metals	1-12	subsection of the detailed engineer study (in progress)	D2

production			2. Cylinder shape 3. Optical sensors 4. Series-production of tested measuring, data collecting and processing circuits, 5. GSM-series units			
F/ Production	A2		Production of soil pin traps 1. Testing of the production of electric circuits for sensors 2. Preparation of materials for sensors 3. Production and assemblages sensors by using object machines) 4. Intermediate testing of production 5. Production of the moduls for measuring, data transmitting (GSM) 7. Manufacture and installation of solar power.	13-21	subsection of Report 3. on the Functioning of the Prototype: results of the operation of the Prototype D6-C	D6-C Deadline: 31/10/2011, belonging to Action 2.
G, Database development	A2		GSM receiver linked to a central computer-server	6-12	subsection of the software documentation 2.: Central Database (prepared)	D4
			SQL-database	6-12	subsection of the software documentation 2.: Central Database (prepared)	D4
H, Modeling	A2		Arc-GIS software development, Map-Guide interface development for internet map publication	13-21	subsection of the D7-B – Report 2. on the Pilot Study: spatial delineation of soil biological activity and soil biodiversity D7-B	D7-B Deadline: 31/12/2012, belonging to Action 2.
	A2		Ecological evaluation of the Mesofauna data by using Statistica software	24-36	subsection in Publications: estimation of soil biodiversity in space and time	D9 Deadline: 31/12/2012

Action 3

Processes	Action	Objectives	Details	Foreseen periods (Months)	Documentation	Deliverables includes
3.1. Laboratory tests	A3	3.1.1. Lab. Experiment	3.1.1.1 and 3.1.1.2. Estimation of the catch-ability of the mechanical part of the traps (Soil Pin Trap)	1-5	Technical report in the D6-A, Report on the Functioning of the Prototype: results of the laboratory test, part A.	D6-A Deadline: 31/01/2011
	A3	3.1.2. Lab. Experiment	Estimation of sensoring of animal's numbers and sizes captured in traps Testing of size sensoring for elements of probe pieces and species. 1. probe piece test 2. species test	6-12	Technical report in the D6-A,	D6-A Deadline: 31/01/2011
			Survey of size sensoring with digital image analysis, using species test	6-12	Detailed technical report on image analysis (i.e. pattern recognition and size estimation)	D6-B Deadline: 31/10/2011
			installation of imaging equipment in EDAPHOLOG	13-21	Detailed report on the installation of imaging equipment	D6-B Deadline: 31/10/2011
			Development and preparation of attractants to Collembola. 1. reviewing of different attractants 2. development and preparation of attractants installation of attractant in EDAPHOLOG	8-24	Detailed report on Collembola attractant development, preparation, and installation	D6-B Deadline: 31/10/2011

	A3	3.1.3. Lab. Experiment	Usage of the traps to different soil types	6-12	Technical report in the D6-A,	D6-A Deadline: 31/01/2011
	A3	3.1.4. Lab. Experiment	Estimation of sensoring of microbial activity	1-12	Technical report in the D6-A,	D6-A Deadline: 31/01/2011
3.2. Outdoor Experiment	A3	Estimation of sensoring of the Prototype in field at three land use types	Testing of catchability effectiveness and size sensoring for different soil types.	15-24	Report 2. on the Functioning of the Prototype: results of the outdoor experiments and catch-ability investigations D6-B	D6-B Deadline: 31/10/2011

Action 5

Processes	Action	Objectives	Details	Foreseen periods (Months)	Documentation	Deliverables includes
Information boards	A5	5.1 – Erecting information signs at project site	In total, 22 information signs (info boards) will be erected on the project sites. 2 info boards at the Beneficiaries' working places	1-5	foto (comleted)	Annex in the IR
			20 info boards at the project sites of the pilot study	13-24	foto	Annex in the PR
Website	A5	5.2 – Design and operate project web site	Initial working of the official Project website	1-5	www.medaphon.hu (completed)	
			Design of Edaphołog Prototype's logo	1-12	working on the website	Annex in the MR
			Design of the 3D flash of the Edapholog Prototype	1-12	working on the website	Annex in the MR
Reports	A5	5.3 – Producing layman's report and project leaflets	In total 500 copies of the layman's report will be printed and distributed on various events (conferences, workshops, forums, etc.). There will be 1000 leaflets printed.	28-36	Publications (layman's report: EDAPHOLOG System) Layman's report printed in 500 copies and distributed on conferences, workshops and other forums /D8/	D8 Deadline in 31/12/2012

		5.4 – Dissemination of results in the scientific community	Publications (scientific papers: Estimation of soil biodiversity in space and time by using the EDAPHOLOG System /D9/	15-36		D9
After LIfe	A5	5.5 – After LIFE Communication Plan	detailed After LIFE Communication Plan /D11/	27-36		D11

Deliverables: Feasibility Study

Detailed technical and functional description of the **EDAPHOLOG-System**

1. Mesofauna collection

The EDAPHOLOG trapping system will be used for collecting motile, soil invertebrates (i.e., mesofauna) that are active in the upper 15 cm layer of the soil. The employed sampling technique is very much similar to the methodology applied in pitfall traps, which are considered one of the most common trapping techniques in biodiversity inventories. Invertebrates that enter the trap will be unable to escape. They will be killed or kept alive within the trap. The EDAPHOLOG's novelty, in comparison with pitfall traps, is to be able to trap animals without interruption for a long time (several months), and to count automatically the number of individuals fallen into the trap and to estimate their body sizes.

The EDAPHOLOG-trap will be able to measure body size (without a measurement unit) which is found to be in strong correlation with body mass (*mg*). The crucial importance of body size estimation (i.e., defining mesofaunal-size composition) is to be able to provide a good ecological functional classification of the mesofauna because body size correlates with, for instance, metabolic rate, generation time, population density, food size. We further help functional classification by using different attractants (baits) in the trap and separate the trapped animals into compartments. These attractants will reflect the general, trophic groups (bacterial feeders, fungal feeders, plant feeders, and predators and omnivores).

Moreover, we would like to design the prototype to be able to receive image processing equipment. Imaging and image processing (image making, differencing) of living mesofauna specimens can be of paramount importance: it is suspected that the number of undiscovered species is very high in soil mesofauna, which warrants a high probability of many new type groups needed to be described. As soil fauna has high species diversity associated with high trophic, functional overlap, these new features of the EDAPHOLOG-trap system (functional classification and image processing at the same time) may open a new horizon in the biodiversity and biomass estimation and monitoring.

1.1. Sensoring (operating principles, output data, sensitivity, range of output signal, measurement range of input signal)

1.1.1. Optical sensoring of mesofauna

1.1.1.1. Operating principles: The operation of counting collembola is based on the detection of change of light conditions. The sensoring of the drop-in takes place in a tube whose diameter is about 200mms, in which the light source is provided by LEDs that emit in the 950nm range. The light emitted by the LED is reflected on the wall of the searcher tube, usually several times, and then the sensing photodiodes are excited by a resultant brightness. In the space defined by the reflections each moving object induces a change in the light conditions. The change can be detected in the form of an electrical impulse and by applying powerful reinforcement refined sensitivity can be reached. Sensitivity is limited by the signal to noise ratio only. Noise level is considerably influenced by basic brightness. Greater brigtness comes with a lower level of noise, however, at the same time, greater current consumption as well. Because of the problem of battery charging, it is advisory to find the optimal LED current at which the noise level is still tolerable but the current consumption is minimal. Noise width has a Gaussian amplitude distribution, that is, theoratically, noise impulses of quite a great amplitude might occur, however their probability converges to zero. This feature is a significant factor of uncertainty as for the false detection. To avoid that, there are two different spots for the detection of drop-ins above one another at a distance of 20mms. The microcontroller filters the cases in which only one sensory circuit indicates a drop-in. Beside the counting, a certain estimation of size also takes place. The objects dropping in cause changes whose amplitude and time is in proportion with their sizes. By integrating these changes, a number is produced that is proportional to size and which forms the base of the estimation of size.

1.1.1.2. Sensitivity (accuracy of measurment): The measuring circuit operates at a relatively high noise level in order to reach greater accuracy, therefore the received test results are rather statistical. The actual measurements show a huge deviation of 50% , however in case of a large number of measurements, the measured rates and the real sizes correlate with each other all right.

1.1.1.3. Output data (range of measurement): the frequency of perception is limited to 2 seconds for practical reasons.

The lower scope of the integrated rate that forms the base of estimation of size is determined by the background noise and the physical size of the optical sensoring system.The higher scope of the measurement range is primarily limited by the high-pass filter cut-off frequency of the sensory circuit. The electrotechnical qualities of the Desktop model of the Edaapholog system are as follows:

1.1.1.3.1. Operating principles: The operating principle of the animal-counting and body-size estimating of the Edapholog trap system is based on optical light sensing. In the trap there is a 20mms diameter tube placed vertically in whose wall the reflected light is sensored by light-sensing photodiodes. The infra LED, placed also in the wall of the tube, functions as a light source. The sensory electronics have been designed for battery feed, therefore it operates with the smallest possible amount of power and brightness. Infra range only refers to the peak of the sensing curve that reaches over to the visible range as well. That is why the operation of the counter is disturbed by even the smallest change of light from outside. The counter has been originally designed for underground operation where excluding the disturbing light coming from above the ground is not so hard. To filter and minimalize false detection and to reach the greatest possible accuracy, the counting electronics has been built with two independent sensory sets. The signals of those are analyzed by a microconroller (CPU) that accounts the perceived change only if it is in accordance with an event caused by an animal (or any kind of particle) falling in from above downwards. Also, there is a display connected to the animal-counter that functions as a data-collecting unit at the same time. This provides power as well with the help of a built-in battery and a battery charger to which a battery voltage is attached. The counter and the data-collecting display are linked with an approximately 1.5- meter- long 12 core shielded wire. The animal-counter is watertight that is, it suffers no damage whatsoever in wet surroundings either. Beside counting the in-dropping animals, the animal-counting unit can also measure soil moisture and temperature by the measuring units belonging to the Edapholog trap system (further details of these see below).

1.1.1.3.2. Sensitivity (accuracy of measurement): To determine the accuracy of measurement, different particles of known materials (plastic, metal, organic material) and of different sizes (300-5000 μm) in known numbers have been counted and measured with the instrument and the procedure has been repeated thee times. In about every second, one particle was dropped into the instrument through a funnel, which made it impossible for the particles to drop out through the metal net covering the trap. The sensitivity of the optical sensors was found to be about 300 μm. However, additional experiments are needed to test the counting and size measuring performance of the optical sensors on living *Collembola* species, with different densities, and in various soil types.

Output data (range of measurement): The measurement range of the optical sensors (we defined counting successful at the 85 % level) was found to be between about 800 and 4000 μm which corresponds to an output signal range of 1-255 (no measurement unit). Under or above these rates the sensors were either not able to count the pieces falling into the trap or failed to give reliable output signal for the size of the objects. The weight of the particles dropping in affects the piece-counting, however, since the body weight range of the mesofauna can be determined in advance, due to the adequate optimization this flaw can be eliminated.

Microbial activity measuring (biofilm)

1.1.1.4. Operating principles: The base of measuring microbial activity is the theory according to which the voltage between zinc and iron electrodes placed in the soil changes in correlation with the activity of the biofilm produced on the iron electrode, or depending on the corrosion generated on the surface of the iron. Both the biofilm layer and the corrosion is generated by bacteria living in the soil. The testing method had originally been developed for examining indusrial sewege sludge but the theory works for soil studies as well. The electrodes are to be placed underground and the induced voltage is to be measured with the help of a proper instrument and then stored. The in-built, low-consumption C8051F320 microcomputer measures and saves the output data at a given frequency. In the memory of the instrument 32.000 output data can be stored that can be displayed on the in-built digital voltmeter, should it be necessary. The display of the digital voltmeter can be switched off after setting the instrument, therefore minimising the consumption of the data-collector. The data-collecting period can be adjusted via computer. The instrument has the options of both network or battery mode.

1.1.1.5. Sensitivity, accuracy of measurement: The average voltage occuring on the electrodes placed underground is between 400-1400mV. An increase of voltage of 100-200mV indicates biological activity.

1.1.1.6. Output data (range of measurement): The milivolt data-collecting instrument has the capacity to receive voltage in the range of 0-2000mV from the electrodes through its measuring connectors.

1.1.2. Soil moisture measuring

Soil moisture will be measured by using the DECAGON soil sensor products. The soil moisture measuring system will be connected to the EDAPHOLOG communication system.

1.1.2.1. The 10HS determines volumetric water content (VWC) by measuring the dielectric constant of the soil using capacitance/frequency domain technology. The sensor uses a 70 MHz frequency, which minimizes salinity and textural effects, making the 10HS accurate in almost any soil. Factory calibrations can be used in most typical soils with a saturation extract EC of 10 dS/m

1.1.2.2. Specification:

Accuracy	Apparent dielectric permittivity (ε_a): ±0.5 from ε_a of 2 to 10, ±2.5 from ε_a of 10 to 50
	VWC: • Using standard calibration equation: ±0.03 m^3/m^3 (±3% VWC) typical in mineral soils that have solution electrical conductivity <10dS/m • Using soil specific calibration, ±0.02 m^3/m^3 (±2% VWC) in any soil
Resolution	ε_a: 0.1 from ε_a of 1 to 30, 0.2 from ε_a of 30 to

	50 VWC: 0.0008 m^3/m^3 (0.08% VWC) in mineral soils from 0 to 0.50 m^3/m^3 (0-50% VWC)
Range	ε_a: 1 (air) to 50 VWC: 0-0.57 m^3/m^3 (0-57% VWC)
Measurement Time	10mS
Sensor Type	Frequency domain
Output	Voltage correlated with VWC, independent of excitation voltage
Operating Environment	-40 - 50°C
Power	3 VDC @ 12mA to 15 VDC @ 15mA
Sensor Dimensions	14.5cm x 3.3cm x 0.7cm
Data Logger Compatibility (not exclusive)	Decagon: Em50, Em50R, ProCheck, ECH_2O Check Campbell Scientific: CR10X, 21X, 23X, CR1000, CR3000, etc. Other: Any data acquisition system capable of 3-15 VDC excitation and single ended voltage measurement at 12 bit or better resolution.
Warranty	One year, parts and labor

1.2. Technical information on the **Edapholog-trap**

1.2.1. Digital signal processing

Sampling, signal processing and data transmission is made by microcontrollers that are capable of microcapacity working

1.2.2. Interim storage

Primary data storage takes place in the microcontroller that measures. It is a short term and temporary storage between the communication acts.

Secondary storage is the storage of the data that is collected in the communication unit. It is able to store data from a whole measurement period in a flash-type semiconductor memory.

1.2.3. Power supply

Each measuring unit gets its power supply from a gel-cell lead-acid battery connected from the outside. Depending on the choice of capacity, a whole measurement period can be supplied with only one charge. However, it probably would not be practical to have as our objective to supply a whole season with one charge, because the installed sensors may require human intervention anyway, on which occasions the power supply can be replaced.

2. Electrical system communication (Raw data collection, Data signal processing: transmission of radio signals, GSM transmission)

2.1. Operating principle: The communication unit transmits data from the soil biology sensors to the EDAPHOLOG serves. The unit has two physical parts:

A. GSM/GPRS communication device

B. Communication devices connected to the sensors – for the transmission of sensor signals to the GSM/GPRS device

System design:

The GSM/GPRS communication device (A) accepts data from multiple sensors using a communication device (B) connected to the sensors by radio connection. Sensors are installed around the GSM/GPRS communication device, in few tens of meters distance. The number of sensors that can be installed depends only on the amount of data they send. Device A collects incoming data, signs it with an appropriate time stamp, saves it then sends it to the EDAPHOLOG server occasionally. The frequency of data transmission depends on user settings and the incoming data. The communication device also sends an alarming message if the device is moved or opened by unauthorized people.

After physical installation the external magnetic switch is activated, and the device starts, and it connects to the GSM/GPRS network. If necessary, certain parameters of the device can be set on the spot by SMS.

After installation, a service program that connects the installed sensors, maps the connections and if connection failed to one of the sensors, helps to troubleshoot must be run on the device.

The state of this program appears on the front LED display of the device. After installation, the communication device goes to virtual sleep mode; it only accepts incoming signals coming from the sensors and saves then into the built-in memory. This memory is a few GB sized, rotary circuit, from which several months of measurement results can be

recovered even in the case of the total collapse of the GPS communication. Communication with the sensors is slow, using 433Mhz transmitter/receiver (or just receiver) or wire. The communication processor processes the incoming radio signals, corrects the errors, and transmits data to the GSM/GPRS. If the sensor with the given serial number receives a message and if there is a built-in transmitter, then it returns data that it got from the GSM/GPRS. The output data from the communication processor is identical to the transmitter-side data, therefore if it is necessary, the 433 MHz radio is removable from the system and sensor signals can be connected to the directly to the GSM / GPRS processor's data input without any SW / HW changes. After the set time (which should not be more than 1-2 daily for the optimization of consumption) or after a specified amount of received data, the GPS unit activates and sends the collected data to the EDAPHOLOG server. The sensors, if necessary, send a message, which immediately activates the GSM / GPRS connection, in certain pre-established emergency cases. In this case it removes relevant data from the server, stores it, and if necessary, forwards it to the sensors (e.g. sensor activity timer, GPRS activity timer, etc).
The GSM / GPRS communication system does not care about the contents of the data came from the sensors; it just associates a time stamp to the incoming information, and transmits them without any change in the direction of the server. As a last data row it sends the details of its status, battery status, temperature, number of communications, etc.

The GSM / GPRS connection can be established in several ways:

1- via SMS: SMS is the simplest and has the lowest transmission capacity, but in some cases, for example in individual or experimental installments it is beneficial that the message goes directly to the user's mobile phone, ignoring the usage of all computer technology.

2-via e-mail: The collected data reaches the set addresses via e-mail. The advantage of this structure is that an APN server is not necessary.

3- Use of an APN server. This server is created and handed over to the user for use by the GSM service. This interconnection is the simplest way from the aspect of the GPRS transmitter, (it has the best energy efficiency also), but it assumes a permanent APN server that has to be monitored by the user organization.

2-3 connection types can be operated only in those places where there is GPRS or Internet connection. The final device has to be capable of all three communication types above to ensure safe communication. The device operates at about 6V voltage, its average current consumption is around 1mA, but in the case of GPRS connection a few amperes of electricity peaks can be expected.

B. Communication equipments connected to sensors

System design:

Normally it is composed of a communication processor and a 433MHz low-power radio transmitter (or radio transmitter/receiver). If the sensor circuit wants to send the data collected by itself, it increases one of its output cables to a high logic level (approximately 3mA electric power demand) to put the communication processor into operation. This level has to be kept until the communication server's response. After 100 mS data transmission can be started in the RS232 wire. After the arrival of the last bit of data the communication processor switches the transmitter on, and then sends the data. If there is a receiver in the system, it waits for the response of the CSM/GPRS communication device, if there is nor, it sends the data randomly for more times. At the end of the communication it sends an acknowledgement sign –05 Ah, or the sign that it received from the GSM/GPRS communication device, in the case a 433MHz receiver is installed too. At this moment the sensory circuit sets its communication initiating outgoing cable back to the zero level, which makes the communication processor to switch off completely. The role of the sensory circuit is to activate communication occasionally (at irregular intervals if possible, in order to avoid conflicts with the data coming from other sensors), and to send a message with a certain baud rate and character number to the communication processor. The problem of communication can be solved without knowing the number of characters and baud rate, but this requires more input energy and processor performance, and also that the communication begins with the known, 055H, 0Aah characters because of synchronization (if this does not mean extra load for the sensor's processor). A test-operation launching input is also necessary for the sensor processor. If this input is set to high by an external switch, it starts a continuous transmission that serves maintenance – see above.

3. Sampling design

The prototype of the EDAPHOLOG- trap System will consist of 200 measuring EDAPHOLOG-traps that allow to do 200 measurements at a time.,The EDAPHOLOG-trap will be able to divide the trapped mesofauna into functional groups in accordance with the general trophic groups (bacterial feeders, fungal feeders, plant feeders, and predators and omnivores). As a consequence of this additional, novel function, each EDAPHOLOG-trap will be baited to attract particular groups of mesofauna. This methodology will require four EDAPHOLOG-traps at the same time in one site, therefore this approach allows us to measure 50 sites at a time.

4. Data analysis

Since we predict that data points taken over long time by the EDAPHOLOG-trap system will have a internal structure (such as autocorrelation, trend or seasonal variation) we will use **time series analysis and models** in data analysis. By using this statistical technique we want to (a) identify the nature of the phenomenon represented by the sequence of measurements, and (b) forecast (predict future values of the time series variable). Both of these goals require that the pattern of observed time series data is identified and described. Once the pattern is established, we will be able to interpret and integrate it with other data (i.e., use it in our theory of the investigated phenomenon, e.g., biological activity of the soil). Regardless of the depth of our understanding and the validity of our interpretation (theory) of the phenomenon, we can extrapolate the identified pattern to predict future events.

In general, most time series patterns can be described in terms of two basic classes of components: trend and seasonality. The former represents a general systematic linear or (most often) nonlinear component that changes over time and does not repeat or at least does not repeat within the time range captured by our data. The latter may have a formally similar nature, however, it repeats itself in systematic intervals over time. Those two general classes of time series components may coexist in real-life data. Consequently, first, we want to obtain an understanding of the underlying forces and structure that produced the observed data, and then to fit a model and proceed to forecasting or monitoring. The fitting and selection of the aprropriate time series model will be done by applying one of the well-known methods, such as the Box-Jenkins ARIMA models, the Box-Jenkins Multivariate Models, and the Holt-Winters Exponential Smoothing

5. Data publication

Project objectives and results will be published in high-rank, peer-reviewed, scientific journals (e.g., Soil Biology and Biochemistry, Applied Soil Ecology, Pedobiologia, etc.). In addition, project results will be communicated on conferences, workshops, and similar public events. Dissemination of results in the scientific community will start by preparing and submitting manuscripts or presentations to various conferences, workshops, or journals as soon as possible but not later than May 2011. In addition, we are planning to use a **WebSTATISTICA Server** in RISSAC. It adds full Internet enablement to STATISTICA software, including the ability to interactively run STATISTICA from a Web browser. With WebSTATISTICA, we can easily and quickly access data and powerful analytical tools from virtually any computer in the world as long as it is connected to the Web and disseminate even the pure results to the scientific community or specified users who receive access to the server. The product is provided with a selection of Internet browser-based user interfaces enabling users to specify analyses and review results or generate detailed reports using a standard Internet browser. WebSTATISTICA Server is a highly scalable, enterprise-level, Web-based data analysis and database gateway application system, built on distributed processing technology and fully supporting multi-tier Client-Server architecture configurations. WebSTATISTICA Server exposes the analytic, query, reporting, and graphics functionality of STATISTICA through easy to use, interactive, standard Web interfaces. It is offered as a complete, ready to install application with an interactive, Internet browser-based (point-and-click) user interface, enabling users in remote locations to interactively create data sets, run analyses, and review output. However, because of its open architecture, WebSTATISTICA Server also includes development kit tools (based entirely on industry standard syntax conventions such as VB Script, C++, HTML, XML), enabling IT departments to customize all main components of the system, or to expand it by building on its foundations, for example, by adding new components and/or corporation-specific analytic or database facilities. The system is compatible with all major Web server software platforms (e.g., UNIX Apache, Microsoft IIS), works in both Microsoft .net and Sun/Java environments, and does not require any changes to the existing firewall and Internet/Intranet security systems.