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COMPUTERISED INVENTORY EVIDENCE IN HISTORICAL BUILDINGS

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1. Motivation

The paper describes a particular project funded by the Ministry of Culture of the Czech Republic being solved in the Gerstner Laboratory currently. The aim of the project is to develop a software system enabling file-keeping of movables located in castles and other historical buildings in Czech Republic. The structure of heritage administration consists of three levels in the Czech Republic. The Central Institute of Care for Historical Monuments (CICHM) stands on the supreme level. It controls seven Regional Institutes of Care for Historical Monuments (RICHM). Each of

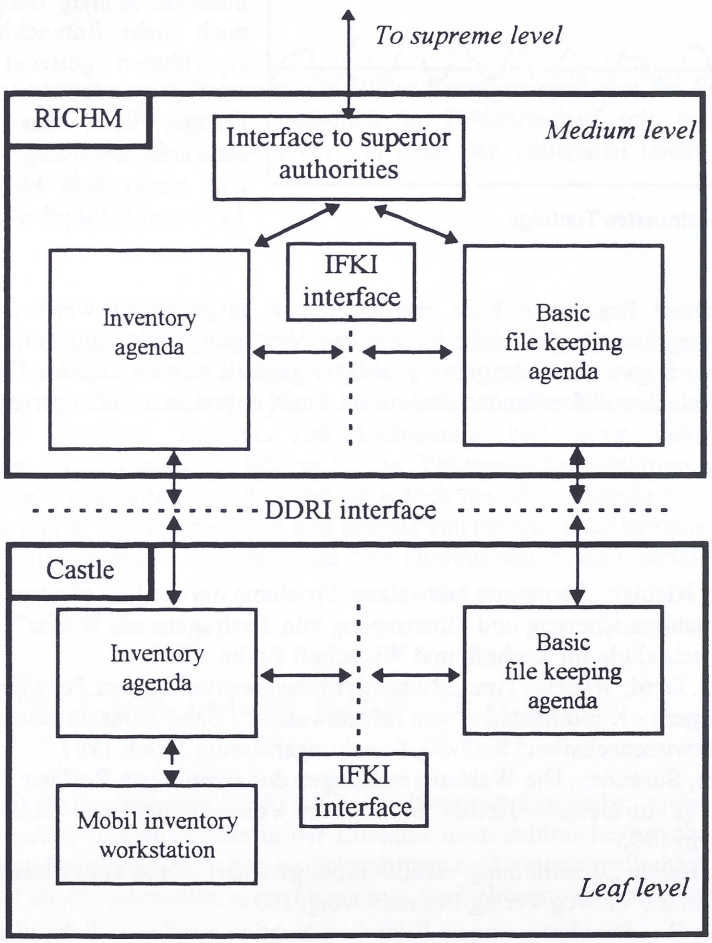

Figure 1. Data flow structure

them supervises heritage caretakers (castellans) administrating particular castles or other historical buildings.

There is a complex data flow within this hierarchical system.

The project aims to analyse those data flows which are handled mostly in a "paper and stamp" way. The major goal is to propose their efficient replacement by electronic data flows.

Current state of the art incorporates running development of the system's lower two levels - see Figure 1 . There already exist several software tools making the file-keeping. This makes the above mentioned process not straightforward. As there exist obligatory guidelines of the CICHM defining which data are to be kept, the structure of the data collected by particular systems in use is similar. However, the integration of those systems into a overall information system requires precisely defined interfaces in order to connect those systems into designed data flow structure. The pilot project is being applied to the heritage region supervised by the South Bohemian Institute for the Care of Historical Monuments located in České Budějovice.

There is a relatively intensive traffic of the movables between various castles and other institutions. The particular pieces of historical movables are taking part in various exhibitions outside of their home castle. The items on inventory record are borrowed to movie producers, they are subject of maintenance in conservators' workshops, etc. All these movements of movables are supervised by the suggested system.

There are two copies of inventory files kept for each castle. The first one is maintained by the castellan directly at the castle, the other one is maintained by a supervisor person from particular RICHM. At the beginning of the stock-taking process both copies are compared. This duplicated file-keeping should eliminate the possibility of unauthorised manipulation with the data.

There are two basic agendas running at the castle. The basic file-keeping agenda maintains the data of art historical character. The other one stands for an inventory evidence documenting the movements of items of particular items out of and into the castle. The reason and approval of movements are also stored there. As there are several types of software supporting the basic file-keeping agenda, an interface (referred as IFKI in Figure 1) has been defined between the both agendas. The interface definition is based on message exchange derived from DDE principal (known from MS Windows) rather then sharing static data.

The other interface definition has been proposed for the castle - to - regional institute bi-directional communication. It is referred as Data Definition and Replication Interface (see Figure 1).

2. The stock-taking (inventory) process

The inventory process incorporates following steps:

1. The director of the RICHM authorises the inventory commission at the beginning of the inventory process. The inventory commission compares files from the RICHM to those from the castle. Without complete and successful matching those files the physical stock-taking process can not be launched.
2. The commission visits all rooms in the building and checks the physical presence of all the items on record during the inventory process. This work is very time extensive because of huge size of inventory files. A commission member has to take every piece of inventory into his hands, read the inventory number, and verify it with the record.
3. The possible absence of some items must be approved by a record in the corresponding RICHM director's instruction.
4. The inventory report is created at the end. The report keeps track of differences found during the inventory process.

3. Computerised inventory

The proposed computerised inventory process is based on the following elements:

- *Inventory Agenda* is a computational process running on a PC. It keeps records of all director's instructions to enabling particular items to leave the castle. Moreover, it keeps track of all physical movements of inventory items out of - and into - the castle. There must exist director's approval for each movement. This agenda communicates also with the mobile terminal.
- *Mobile Terminal* is a hand-held computer equipped with laser bar code reader. Its memory capacity is sufficient for medium-sized castles. In the case of larger castles, it is necessary to split the inventory process into several stages. This limitation is no restriction in fact, as the daily progress of inventory is much smaller then the size of the record in the mobile terminal's memory.

The proposed solution assumes that all the items of inventory file are physically equipped with a sticker containing a unique bar code. Besides the bar code the original identification number is printed in a human-readable way on the sticker. This allows to work even in the case of a scanner malfunction or unreadable bar code. The way of sticking the label onto the surface of valuable exhibits is still considered as subject for discussion. The fixation of the label must be stout enough. On the other hand the surface of the exhibit must not be damaged. There exist special substances recommended by the conservators which create the desired, smooth, and protective layer between the surface and the sticker.

Even if the CCD scanners are cheaper, the laser-based device has been chosen. The reason is that it is able to read the bar code even from longer distances (up to 30 cm). As the direct contact with the label is not necessary, the sticker may be located outside the directly visible part of an exhibit. Moreover, the relatively large triggering distance allows to fix the sticker on cylindrical surfaces with diameter at least 18 mm. The relatively large triggering distance decreases the risk of damage of exhibits during the stock-taking because it is not necessary to pick up each item by hands (china cups).

There are cases when the exhibit is located out of the human's reach (e.g. at the ceiling of high halls). The alternative method of exhibit identification has been proposed. The commission has a photograph of the arrangement of such unreachable exhibits. Each exhibit has a substitute bar code introduced on the photograph. If the commission is convinced that all exhibits are on their places as shown on the photograph, they can scan the substitute bar codes from the photo. All such cases are registered and introduced in the final inventory report. The process may be moderated by assignment of a logical attribute to each item stating if the substitute bar code scanning is allowed or not.

The proposed scenario of the computerised inventory process is very similar to the classical one. It makes easier to accept the new way of work by the people involved in the process. The new features are the following:

1. In the morning the commission loads the data from the stationary computer in the hand held data terminal.
2. At the room's door the commission registers the room number by scanning the room's identification bar code located near the door. Since this moment the hand computer assigns all found items of the inventory to the registered room until the new room is registered.
3. After reading the bar code from the sticker, a short description of the item will be shown on the terminal display. If it does not match the real shape of the exhibit or if the commission is not convinced about the identity of the exhibit, they can reject the registration of the exhibit. The date and time of registration are kept for documentation purposes. In any moment the inventory commission can display the list of all insofar not registered items which should be found in the room.
4. After the return of the commission back to the building office the results of the inventory are downloaded to the computer and the new data can be prepared. If a commission member created some notice about the item this notice will be displayed on the stationary computer and the commission can correct the data on the inventory list.

To eliminate the possibility of unauthorised manipulation with data in the inventory agenda, the security of the data is ensured by a hardware key. The presence of the hardware key is a necessary but not sufficient condition for inventory data manipulation. The hardware key contains a EEPROM memory with the commission's members, assess rights and password description.

4. Conclusion

The classical stock-taking process takes half a year in average. Our solution can rapidly decrease the time demand and also improve precision and objectivity of the inventory process. The mobile inventory workstation together with software of the stationary computer has been developed and it is under testing on the Rožmberk nad Vltavou castle. The dynamic interconnection with the most frequently used software tool for basic file-keeping agenda called Monumis (developed and distributed by the UnicSoft v.o.s. company) is under development.

The software developed in the frame of above mentioned project is implemented in the Delphi 1.0 environment, the hand held data terminal is Psion Workabout equipped with the Blackrock L200 laser scanner.

References

Kouba Z.: "Mobile inventory workplace - a solution proposal" (in Czech), The Gerstner Lab research report No. GLČ-01/96, Czech Technical University, Prague, 1996