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Electronic Logbook for Small Vessels

A Preliminary Study

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1 Introduction

The introduction of the electronic catch reporting system as part of the CFP (Common Fisheries Policy) is under discussion. The current system of manually filling in catches in paper logbooks presents several drawbacks. It is considered as

- too slow due to the delay resulting from manually entering the catch data of each vessel into an electronic database and as
- too expensive due to the great amount of personnel required all over the European fishing ports to type the data.

Change to electronic logbook has been suspended so far for two main reasons:

- Electronic devices on board the fishing vessels were rare in the past but are increasing nowadays
- Software developers offer in between a great variety of packages providing support to the fishing skipper's daily work.

The Council regulation 2371/2002 and Commission regulation 1461/2003 foresee pilot studies for electronic reporting system with aim to prepare the ground for the final introduction of the legislation.

The project SHEEL (Standardised Harmonised European Electronic Logbook) [1] has been the most important exercise towards deploying a secure and harmonised solution, with the aim to develop and test a Europe wide Standard for electronic logbooks. SHEEL includes the whole range of software developers active in the field and associates with them one or more Member States to facilitate the testing. Two vessels per participating Member State are planned to transmit reports throughout the exercise.

2 The small vessels problem

SHEEL focuses on vessels large enough to accommodate a desktop PC on board as only those have already expressed a demand for on board software systems to support them finding the richest fishing grounds and keep track of the catches. Usually such vessels accommodate also the Inmarsat C terminals, essential part of the VMS Vessel Monitoring System) [2], and are thus trained in satellite communications.

The obligation for daily catch reporting in Europe includes all vessels above 10m. The obligation for VMS though includes only vessels above 15m. Thus we can expect from vessels above 15m to accommodate on board electronic devices such as Satellite Communication terminals and PCs but not for those smaller than 15m. Moreover vessels with length between 10-15 m hardly have the space and the power supply to support such equipment on board.

Almost half of the registered European fishing vessels are under 15m (11147 out of a total of 22669). Transferring the legislation from manual reporting to electronic reporting without including 10-15m long vessels would mean

- Weaken one of the most important arguments in favour of electronic logbooks, i.e. the cost savings from suppressing the port officers to enter the data into a database, as personnel will have to be available for manual reports coming from small vessels.
- Creating inequalities among the fishers

Therefore a solution would be welcome to allow small (10-15m) vessels to electronically report, but by using devices that don't require as much space and power as a normal desktop. The obvious solution to this is hand held devices.

3 State of the art in hand held devices

Hand held computers are mainly tablet PCs and PDAs (Personal Digital Assistant).

3.1 PDAs

PDAs are extremely convenient to carry due to their small size. But their small keyboard and screen restrict them only for limited applications. Mostly they have been established for personal calendars and address books. Manufacturers try to resolve the problem of the small keyboard by using an electronic pen. Such pens rely on hand writing recognition, which is questionable for the harsh sea conditions.

PDAs and tablet PCs are offered by the majority of the computer manufacturers all over the world, such as Palm, Compaq, Sony, Samsung etc. Usually they don't weigh more than 1 kilo, have 64Mbyte Memory and 400MHz processor and they may cost around 200 Euro. Almost all new versions run in MS windows environment and can support GPS and internet.

The future trend is the combination of PDAs, mobile phones with blue tooth and even MP3 players and photo cameras. The cost of such an advanced device is around 600-700 Euro.

3.2 Tablet PC

A Tablet PC is a portable computing device which looks much like a detached screen from a conventional notebook computer, or perhaps a hand-held computer that has been scaled up. Similar to PDAs tablet PCs are designed to work with the electronic pen. Similar to the notebook computer they include a full size screen and a hard drive.

As tablet PCs are mainly developed for mobile workers, they are often designed for harsh conditions. One can find in the market highly rugged, fully sealed and waterproof housing, shock-mounted hard drive and handle extreme temperatures versions. Touch screen is an optional as it is integrated GPS, Bluetooth and wide-area wireless connections.

3.3 Power consumption

The power supply of hand held devices is one of the most critical issues of this technology. Ni batteries usually last 2-3 hours, while Li around 4 hours when continuously used. Recharging can be, depending on the battery type from 1000-1500 times. The boot process is highly power consuming as well as some peripherals such as the GPS and often use of the flash card or the mobile phone. Longevity of batteries is prohibitive to extreme temperatures and wet conditions.

Despite the low-powered chips used in tablet PCs batteries are still quite heavy.

3.4 Applications

There are various applications for handheld computers. Among the most known are:

Table 1 Handhelds have been well established in some applications

Aerospace	Recording data on airplane engine testing in the field
Agriculture	Monitoring planting, fertilising and harvesting with GPS, area measurements [4]
Field engineering	Searching for oil and gas wells
Law enforcement	Investigating accidents on site

Telecommunications	Repairing lines, planning new switching centres
Transport of goods	Tracking and monitoring of trucks

In some other applications like in defence rugged wearable handheld devices are used.

4 Handhelds and the fishing industry

In principle there is no limitation in equipping small vessels with handheld devices, which can store data about the catch and the vessel position and hand it in to the authorities when the vessel is back to port. However up to now there has been no demand from the vessels' owners so there has been hardly development for this application.

JRC launched a survey to investigate, which companies have tested an on board solution based on handheld devices. Only few companies have tried to enter this market segment and their main conclusion is that the electronic pen and the small screen PDA are not suitable for the harsh conditions on board. Tablet PC and touch-screen seem to be more suitable.

4.1 Portuguese Fisheries

The University of Kent has been in the past involved in the research project FishCAM [3] on developing electronic logbooks. The trials were supposed to be carried out in Portugal. The consortium concluded that

- Skippers are reluctant to invest to hardware and software with the only purpose to submit catch data to authorities
- On board logbook needed a bigger screen than PDA to be usable.
- The interface has to be carefully designed

4.2 Trap Fishery

The American company Thistle Marine has worked on board of trap boats trying to develop a hand held system for catch data. The company failed though to establish itself in the field.

PDAs are not an option for trap vessels. The fishermen are wearing gloves, handling bait and are in wet wheelhouses. Also they are hauling 300 to 400 traps per day. It was hard enough to get them to push a couple of buttons while they are motoring from one buoy to the next. To get them to pick up a handheld and enter data would be impossible. Trawl fishermen might have the time but trap fishermen would not.

Thistle Marine concluded that handhelds will fail if:

- it takes a fishermen more than a few seconds to enter the data (less than 10 secs)
- they have to use a pen to make screen selections
- they have to take off their gloves
- they have to put on their glasses to read the screen

Figure 1: Handhelds will fail if fishermen have to take their gloves off

4.3 Crab Fisheries

The company Traceall has reported the development of a PDA connected with a mobile phone and GPS for the Irish Fisheries Authority. The PDA was used for data collection which was sent over a mobile phone to the company's web based database. The company reports positive results however the application didn't develop into a market opportunity.

4.4 In the Fishmarkets

The French company Adicio, who is currently involved in electronic logbook development for large vessels, has already developed a PDA application for fish-markets. They used DELL's Pocket PC with POCKET 2003 OS. The database is hosted on a server linked to PDA with a Web Service. The pocket PC works in batch. Data download are made through Wi-Fi or Ethernet. The operator can fill in data after he has identified himself by login and password. Then he is required to sign the electronic form by using the pen for authentication. The signature is compared with the one stored as a picture in the database.

This set up has proven successful however they noticed that the stored data was erased from the pocket PC, when its batteries were empty. Therefore a specific memory card is mandatory. Although they have never tested this solution on the conditions on board the company believes it should not be a problem transferring the technology.

5 SHEEL specifications for handhelds

Generally the software developers involved in SHEEL have hardly experience in handheld applications for fisheries, whilst they might have handheld applications for other market segments. Most of them believe that in principle there is no problem in developing the catch reporting system for PDAs if there is a demand for it.

The company TerraSystems reported that they use the Navman PC with a simple email reporting system for vehicle monitoring which could be transferred to fishing vessels if required. The company Olrac, who is developing value added products for supporting the skippers in their fisheries management doesn't see how their systems can fit in PDAs. On the contrary they believe that tablet PCs might be more useful.

Given the fact that PDAs and tablet PCs nowadays run on the same or similar platforms as desktop PCs there is only small variations in the software development. JAVA and XML technology can be used without any problem on PDAs and tablet PC and the same can GIS systems connected to GPS.

5.1 Sheel reports

Currently SHEEL is based on 11 reports [1].

1. Departure from port
2. Arrival to port
3. Entry to region
4. Exit from region
5. Fishing Operation
6. Transhipping
7. Joint operation
8. Processing of fish
9. Cumulative catch
10. Landing
11. Navigation/Searching

Smaller vessels may not need the whole range of those. As an example report 3 and 4 are mainly proposed for vessels fishing in international waters. Report 11 is thought for vessels spending many days navigating and searching for fish not necessary for small vessels fishing close to its own port for some hours a day. Report 8 is not relevant to small vessels as on board facilities for processing are not present. All reports require the actual vessel position (GPS signal).

SHEEL foresees that most of the information required in these reports are taken directly by the system, such as time and GPS position, or are filled in only once in the initialisation phase such as skipper's name and address, type of nets etc. The skipper is required to only provide a minimum of information. Such information includes the amount and type of catch, the vessels involved in the joint operation or transhipment etc.

6 The challenges

The technical challenges in a handheld system are

- how to allow the skipper to insert these data with a minimum of effort and without disrupting his on board routine
- to ensure that the system doesn't require data in a frequency that will compromise the on board power supply provisions.
- to keep the system protected in a secure and safe place, not interfering with the skipper's activities

Moreover small vessels bring some political challenges along:

- Should they report daily or more often to the authorities? If yes a satellite communication system seems to be unavoidable as radio or GSM communications have only a limited range from land. If VMS is thought to be extended also for vessels from 10 to 15 meters the power supply question arises in a more urgent fashion as in electronic catch reporting.
- Should they have on board systems? Small vessels also make short trips and have small catches. Wouldn't it be enough to oblige skippers to report electronically only on landing. The skippers could use the hardware made available at the port office.

7 The possible system implementations

There are three scenarios to be tested, two with an on board system one without it. The above described technical challenges apply to all of the scenarios.

Table 2: Various Handheld scenarios

Facility	**On board system**		**No system on board**
Type	Electronic Logbook with transmission	Data capture without transmission	All declarations when landing
Equipment	Tablet PC and satellite transmission	Only a tablet PC required	Port facilities
Cost for the fisherman	Equipment and transmission cost	Only tablet PC cost	No cost
Power / Space	Highest power and space requirements	Only tablet PC batteries/ No space requirement	No power/ No space requirement

Implementations for small vessels can include both scenarios with and without an on board system. Depending on the legislative reporting requirements they may include satellite transmission capabilities or not. If vessels are engaged in some hour trips around their home port, port authority facilities can be put in their disposal for reporting electronically their landings.

8 Conclusions & Way forward

Handheld devices can in principle be used for electronic catch reporting on fishing vessels under 15m. However the power supply solutions, space, cost and user friendly interfaces have to be studied to ensure a successful implementation.

The best way to proceed is:

1. understand the nature of the small vessel fisheries all over Europe.
   - How do vessels from 10-15m vessels behave for all types of fisheries?
   - How long are usually their trips?
   - Do they often go beyond radio or GSM, GPRS signal coverage?
   - Which are their target species?
   - Do they cross their national borders?
   - Which types of these vessels have space enough to accommodate the relevant equipment.
2. to identify, which vessels or types of fisheries fall into which scenarios.
3. to design and develop a system, based on tablet PCs and the SHEEL specifications, suitable for each scenario
4. to run tests and understand the pros and cons

Obviously JRC can not do all these on its own. A partnership with other experts and a precise definition of the work frame is needed in order to investigate further the possibility of deploying an e-logbook for small vessels.

9 References

[1] Technical Annex, 2004, http://fish.jrc.it/Sheel/index.htm

[2] http://europa.eu.int/comm/fisheries/news_corner/doss_inf/contr17094_en.htm

[3] http://www.ist-mistic.org/Pro_for_D3/FISHCAM.pdf

[4] ftp://agrifish.jrc.it/public/simon/papers/NavSat2003SKaySession12v2.pdf

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ABSTRACT

According to the EU's Common Fisheries Policy all vessels longer than 10m are obliged to fill in the manual logbook, whilst all vessel longer than 15m have to submit their VMS signal. A new legislation on replacing manual logbooks with electronic logbooks will affect vessels longer than 10m but shorter than 15m. Generally such vessels don't have electronic equipment on board due to both space and power supply limitations. Electronic logbook solutions based on handheld devices are technically possible, however the challenges lie in the interface design and the power supply. The on board power supply requirement will depend on the legislative framework. Satellite transmitted haul-by-haul catch reports will be more power intensive than simple catch data storage without transmission. Various solutions can be designed according to the needs of the small vessel fisheries

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