

# SMS in Emergency Communication

Reykjavik 2009





Nastional Centre on Emergency Communication in Health

## REPORT

**TITLE:**

**SMS in Emergency Communication**  
Reykjavik 2009

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## 1. Summary

- Iceland has implemented a system for SMS on the European emergency number 112
- With an open system without prescription the number of SMS messages is 0.5 % of the overall number of calls
- The fraction of SMS calls which are connected to real emergencies is 10% as opposed to 74 % for the overall number of calls
- Implementation of the system was greatly assisted by Iceland having only 1 PSAP/ Emergency call centre
- The majority of users are persons with special needs in communication
- The efficiency of the system is dependent on the SMS being included in the main case handling system.

## 2. Background

The National Centre on Emergency Communication in Health (KoKom) is conducting the project “Access to Emergency Numbers for Individuals with Special Needs”.

An interim report was issued earlier this year, suggesting a rapid implementation of a basic system for receipt of SMS in emergency centres. The report (in Norwegian) is available upon request.

As a primary measure to ease the access emergency services for persons with special needs in communication, it is suggested to establish a service whereby facilities for the use of Short Messaging Services (SMS) as a means for communication between Public Safety Answering Points (PSAPs)/ Emergency Control Centres and the public.

One activity within the project was collecting information about systems in other countries. It was found that Iceland is currently offering SMS-access to their emergency centre. Together with the Finnish committee working on implementing SMS communication for their emergency services, a visit to Iceland was planned. For internal reasons the Finnish committee had to cancel their participation at short notice.

As we were mainly collecting information as to how the system is established and how it works, and because of the limited time available, this visit was limited to discussions with the 112-organisation ([www.112.is](http://www.112.is)).

### 3. Participants:

From the Icelandic 112-organisation:

Ms Dagný Halldórsdóttir  
Mr Thorallhur Olafsson.  
Ms Elva Bjornsdottir

From Norway:

- Egil Bovim, KoKom
- Åge Jensen, KoKom
- Stig Solberg, Norwegian Post and Telecommunications Authority
- Elin Østli, Norwegian Directorate of Health

### 4. Itinerary

On Tuesday 3<sup>rd</sup> November we initially had a meeting with Ms Dagný Halldórsdóttir and Mr Thorallhur Olafsson, followed by a guided tour of the 112-centre. The guided tour was somehow limited due to the ongoing pandemic of Swine Flue. The management had had to institute limitations in visitors to the actual emergency centre. We were, however, able to look at the activities and to meet one of the operators who demonstrated the system. This was done in the emergency room which was not being used at the time, and which is fitted with a satellite of the systems used in the Emergency Control Centre (ECC)

## 5. About Iceland



Iceland is an isolated set of islands in the North Atlantic Ocean. The geographic position is such that there is no cross-country migration of calls on public telephone systems. The total population is about 320 000, the total area of the country is 103 000 sq. kilometres. The capital is Reykjavik to the south-west, and some two thirds of the population lives in the greater Reykjavik area. Akureyri on the Northern coast has a population of approximately 17 000. Iceland is mainly populated along the coastal areas. The main road circulating Iceland is about 1400 kilometres long.

### 5.1 Mobile telecommunication in Iceland

There are three Mobile Network Operators (MNOs) in Iceland. Two of them have bilateral roaming agreements. The 112-organisation has a contract with two MNOs for submitting SMS. One of the systems is in daily use; the other one is for backup.

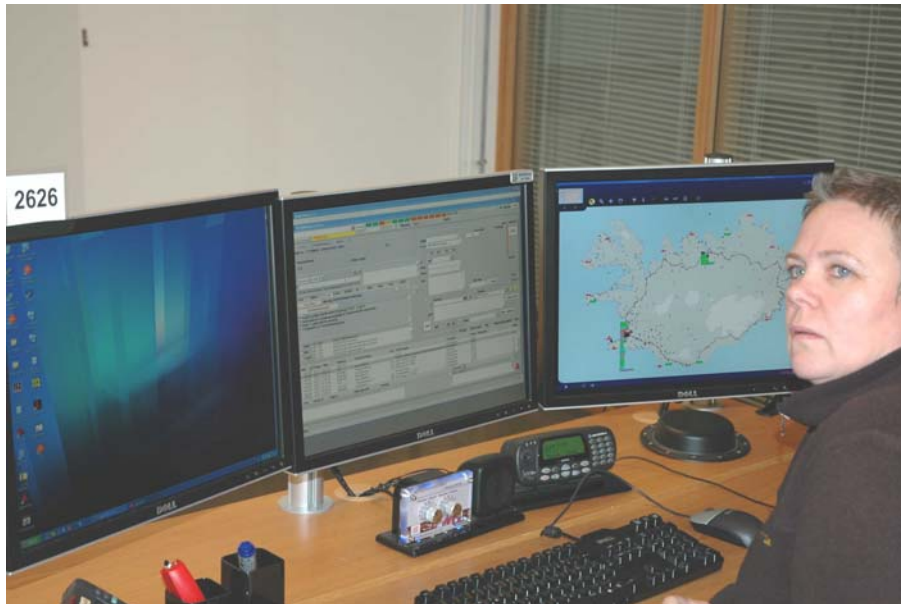
GSM telephones are in wide use. In general, the coverage is sufficient. The capacity in terms of SMS is generally sufficient. However, congestion is experienced at peak situations (New Year's Eve etc), like is the case elsewhere.

The emergency services have a TETRA network in Iceland for voice communication. In addition to the emergency services (including primary health care) the network is also being used by private entities according to contracts with the system owner.

## **5.2 Emergency services in Iceland**

The emergency services in Iceland include police, fire brigade, sea rescue services and health care. A substantial part of the activities are carried out by volunteers, who are organised in local groups. The procedures for dispatch are the same across the country, thus enabling the 112-centre to relate to all local services in the same manner.

## **5.3 Emergency communication systems in Iceland**



Whereas Iceland used to operate many emergency numbers and emergency control centres, the single European emergency number 112 is now implemented as the only emergency number.

Calls from all over Iceland are routed to the 112-centre in Reykjavik.

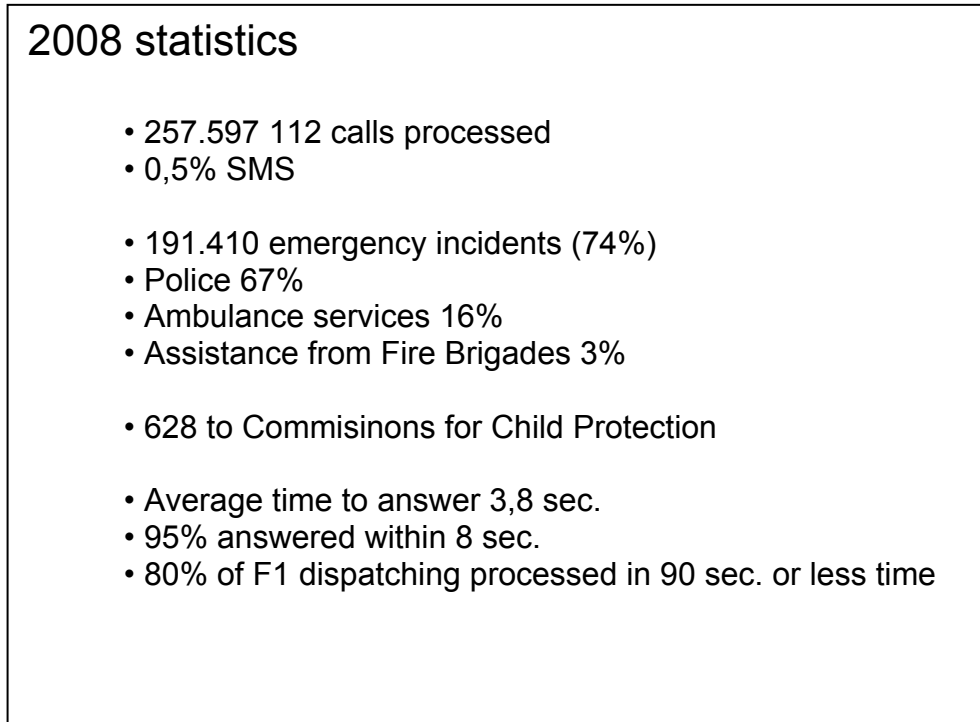
The 112 centre is co-located with the centre for the coast-guard, central administration for voluntary rescue services; the police control room, the fire brigades and ambulance services covering the greater Reykjavik area.

In addition to “traditional” 112-activities, the centre also offers services like non-urgent requests for assistance by the police, child protection agency etc. Discussions are ongoing for the centre to take over as contact point for primary health care physicians (General Practitioners (GPs)) outside office hours. If this is implemented, the centre will receive requests for semi-acute medical assistance, also these via 112.

The 112-centre thus operates as a PSAP for a wide range of services, receiving the calls and registering them. The centre classifies the incoming calls as either police matters, matters for the fire brigade, health care needs or others. In the case of police matters, the caller is forwarded to the police control centre, which is next door from the 112-centre. The police control centre then takes over, and dispatches the necessary resources etc.

If the matter is classified as fire or health emergency, the 112-centre itself dispatches the resources, and follows up the handling of the case.

Figure 1, Statistics from Reykjavik 112-centre



(Ms Dagný Halldórsdóttir, 3<sup>rd</sup> November 2009)

Figure 1 shows that 74 % of the calls received by the 112-centre in 2008 were actual emergency calls, within the definitions used by the centre. The figure is high compared with other countries. One possible explanation is that the services seem to accept a lower threshold for relevant calls to 112 than other countries do. An indication of this is that it is accepted that calls are made to the police via 112 on issues which are not urgently critical.

This is also reflected in that 2 out of 3 calls are defined as police matter. This is substantially higher than what is experienced elsewhere, and probably reflects the fact that the threshold for contacting the police via 112 is different to what is the case in e.g. Norway, where another direct line (02800) has been established by the police for use in non-emergency situations. The lower threshold is also reflected in the statistics showing that the total calls per capita , 0.8 per year, is higher than experienced elsewhere.

Another explanation of the high proportion of 112-calls classified as real calls is that the information to the public about the use of 112 must have been very successful.

The 112-is staffed with operators who have received initial in-service basic training, and who receive on-the-job supervision and training continuously. New staff at the 112-centre undergo a training period of 3 months. The background of the operators varies. They do have some authorised health personnel (e.g. nurses, ), but an operational or professional background from any of the emergency services is not a requirement.

### 5.3.1 Redundancy

There is a replica of the 112-centre in Akureyri on the northern coast of Iceland. This centre is not permanently staffed, and does not include the SMS-services from the public.

Other than that, redundancy is secured by 3 independent lines in/out of the house in Reykjavik, and backup of all systems. The backup systems have been tested, but never used. Despite several critical systems being co-located in Reykjavik, the management is satisfied that the security is well taken care of.

## 6. SMS in Emergency Services Communication

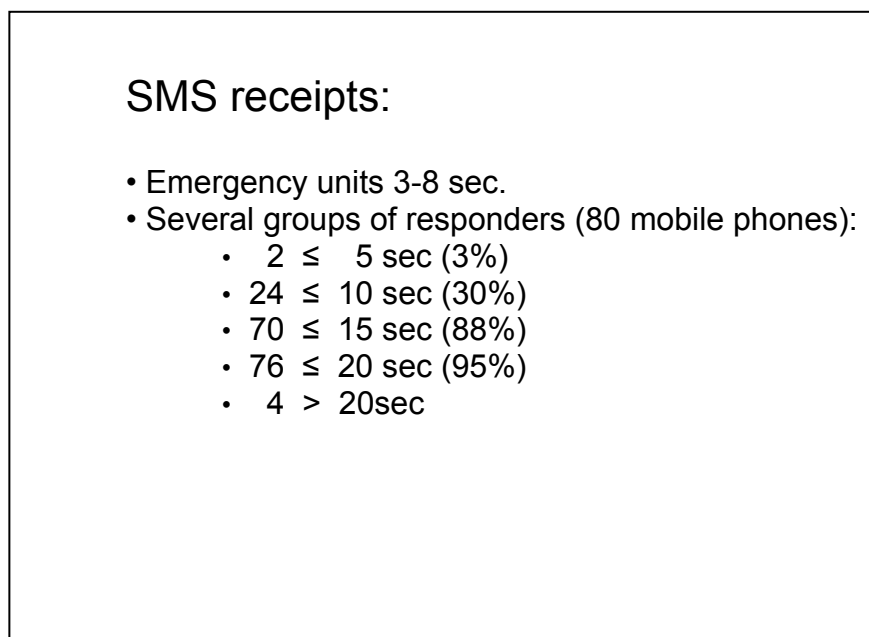
### 6.1 Between authorities

SMS in communication between authorities (112-centre and external resources like ambulances) has been in use in Iceland since 1999.

The centre uses SMS to mobilise services upon need. For this purpose, the 112-centre has a list of pre-defined groups, e.g. ambulance crews. When the ambulance needs to be mobilised, an SMS to that effect is sent to all members of the crew. Once the SMS is received by the handset, a confirmation of delivery is returned to the 112-centre. The confirmation is that the SMS has reached the handset, but not that it has been read or reacted upon.

Further communication during operations was traditionally done via public telephone systems, but since the introduction of the TETRA network this is now the main system in use. The introduction of SMS between authorities was not readily accepted by all actors, but over the years it has developed into a safe system. There was an initial need for training of both the 112-operators and the officers in the field.

Figure 2, Times till delivery confirmation



(Ms Dagný Halldórsdóttir , 3<sup>rd</sup> November 2009)

Possible delays are a concern with emergency services when considering implementing SMS in public telephone systems as a means of communication. The 112-organisation in Iceland has negotiated a priority for SMS sent from the centre to operational forces, but not for the return of the delivery confirmation. The actual times between submission of SMS and receipt of delivery confirmation is shown in figure 2. The figure shows that there is a delay when a large number of SMSs are submitted, but this is not considered an operational problem by the management of the centre. Should a delivery confirmation be delayed for a crucial resource, the centre is able to follow up via TETRA.

It is considered crucial for the effectiveness that the SMS facility is built into the ICT-based handling system for the incidents. The actual submission of SMS, and the confirmation that it has reached the handsets of the group which is being mobilised, is done within the computer system, as one of the activities in registering/ documenting and handling the case.

## ***6.2 Between the population and the 112-centre***

### **6.2.1 Establishment of the system**

Iceland used to have a centre for text-telephones (an electronic device for text communication via telephone line, commonly known as TTYs or TDDs), which was relaying calls between deaf/ hearing impaired persons and others. With the introduction of alternative technologies the facility was hardly ever utilised, and the service has been discontinued.

The system allowing for the population to contact the 112-centre via SMS was established by the 112-centre in cooperation with the association for deaf and hearing impaired persons. The work on requirement analysis etc. was initiated in May 2005, and the system was up and running in April 2006. Before the actual system was installed, there was a facility for sending SMS to a handset which was placed in the 112-centre, but this was then replaced by the present system.

The implementation of 112 as a recipient of SMS involved some work by the MNOs, but was not a major task. Iceland having only one 112-centre was significant in enabling the setup of the system, as MNOs did not have to make arrangements for routing of SMS to different centres based on the location of the caller.

To the operators in the 112-centre the introduction of the facility for the public to make calls to 112 via SMS was merely an add-on to the already implemented system for using SMS for dispatching resources. The need for further training was thus very limited.

The implementation of SMS in emergency calls was not initiated based on legal requirements, but the relevant legislation has since been changed and does now include the provision of SMS.

## 6.2.2 Description of the system

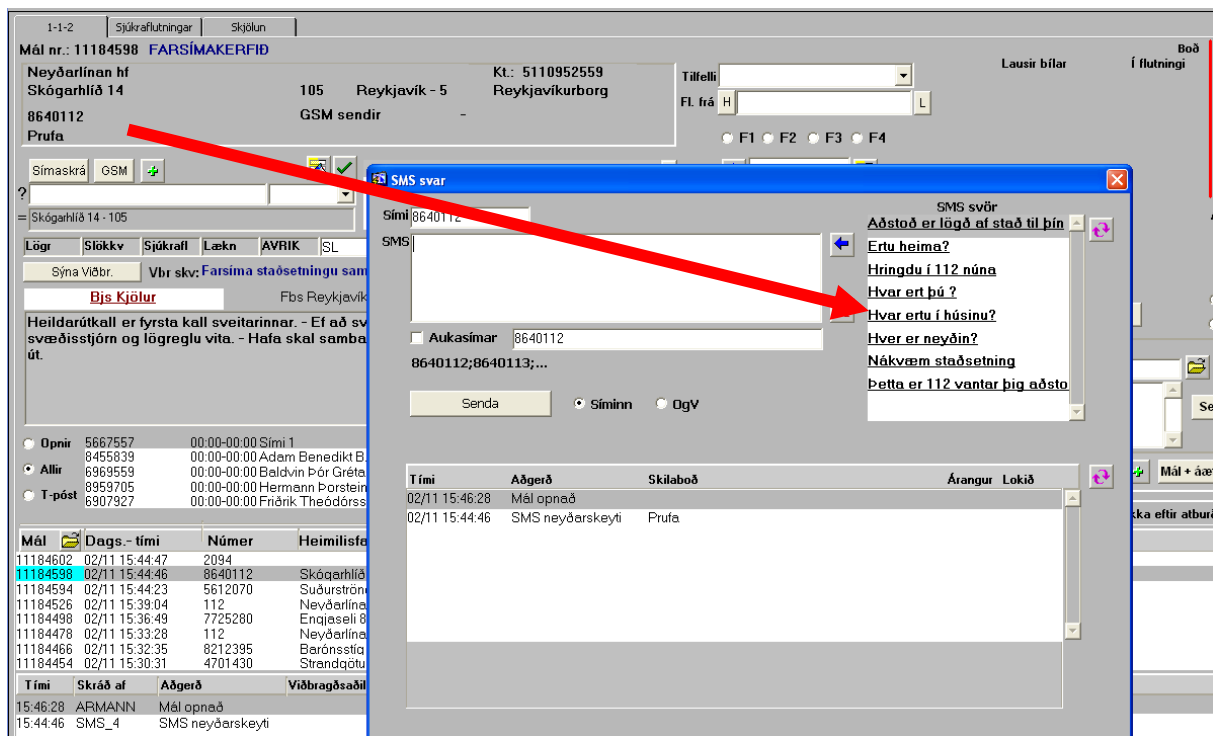
When wanting to contact the 112-centre via SMS, the caller prepares the SMS on the mobile phone and sends it to 112.

Emergency SMSs sent from the public are not automatically confirmed by the network. The caller will receive an answer from the 112-centre, which does confirm that the message has been received and is being dealt with

There is no user fee for sending SMS to 112. The SMS is then treated by the 112-ICT -system in the same way as a voice call. The operator will hear a tone which is different from that of a normal call, and the information about the call appears on the screen.

The operator then types in the response question/SMS to the caller. For this purpose, a set of pre-defined questions/SMSs are available to choose from, as shown in Figure 3

Figure 3, Pre-defined questions/SMSs



(Ms Dagný Halldórsdóttir, 3<sup>rd</sup> November 2009)

The pre-defined questions/SMSs are such as “Are you at home”, “Where are you”, etc. These will then initiate the communication with the caller.

For as long as the operator keeps the case open, new SMS from the same phone will be routed to his or her desk.

If there is a need for forwarding the information from the SMS to operational services, the procedure is to cut and paste into the SDS of the TETRA system.

### **6.2.3 Caller location**

There is no facility for caller location included in the system. The operator either relies on the questions as asked above, or asks the caller to make a voice call, preferably from a land-line where the exact location will be displayed on the screen in the 112-centre, or via the mobile phone which provides a less accurate caller location. The call made from the land-line or the mobile will not automatically be routed to the same operator, the procedure is that all operators will be notified that a silent call is expected.

### **6.2.4 Priority in the network**

SMS-calls to 112 are not defined as emergency calls, like voice calls to 112 are. This implies that the SMS does not have a priority in the network. This might lead to problems if the network is overloaded at the time of the incident. A system for priority in the network for incoming SMS was considered too expensive to implement at the time. The management of the 112-centre have not had any reports on cases where failure of transmission has been a problem.

### **6.2.5 SIM-less calls**

As the SMS to 112 is not technically considered an emergency call, it is not possible to send SMS from a phone without a SIM-card, or from a phone with an invalid SIM.

### **6.2.6 Pre-paid cards**

Pre-paid cards are common in Iceland. For these there is no registration of ownership etc, which would create a challenge if they are used for emergency calls or emergency SMS. Experience is, however, that phones with pre-paid cards are hardly ever used for emergency calls, and to the knowledge of the management of the 112-organisation have never been used for emergency SMS.

### **6.2.7 National roaming**

Two out of the three national SMOs have a roaming agreement. The third one does not, and if subscribers are not within coverage area for this provider, the service will not be available.

### **6.2.8 International roaming**

SMS is always handled by the home network provider. SMS to 112 from a non-Icelandic SIM-card will thus not be routed to the 112-centre in Reykjavik. If an SMS is sent from a phone with an Icelandic SMS from outside Iceland, the call should be routed to the 112-centre in Reykjavik. The management has not had a report that so has ever happened. Such a case has not been tested either.

## 6.2.9 Subscription

Some countries, e.g. Sweden, have implemented a system for SMS to emergency centres based on subscription. The user has to register and sign a contract that he or she has been informed about the system, its shortcomings etc. The purpose of subscription is to ensure that the user is well informed and to avoid abuse of the system. In Iceland, the decision has been made that the opportunity to submit SMS to 112 is open to all, and no subscription is required.

## 6.2.10 The actual use of emergency SMS

As seen from figure 1, the total number of emergency calls received in 2008 was 257 597. Of these, 0.5 % was made via SMS. Whereas the proportion of relevant calls to 112 was 74 % of the total number of calls received, this figure is down to 10 % for emergency SMS. Some SMSs are sent by mistake, other are sent to a wrong number etc.

As the total number of SMSs received is limited, the low fraction of relevant calls is not considered a major problem by the 112-organisation.

The distribution of incoming emergency calls between services is shown in figure 1. The number of received SMS is not sufficiently high to provide valuable statistics, but it seems significant that no calls via SMS are made to the health services.

The report on the Swedish trials on use of SMS concludes that the handling time for incidents where SMS is used as the means of communications averages 14 minutes. The reason for this remains unclear. The 112-organisation has not looked into the handling time for SMS-based handling of incidents. As the overall majority of cases involve the police, the 112-centre is only establishing the location and that the call is a police case, before it is handed over to the police control room for dispatching etc. The process up till handing over is claimed to be far shorter than 14 minutes. Communication over SMS being integrated in the general incident handling system contributes very significantly to speeding up the process.

The SMS-service was established as collaboration between the 112-centre and the organisation for the deaf and hearing impaired. There has been no active marketing of the opportunity to submit emergency 112 by SMS from the 112-organisation. The organisation of the deaf and hearing impaired has informed its membership, and information about the system is slowly becoming commonly known in Iceland. The experience is that those persons who have special needs in communication and who are used to communicate via SMS, are more efficient in providing the necessary information than others.

There are no reports on “Good Samaritan Calls” (calls from individuals who see an accident but are not involved themselves) via SMS.

In addition to the usage by those with communication disorders, there are some cases on record where other individuals have benefited from using SMS. In a case of abduction, the individual was able to raise the alarm without the abductors realising, thus enabling the police to intervene successfully. One worry expressed by the 112-centre is that the sound made by the phone by the incoming SMS may raise the awareness that a secret communication is taking place.

Training programmes for users have not been established, but the advice is that they should prepare some standard messages, e.g. if they suffer from any particular diseases.

Customer satisfaction studies are carried out regularly by the 112-organisation. Due to the low number of SMS-calls, these have so far not been included in the study. A meeting with the organisation for deaf and hard of hearing persons was held some time back, and the feedback in the meeting was that the mere existence of the system provided the potential users with significant feeling of security.

## **7. Emerging technologies**

Considerations have been made whether to establish services for chat and/ or mail communication. So far these have been put on hold, as there is no means of establishing locations and to verify that the call is not a hoax.

Cell broadcast as a means of communicating with the public has been looked at, but is so far too expensive for Iceland to consider implementation. The 112-centre does have the facility to submit SMS or voice mail to all subscribers within a geographic area defined by the operator upon need. This is based on owner information from the telephone directory (geographical addresses), which implies that owners of mobile phones will receive the message even if he or she is not in the area covered by the message. This is considered a minor disadvantage.

## **8. Issues to be considered when establishing a system in Norway**

- Subscription will probably reduce the frequency of non-relevant SMS
- Collaboration with the organisations for the persons with special needs in communication is important for the choice of function and design
- There will be technical issues if we want to receive SMS via emergency numbers at multiple locations using the same emergency number
- Integration of the SMS in the case handling system will increase efficiency and has to be planned for in the new control-rooms.