
Mobile Technologies

Mobile devices have been a part of medical technology for a very long period; and as technology has changed, so have mobile devices. At present, many products in the pipeline of technological development are in the area of molecular medicine, and this may lead to individualized medicine. In the very near future targeting of more than 10 thousand molecules by diagnostic and therapeutic tools can be expected, instead of the 500 molecules currently targeted. This will open totally new horizons for medicine and health care. At the same time the size and mass of mobile devices is rapidly decreasing while their processing capabilities are significantly increasing.

Conditions for free communication have improved across Europe, thanks to the disappearance of political boundaries, the development of virtual networks, the implementation of common data exchange standards, and the ongoing processes of integrating health care enterprises. In addition, the smaller physical size of medical devices and their improved manageability in nearly any part of the European region means that potential for mobility has greatly increased.

It is legitimate to ask if this potential mobility is of any practical value to health care practice, and to the development of medical sciences. The answer is a definite Yes, for the following reasons:

1. Scarcity Of Resources

Implementation of new technologies is often limited by the lack of appropriate buildings, well trained specialists, limited finances and/or other resources.

In mobile solutions the need for appropriate buildings is less pronounced and, depending on the platform used, special spaces may be not needed at all. For instance, when using a truck-platform most often no building is needed, because the unit is able to operate autonomously even on a car parking area. This has been proven at Helsinki University Hospital, where a mobile PET-unit has come to operate on a car parking area on a regular basis since November 2002.

2. Lacking Infrastructure

Using modern technology often requires a complicated infrastructure for maintenance and other purposes. So, creating such infrastructure may delay technology transfer, and in some smaller places such technology transfer may be even impossible.

With mobile solutions, maintenance and some other activities belonging to infrastructure (logistics of specific supplies etc), remain the responsibility of the keeper of the mobile technology. This makes these solutions more feasible for the end-user due to the centralized nature of the infrastructural tasks. This has been proven by mobile MRI-services available in several regions in Europe, especially in the 1980s and 1990s when the clinical implementation of these technologies started.

3. Weak Networking And Low Grade Integration

Weak networking and low grade integration remains a problem when the existing links and communication channels exist on a formal basis but without full functionality.

Mobile technologies make available networks functioning and improve so integration. This has been proven by the recent experience of mobile PET-scanning in the area of Sweden, Finland and Estonia, which brings together medical people in these countries and in the whole region concerned.

4. Potential For Appearance Of Local Problems

In the modern world some acute health problems may appear in very limited geographic areas with a relatively large number of victims. This may be due to an ecological catastrophe, technological accident, terror act or due to an epidemic. Fixed-site technologies may be not close enough to the location of the problem. Mobile technologies have a clear advantage under these circumstances.

While the need for mobile devices and technologies is clear, their interaction with fixed-site technologies should be handled as a specific issue. Despite the fact that mobile technologies are in the majority of cases very autonomous, they should be prepared to link with the site-bound services (and vice versa) due to the complexity of medical work. This item is of special relevance for hospital planning. It may not be sufficient to foresee a parking area or a convenient access to the hospital. It might be necessary to build specific junctions between the hospital and the mobile unit with all required communications. Furthermore, one might require specific waiting areas, logistics points, hot-labs, etc. close to the docking site of the mobile unit.

In terms of processes and logistics, mobile devices may also create specific needs. The most obvious among these processes are:

- Preparedness of medical staff for work with mobile technologies, i.e. devices that may not be always present;
- Referral of patients;
- Patient preparation;
- Patient behaviour;
- Interaction with hospital infrastructures;
- Booking and receiving the mobile technologies;
- Ordering and receiving specific consumables for the mobile technology;
- Documenting and archiving the working process of the mobile technology;
- Clinical implementation of the outcomes of the working processes of the mobile technologies.

The above demonstrates the need for specific management of mobile units, most probably with a dedicated IT-solution.

With the implementation of mobile solutions team building may be different from fixed technologies: there may be no need for device operators at the local hospital, while such specialists are needed with the mobile device. In most cases the keeper of the mobile unit is taking care of maintenance, so releasing the local institution and the local staff from this duty.

In summary, mobile solutions make wide implementation of up-to-date innovative technologies available to several partners in several locations on a cost-sharing basis before such technologies become out-dated. This will speed up the technology transfer and raise the social, economic and scientific competitiveness of the region. New mobile technology platforms may be delivered on a network-basis allowing a move from a Singularity Model of service provision to Integrated Service Model.

Examples Of Already Existing Up-To-Date Mobile Devices

1. Examples of mobile out-patient clinic, mammography unit, operating room, recovery facilities, CT-, MRI- and PET-scanners can be found at the site www.lamboo.nl
2. An example for mobile isotope and radiopharmaceuticals production can be found at site www.accsys.com
3. An example of clinical implementation of a mobile PET scanner is provided in World Journal of Nuclear Medicine, 2004 (S. Nazarenko et al.). This paper demonstrates how mobile technology has permitted revalidation of treatment in 57% of melanoma patients, to introduce a positive change in therapy for 27% and to initialize the wait-and-watch tactic for 16%. Even more, it has caused a change in medical thinking, and provided active management in some patients with previously bad prognosis.
4. At the planning of the new building of the North Estonia Regional Hospital the docking site for mobile (PET) unit was taken into consideration as shown from the following drawing in Figure 1 below.

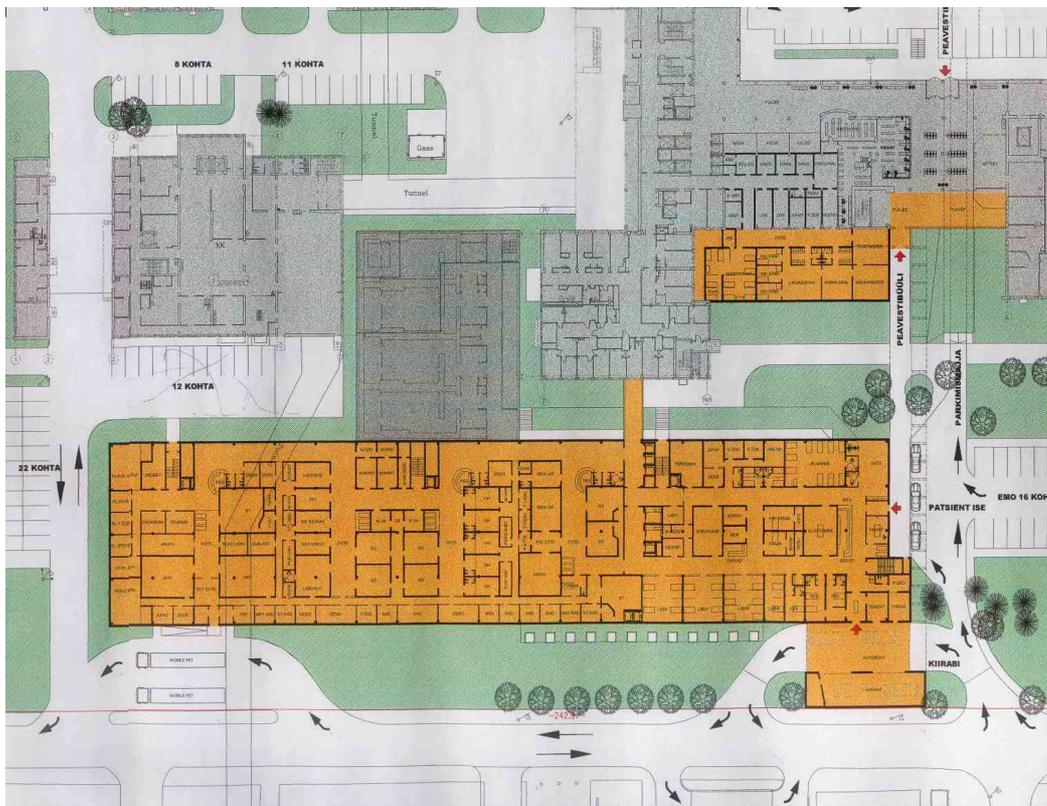


Figure 1: Docking site for mobile (PET) unit, North Estonia Regional Hospital

5. Example for the partners and their tasks for management of the mobile PET unit at North Estonia Regional Hospital, Figure 2 (from a presentation of A.Paats, 2004).

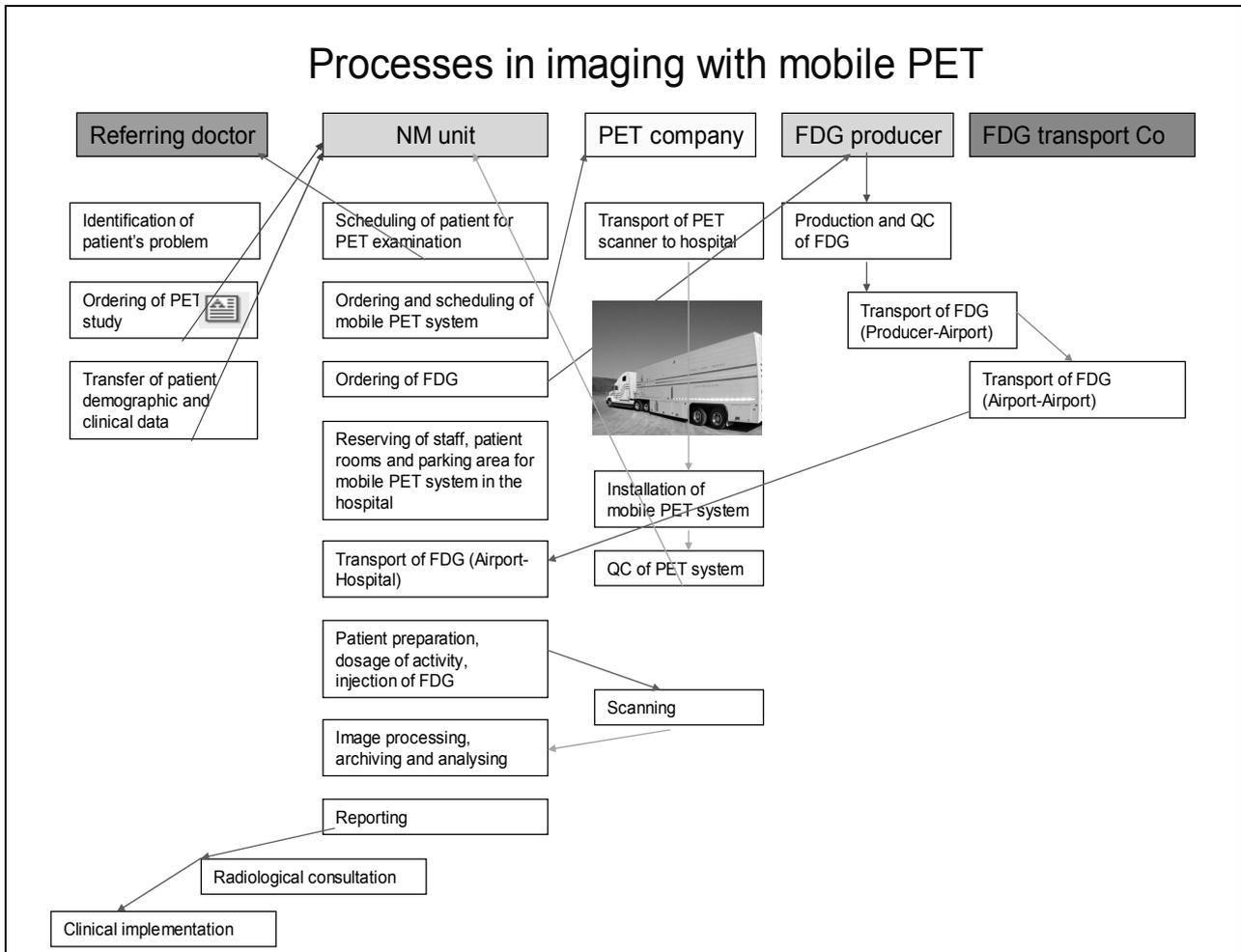


Figure 2: Processes in imaging with mobile PET

6. Route of the mobile PET unit starting Amersfoort, NL and serving the hospitals in Tallinn, Helsinki, Tampere and Stockholm (Figure 3).



Figure 3: Route of the mobile PET unit