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SmartHEALTH

Smart Integrated Biodiagnostic Systems for Healthcare

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D11.14 Delivery of SmartHEALTH Open Day 4

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1. Brief summary of SmartHEALTH Open Day event

This short report describes the delivery of SmartHEALTH Open Day 4 which was held on November 20th 2009 in Dusseldorf, Germany.

The Open Day event, which was held during the MEDICA/ComPaMed International medical and biotechnology Trade Fair, consisted of a SmartHEALTH booth, exhibiting the components and technologies developed, as well as a forum session including presentations and a panel discussion Chaired by Mr Patric Salomon (4M2C). This event provided the team with an ideal audience. During the presentations nearly all available places were occupied, the attendance during the presentations varied between 35 and 40 persons. The presentations were organized in such a way that they gave an overview of the activities of the consortium as a whole.

The session was introduced by Professor Calum McNeil (Newcastle University), the SmartHEALTH coordinator, giving a global overview of the project, its partners and the aims/objectives of the activity. The project is designed to create a complete system, not just for detection, but linking it also effectively into the existing health communication and information systems. This is especially needed to be able to create solutions along the whole chain of events in a disease cycle: from early screening, via diagnosis to monitoring. Therefore, it should be usable not just in the clinical lab, but also at PoC places like a GP's office or even in home situations. It was clearly stated that during the execution of the sub-projects, several component technologies demonstrated their suitability for early commercialization.

Professor Ciara O'Sullivan (Universitat Rovira i Virgili) kicked off the technical presentations by giving an overview of the sensor technology developed for electrochemical detection. Switching to (low-cost) screen-printing, provided a technology platform that can be used for creating the needed sub-dollar cost of the sensors. The sensor array features four rows of electrodes, enabling the use of reference and counter electrodes. The developed sensor surfaces have a chemical composition that overcomes steric hindrance and stability problems shown by other systems based on self-assembly.

Dr Klaus Drese (IMM) demonstrated the design and working of the developed device for the polymerase chain reaction. It basically replaces the traditional cumbersome and labour-intensive repeated steps of sample preparation and detection with an integrated and automated system based on lab-on-a-chip technology. The chip contains four liquid storage tanks and several functional blocks to do the sample preparation, checking the correct working with a reference sample, actual metering etc. After the explanation of the working of each step, an impressive movie was shown, demonstrating the actual performance of the microchip.

Dr Livio Cognolato (Olivetti i-Jet) discussed the challenges encountered in the integration of the overall system. Electrical, optical and mechanical interfaces were needed to link the micro-device to the system, bridging the micro/macro gap. Especially for seemingly simple things such as turning a valve on the chip by the instrument, very delicate instrumentation had to be developed. The optical readout mechanism and its dependence on mechanical tolerances was also discussed. Regarding the integrated heater/mixer, it was commented that the integration provided substantial benefits in terms of more efficient heating and cooling. During the development work, Olivetti i-Jet was able to draw on their experience with the ink-jet print-head development and production. The project also provided them with an excellent introduction to the world of life sciences.

Linda Strömbom (TATAA Biocenter) explained that using standard assays in a microfluidic device is not as straightforward as one tends to think. If one tries to optimize on speed, temperature is an important parameter to use. However, temperature also has an impact on the selectivity, leading to the need for optimizing the reagents. Assays have to be adapted or even to be developed, in order to meet the demands for high-throughput, time-reduction, decreasing sample volumes and the application in a portable device. Whereas in many microfluidic applications, the high surface/volume ratio is a benefit, biologists encounter its disadvantages, mostly associated with the ready adherence of biological substances to the polymeric surfaces. TATAA also had to overcome problems with contaminants as these are concentrated just as much as the targets are. Another problem is even more fundamental: the uncertainties associated with the low number of target molecules in small sample volumes. It practically comes down to counting individual molecules; one can easily understand what this will mean in relating to the need to achieve 95% accuracy levels!

Dr Claudia Gärtner (microfluidic ChipShop) explained that the role of the company was in ensuring transfer to high volume production, with the target of achieving sub-dollar cost levels. Dr Gärtner explained that, while this might not be always achievable, one can come very close with the ultimate chip concept developed. For each component and function, the pros and cons of integration had to be evaluated; not only on the basis of cost but also by taking reliability into account. For example, in the case of pumping, this resulted in the decision to place the pump within the system and not on the chip.

After the presentations, the presenters, supplemented by Dr Philip Bowe (Dublin City University), took part in a panel discussion to address questions from the audience.

Overall, the event was seen as a great success for SmartHEALTH, with significant interest in the project being expressed both during the panel discussion and in subsequent contact from interested parties.

2. Pictures from the SmartHEALTH Open Day at ComPaMed





3. Pictures from the SmartHEALTH Booth at ComPaMed

