

# Development of lab2lab: a virtual instrument for every laboratory

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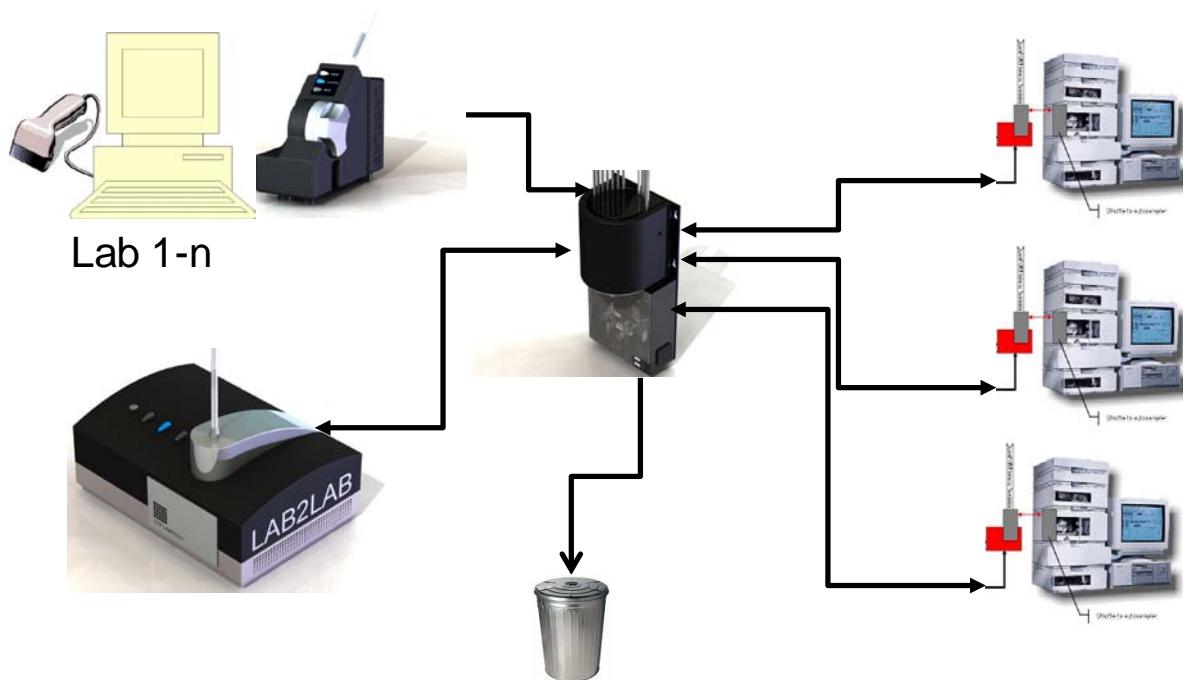
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## introduction

It is essential for medicinal chemists to have easy access to analytical instrumentation for reaction monitoring and product analysis. Ideally instruments need to be in close proximity to chemists' work areas, however, high capital cost and maintenance overheads associated with such instrumentation makes it unfeasible to support instruments such as LC-MS in every medicinal chemistry lab.

In 2009, the Horsham Sector of Novartis Global Discovery Chemistry initiated a project with TTP Labtech to develop a system to automate sample analysis, connecting remote medicinal chemistry labs to instruments in a central analytical chemistry laboratory.



## 1. the lab2lab system

lab2lab comprises a small bench top microtube Sender, connected by pneumatic tubes via a Router to a Buffer. The router controls the flow of sample vials to a temporary storage area (buffer) and then onto the receiver unit of analytical instruments or to the waste and retrieval bins. The flexible delivery tubing connecting the system together is used to transport microtubes by low pressure compressed air.

At the bench, the scientist prepares a sample for analysis by placing it in a 2D bar coded 500 µL tube and seals it with a septum cap. The barcode is scanned and the scientist can log the details of the sample and the required method of analysis into the software. The sample is then transported pneumatically to the router where it is distributed to the buffer or the appropriate analytical instrument.

Once the sample has been analysed, the analytical results are collected and returned across the network to be captured into the scientists' electronic lab notebook. The sample may then be sent to waste or retained in the system for further analysis.

## 2. lab2lab: enhancing the workflow of chemistry

A comparison of traditional methods of analysis against analysis using lab2lab clearly demonstrates significant savings in time and manual effort by the medicinal chemist, increasing workflow and efficiency.

### Traditional analysis

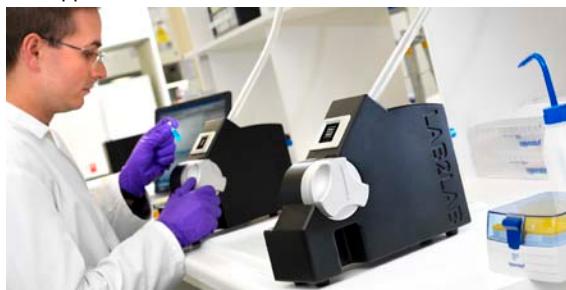
If submission of samples is to remote instruments, the chemist tends to collect together a number of samples and submit them as a batch.

Samples are manually transported and submitted to analytical instrument which is time consuming and tedious.

Personal choice of preferred instrument often results in overload and sample backlog even though other similar instruments are available.

### The advantages of lab2lab

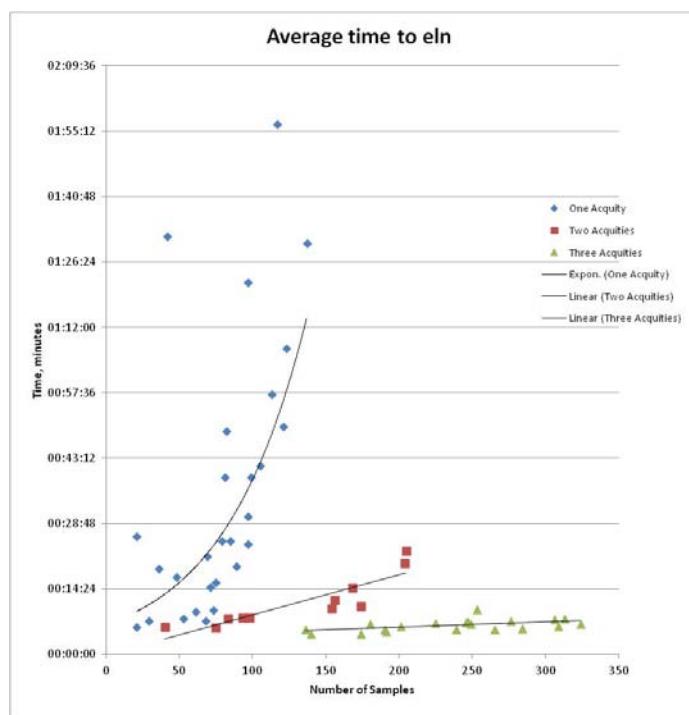
Samples can be sent during the course of a reaction, speeding up analysis and allowing reactions to be modified or stopped.



The buffer gives the scientist the opportunity to store subsequent samples in lab2lab, and analyse earlier results before deciding on further actions. Samples may be sent to waste or to further analytical methods. The software allows the scientist to edit the methods of analysis after submission of the vial.

More samples may be analysed by each instrument, and the queue of samples is distributed equally to instruments.

## 3. software updates



The original version of software waited until the analysis of one sample was completed before sending the next sample. In the software update, it is possible to send subsequent samples before analysis is complete. Using this software it is possible to remove the first sample from an Acquity LC-MS directly after the injection, return it to the buffer and then send the next sample. The second sample can be analysed as soon as the first sample is complete which gives a significant time saving of 30-50% in the average time to ELN. This also ensures that the instruments are working to the highest capacity. Increasing the number of Acquity's on the system has reduced the time to ELN for data even for increasing sample numbers.

## 4. sample sending with a multi-sender

More recently TTP Labtech have introduced the lab2lab multi-sender, capable of sending up to 10 samples sequentially to the buffer for processing.

This innovative technology will allow scientists to send multiple samples from a series of parallel reactions or for multiple scientists to submit samples from the same bench top sender, thereby speeding up analysis and reaction studies further.



## conclusion

lab2lab is saving the chemists' time and increasing the productivity of the Department. It is possible to link analyses within the software so that the initial result determines the sequence of techniques used.

The instruments are working at higher efficiency as the software revision enables them to more fully utilise their capacity.

## collaboration

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