

Lab of the future - Are tomorrow's dreams already today's reality?

Paul Lomax, Product Manager, SPT Labtech

Introduction

"Lab of the future" is a term that has emerged in recent years to promote a vision of the future and challenge the community from scientists to vendors to accelerate change to reach faster outcomes.

Disruptive technology developments will play a key role but equally important will be a focus to drive efficiency to new levels with fully traceable processes that can deliver robust, qualified data faster than before.

This poster outlines how SPT Labtech has repurposed a technology that is over 200 years old to transform the efficiency of critical workflows and accelerate research.

1. mature technology



Pneumatic delivery systems were once commonplace and are still used today in some banks and hospitals

SPT Labtech developed a micro pneumatic transport system, initially to transport 2D barcoded sample tubes in the comPOUND storage system



SPT Labtech's comPOUND stores up to 200,000 2D barcoded tubes utilising pneumatic transport.

2. evolution of capability

Initially used as reliable way to transport tubes within a -20 freezer, the remote delivery capabilities presented new possibilities



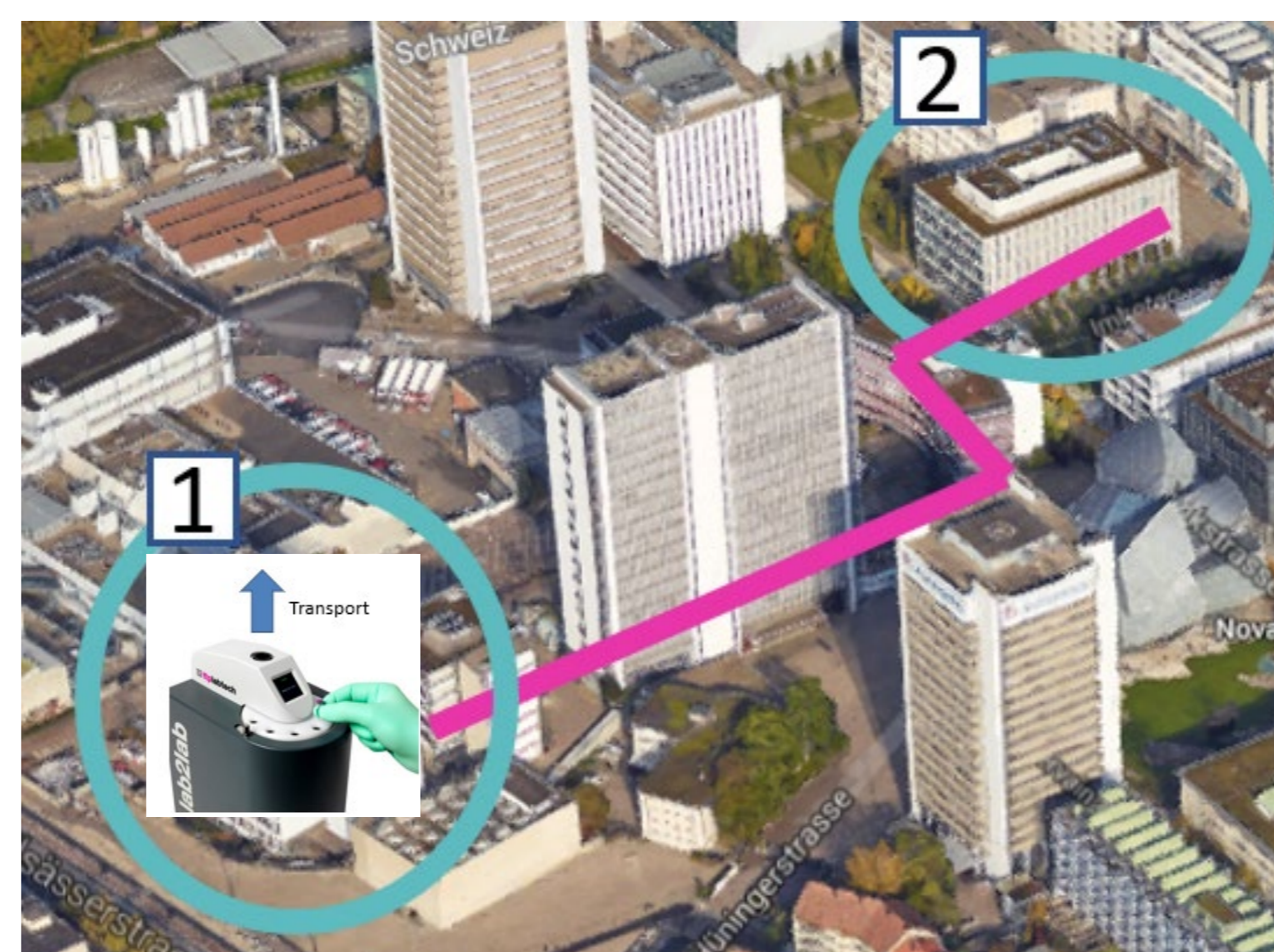
Pneumatics connect multiple comPOUND units to form a single access point store in a remote location saving lab space



Samples are sent through to a remote input/output device, racked and placed in a hotel ready for use or return to storage

3. end to end automation

In collaboration with Novartis, SPT Labtech developed this pneumatic transport system further to provide end to end automation for the analysis of synthesized compounds. Samples are sent directly from Chemistry Depts., to open access labs for fully automated analysis using HPLC, LCMS and NMR. Over time additional buildings across their site were brought on line, with samples travelling up to 600m from source to analyser.



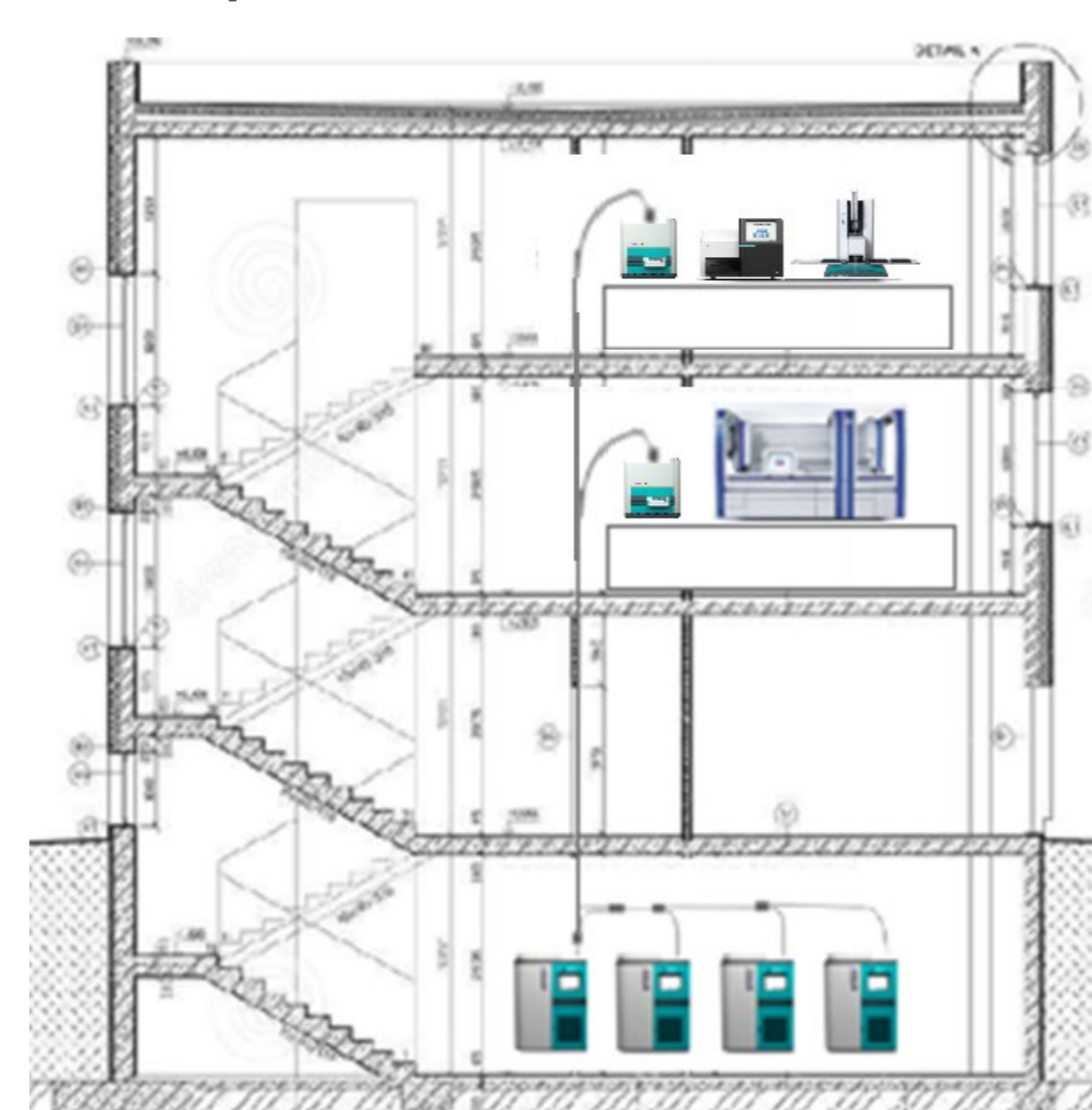
1. Building has 6 chemistry labs equipped with remote sending points connected to an analytical suite in the basement
2. Building has additional labs with remote access points connected to the same analytical suite in building 1 600m away.



Online analysers include LCMS and NMR

4. integrated biobanking

More recently this technology has been used to interconnect arctic -80 modular stores to each other, to provide remote access points or to integrate directly with upstream and downstream devices. Seamless workflows from sample preparation to storage (that minimise the critical time between processing and freezing) and from storage to analysis are now possible.



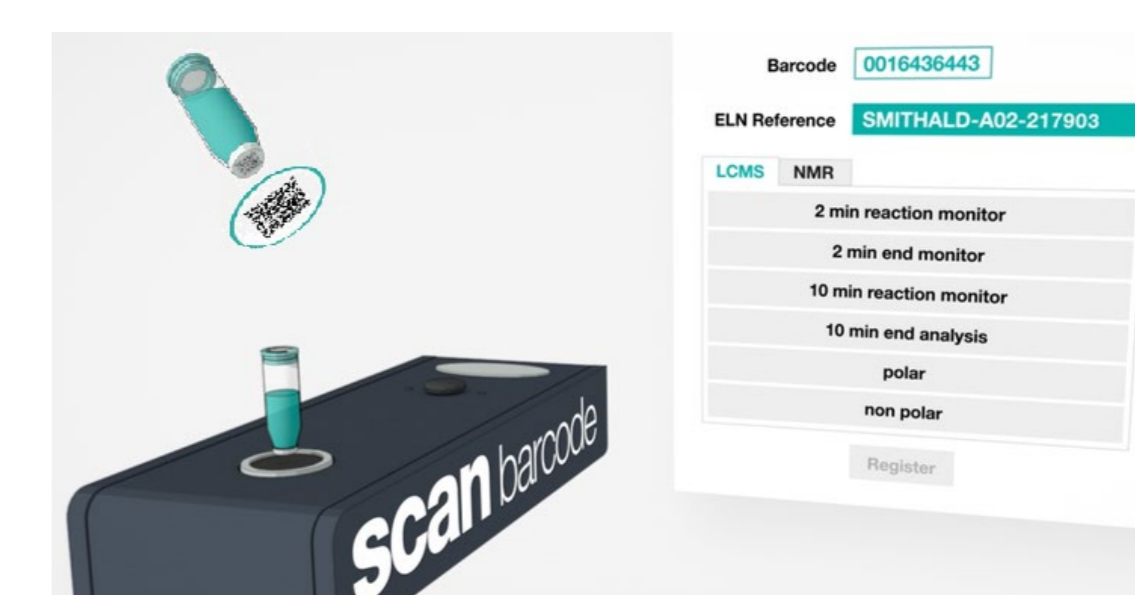
Samples processed on the 2nd floor are sent direct to the biobank. Samples requested by the NGS lab (top floor) are sent direct from the biobank.

5. it's all about the data!

So far we've considered the process efficiency gains of automated sample transport, but the biggest benefit is to data quality. Submitting new therapies for approval to bodies such as the FDA is challenging and time consuming. Access to quality, validated data is critical.

Building a submission can be hampered by delays due to limited evidence. When repeat experiments or sample quality analysis is required, there's a cost to the organisation but potentially to patients too.

To circumvent this, organisations use Electronic Laboratory Notebooks (ELN), Laboratory Information Management Systems (LIMS) and try to restrict users to locked validated methods, but compliance is a common problem. Integration with these tools is key to SPT Labtech's automation solutions, thereby plugging gaps that can call the integrity of data into question or delay the progress of new products to market.



Registration of each unique 2D barcoded sample tube requires an ELN reference. Only validated locked analysis methods are available

Samples are securely and rapidly transported to online analysers. Barcodes are verified before analysis



Sample analysis occurs in a secure, managed analytical suite. All analysers are calibrated regularly to ensure data are consistent, traceable and validated.

conclusions

Without a crystal ball it is impossible to know what the lab of the future will look like. Disruptive technologies will play their part, resulting in many changes that few predict.

For all the riches that new solutions may bring, there's much more that can be done now using proven technologies to accelerate the speed and quality of drug discovery.

Getting it right first time with high integrity, validated and traceable data, avoids needless delays, enables rapid submission to regulators and earlier benefits to patients.