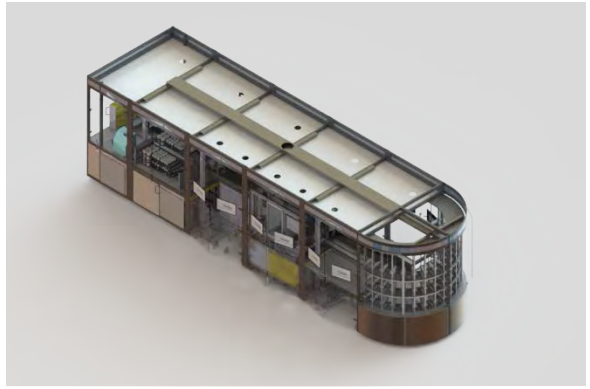
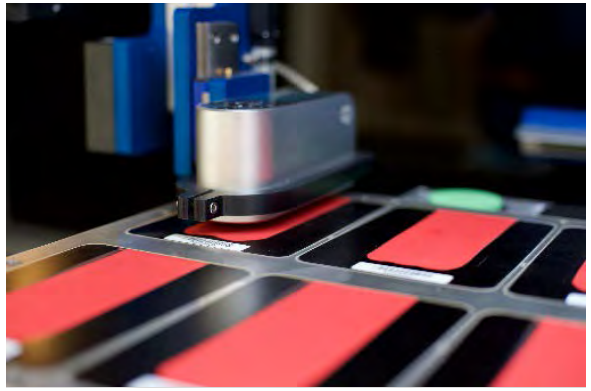
How to do HTE right

Ian Riley

Summary





LABMAN

How to do HTE right

- Introduction to Labman
- What does good HTE look like?
- Why do HTE projects fail?
- Traditional focus of HTE projects
- Getting the specification right
- Future proofing
- Conclusions

LABMAN

Company Overview

- Specialists in Custom Lab Automation
- 80 employees in North Yorkshire, UK.
- 35 years experience
- Family-owned business
- Across multiple industry sectors
- Customers worldwide

High throughput formulation screening how to do HTE right

Labman introduction

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Overview

Custom laboratory automation

Instrument development

Laboratory products

Software projects and services

Innovation

Lab Automation Landscape

Pros

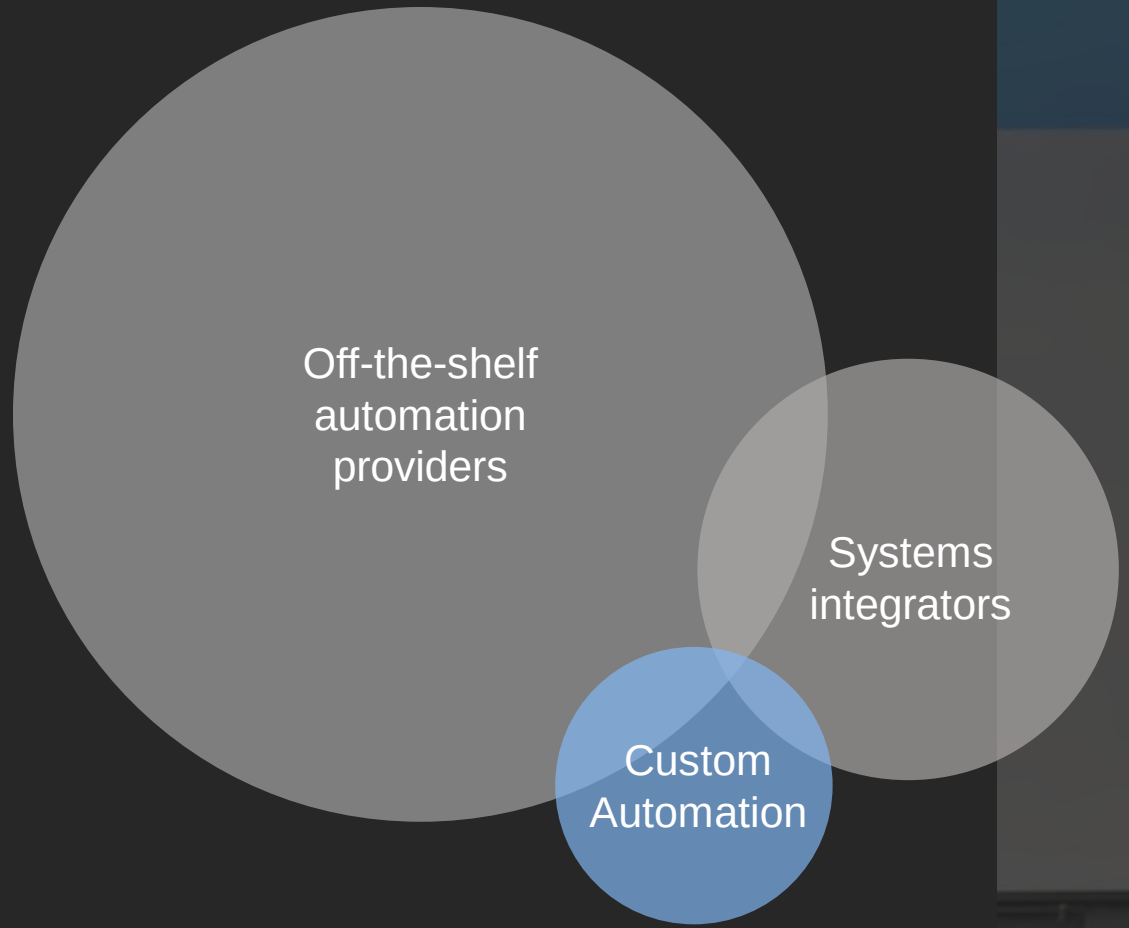
- Full flexibility
- Any consumables
- Your process
- Turn-key solution
- Innovative

Cons

- Project time
- Customer investment
- No ‘try-before-you-buy’

Misconceptions

- Expensive
- Unreliable



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Multi-disciplinary Engineering. In House.

Electrical

- In house electrical and electronic engineers
- Electrical systems design
- Compliance with all relevant EU directives
- Safety Risk assessment as per EN ISO 12100
- Flexible component selection

Mechanical

- In house mechanical design engineers
- Fully equipped CNC tool room
- Stainless steel fabrication
- FDM 3D printer
- Inspection and measurement area

Software

- In house software development team
- Development in any .NET technologies
- Industry standard coding conventions
- Secure versioning and storage system

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Comprehensive Support.

Project Management

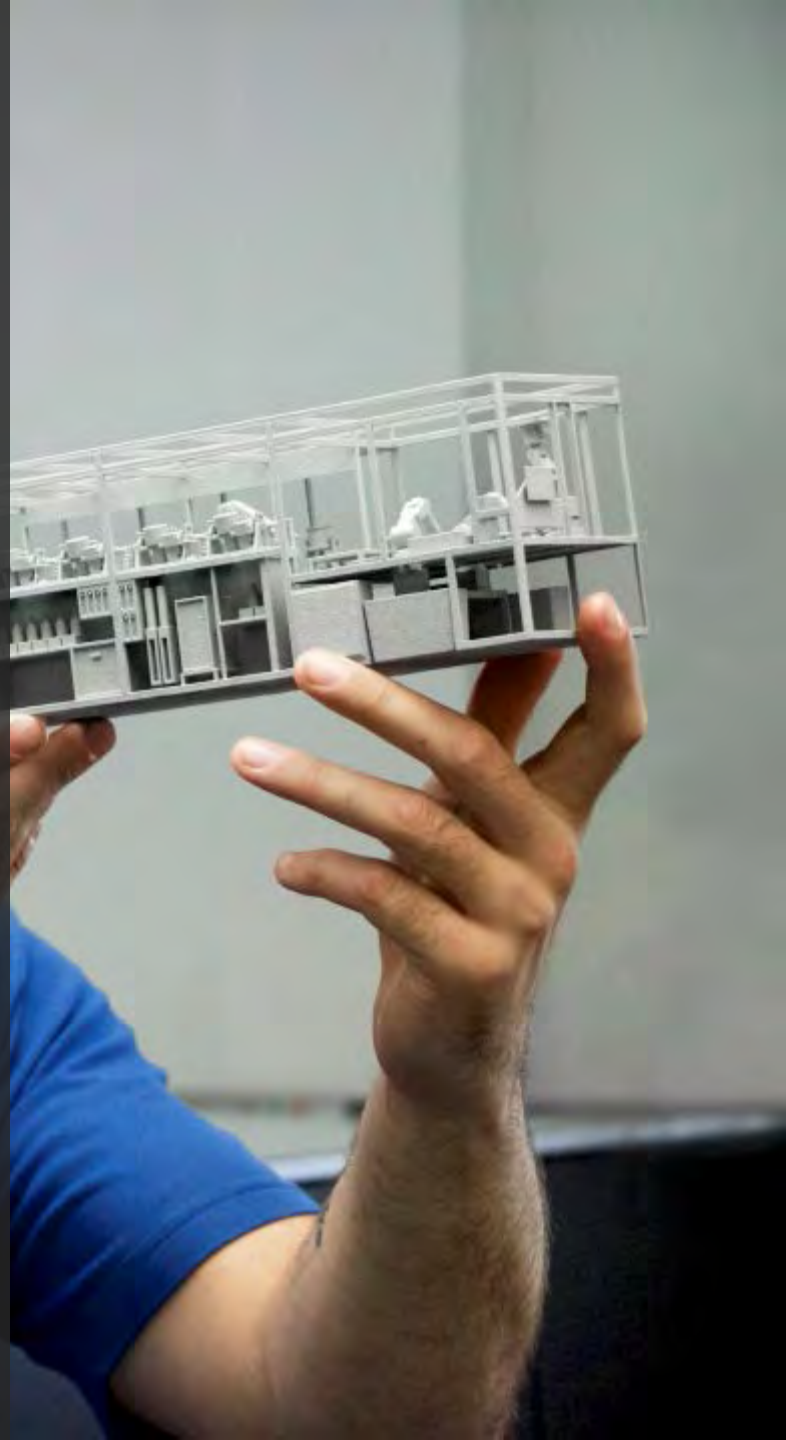
- Technical, automation project managers
- Project manager average of 12 years of automation experience
- Projects managed following GAMP guidelines
- Comprehensive project management and QA system.
- Frequent project reports and updates

Support

- Dedicated European support engineer
- Contracted US support
- Remote phone and software support
- Minimum response time contracts available
- Open technical drawings and source code

Laboratory Testing

- In house laboratory
- Safe materials testing and chemical storage
- Used primarily for feasibility testing



Extensive Experience

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Preparation Systems

- Sample purification
- Weighing
- HPLC Preparation
- Sample dilution
- Reformatting
- Biofuels research
- Plant Grinding

Formulation & Design

- Powder feeding
- Liquid/Viscous liquids dispensing
- Homogenisation, centrifuging, mixing
- Film application
- Process miniturisation
- pH adjustment
- Viscosity adjustment
- Data management and sample tracking

Full Laboratory Process Automation

- Vitens Automated Water Laboratory (Leeuwarden, Netherlands)

Analytical Testing & QC

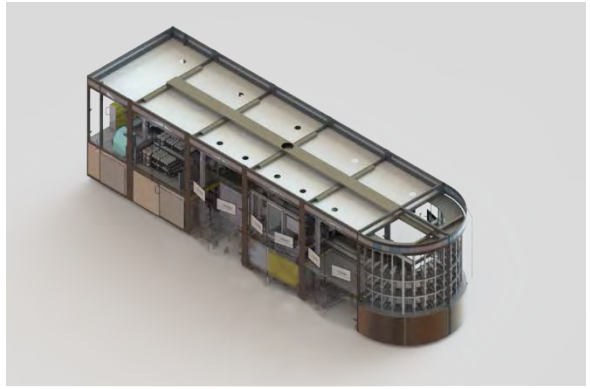
Instrument Integration

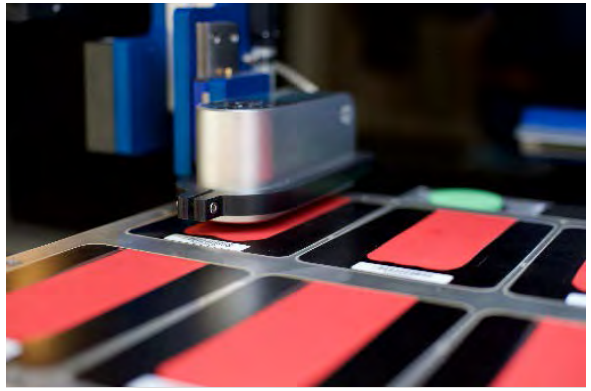
- Force/Strain gauge integration, compression, tension, roughness testing
- Rheometry, spectrophotometry (wet and dry), profilometry, RI, conductivity, gloss, film thickness
- Moisture content, moisture uptake
- Solar cell characterisation
- Water analysis: BOD, COD, pH, colour, UV, turbidity, UREA, ICP, legionella
- Sample stability studies

Instrument Development

- Abrasion testing
- Filtration
- Precipitate detection
- Controlled shear
- Image analysis

Summary





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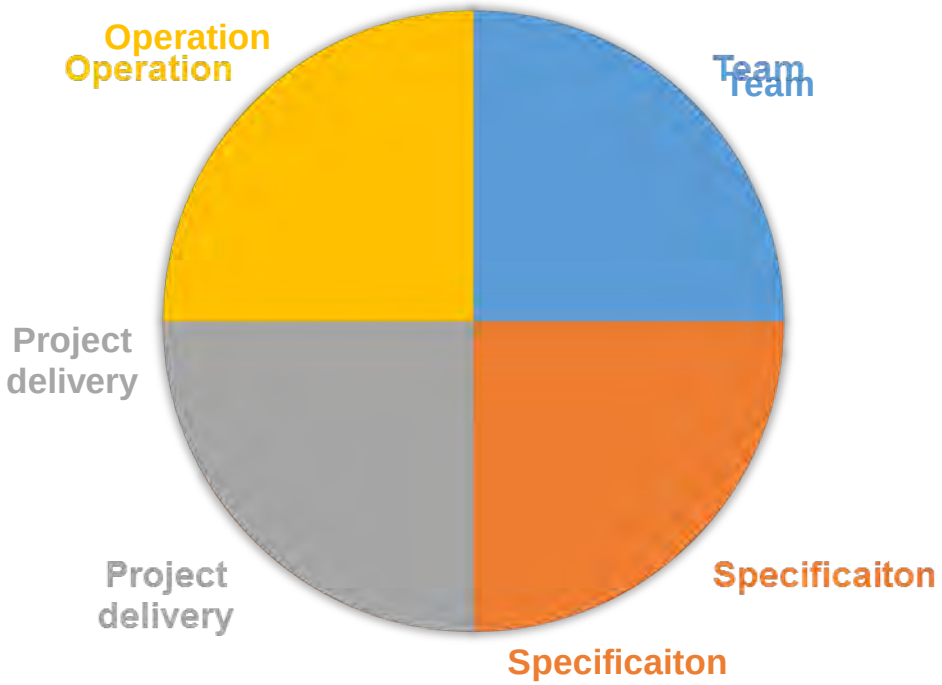
What does good HTE look like?

1. Meets or exceeds the business case
2. Is sponsored by engaged stakeholders
3. Works in conjunction with an engaged team
4. Remains applicable to the business goals



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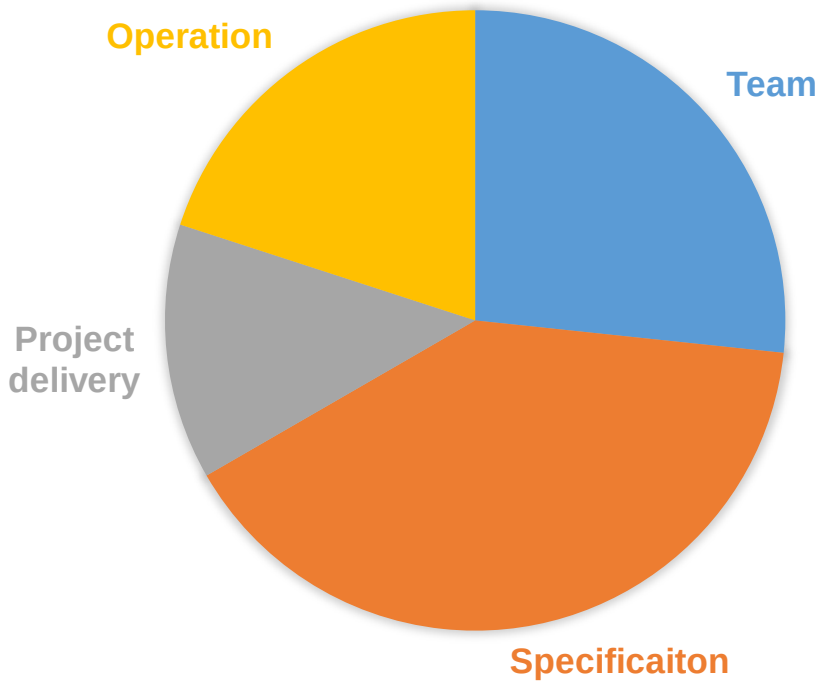
Why do HTE projects fail?

Most common reasons for failure

1. Specification is not correct (machine does not work or does not properly meet business case)
2. The needs of the business change and the HTE system cannot adapt
3. The team is not maintained
4. Data or software system become obsolete

These failure modes confirm that specification and the team are the most important aspects when avoiding failure.



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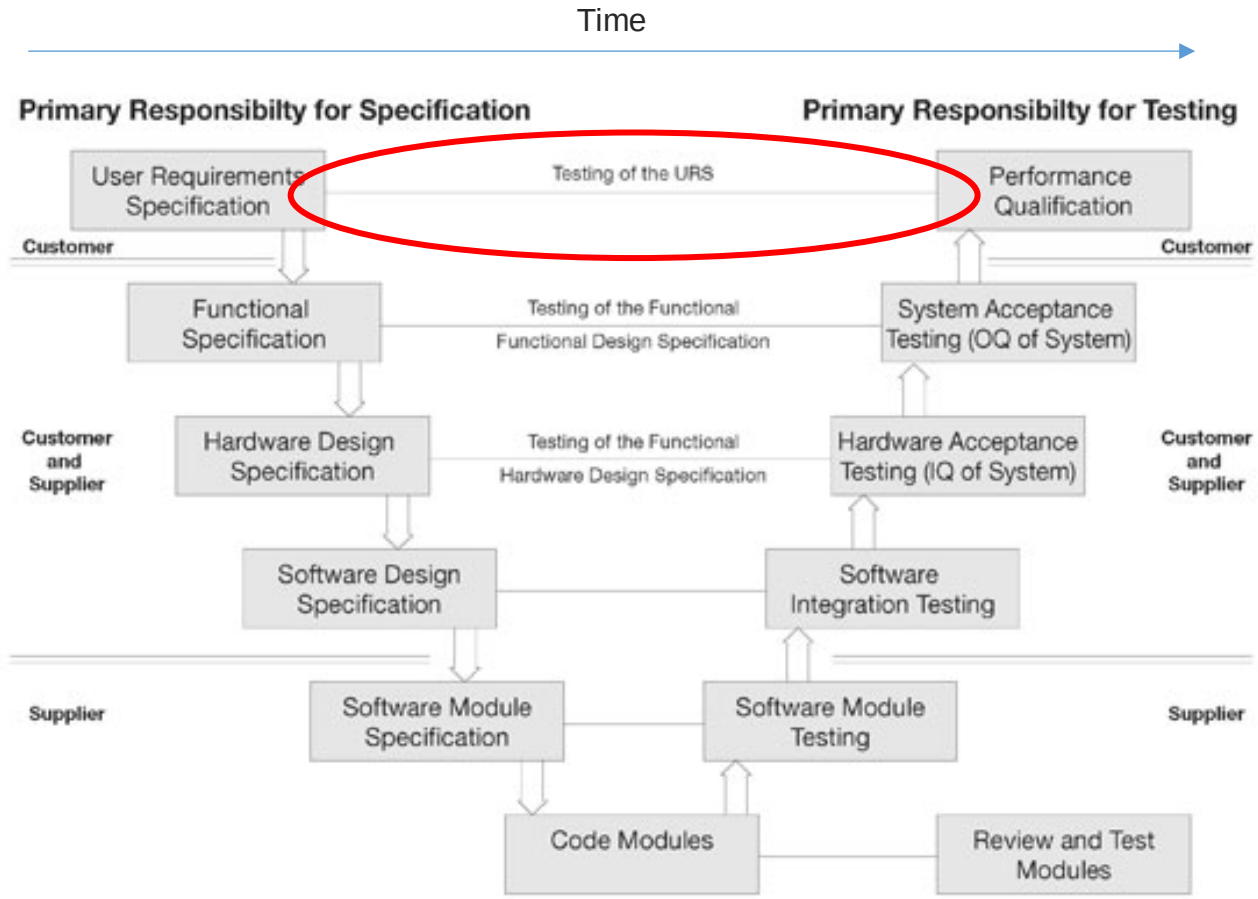
The traditional model for project delivery

GAMP ‘V’ model

1. Robust approach to ensuring the delivering of automation projects.
2. Ensures that you get what you asked for.
3. Defined role for customer and supplier

Problems with this approach

1. The URS is developed independently by the customer
2. Your URS is not ‘tested’ until the end of the project



An approach is needed to improve the quality of the URS and to ‘test’ it early – ‘fail quickly’

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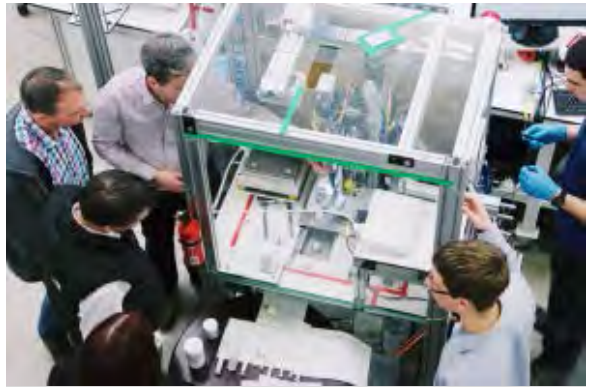
How can we specify better?



Better specification of projects

- Collaboration
  - Customers have engineering and technology knowledge gaps
  - Suppliers have process, user and workflow knowledge gaps
- Engagement with users and stakeholders to ‘test’ the URS
- Risk assessed ‘agile’ approach
- Make informed statements

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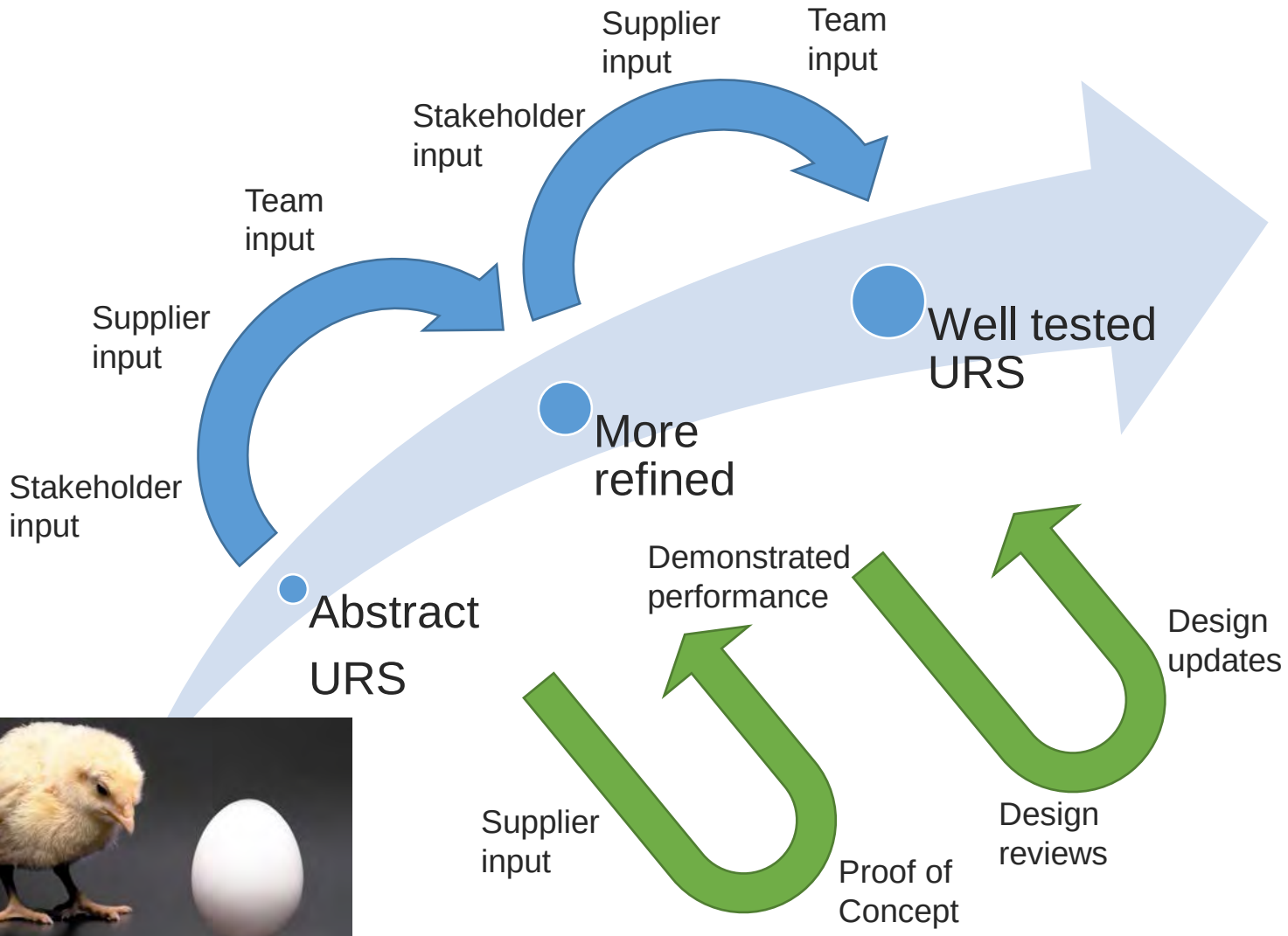
Iterative collaborative specification and design



Collaborative model

- Suppliers, stakeholders and team are engaged
- Concepts are tested and demonstrated
- Minimal risk carried into project delivery phase
- ‘Agile’ approach
  - Abstract to start with
  - Focus and effort is only where it is needed
  - Suppliers and stakeholders identify the holes
- Challenge assumptions
- Input for multiple stakeholders is key
  - User groups
  - Decision makers
  - Data recipients
  - Building services
  - Safety and compliance
  - IT and support services
  - Purchasing

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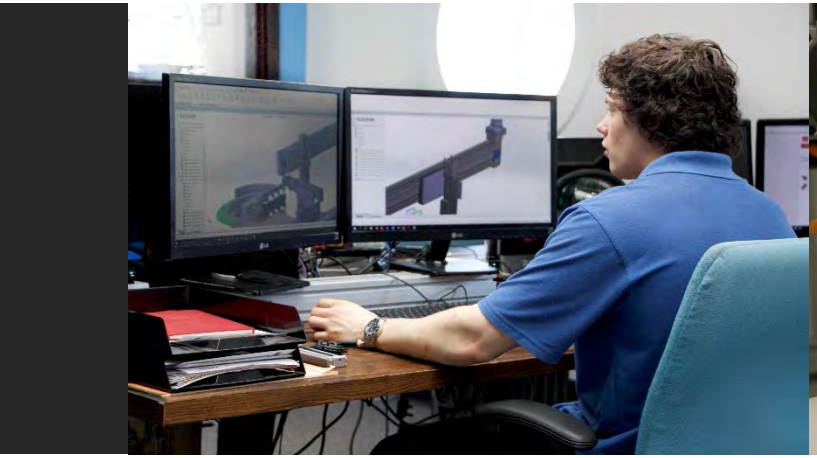
Risk based approach (specification and design)

Risk assessment used to guide detail in the URS

The risk of this ‘agile’ approach is that specifications are missed. This is mitigated by:

- Broad engagement of stakeholders and suppliers
- Risk assessment highlights:
    - Technology gaps – Proof of concept
    - Knowledge gaps – Stakeholder engagement
    - Performance gaps - Stakeholder engagement



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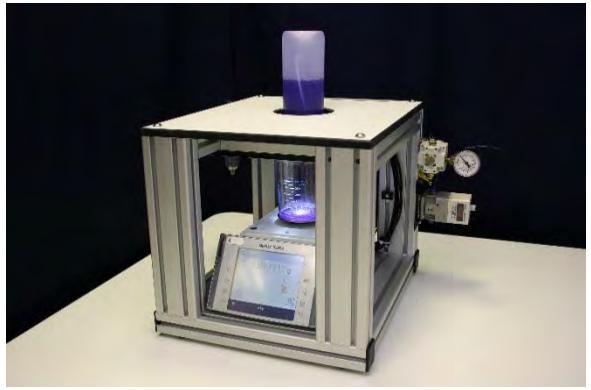
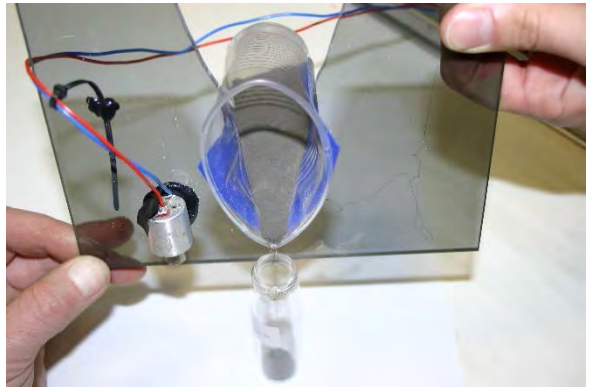
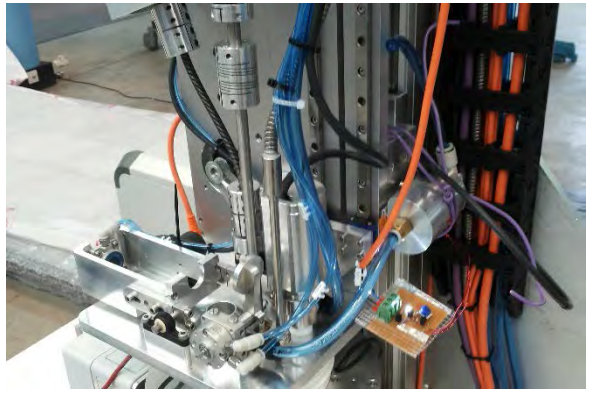
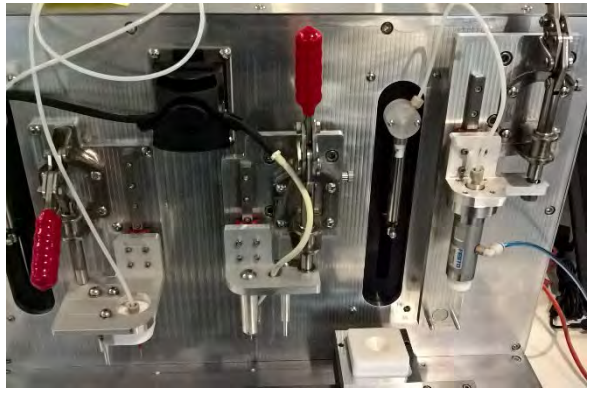
Proof of concept studies









What makes a good proof of concept study?

- Targeted (from risk assessment)
  - Addresses specific technology or performance gaps
- Just engineered enough
  - Only dedicate effort where needed
  - Focus on the targeted goal
- Robust
  - Experimental design is useful
  - Sample extremes and median
  - Engage with stakeholders
  - Objective performance assessment
- Well reported
  - Test methodology and test conditions essential
  - Testing observations important
- Challenge the strategy and be critical
  - Risk assessment is useful here
  - The entire project hinges on this – get it right!

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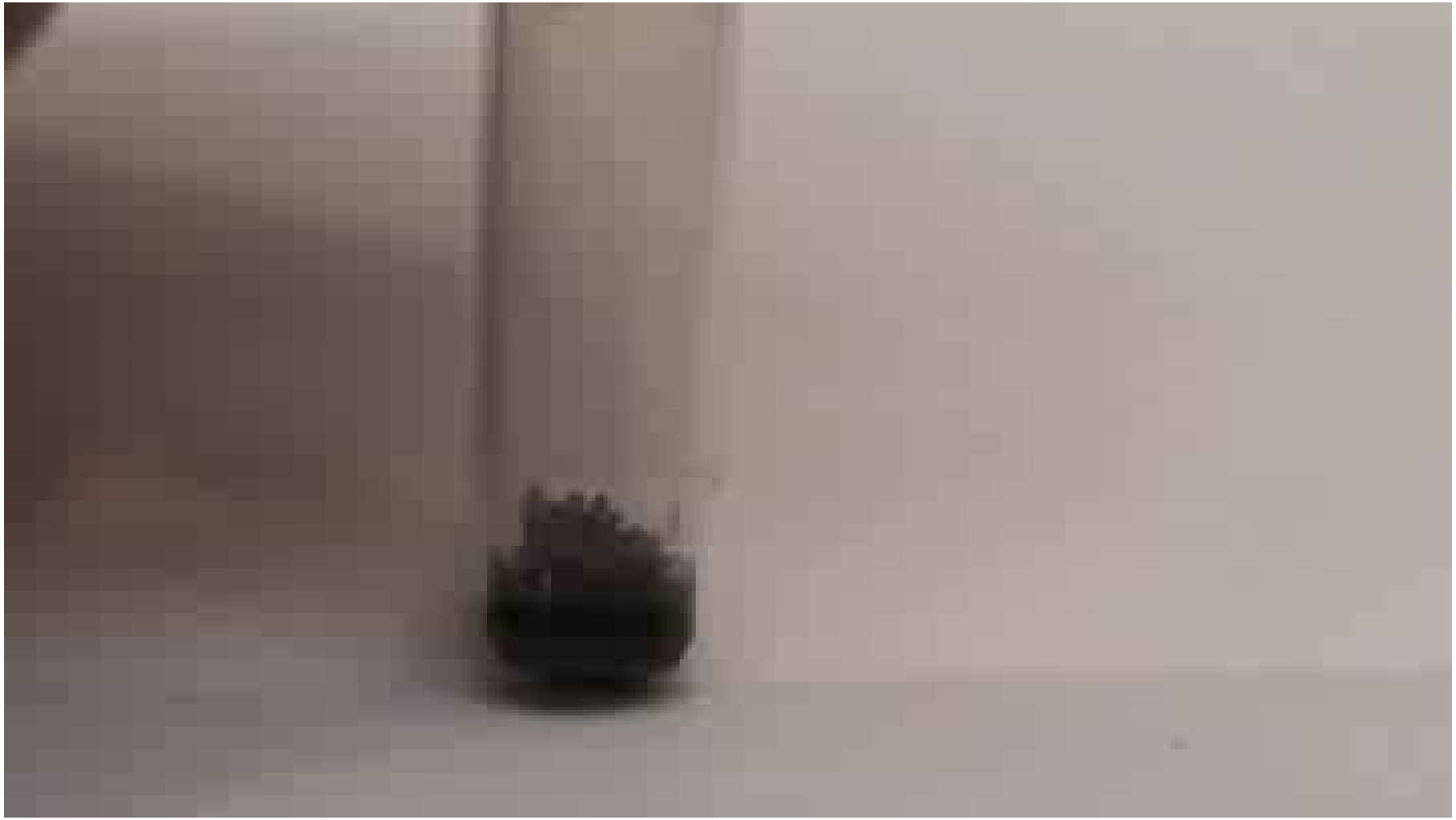
Proof of concept work in practice



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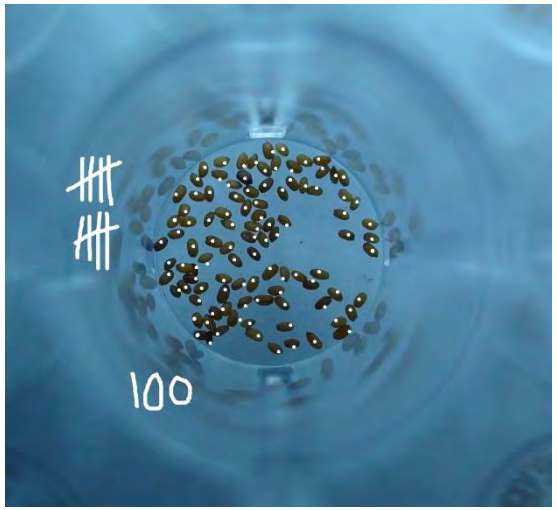

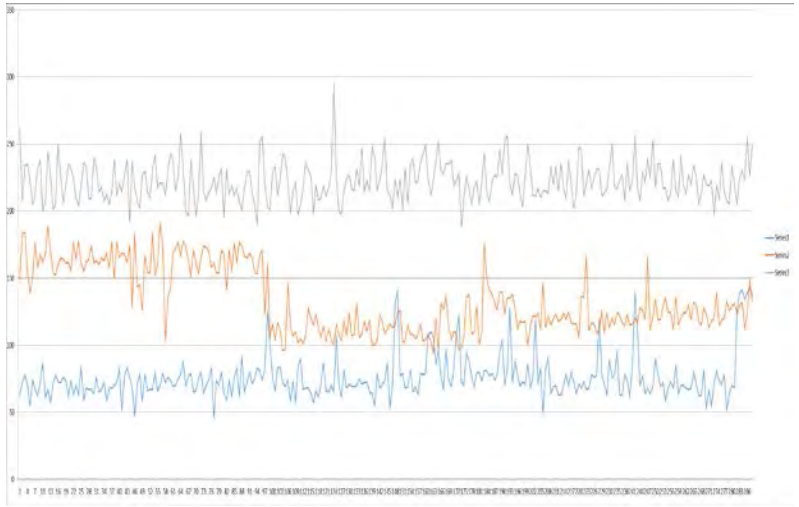

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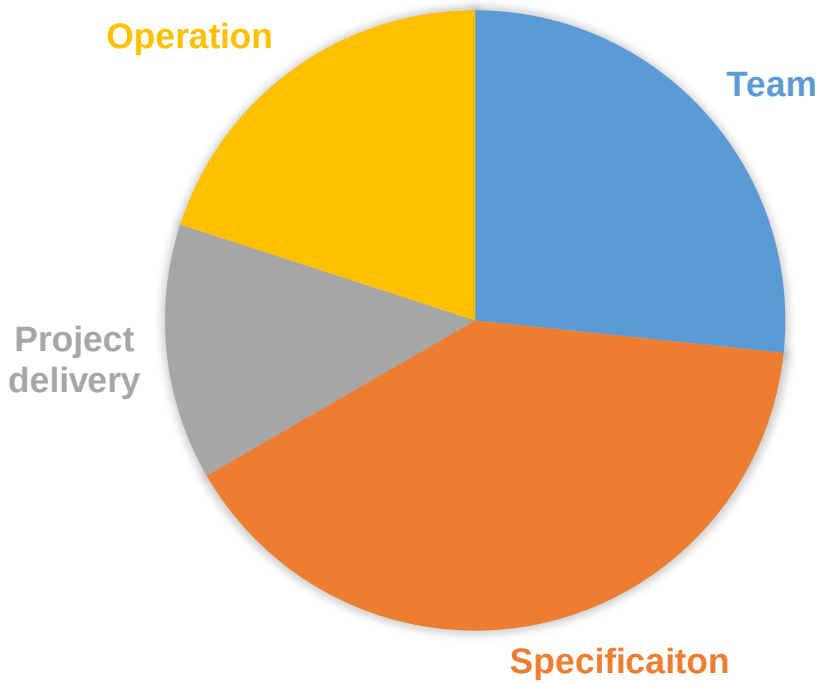

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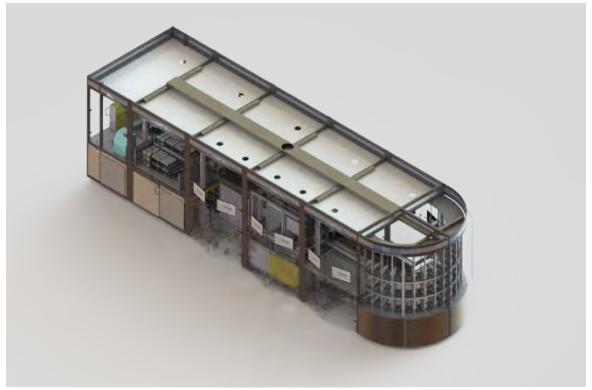
How to improve future proofing



General trend to more flexible more collaborative systems

- Traditionally HTFS systems were monolithic and relatively fixed in terms of process
- Modular systems are now preferred
  - Exchangeable processing modules
  - Re-configurable workspace
  - More flexible hardware
- Collaborative work allows users to add flexibility

How to stay flexible?

- Transparency in design:
  - Open drawings
  - Open process software
- Skills in the team
  - Software
  - Engineering
- Continual improvement programme

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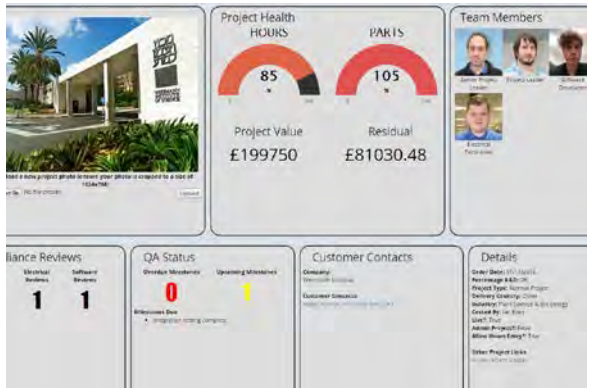
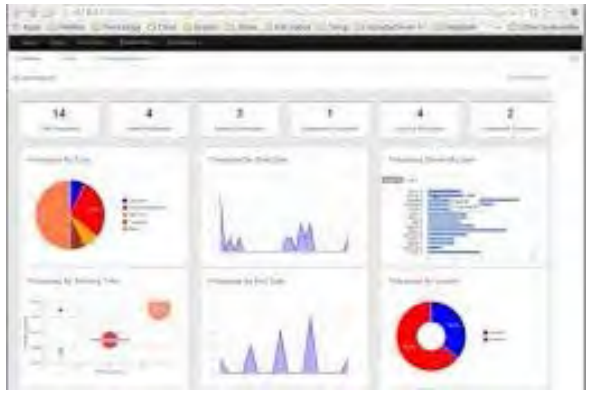
Adopting Industry 4.0





Laboratory 4.0

- System Performance is visible - teams and stakeholders are engaged
- Failures can be predicted and prevented
- Data is available for process optimisation
  - Investment can be justified more easily
  - Teams remain engaged through improvement projects

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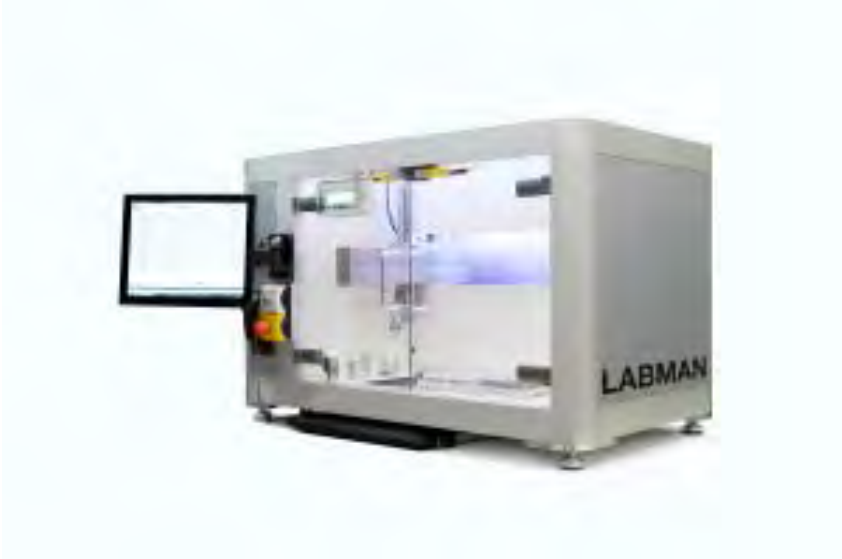
Conclusions

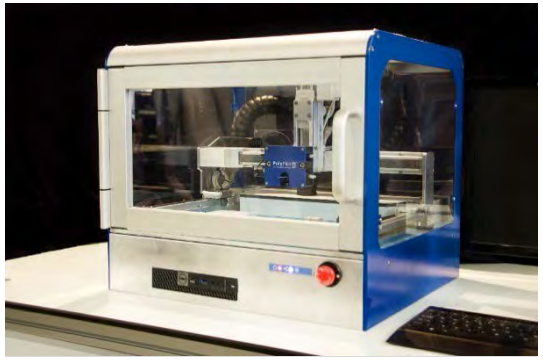
Getting HTE right relies on much more than managing a good project:

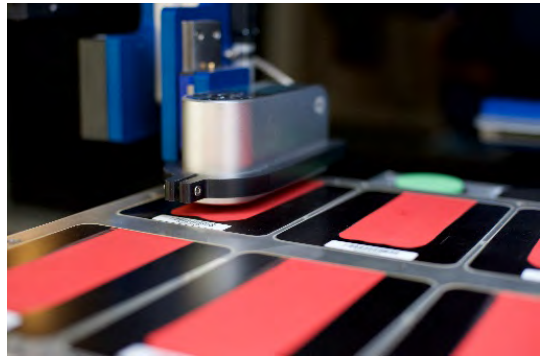
- Building a team with the right skill sets (Innovative, Software skills, Engineering skills)
- Invest in getting the specification right
  - ‘Agile’ approach
  - Use Proof of Concept studies where necessary
  - Engage all stakeholders
  - Be critical and objective
- Plan for flexibility
  - Design with flexibility in mind
  - Modularity is a good way to add flexibility
  - Be prepared to make changes (the team is important here)
- Keep the team engaged
  - Adopt industry 4.0 ideas
  - Develop a continual improvement strategy











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Get in touch.

Whatever your requirements or application, Labman has the abilities and experience to meet your automation needs.

See a sample of the systems Labman has designed and manufactured at:

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