Visual intelligence: the missing piece of the science automation puzzle

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#bioProcessUK

UK BioIndustry Association

Visual Intelligence

The missing piece of the Science Automation Puzzle

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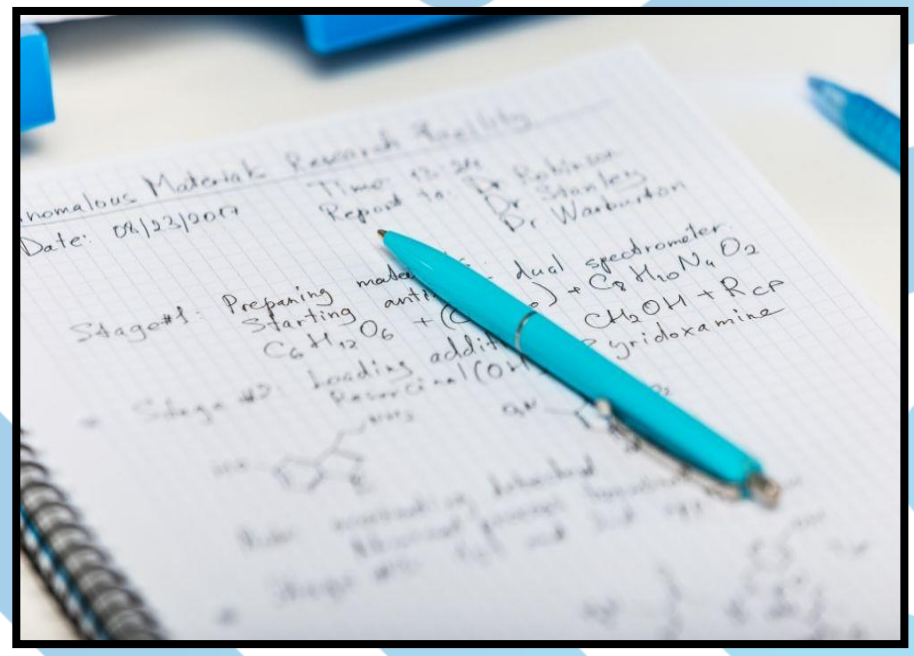
Observation
is the foundation of the scientific method.



The human/data interaction problem at the foundation of science.

Human Experience:

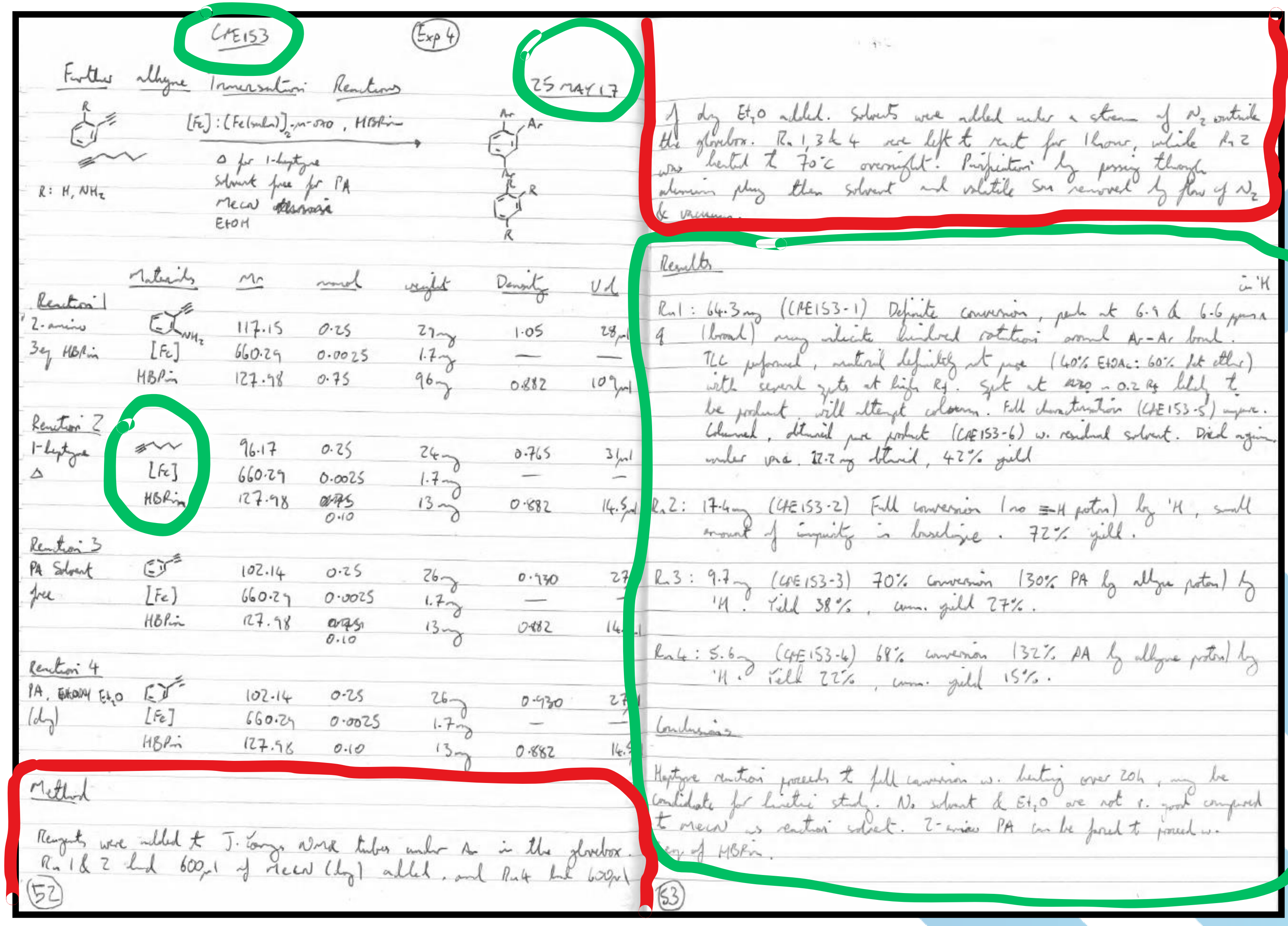
- Manual data capture and logging into ELNs.
- Discrete rather than continuous.
- Irreproducibility challenges.
- Multiple layers of validation.

Compounded and costly when scaling to manufacturing.

Finding the sources of Critical Latent Datasets.

- Human activity and workflow.
- Experimental processes.
- Material condition and state.
- Protocol Adherence and Deviation.
- Machine and automation systems.
- Environmental monitoring.
- Behavioural and intraction.

The information gap


CAE153 — Exp 4 — 25 MAY 17

Further alkyne Isomerisation Reactions

[Fe]: [Fe(mda)]$_2$-μ-oxo, HBPin

0 for 1-heptyne
solvent free for PA
MeCN
EtOH

R: H, NH_2

	Materials	Mr	mmol	weight	Density	Vol
Reaction 1, 2-amino, 3eq HBPin	alkyne	117.15	0.25	29mg	1.05	28μl
	[Fe]	660.29	0.0025	1.7mg	—	—
	HBPin	127.98	0.75	96mg	0.882	109μl
Reaction 2, 1-heptyne, Δ	alkyne	96.17	0.25	24mg	0.765	31μl
	[Fe]	660.29	0.0025	1.7mg	—	—
	HBPin	127.98	~~0.75~~ 0.10	13mg	0.882	14.5μl
Reaction 3, PA solvent free	alkyne	102.14	0.25	26mg	0.930	27[illegible]
	[Fe]	660.29	0.0025	1.7mg	—	
	HBPin	127.98	~~0.75~~ 0.10	13mg	0.882	14.[illegible]
Reaction 4, PA, Et_2O (dry)	alkyne	102.14	0.25	26mg	0.930	27[illegible]
	[Fe]	660.29	0.0025	1.7mg	—	—
	HBPin	127.98	0.10	13mg	0.882	14.[illegible]

Method

Reagents were added to J. Young's NMR tubes under Ar in the glovebox. Rxn 1 & 2 had 600μl of MeCN (dry) added, and Rxn 4 had 600μl

52

of dry Et_2O added. Solvents were added under a stream of N_2 outside the glovebox. Rxn 1, 3 & 4 were left to react for 1 hour, while Rxn 2 was heated to 70°C overnight. Purification by passing through alumina plug then solvent and volatiles removed by flow of N_2 & vacuum.

Results — in ^1H

Rxn 1: 64.3mg (CAE153-1) Definite conversion, peak at 6.9 & 6.6 ppm (broad) may indicate hindered rotation around Ar–Ar bond. TLC performed, material definitely not pure (40% EtOAc : 60% pet ether) with several spots at high Rf. Spot at ~0.2 Rf likely to be product, will attempt column. Full characterisation (CAE153-5) impure. Columned, obtained pure product (CAE153-6) w. residual solvent. Dried again under vac. 22.2mg obtained, 42% yield.

Rxn 2: 17.4mg (CAE153-2) Full conversion (no ≡-H proton) by ^1H, small amount of impurity in baseline. 72% yield.

Rxn 3: 9.7mg (CAE153-3) 70% conversion (30% PA by alkyne proton) by ^1H. Yield 38%, conv. yield 27%.

Rxn 4: 5.6mg (CAE153-4) 68% conversion (32% PA by alkyne proton) by ^1H. Yield 22%, conv. yield 15%.

Conclusions

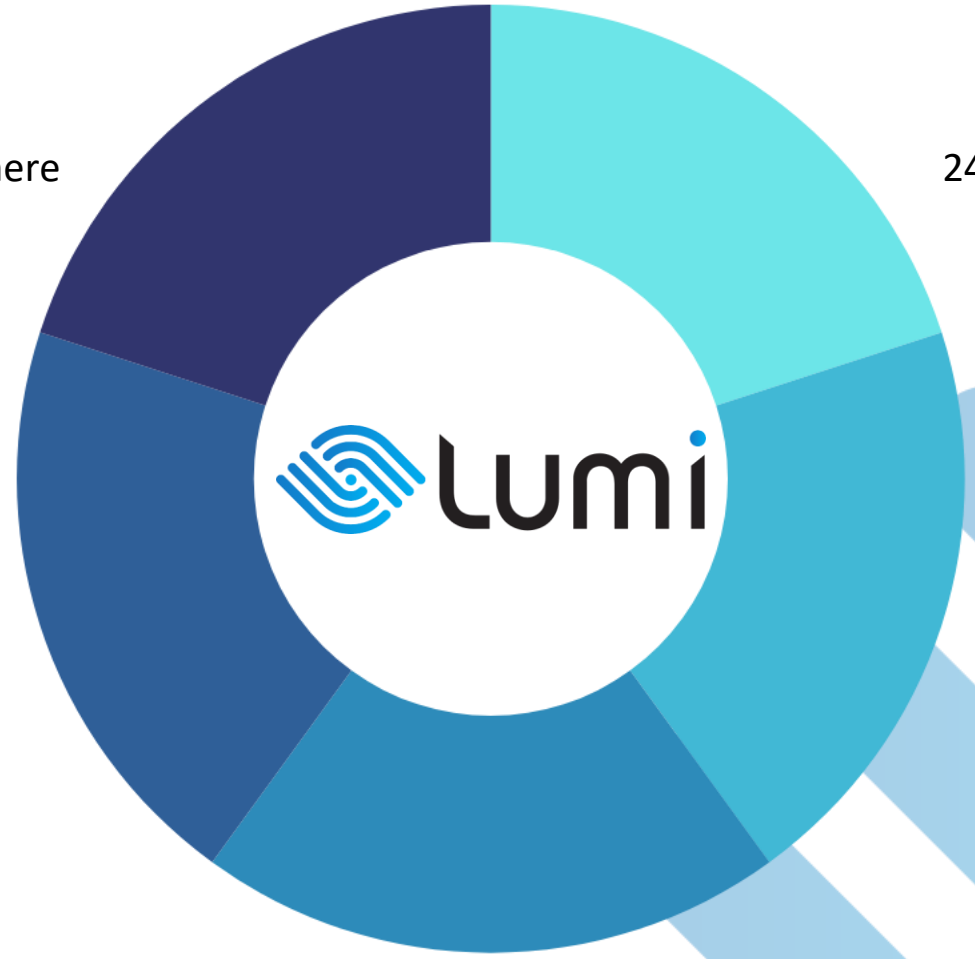
Heptyne reaction proceeds to full conversion w. heating over 20h, may be candidate for kinetic study. No solvent & Et_2O are not as good compared to MeCN as reaction solvent. 2-amino PA can be forced to proceed w. [illegible] eq of HBPin.

53

Packaging it all up.

Cloud platform
Access your data from anywhere

Monitoring Intelligence
24/7 hands free data capture

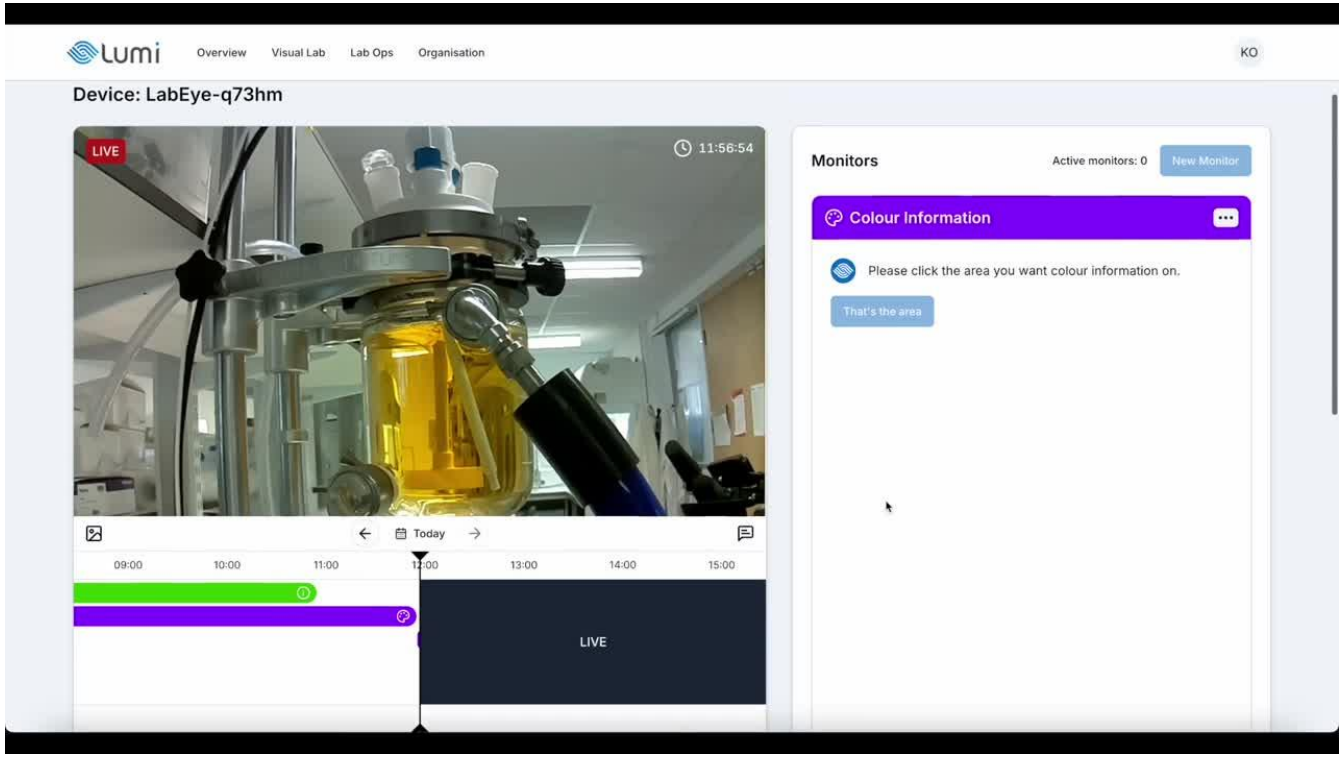


Information Intelligence
Critical information, when it matters

Protocol & Workflow Intelligence
Hand and instrument detection

Experiment and process Monitoring
Colour, Liquid, Insights, Multivariate Analysis

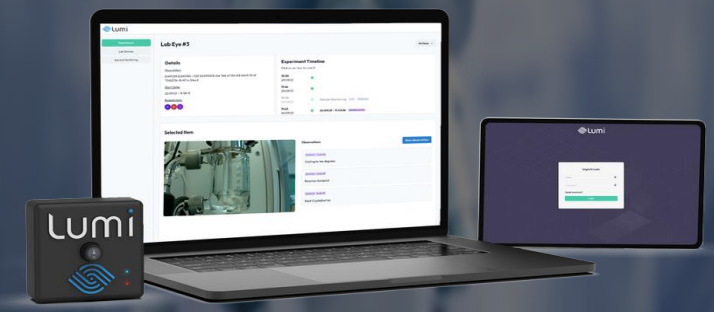
Designed for simplicity, no steep learning curve



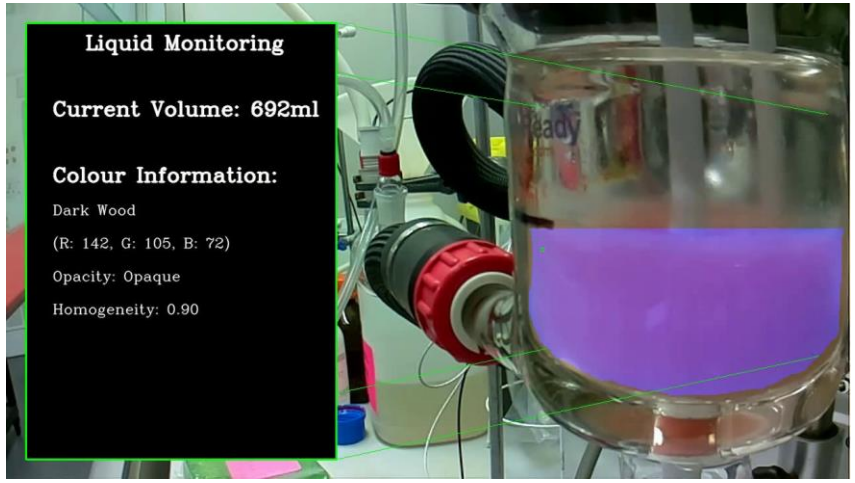
Lumi

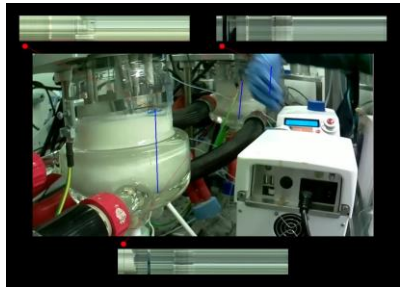
Your real-time lab companion

No complex learnings when setting up AI agents. Follow through the intuitive platform to track relevant information within the lab

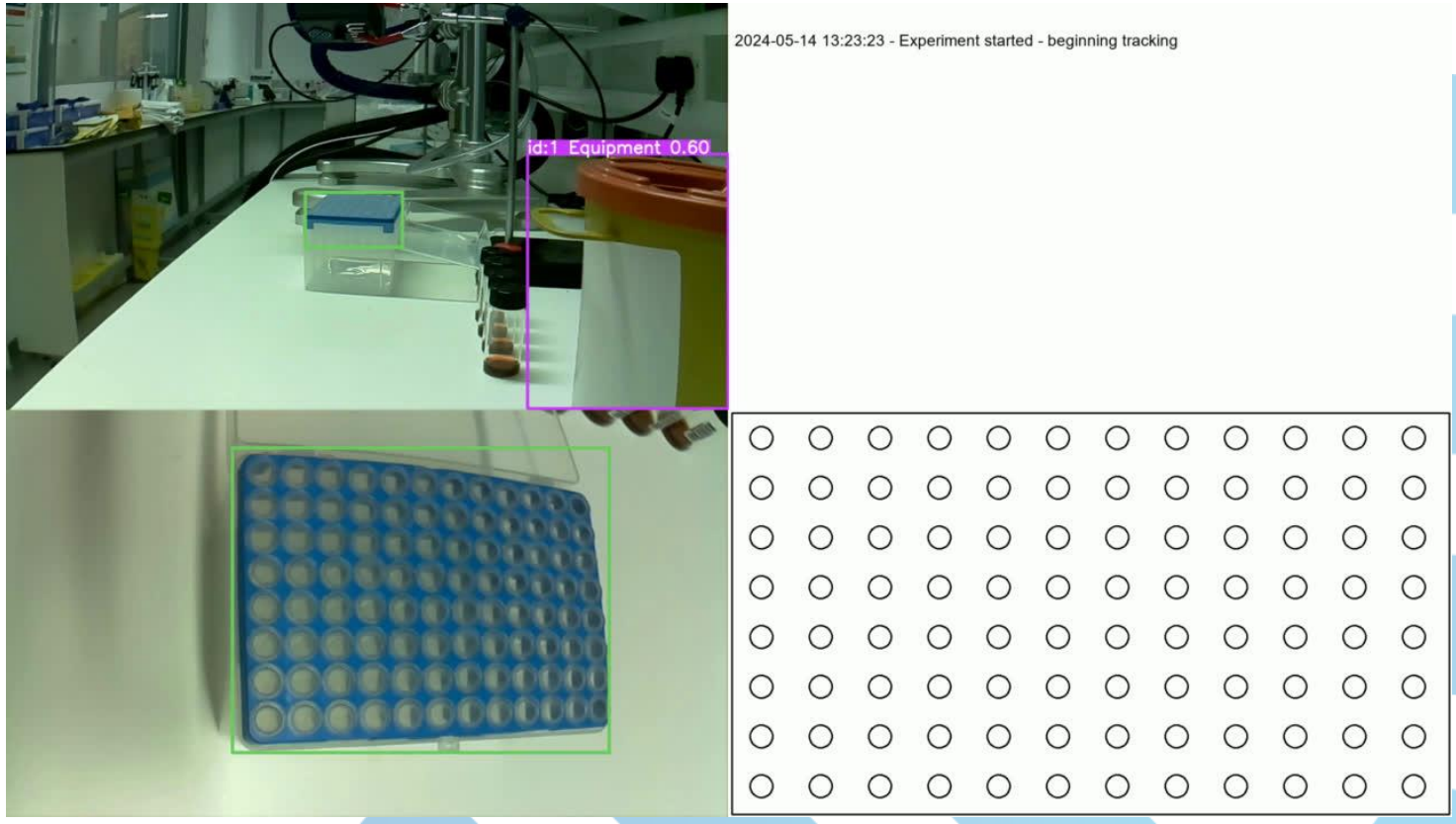


Complete data capture without burden on scientists.



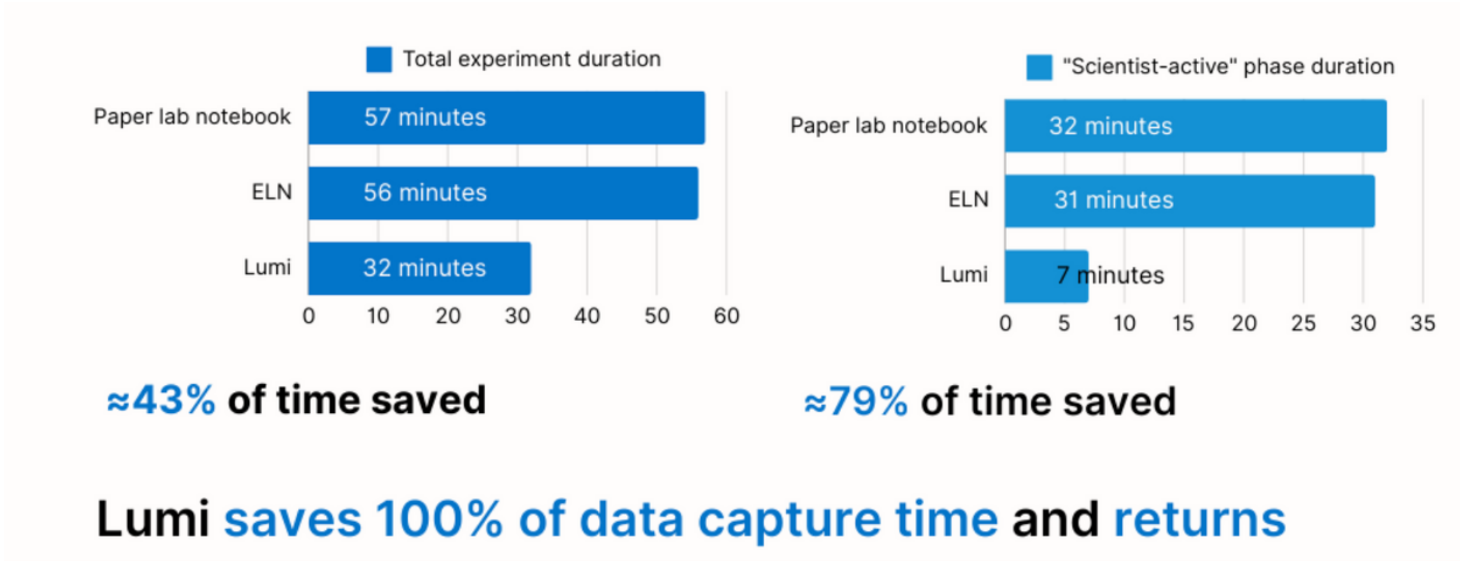


Remote Monitoring and Data Capture in Labs.



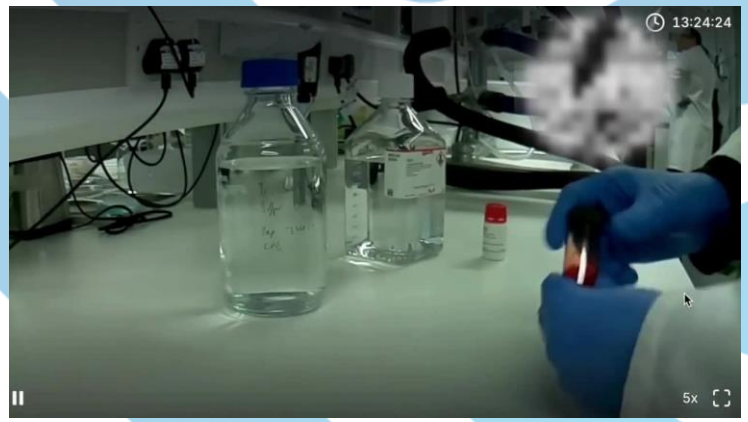
Real-time protocol documentation, process tracking and compliance validation in testing and MFG.

Lets put Lumi to the test



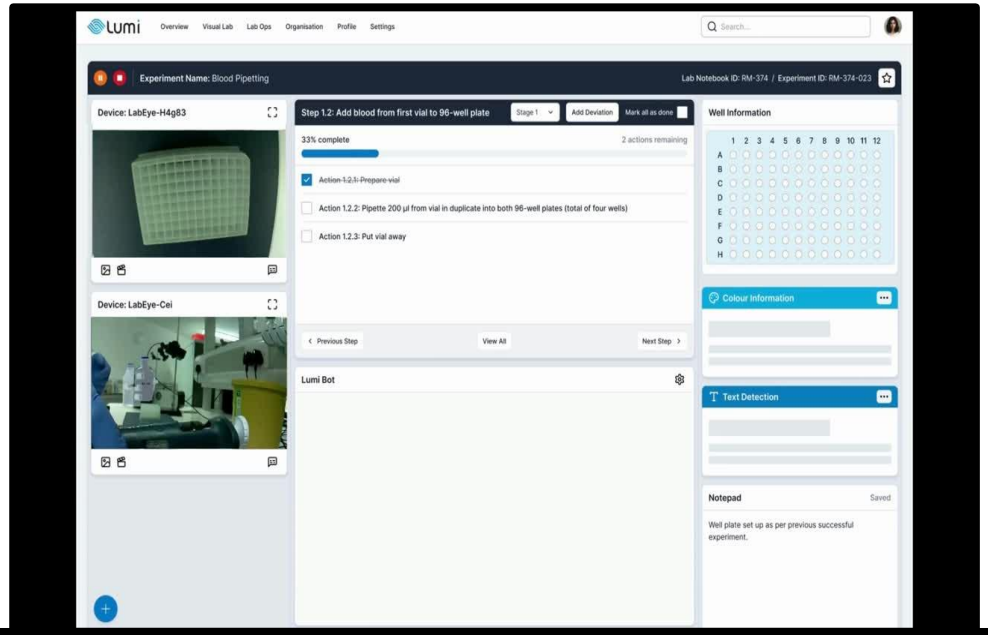
Lab Notebook

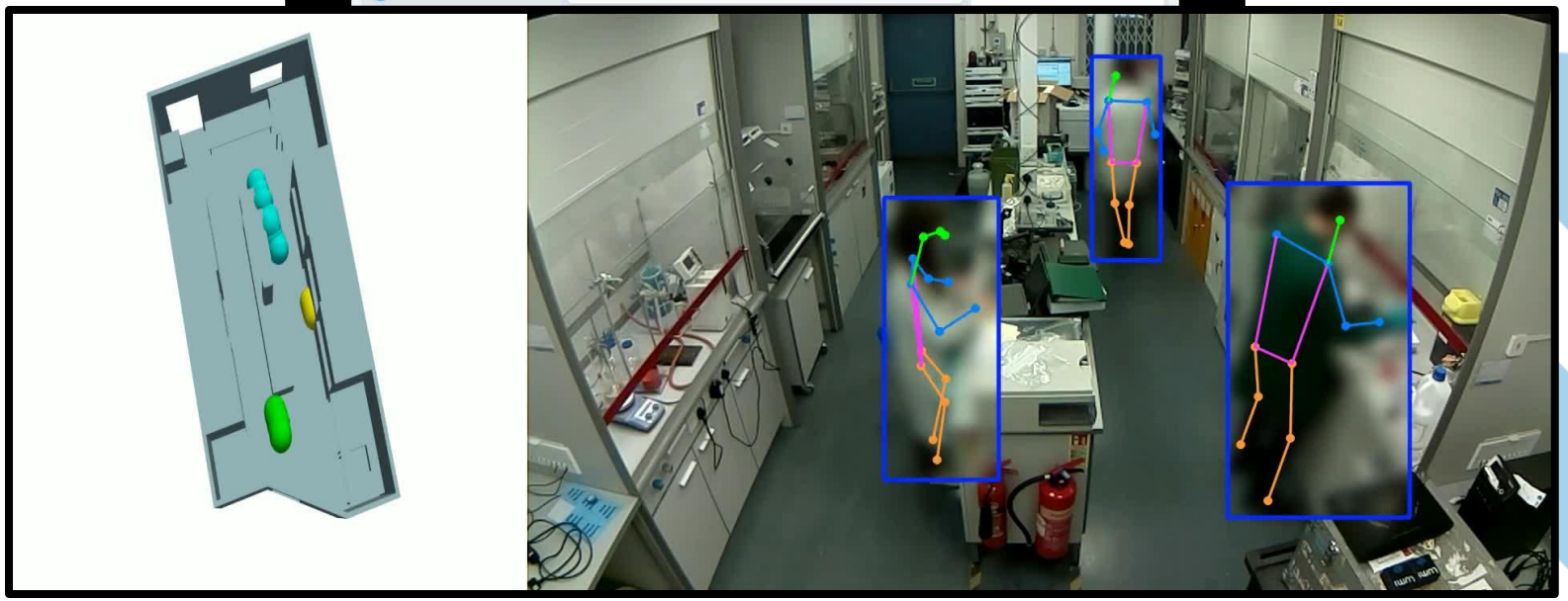
ELN



Lumi

Where we are going

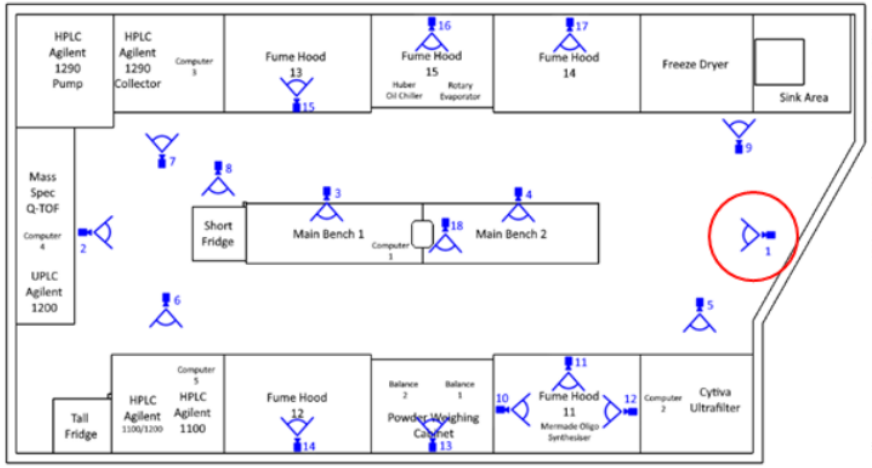


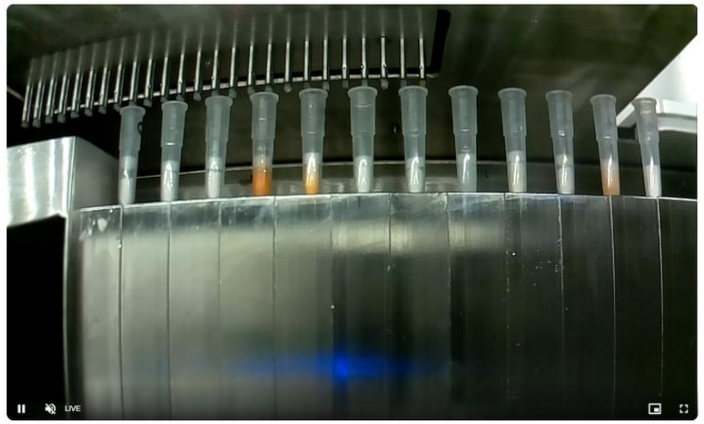


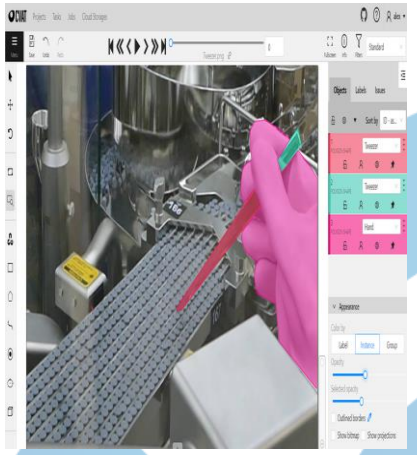
Visual Lab Notebook

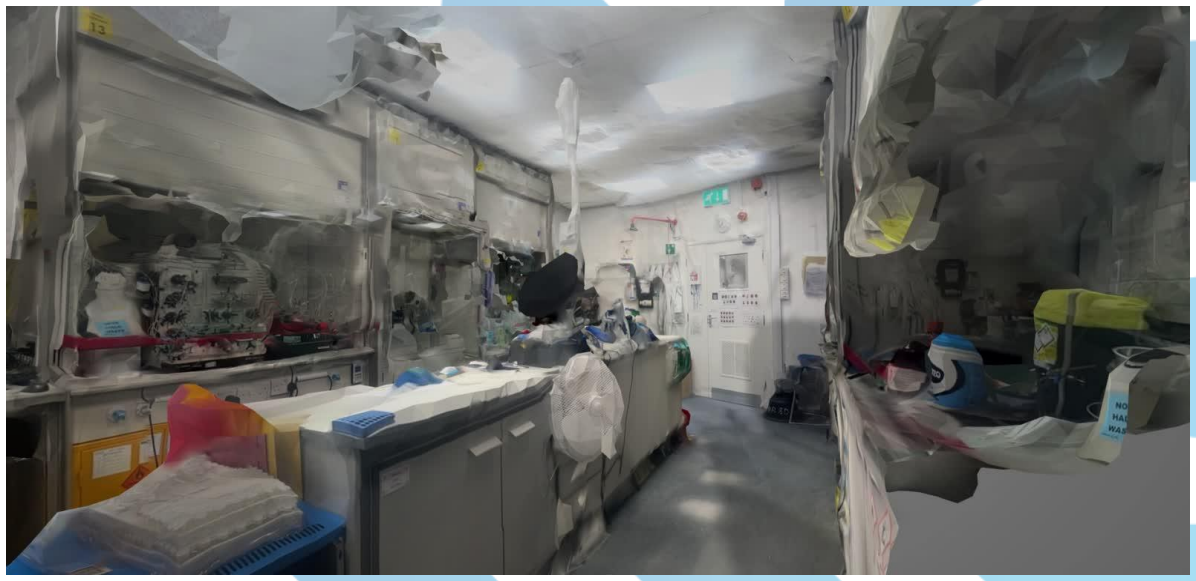
- Understanding of what is happening from context
- Bringing up AI agents pertinent to operation
- Linking macro and bench/FH views for whole-lab tracking
- Minimal human intervention
- A true audit trail of your lab work...what you did, when,

Labs of the future

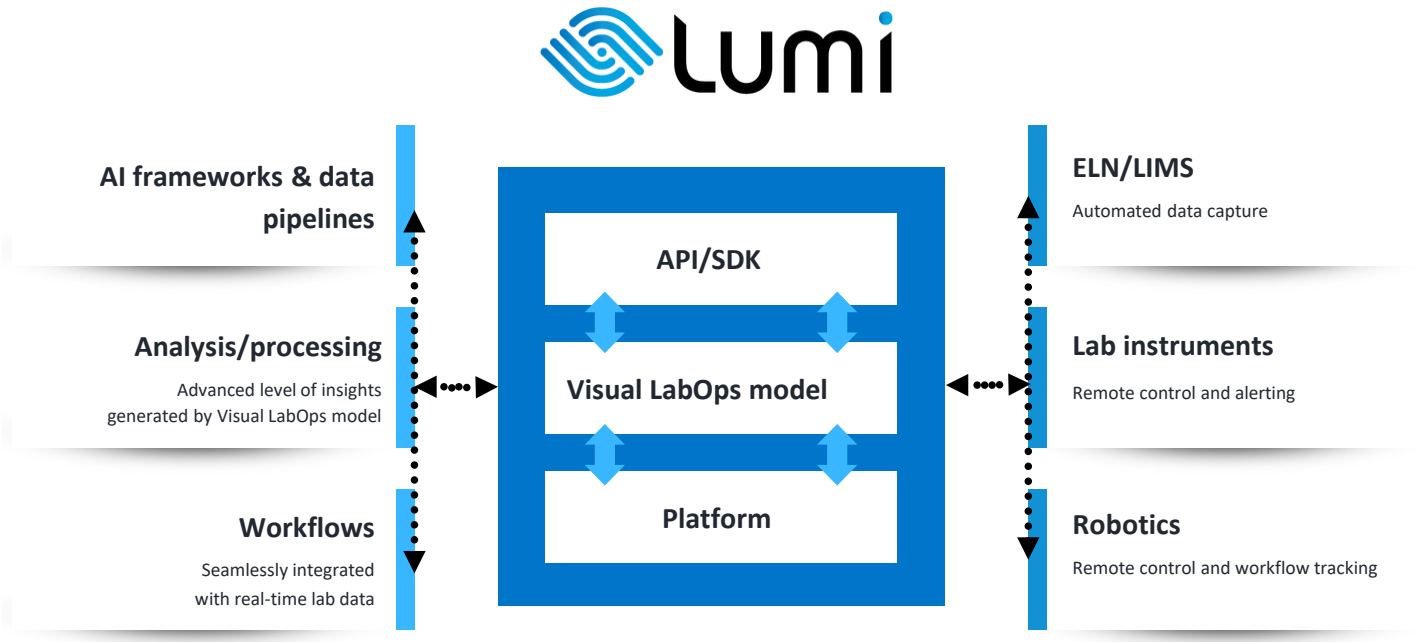








Complete Your Automation Puzzle with Lumi.



Lumi is becoming the **Automation Hub** powering the **R&D behind the global economy.**

Lumi™ Ecosystem

Lumi's integrates easily via API's and SDKs to reduce time-to-value.

Get scientists back to science, error-proof compliance and accelerate R&D.

lumi.systems

Proven success in early deployments.

Accelerated a critical process by **25%**, with automated data capture and process insights.

"We especially liked the **LabEye modules** and the **simplicity** of its **integration** with our systems."

Senior Scientist, Pfizer

Improved process efficiency by **30%**, reducing waste and optimizing medicine manufacturing.

"The pandemic has really shown that **speed to market** is absolutely essential for good patient outcomes and technology like Lumi really helps us drive that speed, it helps us **create medicines more quickly** and it gets **deeper understanding** of what we're doing **all in the same package**."

Dr Sam Whitmarsh, Director of Digital Transformation, CatSci.

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Visual Intelligence for Science Automation

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