



NAME: Chemical lab automation (framework) 


DATE: May 16, 2026 5:24 AM

DESCRIPTION OF TECHNOLOGY
In the world of chemical discoveries, a lot of experiments get performed. A way to increase the amount of discoveries would be to increase the speed and amount of experiments by means of automation.

For this a lot of things needs to be brought together: robot and machine control, planning automation, experiment...


HUMAN VALUES 

The intended users get to step away from their role as a lab rat and can start thinking more about the experiments and how they could be conducted instead of conducting them themselves.

TRANSPARENCY 


Yes, all steps of the automated process should be insightful and verifiable.

The lab itself is transparant about it's automation and even uses it as a selling point.


IMPACT ON SOCIETY 

Automation of chemistry experiments to increase the speed, accuracy and ease; this will improve the reproducibility of experiments and speed up new discoveries.

It helps solve the difficulty of experiment reproducibility & it can help aid discover new things that would take ages without automation.


STAKEHOLDERS 

- Chemical researchers
- General public


SUSTAINABILITY 

The energy use and sustainability has not been taken into an account.

Gains could be made by thinking about calculation waste, (e.g. using cloud computing instead of local computing).


HATEFUL AND CRIMINAL ACTORS 

experiment with forbidden substances (e.g. mustard gas) without taking responsibility. blame the automated lab?

DATA 


Yes, depending on the missing data; experiments could be non reproducible.

It is important to capture the right data for reproducibility. A solid framework should have guidelines on what to store and how to store it.


FUTURE 

it can discover amazing new materials and help push lab research into the age of digitalisation.

It could be used for discoveries that have applications in war etc. (discovering the next nuke).

PRIVACY 

No, and if it would, the name and contact details of the responsible researcher / chemist.

INCLUSIVITY 

the AI that will be part of the framework could have biases built in based on previous research results, and get stuck on certain interpretations.


That is why it training on it's own experiment results could be a good way to counteract this.

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HUMAN VALUES 

How is the identity of the (intended) users affected by the technology?

To help you answer this question think about sub questions like:

- If two friends use your product, how could it enhance or detract from their relationship?
- Does your product create new ways for people to interact?...

TRANSPARENCY 

Is it explained to the users/stakeholders how the technology works and how the business model works?

- Is it easy for users to find out how the technology works?
- Can a user understand or find out why your technology behaves in a certain way?
- Are the goals explained?
- Is the idea of the technology explained?
- Is the technology company transparent about the way their...

IMPACT ON SOCIETY 

What is exactly the problem? Is it really a problem? Are you sure?

Can you exactly define what the challenge is? What problem (what 'pain') does this technology want to solve? Can you make a clear definition of the problem? What 'pain' does this technology want to ease? Whose pain? Is it really a problem? For who? Will solving the problem make the world better? Are you sure? The problem definition will help you to determine...

STAKEHOLDERS 

Who are the main users/targetgroups/stakeholders for this technology? Think about the intended context by...

When thinking about the stakeholders, the most obvious one are of course the intended users, so start there. Next, list the stakeholders that are directly affected. Listing the users and directly affected stakeholders also gives an impression of the intended context of the technology.

...

SUSTAINABILITY 

In what way is the direct and indirect energy use of this technology taken into account?

One of the most prominent impacts on sustainability is energy efficiency. Consider what service you want this technology to provide and how this could be achieved with a minimal use of energy. Are improvements possible?

HATEFUL AND CRIMINAL ACTORS 

In which way can the technology be used to break the law or avoid the consequences of breaking the law?

Can you imagine ways that the technology can or will be used to break the law? Think about invading someone's privacy. Spying. Hurting people. Harassment. Steal things. Fraud/identity theft and so on. Or will people use the technology to avoid facing the consequences of breaking the law (using trackers to evade speed radars or using bitcoins to launder...)

DATA 

Are you familiar with the fundamental shortcomings and pitfalls of data and do you take this sufficiently into...

There are fundamental issues with data. For example:

- Data is always subjective;
- Data collections are never complete;
- Correlation and causation are tricky concepts;
- Data collections are often biased;...

FUTURE 

What could possibly happen with this technology in the future?

Discuss this quickly and note your first thoughts here. Think about what happens when 100 million people use your product. How could communities, habits and norms change?

PRIVACY 

Does the technology register personal data? If yes, what personal data?

If this technology registers personal data you have to be aware of privacy legislation and the concept of privacy. Think hard about this question. Remember: personal data can be interpreted in a broad way. Maybe this technology does not collect personal data, but can be used to assemble personal data. If the technology collects special personal data (like...

INCLUSIVITY 

Does this technology have a built-in bias?

Do a brainstorm. Can you find a built-in bias in this technology? Maybe because of the way the data was collected, either by personal bias, historical bias, political bias or a lack of diversity in the people responsible for the design of the technology? How do you know this is not the case? Be critical. Be aware of your own biases....

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