

#ROADMAP

#ML2GROW

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EXPERTS IN CREATING IMPACT WITH AI

A roadmap to your AI solution



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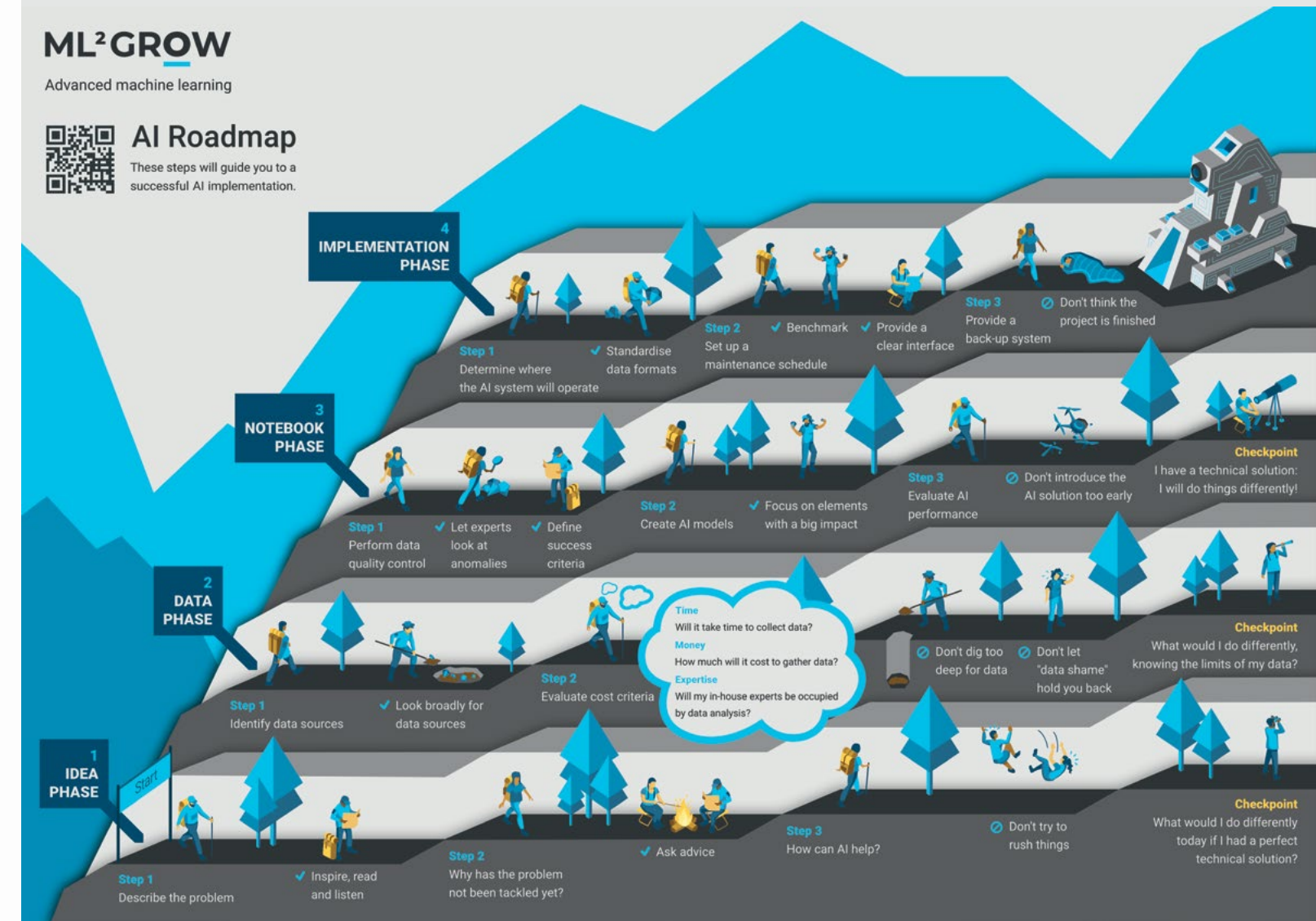
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Visit the interactive roadmap at our website www.ml2grow.com/sme.

The Idea Phase

Focus on the problem and not the solution.

The idea phase focuses on the problem and not on the solution. By thoroughly defining the problem and informing yourself, an idea for a possible AI solution is born. Nowadays, instead of the AI technology itself, the idea poses the real challenge: the more powerful the idea, the more effective the AI solution.

Step 1: Describe the problem

In the first step of the idea phase it is important to describe the problem the AI solution should tackle. Don't be tempted to propose solutions yet, but rather define the problem in all its aspects. This is an exercise that is often too easily overlooked. That is why we make it the fundament of our work dynamic.

Step 2: Why has the problem not been tackled yet?

As the problem is clearly described in Step 1 of the idea phase, it is straightforward to look into why the problem has not been tackled before. Maybe a solution exists, but this solution is too expensive? Or perhaps it is simply impossible to solve the problem technically? The problem could be too dynamic, only solvable by an intensive-care solution that would need constant monitoring and adaptations. Maybe there are only limited resources to tackle the problem? Identifying these surrounding problems is critical to decide if and how to proceed in the AI solution development process.

Step 3: How can AI help?

In step 3 of the idea phase, criteria for using AI as a solution should be proposed. Perhaps you were inspired by a similar solution elsewhere? Or maybe the problem has a repetitive nature and can easily be automated?

Checkpoint: What would I do differently today if I had a perfect technical solution?

At the end of the Idea Phase, you understand the problem and have a realistic image of what AI can offer you. Nowadays you can solve everything with AI. The question is: if you would have this perfect AI solution, would it indeed benefit your company? Is AI really the way to go?

TIPS AND TRICKS

Inspire, read and listen

Get inspired by reading and listening to experienced people to determine if and how Machine Learning can help you. Try to be realistic: it is also possible that Machine Learning will only yield a suboptimal solution to your problem.

Ask advice

Many public institutions or private companies will gladly have a coffee to listen and provide initial advice. Also talk to internal stakeholders.

Don't try to rush things

Don't be tempted to experiment with algorithms and models, to initiate a technical training, to define success criteria, or to start analyzing data. All these actions mean you are focusing on the solution, instead of outlining the problem first, which is crucial in this phase.



The Data Phase

Focus on the search and evaluation for data sets.

AI systems are only as good as the data we put into them. Therefore, the data phase focuses only on the search for and the evaluation of data sets. Still no success criteria should be defined for the project at this stage.

Step 1: Identify data sources

It is useful to start with summing up all possible data sources that can be linked to the problem. Are there in-house data sources or do public databanks exist? Do you need to create (more) data? Don't hesitate to involve other stakeholders and experts to create win-wins.

Step 2: Evaluate cost criteria

Once you have a list of possible data sources that can be used to tackle your problem, each data source needs to be critically evaluated, in order to select the best one(s).

We proceed only with data sources that offer a meaningful contribution to the AI model. For each of these data sources, three cost criteria are evaluated: time, money, and expertise.



TIME

If the data you need is not available yet, it might take some time to collect the data. How long will this process take? Can you already start as soon as you have incoming data or do you need to wait for a more profound data set?



MONEY

Do you need to pay for the data source you need? Or are there start-up costs in case you want to start collecting data?



EXPERTISE

What will you do with the data? Will your in-house experts be occupied by data gathering and labeling or can you outsource or automate it?

TIPS AND TRICKS

Don't dig too deep for data, but look broadly for data sources

Avoid in-depth analysis of the data sources you found, but rather think out of the box and look broadly for data sources. You could ask advice from experts or involve your project in other initiatives that would result in useful data in the future.

Don't let data shame hold you back

If you have the feeling your data is not well structured, too scattered, outdated, etc., you might suffer from 'data shame'. However, there is no need to try and process raw data or to place the project on hold until all data are available. With our AI solution, you can already start as soon as possible.

Checkpoint: What would I do differently, knowing the possible limits of my data?

At the end of the Data Phase, you have selected one or several data sources that can be used to tackle your problem. Do these data sources - with their inherent costs - contribute significantly to your perfect AI solution? Is it worthwhile to proceed to the next phase?

Step 1
Identify data sources

✓ Look broadly for data sources

Step 2
Evaluate cost criteria

Time

Will it take time to collect data?

Money

How much will it cost to gather data?

Expertise

Will my in-house experts be occupied by data analysis?

⊘ Don't dig too deep for data

⊘ Don't let "data shame" hold you back

Checkpoint

What would I do differently, knowing the limits of my data?

The Notebook Phase

Focus on the rapid creation of the AI model.

*A notebook is a development and reporting tool used by data scientists. Notebooks are a form of interactive computing, in which users write and execute code, visualize the results, and share insights. Typically, data scientists use notebooks for experiments and exploration tasks. Notebooks are not suited for (integration into) production environments.

The Notebook* Phase focuses on the experimental creation of an AI model, not on the implementation of it yet. No matter how close you are to the application of the AI solution, re-evaluate the process if the solution cannot deliver a realistic and profitable answer to your problem.

Step 1: Perform data quality control

In the notebook phase you have your selected data source(s) available. This is the time to determine the quality of the data and the information that can be extracted from them. If necessary, data transformations can be developed ('feature engineering').

Step 2: Create AI models

Finally, the actual AI model can be created. This is just one step of one phase, illustrating how important all the surrounding steps and phases are. Several models can be developed, which are all evaluated to select the optimal AI solution.

Step 3: Evaluate AI performance

The performance of the AI solution is evaluated both during and after the development of the AI model. This is done by comparison to simple benchmarks and, if relevant, to human performance.

Checkpoint: I have a technical solution, I will do things differently!

Now you have an evaluated AI model at your disposal, but it is not the perfect, theoretical solution you visualized at the start. Knowing the limits of the AI solution, you can determine an endpoint for development that is most profitable. Change or stop the process if this is not the case. If you do proceed to the next phase, implement the solution as soon as it has a positive impact on your problem. Further refinement can happen in a next iteration or in parallel.

TIPS AND TRICKS

Let experts look at anomalies

Extract and visualize anomalies in the data during the quality control step and present them to experts. Their feedback will drastically accelerate the development of the model in the good direction.

Define success criteria

Work in sprints, plan critical gating moments and success criteria to evaluate the project and the performance of the model. Make sure to involve the other stakeholders in the gating moments. Also make time to define benchmarks that contribute to the interpretation of the model's accuracy and performance.

Focus on elements with a big impact

Don't focus on small, percentual improvements in accuracy by model selection or model adaptations. Rather look for elements with a big impact, such as approach, new data sources or increasing insight.

Introduce this AI solution as soon as it has a positive operational impact

Avoid introducing the AI solution in a production or other environment where it can impact the business process prematurely.

Step 1

Perform data quality control

✓ Let experts look at anomalies

✓ Define success criteria

Step 2

Create AI models

✓ Focus on elements with a big impact

Step 3

Evaluate AI performance

⊘ Don't introduce the AI solution too early

Checkpoint

I have a technical solution: I will do things differently!

The Implementation Phase

Focus on integrating the Machine Learning solution in the production environment.

The implementation phase focuses on the installation of the Machine Learning solution in the production environment. Be aware that this is not a final step, but continuous valuation can lead to further automation and increasing profits.

Step 1: Determine where the AI system will operate

AI models need to receive data to operate and need to be able to have an impact on the operational system. Depending on the solution, it might be most profitable to deploy the model in the cloud, in others on the edge.

Step 2: Set up a maintenance schedule

Decide how and when the system needs to be updated. Will you set up a periodical retraining or will you work with a permanently, self-learning system? How are you going to make sure the system will always be fed with the data you expect and will not change (e.g. format, underlying data sources).

Step 3: Provide a back-up system

Don't introduce the model as a single point of failure. Rather work out a back-up plan in case the system stops working unexpectedly or is unavailable.

Step 1

Determine where the AI system will operate

✓ Standardise data formats

Step 2
Set up a maintenance schedule

✓ Benchmark

✓ Provide a clear interface

Step 3

Provide a back-up system

⊘ Don't think the project is finished

TIPS AND TRICKS

Standardize data formats

It is useful to make schedules of the data sources, just like predetermined columns and rows in an Excel template. In that way the data will always be imported correctly in the AI model.

Benchmark

Make use of benchmarks and quality control checks during automatical model updates. Keep in mind that introducing any human dependency during (incremental) updates is often expensive.

Provide a clear interface

Make the AI system modular and communicate clear API descriptions. In that way, updates of the system or surrounding systems have no impact on the model.

Don't think the project is finished

Due to its inherent learning nature, an AI solution is never finished. With this in mind, think about how the model should evolve over time.

What is Machine Learning?

Machine Learning is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.

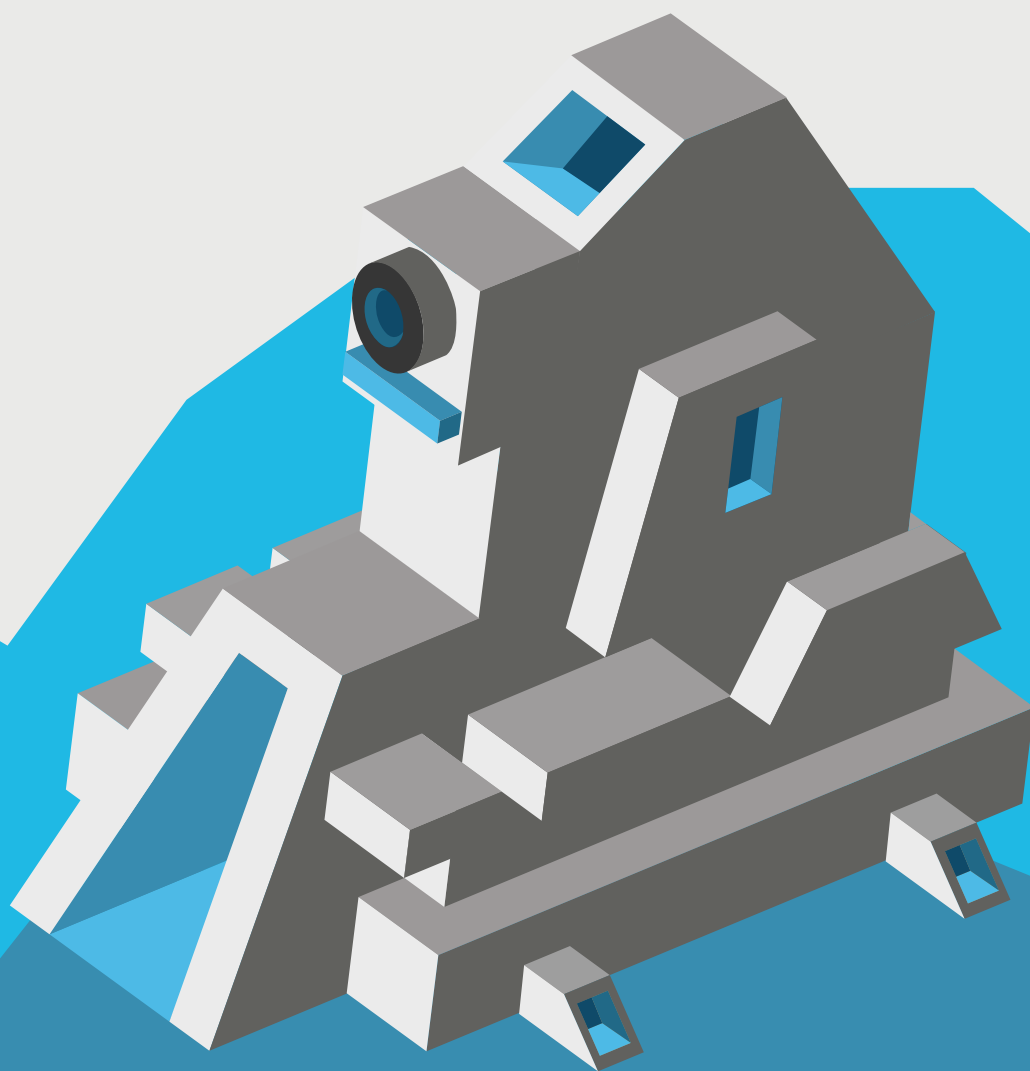
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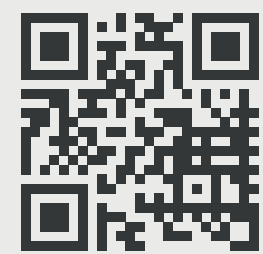
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Thank you for reading





AI Roadmap

These steps will guide you to a successful AI implementation.

