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# HOW TO LEVERAGE DATA SCIENCE IN THE HOME CARE SPACE

A three-step guide for home and  
community care professionals

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# Introduction

**Today, nearly every industry is undergoing an evolution centered around data.**

In health care, it has long been discussed but only in recent years has true momentum built around how providers can glean the true value, the potential, that lays in data science.

Many new startups claim they can help your organization reap that value – be it via shiny new business intelligence platforms, analytics engines, or artificial intelligence. There is no doubt high potential here, but navigating this shifting, data-soaked landscape can quickly confuse an organization just starting to gather and interpret data.

Launching a data science project without the right strategy can often lead to results that don't meet expectations and leave project managers fielding some tough queries from their stakeholders.

This guide aims to help home care organizations understand data science in home and community care, take the important first steps, and generate value at each stage of your data science project.



## Background

My name is Simon, I am Lead Data Scientist of AlayaCare's research and development branch. While new to the home care industry, I spent five years helping companies become data-driven and building products designed with machine learning.

What I've found is that many data science projects fail simply because of confusion between the various parties involved in the project. Yet, with a clear problem to solve, a plan with sensible milestones, and measurable deliverables in place, many companies can easily begin to tap the value of data to better serve clients and run an efficient organization.

# So, What Is Data Science?

Data science is a broad field that uses scientific methods, machine learning algorithms and systems to extract knowledge and insights from structured and unstructured data. Some exciting applications underway in AlayaLabs include:



## Caregiver Churn Prediction

This system sends key stakeholders in your organization an alert if any caregiver is vulnerable to churn within the next month, based off set criteria and thresholds in your data.



## Smart Scheduling

Optimized route and scheduling can streamline coordinator workflows and improve the utilization rates of caregivers while reducing the amount of overtime needed.



## Profit Margin Analysis

Take a deep dive into your organization's historical AlayaCare data to unearth new insights about how hidden factors impact your profit margins.



While each data science project is different than the next, I have found that a specific three-step process plants the right foundation for getting underway.

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# Step 1 - Gather Requirements

## Begin first by determining the goal of this data science project.

For instance, are you looking for insights about a business problem your organization is facing? Perhaps general insights are insufficient and you're actually seeking strategic recommendations of actionable insights? Or, do you have very specific goals, such as activating a predictive alert that flags potential risk ahead of time? (And, if so, how will this alert merge with the agency's workflow?)



Such questions can significantly impact every aspect of your project, from who should be involved to what level of data you collect, and what specifications get sent to which team members. In truth, there can be an endless list of questions to ask before embarking on a data science project.

## To help you, I've identified the key topics that are ideally covered while you gather requirements for the project:

1

### Business Context

*What is motivating this project? What problem are we trying to solve?*

It's essential that team members have a general understanding of the key problem being addressed and, as much as possible, underlying complexities that impact stakeholders.

2

### Stakeholder hypothesis

*What do the SMEs consider the most important data points/factors? Do they have theories as to the nature of the problem and what it will take to solve it?*

Learning this helps data scientists (who are often at arm's length to the business problem) gain context and a feel for what's causing the trends that the data might reveal. Answers here also point to initial ideas to explore and validate when performing a data analysis.

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## 3

**Deliverables**

*What do stakeholders want? Insights, strategic recommendations, or predictive alerts? For any of the three, how should it be delivered to, and used by, each stakeholder?*

Understanding how people can feasibly consume the data is key to delivering real value to an organization. So here you will deduce which additional team members should be involved. For strategic recommendations, you'll need various SMEs to turn insight into action. For predictive alerts, you'll need a user experience ("UX") designer, and a stakeholder to design and validate an enhanced workflow that benefits from alerts.

## 5

**Technical Validation**

*Can this idea work?*

Before stakeholders and project managers get too excited about the next greatest machine learning powered product feature, technical validation is an important step to predicting any challenges that the team will face. Speak to technical stakeholders about:

- The feasibility of improving existing data
- The feasibility of building a machine learning model for desired business goal
- Other potential technical solutions that could address business problem
- Complexities of integrating alerts into existing software (if applicable)

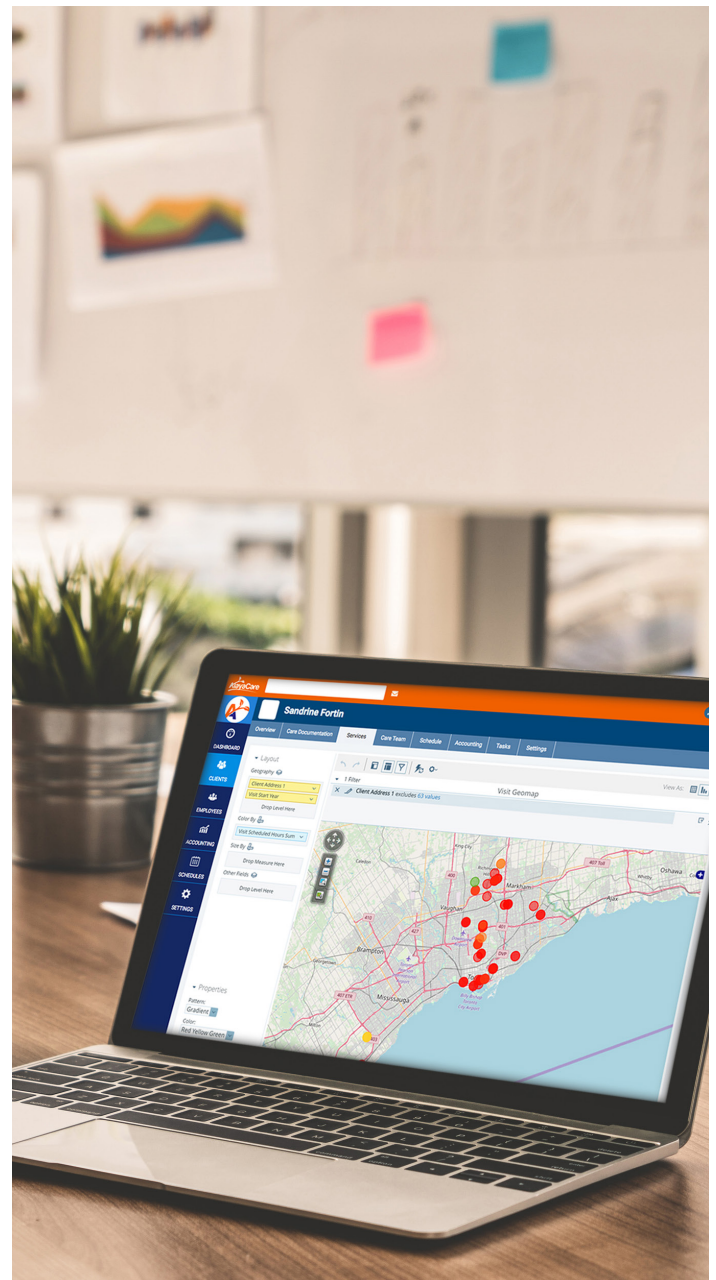
At the end of step 1, it's a good idea for the project manager to present a summary of the above topics (PowerPoint is handy) so all stakeholders can understand the true ins and outs of the project. Problem solving early sets the stage for success.

## 4

**Existing Data**

*Does a dataset already exist? Are there complexities of how the data are created that should be understood before analyzing it?*

The ideal business problem on which to base a data science project is one that already has loads of data. Bonus points if the data has been audited and consumed by someone already.



# Step 2 - Data Profiling & Improvement

**Once you possess the insights that will form the base of your research, you can begin creating a dataset from existing data systems.**

It's time to begin looking at the data, but before attempting to glean insights about your business problem, we are going to need to give your dataset a health-check. This addresses three key questions:

- 1 How many data points do we have and are there enough to form meaningful insights?
- 2 What fields are missing in the data?
- 3 Are inferred fields accurately computed/labelled so there is no "dirty" data? (Example: caregivers still marked as active staff even when they left six months ago)

Your answers will yield both data improvement recommendations to help get more insight on the business problem, as well as a greater understanding of the reliability of the data analysis – which happens in step 3.



# Step 3 - Data Analysis

## Example Analysis

### Utilization History of Active vs. Inactive Employee

Now, this is where the real fun begins. Regardless of the business goal you've identified, discerning the basic trends in your data is essential. There is no one exact way to analyze data, but here are some places to start:

- 1 Search for simple correlations in the data. (Example: yearly turnover rates – is employee retention slipping each year?)
- 2 Plot frequency distribution of all the dimensions in the data respective to what you are aiming to predict.
- 3 Try unsupervised learning to reveal hidden structures.
- 4 Try to find evidence that proves or disproves any stakeholder hypothesis.
- 5 Formulate new hypotheses from the above work and prove/disprove them.

Congratulations!  
Once you've performed this step, you will have a fairly clear understanding of what is happening in your dataset. Regardless of the delivery method, this kind of data analysis is the foundation to effective data science projects.

Now, data scientists, stakeholders and subject matter experts can start to uncover the basic trends and factors affecting the data – and plan for more complex analyses in future iterations of this project.

When there are important verified findings, be sure to spread awareness throughout the organization so the new data insights can be used each day to drive real business value.

For maximum value, consider a real-time dashboard that demonstrates insights in a self-serve environment to enable business optimization efforts to be measured for effectiveness.

## Contact Us

If the creative wheels are turning when it comes to data science and you're wondering if AlayaLabs can help bring your project to life, connect with your AlayaCare Client Relationship Manager at any time, or visit [www.alayacare.com/alayalabs](http://www.alayacare.com/alayalabs) for more information on AlayaLabs and how we can work together on your next data science project.



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