Farm data as moneymaker?

NUFFIELD
THE NETHERLANDS
FARMING SCHOLARS

provincie Overijssel

Introduction

Nuffield has been a great opportunity for me in terms of personal development and learning new things outside my daily job. Most interesting for me was to do research on a topic for which I usually do not have the time for because of my responsibilities on the farm.

My Nuffield 2018 topic is about Farm Data. Even after two years of research and traveling, I still have the feeling I just started! However, Nuffield is an ongoing process and - besides writing a nice report - the most important goal is to build something, which contributes to the development and growth of our farmers and their farms.

This summary explains my journey of Nuffield and how the farmers can benefit from it. This is just an overview of the journey so far, I will give my final presentation on the annual Nuffield Netherlands congress on November 29th, 2019.

I am also organizing a seminar with the ultimate goal to offer the opportunity to farmers being part of a farmer's database which they can control. The seminar will be held on February 7th, 2020. This seminar is particularly meant for farmers. In case you are interested, please sign up via www.farmersnet.org.

This journey has just started and I am hoping it will have a snowball effect where many farmers join forces by working together. If we collectively gather the data from multiple farmers and work together in developing new skills and opportunities, this can result in more income and growth for the individual farmers.

My hope is that during this process, more and more people in organizations like universities and governments (both regional and national), become enthusiastic. This will help us being competitive in the data 'battle'. With farmers being in control, we have a better position in the meat chain and it helps farmers deciding who are the best business partners for them and also with whom they want to share their data with.

In this summary, I will explain my topic Farm Data. I will start with a few problems that came up during this journey and I will write about how my traveling contributed to the project. You can also read about the project itself as well as the current status. At the end of this summary, I will explain the next steps.

I hope you enjoy reading this summary. I am also looking forward meeting you if you can contribute (in any way) to this project on www.farmersnet.org.

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Farm data

Every day, hour by hour and even every second, a lot of data is collected by farm computers. Regardless if it is a tractor or machine, an automatic milking system for cows, or the computers in pig and poultry houses. Farmers collect data. The data is used to control a process. In some cases, the stored data is used for research and helps understanding why certain things happened during the process.
Besides using data on the farm, there is so much more we can do with this data!

1. How can I inform my consumers (and or retailers) what is happening during the poultry farming process? Besides this, I also want to use it to prevent incorrect information being broadcasted on the news- a good example here is animal welfare.

2. How can we also use it to better position ourselves in the meat chain?
   If a farmer can do business on an equal level in the meat chain, he or she can do better negotiations which leads to a fairer farm income more in line with the financial risks a farmer has.

3. How can I develop new skills to improve management on a farm?

4. Can block chain contribute to secure data?

These four points are the subject matter of my Nuffield topic. First I will describe the contribution of the Global Focus Program (GFP) and my personal traveling.

Contribution of GFP

Different farmers are looking at data analyzing tools for their own farm. An example is a New Zealand farmer based near Delhi, India. He developed his own system to improve milk quality and productivity in his 220-cow dairy farm. This farm is a cooperation of local Indian landowners. This farm showed us (our GFP group) that deeper analysis of many of the data creates a very different perspective. In this case, the focus was mainly on feed formulation to improve total yield of milk production, in particular to keep track of the lowest producing cows and the uniformity in production per cow. And the lesson learnt in this particular case, low producing cows needed more feeding rack space to increase feed intake. This on top of all of the other challenges India has!

In the United States of America, I talked to poultry farmers who are fully controlled by their slaughter company or retailer. This retailer usually is de director of the meat chain and dictates which equipment farmers should buy. They even control poultry computers or computer settings every week to make sure that all farmers raise broilers in the same way. They have fully access to computers but do not use one piece of data from farm computers for data analysis! Even they have the opportunity and the capital to do data analysis to improve farming and reduce meat chain costs.

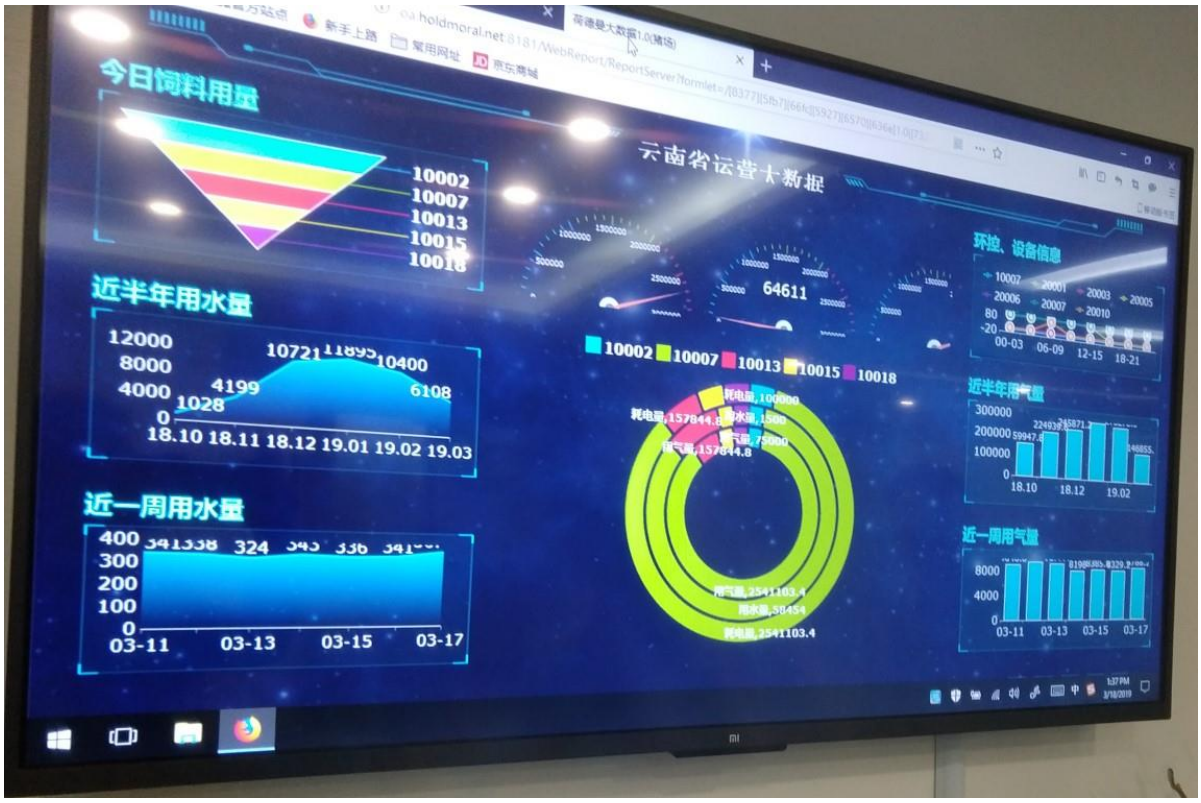
In the UAE and Qatar, large farms including hatchery and slaughter plants - which are fully owned by the integration - showed us that even if every piece of a farm is fully in control, they do not take benefits of using the already existing data. The focus in these integrations is on cost control of the overall process. This is of course very important, but you can reduce (failure) costs if you take the full benefits of the available data.

All of the above mentioned challenges have one thing in common: regardless if a poultry meat integration is fully owned by one company (and farmers only take risks of the flock and building the houses), or if the whole integration is privately owned by different companies and independent

farmers (like in North-West Europe), integrations do not take the full benefit of all of the available data to prevent failure costs and to improve total revenues in the chain.

Contribution of my personal traveling

China showed me that by using European equipment like pig and poultry computers, the technical performance could be at a same level as it is in the EU, which depends on management. Especially large companies in pig and poultry collect many data and some of them have developed dashboards similar to what some of the European companies are using such as Porphyrio and Farmresult. This helps them to be more in control. The dashboard helps to have a good overview of the existing data as shown in the picture below.



In China, one pig integration in Guangzhou tries to implement block chain in their computerized system. The main driver for this is food safety, which is a big issue in China. One of the biggest challenges they ran into is on how to convince other companies in the meat chain to implement block chain as well. In this particular case they had a challenge with the slaughter company (the integration owns everything in the chain except the slaughter plant). Because of a different political system, they convinced the governmental bureau that this improves food safety and this governmental bureau forces the slaughter company to cooperate. This company just started implementing block chain! Because of the fact they just started, they were not able to show some examples.

Different from that, Thailand showed us that integrations or companies, who are expanding quite fast, are using modern farm computers, but they do not take many benefits of all of the generated data. In countries like Spain, France or the United States of America, farm computers are also only used as a process controller for climate and feeding.

In almost all countries I visited, computers are in use for process control and the generated data is not very often used for analysis purposes. This is most likely the result of replacing analogue climate controllers by digital computers. The controlling process is still the same but computers of today can

do much more. Nevertheless, regardless of an independent farmer or a big integration, at poultry house level, the level of data exchanging or analyzing is almost the same.

Looking at all of the different markets and organizations of the poultry meat chain and the position of the farmer in this chain, they all have one thing in in common: data sharing and analyzing is generally not developed, regardless the state of the art of farms and/or type of meat chain.

Taking all the things in mind I noticed during travelling around the globe, I will describe first the challenges and the reasons of not sharing data at this moment. After this, I describe a possible solution and what is necessary to achieve a successful data exchange and take all the benefits of it. Finally I describe next steps of this project.

Challenges

Nowadays almost everyone is agreeing that data generated on a farm, is owned by the farm or farmer. Quite simple so far. However, if you want to do more with it, you have to rely on the support of the software producer. Raw data generated by one platform only is not usable without 'translating' to another platform. For example, combining data from different brand computers is not possible. It takes many data elements in order to do a full analysis where the farmers can learn and benefit from. Developing new software, which farmers can use to show to their customers the actual farming process, costs a lot of money and this is not affordable for most individual farmers. However, it is a critical selling point for the farmers to demonstrate what makes their farm unique

Another challenge is data exchange in the meat chain. This is necessary because of governmental requirements on food safety and animal welfare. In order to meet these requirements, the farmer has to exchange data to many different companies and they all work with their own platform. This creates a lot of manual effort by hand typing the data into the different platforms while the data is already stored on the farm's computer! The amount of data from other partners is usually limited to governmental required data only which prevents cost optimization of the total meat chain.

Reasons not sharing and analyzing data

There are a few reasons why working together based on sharing data is not a basic condition in farming.

1 Most of the poultry houses worldwide (and pig houses) are equipped with maybe 5-10 brands of computers. A lot of them are still working on a MS DOS platform. The software/computer developers are not busy with developing new skills and/or data analysis. Mainly because of the fact that data analysis is quite expensive because you need a lot of data as a benchmark. Besides this, return on investment will be low because of the limited number of poultry houses worldwide. Software markets are small in agriculture if you compare it to other software markets like business or health. Therefore, the software producers are not eager to develop a lot of new programs.

2 All the partners in the meat chain have evolved in large companies in the last decades and they have developed their own software systems which is focused on cost reduction and tracking and tracing of their own business. For them there is currently no benefit in sharing data.

3 From what I have seen, the biggest problem in exchanging data with the partners in the meat chain is that all partners in the meat chain such as retailers, slaughter companies, hatcheries etc., are quite confident and happy with their existing role and their financial revenue. Everyone except the farmers, mainly because of the huge financial risks and low return on investment farmers usually have.

If you summarize the above, you can imagine that only outside pressure (like governmental involvement) can change the course of the game. Alternatively, farmers have to exploit it themselves. This is why it is best to combine both!

Solution

With the knowledge from above, let us go back to the start where I described the three ideas of what else I believe you can do with Farm Data (page 3 of this summary). If you keep all of this in mind and the fact that I did research with other people and farmers on using house data for explaining animal welfare to consumers, I noticed the following points:

Subject 1

We (two broiler farmers and software suppliers), tried to set up a project of animal welfare data merged into a dashboard which is understandable for consumers.

It can help tell farmers their story but unfortunately, no animal welfare company or retailer is interested in this. If we want this to be a success, we need many farm data in a database to convince people in the meat chain such as retailers, about the benefits of this. However, this means we can only make it successful if we are able to develop the dashboard by paying it from the benefits of a successful database project and use it as extra method in order to be more transparent.

Subject 2

Almost all of the required data is available in the meat chain, but stored/collected by different partners. These partners in the meat chain all have their own reasons for not sharing the data. Most common reason is the fear of being copied by competitors, their current controlling position in the meat chain or the fear of claims from other meat chain partners. It can save farmers a lot of time if these partners are willing to work together as this eliminates the need of farmers to collect data from different platforms.

Subject 3

The existing data from the houses stores a lot of information, so it will be a matter of data analyzing from a big database to build up smart tools like an app which generates practical advice to improve farm management for a farmer.

All of the above-mentioned three points have one thing in common. **Farmers have to create their own database!** With this database, farmers can start collecting data. Very soon, we will see savings due to saving time and making less mistakes when exchanging data automatically with other companies in the meat chain. After that, we can work on analyzing data and developing new management skills and maybe even predict where the risks are in raising poultry! During these processes, we can also work on developing dashboards - for example for animal welfare - to help farmers developing new markets. Farmers can also use specific data from the dashboards to convince retailers and become more profitable by getting better prices for their products.

Below you find the mentioned solution summarized in a table.

Question	Solution	How?
How can I inform consumers and retailers?	Filter farm computer data on welfare and design an understandable dashboard	Farm data base software Graphic designer Consumer expert
How gets a farmer a better position in the meat chain?	Create a big database of farm data and connect the meat chain	Develop simple tool for adding crucial data into the data base
How can I improve management and develop new skills?	Data analysis big database and develop new tools	Let data analysts, veterinarians And farmers work together
Can block chain contribute to secure data in the meat chain?	Only in case of no confidence between partners	Develop block chain only for ‘lack of confidence’ topics

What is important for a successful database?

Four things are necessary to make a farm database a success. And all four points mentioned below are necessary to make it a success.

1 As a start, the developing of an **independent** database from and for farmers is a must.
2 Companies in the meat chain, consumers and the government have to **acknowledge** the database. Preferably by taking benefit out of the gathered data.
3 Partners in the meat chain have to **share** their data.
4 Database must have an **added value** to all connected partners.

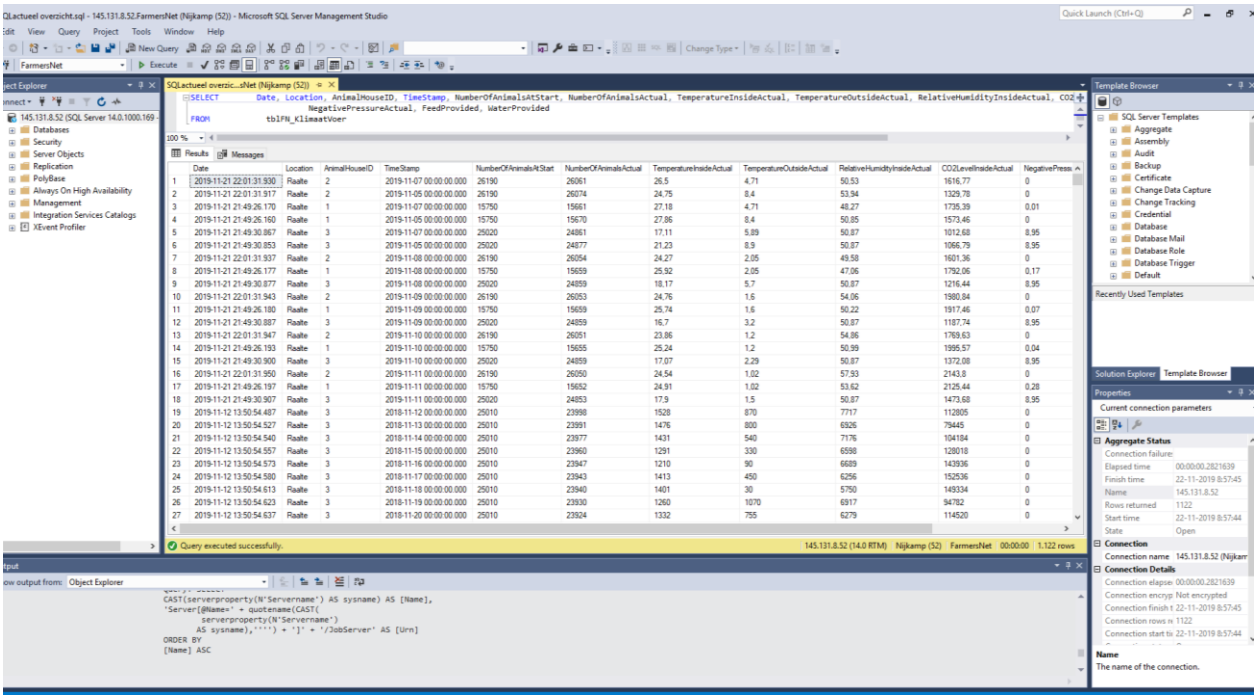
All four conditions are important but it can still take a long time before we start seeing benefits from our database due to a slow scale up. People will start quickly if they see benefits of being connected. At this point external pressure (like the government) can help.

How can we achieve this?

I have tried to connect with an existing database software developer who is very active in the farming industry. This was the quickest and easiest way to get start. However, they were not very eager to participate. Main reason was that they have spent a lot of money in developing their software. Biggest struggle for them was the connection with all the different brands of farming computers. This is the largest percentage of the developing cost, not the database itself. Besides this, their business model for return on investment is based on the expected number of farmers who are willing to connect. If there is another system, revenues will be lower. In order for these companies to start earning revenue, they are connecting to existing companies in the meat chain. This makes them almost 'part' of the commercial companies in the chain.

There is only one solution left. Just start collecting data! If you want to convince people like farmers and other farming related companies, it works best if you can show some examples and that is wat I did.

Below you see a screenshot of our database with all the daily data from all of my three broiler houses from the last year.

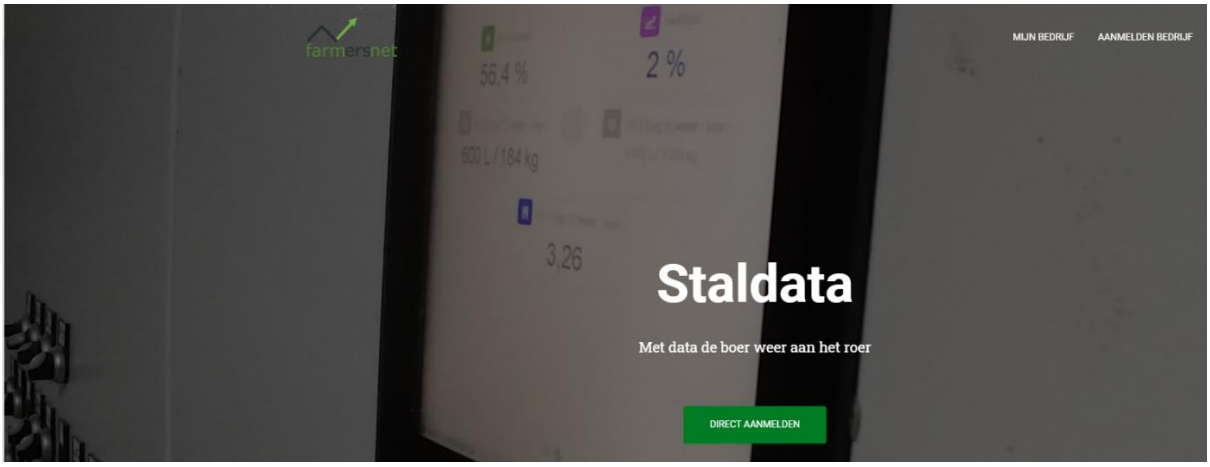


I started small scale and with a low budget on a server with an SQL database. Now I am working on connecting other farmers to our database. In order to prevent spending a lot of money to get connected to all different types of software brands, we need external support - e.g. government – to drive this. If there is enough support, partners are eager to get connected and pay for their own connection to our database. This does not only prevent us from spending money to make connections with different brands of farm computers, but it can also help us in getting connected with companies like slaughter houses, feeding plants and hatcheries.
This is also the reason that I visited the department of Agriculture of our government. If the government can help us as farmers (for example they can support us to get connected to the national database with all the flocks for veterinarian purposes), more companies see benefits and are more eager to connect. The government/Minister of Agriculture already said that a better position of farmers in the chain is a must to give farmers fair prices for their products and this Farm Data initiative can support that. Also, the government is very interested in the use of block chain to improve data security. That is the reason why Wageningen Economic Research (WER), which is a part of Wageningen University, is involved too. They wrote a project plan to help me funding money for further expansion of our database and most likely also to implement block chain for better securing data. This will be a next step. First, we try to expand our database and work on data analyzing. By getting connected with the governmental database (and most likely also with the slaughter company), farmers save a lot of time and are also reducing errors. These are benefits farmers like to see as well as a guarantee this is their database (and thus fully independent)

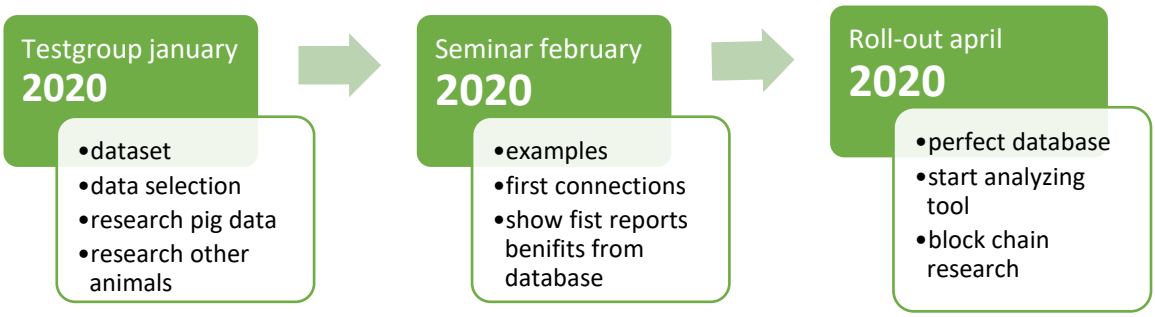
What is next?

The database currently runs on an experimental scale. We are in the process of connecting a few other farmers so that we can start collecting additional data. Meanwhile we are also formulating with a small group of poultry farmers the key data we want to collect. At the same time, we are investigating if we can include data from pig farming after the first poultry rollout as well to generate additional farm data. This is because pig farms are equipped with the same brands of computers as poultry and almost 80% of the generated data is equal.

At the same time we ae also in the process of setting up a website named farmersnet.org. Not only for information purposes, but also to add new data (like vaccinations of the flock), in a simple way by just using your mobile phone. A screenshot below shows our website.



Next steps are shown in the timetable below as a roll-out of our project



This timetable shows that the seminar at February 7, 2020, is very important to create support from farmers. It gives 'body' to our database. The number of participating farmers at the start of the project is not so important. Instead, it is more important to have enthusiastic farmers who are willing to connect. This helps us building the data base and also gives us extra motivation on how important working together is. At the same time, we generate feedback on how to improve our project.

Meanwhile it is important to find at least one meat chain company to exchange data with. That is why I already started contacting my slaughter company (as the director of the meat chain I am part of). They are curious about our database and the (possible) agreement with the government!

As you can read, there is a lot is going on in farm data. However, it is just the beginning! There is so much possible, I think more than anybody can even imagine. Think about all the large companies worldwide, spending a lot of money on data analysis and improvements. If we are able to manage our own data and take all the benefits of it by improving our database, we can make revenue out of it as well. You already see many companies, even in agriculture, who make revenue out of farm data. Examples are automatic milking system manufacturers and tractor and machine manufacturers. They all have subscriptions for transforming raw data from multiple farms into usable data for machines and systems. Something we can do ourselves!

This is a project born out of frustration in a particular Dutch farm setting and Dutch meat chain. As I wrote before, many problems in (poultry) farming are worldwide the same! It would give much more benefit to farmers if they all share data together regardless the country they are located in or the type of farming they are in! So please contact us at www.farmersnet.org and join!

Epilogue

Let me start thanking my sponsor, the Province of Overijssel, who gave me the opportunity to travel, both my personal travel as well as the GFP, the Global Focus Program. Not only supporting Nuffield, but also innovative agriculture in general, they helped me as a sparring partner. Not in technical details or on how to reach my goals, but they always supported me with every step and helped me with good discussions, organizing events and they gave me other connections and people to talk with.

Of course, I want to thank Nuffield The Netherlands, who gave me the opportunity to learn, discover, ask, think and rethink. During my scholarship for every answer, two questions came up! They not only gave me the opportunity to travel, but also gave me a personal leadership course and support during this process.

Thanks to my GFP mate's too. They gave me an unforgettable journey! Not only in terms of a six-weeks of travel and learning from different cultures and each other, but mainly in the great way we respect and treat each other!

Lastly, I want to thank my family. I could not have done this without the support of my wife Renate and my kids as well as other close family members. They have supported me from the beginning of this journey and I would not have been able to make the Nuffield experience a success without their tremendous support!

Robert Nijkamp