Krister Talvinen

ADDED VALUE

– Researcher's Guide to Impact and Winning Proposals –

Krister Talvinen

ADDED VALUE

– Researcher's Guide to Impact and Winning Proposals –

In loving memory of Pasi “Paake” Rautiainen (1975 – 2020). A colleague and friend, and I will always remember you as a cheerful giant with a golden heart.

© 2020 Krister Talvinen

Helda Open Books

Cover: Rafael Zamora

ISBN: 978-951-51-4991-6

DOI: 10.31885/9789515149916

This book is published under Creative Commons license (CC BY).

FOREWORD

This book is meant to be a practical guide for researchers and PhD students on the topic of ‘impact’. Nowadays many funding bodies expect applicants to compose an ‘impact section’ in research funding applications, and this guide focuses on providing concrete tips and tools for proposal writing. The book is not intended to be an academic exploration into the concept, but the guidance provided here is based on my experiences of writing winning proposals. I am aware of the academic debate on the concept of ‘impact’ and its development during the past decades, but the guiding principle for me in writing this book has been to provide the best possible insights for researchers in order to write better proposals and have even more impactful research. During the past four years or so at the University of Helsinki, I have held tens of workshops on impact and helped researchers on virtually all funding instruments offered by the Academy of Finland or Business Finland, and also supported several applications for foundations and EU funding. I express my gratitude to all researchers, PhD students, and colleagues with whom I have had the privilege to work and discuss about the impact of research.

Finally, music has always had a huge impact on my life. The following albums have been repeatedly listened to during the writing of this guide, thus have formed the soundtrack for *Added Value*. I deeply thank the artists for nurturing my soul with their passionate creations.

Blood Incantation: Hidden History of the Human Race

Emerson, Lake & Palmer: Tarkus

Fulci: Tropical Sun

Immolation: Atonement

Mayhem: Daemon

Mithras: On Strange Loops

Pestilence: Consuming Impulse

Runemagick: Into Desolate Realms

Suffering Hour: In Passing Ascensions

Tomb Mold: Planetary Clairvoyance

Whitesnake: Slip of the Tongue

CONTENTS

INTRODUCTION	7
OBJECTIVES OF BOOK	7
KEY CONCEPTS	7
ABOUT CONTENTS	9
 CHAPTER 1 – BIG PICTURE	 10
1.1 FIRST THINGS FIRST	10
1.2 SCIENCE MATTERS	12
1.3 MEGA-TRENDS	15
1.4 SUSTAINABLE DEVELOPMENT GOALS	16
1.5 SUMMARY	21
 CHAPTER 2 – REALM OF IMPACT	 22
2.1 BEDROCK	22
2.2 MANY FACES OF IMPACT	23
2.3 FROM RESEARCH TO IMPACT	25
2.4 TRIANGLE OF IMPACT	29
2.5 ACADEMIC IMPACT	30
2.6 METHODOLOGICAL CHALLENGES	34
2.7 SUMMARY AND DISCUSSION	36
 CHAPTER 3 – COLLABORATION	 39
3.1 WHY BOTHER?	39
3.2 SHOULDERS OF GIANTS	40
3.3 STAKEHOLDER ENGAGEMENT	45
3.4 SUMMARY AND DISCUSSION	49
 CHAPTER 4 – COMMUNICATION	 50
4.1 CLARITY	50
4.2 PITCHING AND NABC	51
4.3 ONE-PAGER	56

4.4 SUMMARY AND DISCUSSION	58
CHAPTER 5 – FUNDING AGENCIES	59
5.1 INTRODUCTION	59
5.2 PROPOSAL EVALUATION	60
5.3 FOUNDATIONS	62
5.4 ACADEMY OF FINLAND	65
5.5 STRATEGIC RESEARCH COUNCIL	69
5.6 BUSINESS FINLAND	72
5.7 SUMMARY	74
CONCLUSION – ONLY IMPACT MATTERS	75
NOTES	77
APPENDIX – EXERCISES TEMPLATE	81

INTRODUCTION

OBJECTIVES OF BOOK

This book is meant to guide researchers and PhD students in matters pertaining to ‘impact’. A couple of decades ago, ‘excellence’ was all that funding agencies wanted from research. Simply put, if you were able to show that your intended research project will significantly advance the field and discipline(s) involved, you were funded. Since that era, however, funding agencies have changed their vocabulary, and even though excellence is still important, funding calls now emphasize terms such as ‘stakeholder engagement’, ‘interaction plan’, ‘dissemination activities’, and of course, ‘impact’. My sole purpose is to help you to write better proposals and enhance your chances of being funded. I am also a firm believer in science, and all researchers should be too. Therefore, I am not going to ask you to sell your soul to some dark demons of consultancy mumbo jumbo. Science comes first and is paramount. But there are various things to be considered in the context of *proposal writing*. The game is relatively simple after all: you are asking for money, and if you are convincing enough, you will get what you want. The rules of the game are published in funding calls – if they want you to provide impact, you have to give them that. This guide aims to provide the following gains:

- How to make the best out of ‘impact’ and how to efficiently communicate the impact of research in grant proposals;
- Concrete tools for enhancing grant proposals in general;
- Concrete tools for enhancing grant proposals for specific funding agencies or calls;
- Tips for developing the impact of research and making it more significant.

Much of what will be presented in the following pages is about *how* (and what) you communicate about your research. But this guide is not intended to be an assistant in verbal acrobatics only, for I hope that some lessons here can help you in making your research *de facto* more significant, to have more of that precious impact.

KEY CONCEPTS

Since composing proposals means writing them, the general virtues applying to communication are ever important here as well. My own experience, based on hundreds of applications, is that winning proposals are always very clearly written: text is concise, language and sentence structures are relatively simple, overly use of jargon is avoided, structuring of the text with the help of chapters and titles is robust and adds clarity on the whole, each paragraph and sentence is considered and has a point, and there is a good sense of flow in

the text. Presumably all of us know these virtues of writing, but of course being able to master them is another matter. However, I would say that having a good structure in the proposal is not that difficult to obtain – and a well-thought-out structure in a research plan helps enormously in understanding the contents. Basically, you just have to communicate as clearly as possible what, why, and how you are going to research. There are thousands of books on how to write grant proposals and courses to attend, and I try avoid this type of general advice on proposal writing, although much of what I will say concerns how to communicate the *impact* of your research. However, Chapter 4 is devoted to communication, or how to pitch your research via a very influential tool, the NABC template.

If I had to summarize everything about impact into a couple of terms, I would probably choose the concepts below. They also illuminate my approach or framework to impact and proposal writing, more generally.

***Return on investment (ROI):** In business analysis, ‘return on investment’ is a technical term referring to efficiency of investment. My usage is more metaphorical, but I think ROI captures something very essential in the context of proposal writing too. Namely, you are asking for money (or investment) for your research, and you have to convince the evaluators that the expected benefits (or return) of your project outweigh all the others in the competition. In my experience, many researchers excel in describing the actual research work, but not that many are able to tell the expected gains arising from the research. Here we are touching on the very crux of impact, namely being able to explain how the world will change, and what kinds of benefits will be gained by the scientific community and humanity as a whole.

***Collaboration:** As I have said, I will include a lot of material on how to efficiently communicate about the significance or impact of your research. However, collaboration is one of the most powerful means to gain more actual relevance or impact for your research. Briefly, collaboration is efficient, while staying only in your chamber is not. We all know this from the praxis of funding calls as well: it is assumed that you collaborate with people, because that way your research project will be more comprehensive and significant. At least from governments’ and funding agencies’ perspectives, science is supposed to provide solutions to difficult problems, and when scientists collaborate, they arguably can achieve more together than by working solo, isolated from each other. As for related terminology, ‘*multidisciplinary* research’ calls for collaboration between researchers from different disciplines, whereas ‘*transdisciplinary* research’ calls for collaboration between researchers and non-academic stakeholders. Collaboration enlarges the scope and relevance of your research and provides opportunities for other parties to utilize your research.

***State-of-the-art:** If the above terms are key concepts, ‘state-of-the-art’ is the definitive door to be opened by those keys. State-of-the-art would be my choice for the most important single concept in grant writing. Referring to the highest level of development, the concept seems cunningly simple, but when properly understood, it can really make the difference between a winning and losing proposal. Grant writing is about

selling your idea and convincing evaluators that you are worth funding. Whatever your business is, people making decisions about money are interested in knowing what the market for your solution is and how it relates to the state-of-the-art in the field. In other words, you always have to contextualize your research with respect to the state-of-the-art, and communicate the benefits of your project, i.e. how you are going to advance the field and go beyond the state-of-the-art. No one wants to fund the same old work that is already being done elsewhere.

ABOUT CONTENTS

Chapter 1 sets the stage and provides the big picture before we go into detail in the subsequent chapters. We discuss the impact of science in general, as well as the relevance of *mega-trends*. Sustainable Development Goals defined by the United Nations are considered too, and why researchers should take them into account is discussed.

Chapter 2 goes into the depths of *impact*. We set useful conceptual distinctions and discuss the varying timescales for impact. A very useful tool, *triangle of impact*, is introduced, and this supports deeper discussion of academic or scientific impact. How each project should define its added value (or ROI) is discussed in relation to the ultimate expected scientific outcomes, the impact of a project. The chapter is closed by considering some methodological challenges inherent to statements about impact or expected outcomes of research occurring in the future.

Chapter 3 provides an overview on collaboration and its importance. Science in itself is a collaborative endeavor, and a sophisticated system of infrastructure and administrative services is needed for any research project to take place. We discuss generally ‘stakeholder engagement’ or collaboration with non-academic parties, and how to do it in practice.

Chapter 4 discusses communication and especially how important it is for researchers to be able to summarize research ideas clearly in a concise manner. This kind of skill is called ‘pitching’, for which an effective tool or NABC model is introduced and its use is practiced too. We also learn how to compose effective one-pagers.

Chapter 5 discusses how to apply the lessons of the previous chapters into specific funding calls. After briefly describing evaluation procedures, hints are provided for foundations, the Academy of Finland, the Strategic Research Council, and Business Finland.

The book is closed with a few concluding remarks.

CHAPTER 1 – BIG PICTURE

In this chapter, we justify the notion of *impact* in general. Impact is nothing new, since science has had an enormous influence upon humanity, and governments and funding agencies simply aim to ensure that it will stay that way in the future too. Currently, we are faced with various complex and global problems, and, if research can be shown to be relevant in solving them, science has an undeniable impact. This is an efficient way of highlighting that investment in research will not be in vain. So basically, a researcher just has to tell how the intended research work and scientific findings will contribute to the good of humanity.

1.1 FIRST THINGS FIRST

This book is meant to be a guidance on issues related to impact of research, especially in the context of funding applications. As such, the chapters of the book are like a training program, since *impact* is in many ways a skill you have to cultivate in order to learn the basics and more advanced levels. Lesson number one is that you must take this endeavor seriously and allow sufficient time to read and reflect. There are no definitive answers about *impact*, but it depends on *your* particular research themes and settings. This book provides you with tools that are, however, useless if you fail to think about how to apply them into your own research. This book is filled with different exercises, and again, if you want me to be able to help you, please take time and complete all the exercises as they appear. On pages 81–98, you can find an ‘Exercise Template’ as an Appendix. Please do print the template, and fill in your answers one by one as you encounter the exercises. And now, it is time for the very first exercise.

EXERCISE 1 / WHAT THE HILL IS IMPACT?

This exercise is all about free association; just try to capture your first impressions and thoughts. So, think about the word 'impact' and start writing down your thoughts on it into the Exercise Template. Your answer can be whole sentences, individual words, or a mind map; whatever suits you the best. Use a couple of minutes, or as long as you have a flow going on. Then have a brief pause and return to the book.

1.2 SCIENCE MATTERS

As you are probably well aware, for quite some time funding agencies have been asking applicants to justify their research proposals by providing accounts on the impact of their research. An obvious way to start exploring this magical ingredient X or *impact* is to ask what the concept means. A very influential and widespread definition has been the one provided by UK Research and Innovation. In all its simplicity, the definition reads as follows:

“Impact is the demonstrable contribution that excellent research makes to society and the economy”¹.

Here impact is understood as societal; something that benefits the society and citizens. In addition to this societal reading, academic impact can also be distinguished. Academic impact refers to scientific advances acquired via research, and societal impact refers to non-academic, societal advances or benefits acquired via research. In this chapter, we discuss impact broadly, as all things considered benefits arising out of research. In the following chapter, we are going to discuss the taxonomy of impact in further detail, but for the time being, let us not be too bothered about conceptual distinctions.

If you think about the past millennium, scientific discoveries have had an enormous impact on human life. In fact, it is hard to come up with any area of life that is not affected by the progress of science. Rational thinking and cumulative scientific discoveries tell us apart from the rest of the animal kingdom. Via scientific method we have found ways to transform the raw materials of the Earth into different commodities. Inventions such as fabrication of steel, optical lenses, compass, gunpowder, paper and the printing press paved the way for the modern society with further inventions like electricity, internal combustion engine utilized in cars and planes, vaccination, nuclear fission, and personal computers. And as we now know, Internet, digitalization and artificial intelligence are expected to drastically change our lives in the coming decades. All aforementioned inventions would not have been possible without scholars and rigorous scientific practices. Of course, it might be argued that in fact many inventions have been results of lucky coincidences. But even if that is true, scientific method has provided us with cumulative understanding over all past discoveries, which has, in turn, led to new breakthroughs. In two words – science matters.

One obvious lesson that can be drawn from the above is that impact of research is easier to see retrospectively, looking into the past and seeing connections between earlier discoveries and current developments. Here we are touching on one of the most challenging features of impact statements, namely that we try to foresee the future state of affairs and distinguish the effects and influence – i.e. *impact* – of current-day research. This guide is intended to provide you with tools to undertake that very magic trick. One of these tools is actually looking into the past: when you understand what kinds of achievements have

followed from the past research in your own discipline, you are able to formulate plausible statements about the expected outcomes of recent research. This is a recommendable technique in various contexts regarding proposal writing. Namely, when writing research plans, you very often have to describe research work that *will* be conducted and *expected* outcomes, as well as *likely* risks. In other words, you have to make educated guesses about the future.

Proposal evaluators first and foremost try to determine whether the research ideas presented have, even paradigm-shifting, breakthrough potential in terms of scientific excellence. And if they are convinced of the uniqueness of the research idea, then they try to assess the feasibility of the project, i.e. whether you can deliver that what you have promised. My argument here is that you can convince evaluators on the project's feasibility and your credibility by showing your past successes or track record in a relevantly similar area. If you do not have personal prior achievements in the area, it is still worth checking whether you could utilize e.g. the track record of your department or other scientists in a relevant discipline. The logic of the game for funding is quite simple after all: you have to provide evidence for evaluators that your research idea is unique and feasible. Most proposal evaluation processes include several phases, and you have to convince different people in all the phases in order to win, that is, receive funding. External reviewers and actual funding decision-makers have different backgrounds, and they do not necessarily know what is or is not feasible in your discipline. Thus, you have to tell them and do not make them guess anything. Let us apply all of this into an exercise.

EXERCISE 2 / LESSONS FROM THE PAST

First, write down your discipline and research theme(s) into the Exercise Template. Then think about what kinds of achievements there have been in the area and write them down. Do not be bothered whether those examples of yours are 'societal' or 'academic', or whether they are quite old or very recent. The point here is to think about what kinds of successes there have been in your research area.

EXAMPLE 1 / Food sciences: Due to significant advances in plant cell research, we are nowadays able to produce cultured meat.

EXAMPLE 2 / Cultural history: Meticulous studies have shown that history writing is often biased and thus replicating the power hierarchy between ruling class and minorities.

EXAMPLE 3 / Cancer research: Understanding the genetic changes tumors cause has led to a new era of 'personalized medicine': treatments will be tailored in accordance with each patient's unique traits.

1.3 MEGA-TRENDS

Change is inevitable, that much is certain. But governments and organizations such as the United Nations must also act and determine their course of action on the basis of the best possible predictions and evaluations. Therefore, we nowadays have various lists of 'mega-trends' that help governments, intergovernmental organizations, scientific communities and others in deciding where resources should be allocated for the benefit of humanity. The European Union has its own unit, ESPAS (the European Strategy and Policy Analysis System), for providing foresight and information on mega-trends. The following characterization of mega-trends by ESPAS is illuminating:

Whenever we think about the future, mega-trends are our first helpers. This is because mega-trends have several characteristics in common that help us narrow down the futures from infinite possibilities to a restricted possibility space. As their name suggests, mega-trends are trends that occur on a large scale; they therefore affect large groups of humans, states, regions, and in many cases, the entire world. Mega-trends also unfold over an extended period of time: their lifespan is normally at least a decade, and often longer. Most importantly, mega-trends are linked to our present and are therefore phenomena we can already observe today. Because mega-trends are measurable, and affect many, and for a long period of time, they lend a previously foggy future an increased degree of visibility.²

In its report³ from 2015, ESPAS defines the below five global trends as most influential on our course toward the year 2030.

1. The human race is growing older and richer with a growing middle class and widening inequalities.
2. Economic weight and political power is shifting to Asia. Sustained development of the world economy is becoming more vulnerable to challenges and to weaknesses in the globalization process.
3. A transformative industrial and technological revolution. A revolution in technologies and their applications transforms societies in almost every aspect. Digitization is the invader and radical, disruptive change the consequence.
4. A growing nexus of climate change, energy and competition for resources. Managing scarcity of resources becomes an increasing challenge, with rising energy consumption and shifting patterns of production.

5. Changing power, interdependence and fragile multilateralism. The interdependence of countries, now a fact of global life, is not matched by strengthening global governance. The world order becomes more fragile and unpredictable.⁴

The above trends may seem quite self-evident or unsurprising, but the reason for discussing them here should be obvious. Namely, if you are able to argue that your research is relevant for coping with global trends or providing solutions for the associated problems, then you can also claim to have an impact. Your research is significant, since it addresses topical and grave challenges that humanity is currently faced with.

In Finland, the Finnish Innovation Fund, Sitra, has published mega-trend reports regularly since 2011, and their latest report⁵ was published in January 2020. The report, written in Finnish, is worth checking out, even though its main five trends are more or less the same as those outlined by ESPAS, listed above. It is however interesting, as noted in the preface of Sitra's new report, that also understanding of and discussion relating to mega-trends has evolved over the years. In the past, megatrends were just static lists of strengthening, significant phenomena. Now the dynamics are emphasized, and accordingly so are different linkages, interrelationships, and tensions between mega-trends. It is also now acknowledged that trends will not necessarily actualize linearly, but the future can be affected by their unforeseen combinations.⁶ Which is almost as admitting that, after all, we do not know what the future will be like. However, I think that it is useful for researchers to be at least aware of the discussion on mega-trends. A related, important topic is to acknowledge the strategic objectives and mission of funding agencies. The obvious moral here is that it is all the better if you can argue that your research project will also advance the goals of the funding body in question. You may still be wondering how the so-called mega-trends are relevant for your research, but there are other very influential 'trends' that show in various countries' political agendas and, hence, in the strategies of national funding agencies. These are the Sustainable Development Goals (SDGs).

1.4 SUSTAINABLE DEVELOPMENT GOALS

The Sustainable Development Goals (SDGs) were set by the United Nations in 2015, after many years of preparation. In a nutshell, SDGs are "a universal call to action to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere."⁷ Their importance is paramount – "we don't have plan B because there is no planet B" – as famously said by the United Nations Secretary-General Ban Ki-Moon.⁸ Although the SDGs are not legally binding, countries are expected to implement actions in order to achieve the goals. The European Union is fully committed to implement the SDGs, and thus they are also deeply entrenched into European science policy. As you may already know, the Academy of Finland requires that applications for funding include a brief section on how the research project will promote sustainable development. The Academy's account on SDGs will be discussed more closely in Chapter 5.4. The SDGs are

presented below in Figure 1, followed by a list that spells out, in quotation marks, the exact phrasing of each goal. The United Nations website has lots of information on SDGs in general and with respect to each particular goal.⁹ There are also specific targets for each goal, and each target has specific indicators – the total number of targets is 169 and indicators 232.¹⁰

Figure 1. Sustainable Development Goals

Goal 1: No poverty

“End poverty in all its forms everywhere.”

Goal 2: Zero hunger

“End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.”

Goal 3: Good health and well-being for people

“Ensure healthy lives and promote well-being for all at all ages.”

Goal 4: Quality education

“Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.”

Goal 5: Gender equality

“Achieve gender equality and empower all women and girls.”

Goal 6: Clean water and sanitation

“Ensure availability and sustainable management of water and sanitation for all.”

Goal 7: Affordable and clean energy

“Ensure access to affordable, reliable, sustainable, and modern energy for all.”

Goal 8: Decent work and economic growth

“Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.”

Goal 9: Industry, Innovation, and Infrastructure

“Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.”

Goal 10: Reducing inequalities

“Reduce income inequality within and among countries.”

Goal 11: Sustainable cities and communities

“Make cities and human settlements inclusive, safe, resilient, and sustainable.”

Goal 12: Responsible consumption and production

“Ensure sustainable consumption and production patterns.”

Goal 13: Climate action

“Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.”

Goal 14: Life below water

“Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.”

Goal 15: Life on land

“Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.”

Goal 16: Peace, justice and strong institutions

“Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.”

Goal 17: Partnerships for the goals

“Strengthen the means of implementation and revitalize the global partnership for sustainable development.”

Let us recall why we are discussing the SDGs in the first place. In a nutshell, funding agencies worldwide require scientific excellence but also significance or impact from research proposals. Thus, each and every

researcher is faced with the challenge of providing a plausible narrative for the significance or impact of the intended research project. The lesson to be drawn from our discussion so far is that mega-trends or SDGs can provide you with a neat framework for justifying the general significance of your research. Thus, it is time to practice all of this via an exercise.

EXERCISE 3 / SUSTAINABLE DEVELOPMENT GOALS

First, think about the future and how you see what kinds of changes the world and humanity will face in the next decade. Write briefly about your thoughts into the Exercise Template. Next, read through all the Sustainable Development Goals, and think how your research work or discipline in general can be seen to promote sustainable development and SDGs. Choose one to three SDGs and justify briefly in the Exercise Template how your research (or discipline) contributes to them.

EXAMPLE 1 / Mechanical engineering: SDGs 7, 8, and 9. By developing more efficient electric motors, usage of renewable energy is promoted. New production chains and infrastructure have to be established too, which advances economic growth, innovations, and new branches of industry.

EXAMPLE 2 / Animal studies: SDGs 3 and 12. The relationships between humans and other animals are complex and, in many regards, still unexamined. Whether production animals, service animals, or pets, better understanding our relationships with them promotes our (and their) well-being, educates consumers to respect animals, and advances sustainable consumption.

EXAMPLE 3 / Mathematics: all SDGs. Mathematical research has had a huge impact on humanity, and without this abstract science we would still live in caves. Math is applied everywhere, and it is needed in promoting SDGs as well. Further, the value of many profound mathematical discoveries has been properly understood only centuries later, and quite likely that applies to recent abstract discoveries too.

1.5 SUMMARY

Our discussion on mega-trends and Sustainable Development Goals was intended to highlight that governments are tackling huge problems, and publicly funded research is expected to help in solving those problems. At least for me, that sounds fair and reasonable: publicly funded endeavors should benefit the general public too. Finding linkages between one's own research and a bigger picture has been reflected on here in a couple of exercises, and now it is time to move into the very core of impact.

CHAPTER 2 – REALM OF IMPACT

In this chapter, we go into the core of impact and several conceptual distinctions are established. Distinctions are not made for the sake of academic scrupulousness, but they are meant to be helpful tools in preparing proposals. After a particularly useful tool, ‘triangle of impact’, is introduced, we intend to reach way beyond the state-of-the-art. However, there are all kinds of challenges in making statements about the future state of affairs, and these are discussed in the closing part of the chapter.

2.1 BEDROCK

In the previous chapter, I intentionally discussed about impact rather broadly. A broad reading on impact helped to keep things simple, for as you will soon notice, when you start forming distinctions, you will quickly come up with further distinctions. It is always better to simplify a little bit, rather than get lost in a maze of a myriad of concepts. This is especially so, since we are not dealing with rocket science here, but only trying to determine the beneficial outcomes of research. This is also one of the most important lessons in this book: keep the focus on your research work and try to figure out all the potential benefits that could come out of it. Do not worry too much about whether benefits are academic or societal, but try to have a comprehensive overview on your research topic, where you are now in it, what the feasible paths are to advance the research, and what kinds of gains would follow. Keep it simple, for when you are describing research and its benefits, there are no merits for being overly complicated or hard to understand.

It is easy to write poor grant proposals or impact sections, and it does not help that there is no universally accepted reading for the term ‘impact’ or how it should be taken into account in research work. I am offering one interpretation on the subject, but there are countless others. This is also understandable, since *societal* ‘impact’ is a relatively new term for science policy and funding agencies. Some people also make their living on ‘impact’, that is, they are selling consultancy for researchers, which has muddied the waters too. My advice is to keep the focus on science, since that is your expertise, and there is not that much room for interpretation: you and your scientific peers agree on what counts as ‘excellence’ in your discipline, most of the time. Impact is not something external to research, for every bit of impact should be based on research. And no one knows your research better than you, ergo, no one knows the expected impact better than you. Of course, it is still advisable to discuss with your peers about ‘impact’, as you do with respect to research – impact meaning here the expected beneficial outcomes generated by research. In fact, I have noticed that it is very useful for researchers to discuss with other researchers from various fields about impact. Many, if not all, researchers have had to think about the impact of their research, especially when applying for funding. It is instructive to ponder with others about impact in general, what kinds of cases for verified impact there are, and how to plausibly argue for expected impact, beneficial outcomes of research.

Before we delve further into conceptual distinctions, we will establish a firm foundation. Namely, a distinction between academic and societal impact is useful to bear in mind, even if in some cases research outcomes can be praiseworthy both academically and societally. Let us utilize the following definition by UK Research and Innovation as our impactful bedrock:

Academic impact is the demonstrable contribution that excellent research makes to scientific advances, across and within disciplines, including significant advances in understanding, method, theory, and application.

Economic and societal impact is the demonstrable contribution that excellent research makes to society and the economy, of benefit to individuals, organizations, and nations.¹¹

There are of course other definitions for impact, but I have chosen to stick with the above one, since it neatly captures everything relevant, with certain British elegance.

2.2 MANY FACES OF IMPACT

The Academy of Finland is the major funder of scientific research in Finland, thus it is wise to see how they characterize impact. The following extract from their website is telling:

Research can have many different kinds of effects and impact depending on the discipline and the research organisation. Society's expectations of the impact of science are also different for different disciplines.

New information and expertise generated by research can, for instance:

- boost prosperity by providing solutions for streamlining business operations,
- aid and support policy-making by providing reliable background information,
- generate knowledge and skills needed in working life,
- support individuals in spiritual growth and education.

In the long term, science and research also contribute to the development of society's ultimate aims and our understanding of the best way to reach them.¹²

It is noteworthy that the Academy acknowledges that impact varies due to various factors. In my opinion, this is also a permissive statement from an official government agency for research funding. Namely, in the past, governments or respective ministries strived for strict, measurable definitions for impact. Obviously, that would have dire consequences: if impact were defined, for example, only as a value that promotes business, this would drastically change the praxis of science toward business collaboration, innovation activities, and profit-making. Arguably, technical sciences would flourish, and humanities perish. Thus, it is crucial that the Academy also addresses other values that research can generate. As they say, science has the power to change the very aims of humanity. An additional important aspect of impact raised by the Academy is policy-making: viz. nowadays many funding calls presuppose that research results should be communicated to relevant ministries or bureaus in order to inform policy decision-making. Or studies can be directly commissioned by governmental organizations, where the research setting and questions are given, and only results are up to scientific inquiry. Of course, the outcomes of such studies can be scientifically valuable too, but they obviously have societal or political impact. It is thus important to discern who could utilize your research – impact *for whom* – when you are mapping out the beneficial outcomes of your research.

Lastly, I will borrow a list composed by the European Science Foundation (ESF) in a report from 2012. Their list on the different forms of impact is as follows:

- *Scientific impact*: contribution to the subsequent progress of knowledge, the formation of disciplines, training and capacity building.
- *Technological impact*: contribution to the creation of product, process and service innovations.
- *Economic impact*: contribution to the sale price of products, a firm's costs and revenues (micro level), and economic returns either through economic growth or productivity growth (macro level).
- *Social impact*: contribution to community welfare, quality of life, behavior, practices and activities of people and groups.
- *Political impact*: contribution to how policy makers act and how policies are constructed and to political stability.
- *Environmental impact*: contribution to the management of the environment, for example, natural resources, environmental pollution, climate and meteorology.
- *Health impact*: contribution to public health, life expectancy, prevention of illnesses and quality of life.
- *Cultural impact*: contribution to understanding of ideas and reality, values and beliefs.
- *Training impacts*: contribution to curricula, pedagogical tools, qualifications.¹³

The above list is not exhaustive, and the categories may overlap with each other. Sometimes the outcomes of research can have many kinds of impacts. For example, a study on public health may turn out to be academically valuable (as a new finding contributing for scientific discussion on the topic) and have important implications for policy decision-making (as contributing for new governmental recommendations and organizing of services), public health (when recommendations are implemented, the number of diseases decreases), and economy (healthier citizens means less costs for public health services). This example was also meant to highlight that these values *may* occur, but currently we have no way of knowing, since these or other impacts will be realized in the future. This is also the reason why I want you to try to have a comprehensive perspective of your research work, clarify what you aim to achieve with your research, what kinds of results or outcomes it could generate, how the outcomes could be utilized or advanced further, and who could benefit from the research. The above is intended to be a supporting tool, which may assist in identifying what kinds of impacts your research project can bring forth.

I hope that I have succeeded thus far in making the concept of impact clearer for you. But how about the temporal horizon, could not something more precise be said than just that impact occurs in the future? That is the topic we will tackle next.

2.3 FROM RESEARCH TO IMPACT

Conducting research takes time, and even more so in order for us to see the verifiable effects or impact in society. For example, the development of a vaccine takes over 10 years. Vaccine development includes research, pre-clinical testing, clinical testing, and regulatory processes for approval. Then the vaccine has to be manufactured and transported for people in need of it. The final *impact* of research would be the eradication of disease for good. The moral of the story is that there are various phases from research to impact, and thus it is reasonable to have a plan for reaching your desired impact. In other words, it is not recommendable to describe your impact in research proposals just by a plain statement “eradication of disease”. A more convincing manner should be employed to describe, in some detail, the phases required to reach that end state. Figure 2 below has proven to be useful in highlighting for researchers the different phases from research to impact.

CONCEPT	DEFINITION	AREAS OF APPLICATION	CONCRETE EXAMPLE
Input	The resources a research funder or institution spends in the research process	people, infrastructure, knowhow, background IP, money, etc.	
Activities	Actions taken or work performed as a result of research inputs	teams established, research undertaken, networking, etc.	
Output	The accomplishment or product of the activity	publications, conferences, new research leadership skills and experience for (less-connected) researchers, new (interdisciplinary) research collaborations for researchers, etc.	Identification of an antigen that triggers immunity for a certain disease
Outcome	Knowledge transferred and/or the changes that occur as a result of a programme/project Tends to be more immediate than most forms of impact A distinction can be made between scientific outcomes (on which the emphasis currently lies), societal outcomes (e.g. contribution to policy debates or documents, strategy development), and economic outcomes (e.g. start-ups, spinoffs, increased productivity in a certain field).	Career advancement for (less-connected) researchers; new research infrastructure and programmes on societal challenges; coordination of standards, procedures and methods; approved common research projects on interdisciplinary research;	Development or commercialisation of a vaccine against a disease
Impact	"... the demonstrable contribution that excellent research makes to society and the economy, of benefit to individuals, organizations and nations."	Environmental sustainability, protection and impact Wealth creation, economic prosperity and regeneration Enhancing cultural enrichment and quality of life Worldwide academic advancement Commercialisation and exploitation	Eradication of the disease

Figure 2. From research to impact¹⁴

Again, I am not saying that for each expected impact you should define all the preceding phases of inputs, activities, outputs, and outcomes. The table above is meant to be a tool that helps in understanding the different phases leading to impact. It is also easier to start planning step by step, rather than trying to jump right away into the expected impacts. I would also recommend focusing on the expected *outcomes* of research, since they are concrete results stemming from research, and researchers have to formulate them anyway in research proposals.¹⁵ Thus, maybe all this buzz about impact does not change things that much.

Just as before, you have to be clear about the objectives of research, how and by which methods you are going to gather data, and what kinds of results or deliverables you are expecting. If all that is clear to you, then impact poses no problem. As we recall from the example about a study on public health, sometimes **impact means the value adhered to the outcomes of research by different beneficiaries**. The same study can have academic, political, economic, or health impact – it just depends on who we are asking. Thus, when planning a research project and composing funding applications, it is advisable to map out all outcomes of a project. Then, it can be pondered who could utilize the results or what kind of value (i.e. impact) they have besides academic.

It is worth pointing out that we have discussed impact as a beneficial consequence of research, but impact can also be negative in nature, or the same outcome may have conflicting impacts. For example, technological research leading to more powerful bulldozers could enhance the Finnish economy and have thus positive economic impact, but the production and use of bulldozers could cause more pollutants, implying negative environmental impact. Or clinical research could end up with production of drugs, having then arguably positive health impact. But what if there could be effective non-drug treatments for the disorder in question, they just are not developed due to dynamics of drug industry who intend to maximize profits. Or cultural richness of an area could suffer from urban planning that indirectly favors rich people and enhances their quality of life: there we would have negative cultural impact and positive health impact. My advice is that it is good to think carefully through what kinds of impacts your research could bring about, and which of them you would like to further. The question is what kind of impact(s) would you like to generate with your research? Impact also means change: as a result of research something will change in comparison to the current situation. So the question is also how would you like the world to be changed? What kind of difference would you like to make? Now it is time for another exercise.

EXERCISE 4 / FROM RESEARCH TO IMPACT

Think about your research work and your future goals for it. Utilizing the Exercise Template, first write down some of your desired outcomes for your research. Then, reflect upon everything you have read about impact so far in this book and think about what kinds of societal or non-academic impacts could follow from your research.

EXAMPLE 1 / Geology. Outcomes: analyzing seismic waves in order to have knowledge on the Earth's composition and metallic core. Impact: Geological research can open up new possibilities for the utilization of our planet's resources, including forms of energy. If we can have access to so far unexploited resources or harness new forms of energy, that would have an enormous impact for the whole humanity and our future technological progress.

EXAMPLE 2 / Phonetics. Outcomes: understanding differing usage of vowels in English language. Impact: Linguistic research on spoken language will have an obvious training impact, for then more efficient courses can be developed for foreign speakers. Combined with AI-assisted language learning tools, research on phonetics can lead to new technological innovations, which can also help people with disorders such as dyslexia.

EXAMPLE 3 / Theology. Outcomes: understanding the development of the doctrine of trinity. Impact: Understanding religions and their conceptual and historical development has inherent cultural value or impact: it helps us to understand who we are and how our values and concepts on supranatural and eternity have been formed. Understanding the underpinning of a religion is also often a key to understanding a culture different from our own.

2.4 TRIANGLE OF IMPACT

In this section, I am going to introduce a simple but very efficient tool. Without further ado, please find the tool below, as Figure 3.

Figure 3. Triangle of impact

The above triangle tries to capture the relevant features of impact in one picture. Arrows around the triangle indicate that different impacts are interrelated. History has shown that outstanding research very often leads to societally remarkable impacts, in addition to scientific ones. In fact, a recent study by the European Research Council (ERC) is very interesting in this regard. The ERC awards funding for research proposals on the basis of excellence alone, and ERC grants are the most esteemed in the European funding scheme. First, the study by the ERC found that most of the funded projects had led to major scientific advances or even breakthroughs – thus, the academic impact of these projects is unquestionable. However, even more interestingly, the same study found that almost half of the projects had already demonstrated societal or economic impact, and most of the projects are expected to demonstrate societal (or economic) impact in the

long term.¹⁶ The evaluated projects had started their 5-year funding period in 2007 or 2008, and the study was carried out in 2014; thus it is understandable that not all impacts are yet seen. Honestly speaking, I am surprised that societal impacts can be demonstrated already now. The moral of the story is the same as I have already stated elsewhere – the most important thing is to focus on the scientific contributions of a project. If you are able to convincingly show that you have what it takes to go beyond the state-of-the-art and deliver accordingly, impacts will follow.

Again, the triangle (Figure 3) is meant to be a kind of catalyst, inspiring you to find potential avenues for utilization of your research, and thus clarifying the expected impacts. In case you wondered, economic impact still is, technically speaking, part of societal impact, as we defined in Chapter 2.1. Quite often, however, they are separated from each other, and the triangle as a heuristic tool has proved its efficiency just as it currently stands, based on a trifold division of impact. As said, academic breakthroughs can lead to societal or economic advancements, such as improved living conditions of people or new products in the markets, which creates economic growth. Obviously, economic impact can lead to increased societal impact or the other way around. For example, health tech innovations can be extremely profitable but also improve people's quality of life, or well-functioning public services save costs and may enhance entrepreneurship. Societal or economic impact can further advance scientific research and create academic impact. Think about the global economic impact created by research conducted in Silicon Valley, which has provided impetus for further scientific research and especially provided wealthy resources for scientists. Impacts are interrelated, and it is just up to you to find your 'narrative' or how you see that your project's research outcomes generate societally beneficial impacts too. Science comes first, and the use of the triangle is also advisable to start from the bottom or academic impact.

2.5 ACADEMIC IMPACT

Academic or scientific impact should be at the very core of each grant proposal. It basically represents your 'winning argument', the most important reasons for funding the project. It is the added value of your project, and you should be able to clearly formulate it in proposals. In Chapter 4, we will discuss more closely *pitching* in the context of proposals, but it can already be said now, that it is a good idea to try to formulate the crux of a project into a few sentences, as a kind of sales pitch. This pitch of yours is the core of your project, and it is advisable to explicitly state it at the beginning of a proposal, in the concluding section, and here and there along the way. Of course, a thorough explication of a project's scientific impact may require several paragraphs, but at least in the winning proposals I have seen, researchers have also been able to address the core or added value very clearly and concisely, with a few sentences.

I am not saying that concisely formulating the very core of your project is easy, however. In fact, it is quite the contrary from what I have witnessed, for in many proposals it has been the most difficult task. Again, this is perfectly understandable, for an exemplary description of added value states how state-of-the-art, research landscape and relevant disciplines are influenced by the project. This is not easy; especially as you are also trying to foresee the future and describe with a few sentences how one of the most complex human practices – science – will be affected by your project. It is still very much worth the effort, and at least you should be able to state something more than just a dissemination plan. Namely, quite often when researchers are told to clarify their scientific impact, they list different peer-reviewed journals, where they intend to publish the results. Plans on publication are of course important too, but as we recall from our previous discussion (esp. Figure 2), publications are mere outputs, but now we are asking for outcomes, or how those publications will alter the scene.

As said before, funding agencies and governments want to fund breakthrough research that preferably would also provide solutions to topical, global challenges. Understandably, not all outcomes can be unique and paradigm-shifting, but state-of-the-art should remain the framework against which you contextualize the outcomes of your research. All kinds of outcomes, both minor and major, are naturally important and worth mentioning in proposals. When you begin to map out the outcomes, you can utilize the above triangle (Figure 3). Think about your research questions or hypotheses as placed into the center of the triangle, and start figuring out what kinds of outcomes they could generate. As listed within the triangle, academic or scientific impacts can be contributions to, for example, the following items:

- theories, new framework or way of understanding, renewal of scientific paradigm;
- conceptual developments such as novel distinctions or concepts;
- methodological developments or new methods or new combinations of methods;
- understanding, new knowledge on the studied phenomena;
- megatrends and e.g. new AI solutions advancing research work;
- new links between disciplines, which creates opportunities for new kinds of collaboration;
- new links between ‘stakeholders’ or users of knowledge (e.g. my data, personalized medicine);
- data and its utilisation or restructuring, big data management and utilization;
- infrastructure or equipment/measurement development; or
- new competences for researchers, other experts and professionals, students at universities.

When determining the expected outcomes, it is maybe wise to start from the expected short-term gains close to your particular problem, and then widen the scope to reach the expected long-term gains across the field and other associated disciplines. Now, all of this will be practiced via an exercise.

EXERCISE 5 / BEYOND STATE-OF-THE-ART

Think about your research work and what kind of scientific or academic impact you are expecting from it. Envision the current state-of-the-art and how you are going to contribute to it, or even provide some breakthrough results beyond the state-of-the-art. Try to figure out what will be the most fundamental scientific gain from your research and write that scientific core of yours into the Exercise Template.

EXAMPLE 1 / Medicine, research on brain metastases. Academic impact: Survival rates of patients with brain metastases are poor, and discovery of new therapies rely on 2D cultures and in vivo testing in mice. We will develop 3D-printed models of brain metastases, which establishes an efficient use of nano-vaccines and selective targeting of tumor cells. The project will result in a paradigm shift by generating new preclinical cancer models that will bridge the translational gap in cancer therapeutics.

EXAMPLE 2 / History, research on people's interactions with water. Academic impact: Water is vital for human cultures, yet it is neglected in history writing. The project aims to establish a new field of study, Water Cultures. There are several dimensions associated, for example symbolic beliefs and practices associated with water; the water management systems of large cities and demands on them; and the occupations of water, exploring the professions and trades associated with water. This transformative project conceptualizes a new way of writing history: the construction of identities and forms of self-representation based on relationships and interactions with water.

EXAMPLE 3 / Computer science, research on optimal AI. Academic impact: Currently machine learning is limited to function-based perception tasks that learn data associations. Achieving beneficial collaboration between human and artificial agents requires models of autonomy, inference, decision-making, control, and coordination that go significantly beyond perception. In this project, a model-based, probabilistic reasoning framework for autonomous agents is developed, and thus major advances are to be expected.

2.6 METHODOLOGICAL CHALLENGES¹⁷

My aim here has been to help you to understand what ‘impact’ is all about, and how to compose plausible impact sections into proposals, or how to convincingly argue about the expected outcomes of your project. As I have explained, one difficulty about impact is that the expected outcomes occur in the future. This creates several methodological problems that we will address next. It is good to be aware of these problems, even though you may not have satisfactory answers to them. Acknowledging these issues may help you in formulating, as realistic as possible, statements on the impact of your project.

Time. The impact of a research investigation greatly varies depending on the timescale. As we know from history, some scientific discoveries such as Copernican heliocentrism still have an impact, centuries after the model was established. Unfortunately, there are no definitive answers for an optimal timescale in research proposals. It all depends on your discipline and also on which kinds of benefits you are willing to emphasize. You may want to underline collaboration with a stakeholder utilizing your discoveries already in the next two years, or you may be up to a conceptual change in your discipline which will take at least a decade to be realized. It is, however, reasonable to try to define indicators or milestones for your project in order to be able follow the progress and realized outcomes or impacts. For example, if you want to influence policy decision-making, you may measure and set indicators for the number of politicians met, public engagement events organized, policy papers written, attendance at relevant hearings. You can also define short-term and long-term (impact) goals for your project, as in the quoted example below:

- a) Potential impact (short-term), for example research on knee surgery that has the potential to be more effective so that people can be rehabilitated faster and use less health care resources.
- b) Action towards impact (medium-term), new guidelines on how to perform knee surgery.
- c) Impact observed (long-term), operations are carried out according to the new guidelines which lead to benefits for the individual and society.¹⁸

Attribution. It is often extremely hard to verify causal connections between research and impacts. Take for an example a project that states that it will induce economic growth. But even if economic growth would occur in the future, it is difficult to attribute the exact contribution by the project, since obviously there are many factors and actions that have eventually led to economic impact. Furthermore, this complexity implies that several other factors have to develop favorably in order for the expected impact to occur. In other words, the future state of affairs is in many ways independent of a research project, even if the project would have been optimally conducted toward the impact goal. This problem of attribution can be at least partly tackled by trying to make specified claims about the expected outcomes. In my opinion, broader claims can still be

made, and it can be openly admitted in a proposal that, for example, a realization of a health impact requires contribution from various other factors beyond the research alone. As was discussed, impact also means ‘value for someone’, and thus the attribution problem can be tackled by claiming, for example, that the research will be especially useful for power plant operators, with whom there will be close collaboration.

Counterfactual argument. Related to the problem of attribution, counterfactual argument states that the beneficial impacts would have occurred anyway, independently of a research project. This objection is relevant only retrospectively, when we are debating whether the current state of affairs is relevantly caused by a research conducted in the past. This is clearly a tricky challenge, since it requires us to show that if the research had not been conducted, the present situation would be relevantly different. Sometimes it might be possible to show that research was fundamental for the observed effects to occur. For example, if we can compare research groups of which one made a breakthrough and the other did not, then we could also observe whether the former generated such consequences the latter did not. However, in many cases, such comparisons simply are impossible.

The above challenges do not stand alone. The expected impacts can be intangible, and therefore measuring them is far from obvious. For example, research in humanities may enhance people’s cultural integrity or individuals’ self-esteem. But even though those objects are hard to measure, presumably we still are willing to say that such research matters and definitely does have an important impact. As we already discussed, another challenge is that outcomes may have even contradictory values for different stakeholders. The key lesson here is that it is important to very carefully think through claims of expected outcomes and associated impacts for different parties. If something about the expected outcomes bothers you or seems complicated, it is perfectly acceptable to state that in your proposal. Grant applications are read by experts from various fields, and it is very likely that at least someone of them takes note of overly simplified or too naïve claims to impact. Honesty and transparency are exemplary virtues in the context of proposal writing too.

Finally, an important part of showing that you understand the complexity of matters is to define some means to follow the progress of the project and to have a contingency plan. These are standard procedures in grant writing, and for that reason they are only briefly discussed here. However, when you are defining the different societal or scientific outcomes for your project, it is crucial to also pay attention to indicators with which you are going to measure your successfulness. The number of publications is an often-used indicator for scientific impact, and educational impact can be measured by outcomes such as the number of thesis works supervised and courses held. A contingency plan, in turn, explicates the major risks for achieving the defined outcomes and remedial actions for each risk. Contingency plans usually focus on the scientific progress of a project but could also include the expected societal outcomes. For example, if your aim is to

organize workshops for public engagement, an obvious risk is that not enough people attend the events. Then you could define different venues of social media as remedial actions utilized in marketing the events, and that eventually some events could be held online with the help of a social media professional.

2.7 SUMMARY AND DISCUSSION

First, we made a fundamental distinction by dividing impact into academic and societal parts. Then, it was pointed out that societal impact can be further divided into different categories, such as environmental or political impact. Next, the temporal dimension on impact was discussed and an additional taxonomy was established, differentiating between inputs, outcomes, and impact. A tool, the triangle of impact, was introduced, and then we tried to capture the very essence of academic impact. Finally, we discussed a couple of problems that are inevitable as soon as we start making statements about the future state of affairs.

I think the main finding of this chapter and maybe the whole book can be summarized as follows:

Your research outcomes form your impact.

The outcomes of your research are your most valuable capital as a researcher. They are also unique assets, since only scientists in research institutions are capable of undertaking rigorous scientific practices, requiring tremendous amounts of cumulative knowledge, special infrastructure and networks, and of course exceptional cognitive skills from researchers themselves. Without science, the civilization would collapse. The impact of science is therefore beyond a reasonable doubt. But when you try to pinpoint the expected impact of your particular research project – outcomes occurring in the distant future – that is certainly a challenging task. After reading this chapter and accomplishing the exercises, I hope that you are now better equipped to answer questions on the impact of your research.

Overall, the key is to map out the scientific outcomes and reflect upon how they are going to change the science. These findings also basically represent the added value of your project, at least in scientific terms. After you are clear about your scientific outcomes, you can start to figure out other impacts, like who could utilize your research and what kinds of values can be adhered to your research. When you have determined the academic and societal impact of your research, you are quite close to having also determined your ROI (return on investment). Defining your ROI depends on the specifications of the funding agency: if they are exclusively interested in scientific results only, then you should define your ROI (and added value) as the scientific gains coming out of your project. But if the funding agency or call in question also values broader societal impact, then you should think about which outcomes you emphasize. I am implying here that you

should have a concise 'sales pitch' already at the beginning of your proposal, which immediately explicitly answers the questions as to what your ROI is, or what the significant gains are if the project is funded.

Finally, I think that 'impact' is haunted by an unsatisfactory conceptual vagueness. Sometimes in literature pure outcomes are referred to as 'impact', and sometimes impact seems to refer to a fundamental change, such as the huge impact caused by Isaac Newton. Governmental organizations and funding agencies also use the term 'impact' differently from each other, although all of them are generally referring to the beneficial consequences coming out of research. However, it is crucial that at least *you* know what you are referring to when you are discussing outcomes or impacts of your research in proposals. More importantly, it is recommendable to use terminology consistently, so that reviewers of your proposal know what you are referring to when you talk about e.g. the project's scientific outcomes. And most importantly, you have to provide those kinds of impacts that the funding agency is asking for. This will be discussed more closely in Chapter 5, but the Academy of Finland, for example, is flexible as to its account on (societal) impact, calls in the EU's Horizon 2020 have exact requirements for expected impact, and Business Finland is all about economic growth and monetary value for Finnish industry.

The next chapter is about collaboration, or how to efficiently enhance your impact via collaboration. I will conclude this chapter with a picture, for as they say, a picture is worth a thousand words. The below figure has intrigued me from the moment I found it, and I cannot quite tell why. It somehow captures the many aspects on impact, and as a picture it is even meditative, a sort of mandala.

Figure 4. Pathways to impact¹⁹

CHAPTER 3 – COLLABORATION

This chapter provides a brief overview on collaboration, especially regarding stakeholder engagement or collaboration with non-academic parties. First, we discuss the relevance of collaboration in general. Then, it is shown that, in research proposals, you should spell out the support provided to you by your research environment. Research equipment or infrastructure is a concrete example of support, but there are other kinds as well. The latter part of the chapter discusses how to advance and plan collaboration with stakeholders.

3.1 WHY BOTHER?

Why should we collaborate in the first place? A short answer is that you do not have to, but there are enormous gains available from cooperative activities instead of working and figuring out everything by yourself. First of all, research is quite often conducted in *projects*, and in such endeavors many kinds of competences are needed. Basically, collaboration enables you as a project leader to gain access to multiple resources, competences, and knowhow. One of the most precious resources is time, and several people can achieve much more than a single person within the same time span. Scientific projects are also becoming increasingly phenomenon-based, and the basis of all action is active collaboration between researchers from different fields. Tackling climate change, establishing sustainable forms of energy, or developing more participatory public decision-making systems are all examples of where various expertise is needed, and no single discipline is sufficient by itself. Related to phenomenon-based approach is the development of concrete solutions or innovations besides scientific research, which usually implies the involvement of non-academic stakeholders. To introduce further terminology, such multidisciplinary (involving researchers from multiple disciplines) and transdisciplinary (involving non-academic stakeholders) projects usually employ the method of *co-creation*, where all relevant parties are involved to varying extents to advance shared objectives.

It is more than likely that every researcher will be involved in a multidisciplinary research project at some point during their careers. In my opinion, the sooner, the better. Multidisciplinary projects provide insights into different scientific perspectives, how to coherently bring together results employing different methods, and how to communicate and work with people of various backgrounds and competences. Younger researchers also gain invaluable experiences regarding what the management and steering of large research projects require. You get to know new, brilliant people and enlarge your networks too. More substantially, collaboration and intense discussions with peers may help in seeing the very crux of the problem at hand and what should be an optimal research setting for it. For that reason, you should consult various people and discuss about your research idea before you apply for funding. Funding agencies want to fund exceptional

projects leading to unforeseen breakthrough results. This is not an easy requirement to fulfill, and it is unlikely to be met with conventional way of thinking. Therefore, you have to challenge yourself and try to find unique angles to the problem, which may succeed when you share your thoughts with researchers from different fields.

A lesson from the above is that, in research proposals, collaborators should always be justified on the basis of their competences. I have too often seen just a list of people's names, their titles, and current host organizations in proposals' sections where collaborators should be defined and *justified*. Mere names tell us next to nothing. A reasonable alternative is to describe the research problem, resources, and competences needed to address the problem, and then introducing the collaborators by way of expertise they provide and how they contribute to solving the problem.

Collaboration is good to start from nearby, that is, from your home institution. For example, the University of Helsinki employs over 4 000 teaching and research staff, which provides a marvelous opportunity for all kinds of collaboration based on mutual interests. The university's Research Portal (<https://researchportal.helsinki.fi/>) enables various search options, and it includes extensive data on different research projects too. If you find an interesting researcher or project, writing an email and asking for a quick meeting or lunch can represent the start of a lifelong collaboration. Establishing a career as a researcher is also about building up your own, unique expertise and consistent line of research. It is thus reasonable to be aware of at least your home institution's relevant researchers and how their work relates to your own. Many funding agencies publish their funding decisions, and these databases show what kinds of research is funded. It is also possible that databases show you some interesting researchers with whom you could even have collaborative projects in the future. In proposals, you have to convince reviewers that you know your field and the most important researchers, and also that you are familiar with your home institution, relevant research, and opportunities for collaboration. The funding decisions by the Academy of Finland can be found here: <https://www.aka.fi/en/review-and-funding-decisions/funding-decisions/>. A respective database of the European Research Council (ERC) can be found here: <https://erc.europa.eu/projects-figures/erc-funded-projects>. The ERC database also includes concise summaries of projects, and most of them are exemplary in describing the project's contributions with respect to state-of-the-art.

3.2 SHOULDERS OF GIANTS

In addition to scientific contributions, proposals are also evaluated regarding their feasibility. Thus, you have to justify that your research environment is optimal, and that it provides you with all the needed resources, support, and infrastructure. You can also highlight the track record in relevant parts, for example that your

host institution has been successful in past funding calls and has also attracted private investments. This kind of evidence shows that your research environment is competitive and that it is able to provide sufficient resources and support for researchers. You should also justify that your project has excellent academic and/or scientific support in your current research environment, and additional competences are gained via your networks and other collaborators. You should thus show that you and your project is standing on the shoulders of giants. The below picture, Figure 5, illustrates what I mean.

Figure 5. On the shoulders of giants

The different layers of circles in Figure 5 signify that you can extend the description of your support from faculty-level to even European Union. It all depends on what kind of narrative you want to use. For example, you can explain that your research objectives contribute to the EU's Sustainable Development Goals, are relevant for the Finnish Government's strategy of sustainable growth, are included in the University of Helsinki's (UH) research priorities, and belong to one of the key research programmes in your Faculty. This is one way of showing that your research matters, that it is significant in many regards, and not only because you happen to have a personal interest in the research topic. In addition to support being local or even global, there are differences in types of support as well, which are discussed below.

Academic. You have to show that you are building upon past research traditions but also that you are about to contribute beyond the current state-of-the-art. Thus, it is important to justify that your research

environment offers knowhow and competences with the help of which you can achieve your ambitious goals. Track record provides evidence that your department has talent, and you can provide examples of success in competitive funding calls relevant to your research (e.g. ERC grants, Centres of Excellence). Past success predicts that your research environment will attract more research funding in the future as well, which implies that you will be in good hands resources-wise. You should mention relevant research groups or academics who can be important in terms of collaborative support too. Finally, in addition to explaining how you are academically supported, you can describe how you see that your project will advance the research profile of your department or even the whole university.

Infrastructure. It is important to show that the available infrastructure is up-to-date and optimal for your project. What counts as relevant infrastructure clearly depends on your discipline and your research project. It can include, for example, measurement equipment, laboratory facilities, software, databases, registries, and archives. At their website, the Academy of Finland describes ‘research infrastructure’ as follows:

Research infrastructures refer to a reserve of instruments, equipment, information networks, databases, materials and services enabling research at various stages. Research infrastructures may be based at a single location (single-sited), scattered across several sites (distributed), or provided via a virtual platform (virtual). They can also form mutually complementary wholes and networks. Europe hosts several large-scale research infrastructures that are open to collaborative use across national boundaries.²⁰

If you think about it, a university’s infrastructure includes a plethora of immaterial and material support enabling research work. Research institutions also have many kinds of support staff available for e.g. legal and financial matters, project coordination, or commercialization of research. Relevant administrative services can be mentioned in your proposal too. If your project will somehow enhance infrastructures in your research environment, it definitely should be highlighted, since that will be a part of your project’s added value in form of institutional impact. Especially many larger projects are expected to develop institutional infrastructures or even advance multi-operator ecosystems.

Strategic. It is definitely a plus if your research topic is included in the prioritized research themes of the university. It demonstrates that there are other resources besides your project allocated to the research topic, and that your project has strategic and institutional support. If you would be a sole person to carry out the research at your institution, then it basically lives or dies by you. This is a clear risk, if you think of a funding agency’s viewpoint. Similarly, if you can show that your research project aligns with a government’s strategic

growth programme, this is further evidence that your project matters and that it has relevance for the government too.

In a nutshell, research institutions provide many kinds of support for researchers. You are asking for an investment, and your research environment is an important part of the project's feasibility. You would not yourself invest a dime in a project for which the facilities and infrastructure appear to be subpar. Next, we will practice the art of describing the support provided by your surroundings.

EXERCISE 6 / HOME SWEET HOME

Think about your research work and what kinds of prerequisites it needs, especially in terms of infrastructure. Then consider what kinds of administrative services and processes are required for running the project. Focus on your own university and envision all the options for scientific collaboration you have there. Recall the importance of track record and name a few past success stories in your department. Check the strategy documents of your institution, and also consider the big picture as to whether government's or EU's strategic programmes are supportive of your research objectives. Utilizing the Exercise Template, write a concise narrative about the support provided to you by your home institution.

EXAMPLE / The study on the common basis of environmental regulations in the area of EU will be conducted in the Faculty of Law, which has received four ERC grants and a Centre of Excellence funding during the past 5 years. We will be in close collaboration with two research groups in the Faculty, led by Professors Righteous and Triumph. The latter part of the project will benefit from case studies in collaboration with researchers from the Faculty of Environmental Sciences. The university's databases provide access to all relevant sources, and the project will also enjoy support from an ongoing development project of legal informatics. One of the project's expected outcomes is an improved regulatory framework for environmental matters in the EU, and thus we will contribute to sustainable development, which is also defined as the core theme in the university's strategy.

3.3 STAKEHOLDER ENGAGEMENT

Here we will discuss collaboration with non-academic partners, which is often referred to as ‘stakeholder engagement’. Stakeholders can be defined as people or organizations who have an interest in your research, or who may be affected by its outcomes. Of course, you rarely if ever collaborate with all your stakeholders, especially during a particular research project. However, it is useful to map out your potential non-academic collaborators, and to consider how you could benefit each other. Enlarging your networks and collaborating with relevant public or private organizations is an effective strategy to pursue societal impact with your research.

Collaboration means that you and the other party have shared objectives. Hence, when you work together, you benefit each other. This also implies that you have to be absolutely clear what your partners or stakeholders want out of the collaboration. At the beginning of a collaborative project, all parties should be aware of each other’s needs and goals. Presumably, all of us have experienced difficulties in collaborating with others due to misconceptions about intentions or needs. A simple remedy for this malady is to assume as little as possible and discuss with other parties in order to find a common ground. A genuine and deep research collaboration is very seldom simple and linear in such a way that first scientists produce research results and then an industry partner, for example, implements them. In a true collaboration, you have to take others’ views into account from day one and maintain a dialogue throughout the whole project. There are quite likely professors in your faculty who have worked with industry or the public sector, and learning from their insights is something you cannot read from books.

You can start planning collaboration with the help of the following three questions:

IMPACT MAPPING

- What kinds of beneficial outcomes will your project produce?

STAKEHOLDER MAPPING

- Who could utilize your research work and its results?

INTERACTION PLANNING

- With which stakeholders should you collaborate during the project, and what would be an appropriate level of engagement for each stakeholder?

This whole book has thus far been about impact mapping, thus the first question above should not pose a problem. However, it must be noted that the form of your deliverables may vary depending on a stakeholder and their needs. They may be interested in your data, test protocols, algorithms, or research sample repository. Your research methods or qualitative questionnaires may be valuable as well. Industry partners

may want to have more concrete results such as prototypes and patentable applications. If you aim for public engagement or education materials, you often have to popularize your results and have to think about an educational, visual way to represent them. Similarly, policy decision makers usually do not want to read fully fledged scientific publications on matters of interest to them, but instead they opt for concise policy briefs. It is possible that your collaborator craves for the very substance of your research and that they value scientific publications more than anything. The point is that you have no way of knowing that *a priori*, and therefore early discussions are pivotal.

As for the second question above (“Who could utilize your research work and its results?”), you can easily find various lists highlighting different types of stakeholders from the Internet. I chose not to use such lists here, but instead generally discuss various types of stakeholders. In the context of planning stakeholder activities for research proposals, a very handy tool has been a basic trifold division between the public sector, private sector, and the general public.

The public sector constitutes the backbone and infrastructure of a democratic society, and researchers often cooperate at the policy decision-making level, with bodies such as Ministries, bureaus and institutes. Ministries and municipalities are excellent partners, because it is their responsibility to implement different solutions for the benefit of citizens, and research can have a huge impact via these bodies. The public sector is responsible for producing many kinds of services for citizens, including transportation, healthcare, education, arts, culture activities, legislation, telecommunications, water supply, and waste management. The private sector, in turn, consists of entrepreneurs and companies who aim for profit and keep the wheels of the economy turning. Various branches of industry produce different kinds of commodities and services for other companies, consumers, or the state. The general public is basically all of us, when not belonging to any interest groups or stakeholders related to the matter at hand. For example, in matters pertaining to science, researchers represent a stakeholder, but in matters of income taxation, researchers are part of the general public. The general public can be organized into different local or virtual communities, and such communities may be relevant collaborators for researchers too. Communities can also form different voluntary organizations, such as charities, and these non-profit organizations are usually referred to as a third sector.

The third question above, ‘Interaction planning’, asks you to draw up a plan for collaboration. In principle, collaborating with non-academic parties is not that different from collaboration with scientists. For both, you have to know what the other party wants, when they want to have it, and exactly in which form they want to have your contribution. Then you have to plan how much you, or your research group, need time and other resources in order to deliver the goods. It may be that your chosen partner is content with a brief

progress report on the project every six months, or they may want to co-create the research questions and data collection, and also collaborate on the interpretation of findings. The point is that you have to have a detailed plan in order to describe 'stakeholder engagement' in your proposal. The same rules apply as for the description of research work: if you are vague and sketchy, then you are seen as unconvincing. Thus, you have to provide a detailed narrative about the planned collaboration, its objectives, expected outcomes, required resources, and risk management. Presumably, your project has a schedule for research work, and that timeline should be your basis for stakeholder activities as well, or at least you should take the former into account when planning the latter. A schedule should also include milestones, and for follow-up it is good to define key indicators with which the expected outcomes can be measured. At least large projects should define indicators as part of managing the project, but for small projects it may well suffice to determine the expected outcomes and their schedule.

We have discussed collaboration here as research providing value for stakeholders, but you should also ask how the collaboration benefits you. At least stakeholder engagement always creates societal impact, and it is a value expected from research nowadays. Collaboration can, however, provide additional competences or resources for your research project. Companies can pay for your research or provide access to relevant data, let you utilize their laboratory equipment or other infrastructure, or provide you with additional technical staff. Stakeholder engagement can also be valuable research-wise, for sometimes discussions with your non-academic partners may make you realize scientifically valuable insights. Collaboration may thus provide you with new scientific findings, which you can publish and advance academic fields. Next, we will complete an exercise on stakeholder engagement.

EXERCISE 7 / COLLABORATIVE BENEFITS

The purpose of this exercise is to plan collaboration with a non-academic party, who has an interest in your research. Start by figuring out your potential stakeholders, choose one of them and sketch details on the collaboration. Think about what kinds of outcomes both of you are expecting, timeline, required resources and how the collaboration will be managed in practice. Then, write a concise narrative about the envisioned stakeholder engagement into the Exercise Template.

EXAMPLE 1 / Social science. The project studies the environmental attitudes of the citizens of Helsinki, their consumption patterns and participation in social media groups. Data will be gathered from a representative sample of citizens, including an extensive set of social variables. The city of Helsinki has already expressed their interest in the research results, and a market research company will pay for the research data. We are currently negotiating about the details of the contract with the company, and lawyers of the university are included in the process.

EXAMPLE 2 / Acoustics. The project studies concert hall acoustics and aims to develop novel algorithms for spatial sound analysis, as well as understand better the relationship between subjective and objective assessments of audio quality. The results of the project can be applied to build acoustically better concert halls and public places such as libraries. Thus, the research is of interest to cities, the general public, concert providers and other commercial organizations. The research is conducted together with the department of architecture, and we will together look for concrete applications at later stage. Further, a Finnish loudspeaker manufacturer is willing to continue our earlier collaboration in this project too.

EXAMPLE 3 / Astrophysics. The project studies super massive black holes that are found at the centers of massive galaxies. The research will provide new understanding on the formation of cores in galaxies, the formation of nuclear stellar clusters and the distribution of the gravitational wave background. The project will have a huge scientific impact, especially in gravitational wave astronomy. It is unlikely to produce any concrete commercial applications. The general public has always been interested in astronomy, however, and we will collaborate with a Finnish science center in organizing an exhibition on black holes in the year 2022. Moreover, we are collaborating with all space agencies and we are involved e.g. in the development work of gravitational wave observatories.

3.4 SUMMARY AND DISCUSSION

The chapter began by showing that collaboration is inevitable, and your networks also form an important part of your resources. Research work is dependent on various people, and the more complicated a project is, the more complex networks are. Thus, each scientist is standing on the shoulders of giants, and in proposals it is important to describe the support you have. When reviewers are evaluating the feasibility of your project, they are also assessing the quality of your research environment, collaborators, and networks. If it seems that you are missing a central laboratory equipment or do not have a crucial competence among your collaborators, you are not going to have high scores in feasibility.

The latter part of the chapter dealt with how to start planning stakeholder engagement or collaboration with non-academic parties. It must be emphasized that here I have only scratched the surface of a huge topic, and there is a whole literature of its own on stakeholder engagement. However, in principle, collaboration is just as easy as defining what all the parties want and giving them that. Moreover, researchers are used to planning the execution of research work and describing it in proposals, and the same analytical and organized approach can also be applied to collaboration with stakeholders. You just have to find out who could benefit from your research work – including data, methods, results, and outcomes –and then you plan together the details of collaboration. In proposals, it is important to describe your planned collaboration with stakeholders and the expected benefits for them, since that concretely shows the societal impact of your research. You can also describe other potential stakeholders or beneficiaries of your research, even though you would not collaborate with them during the currently planned project. This would demonstrate the research project's potential for additional impact, and it also helps in seeing the big picture or what kinds of beneficial societal outcomes your project could generate.

The key in all kinds of communication is finding a common language. Therefore, you should adjust your terminology according to your audience: if you want to be understood, you must speak quite differently with industry people than your fellow academics. The next chapter will highlight some techniques for clear communication.

CHAPTER 4 – COMMUNICATION

In this chapter, we first discuss how to generally enhance the clarity of proposals. Then we enter the realm of pitching and practice using the NABC template that provides an excellent framework for giving a clear and concise presentation. Finally, we review how to compose a ‘one-pager’, a kind of extended pitch that can be utilized as an abstract, introduction or summary of a proposal.

4.1 CLARITY

As stated in the Introduction, winning proposals are clearly written. A badly communicated proposal hinders seeing the crux of your proposal or understanding the project in general, which significantly decreases your chances for funding. First, you have to clarify for yourself why the research project is needed, what will be the major outcomes, and how will the project be conducted and managed in practice. Then, you have to communicate the project as clearly as possible in the proposal. Take into account that your reviewers usually have various backgrounds and expertise; they are intelligent, but not necessarily that well informed on your research area. It is easy to test whether your proposal is understandable: let different people read it, and then discuss with them in order to see whether they have understood what they have read.

A well-thought-out structure and logical flow of the text are crucial. Consider also visualizing the proposal with pictures, figures, and graphs, for they break the sometimes monotonous rhythm of plain text. More importantly, a figure can be an eye-opener and may be able to represent a complex research work at a glance. Of course, the balance between text and figures must be right, for the number of graphs can be excessive or they may be more confusing than beneficial. In general, it is easier to understand a simple and concrete style of writing than very abstract with complex sentence structures. You can provide concrete examples, numbers, and already verified evidence for making your text more specific and less abstract. A constant use of acronyms and abbreviations is also an efficient way of frustrating your reader. If possible, utilize active instead of passive voice, and accordingly write e.g. “Our research clearly shows that” instead of “It has been demonstrated that”. There are hundreds of books and online courses on academic writing and you can learn useful techniques from them. I am not an expert here, but of course the more you write, the better you become, since writing is a skill that can be improved by practice after all. I am also inclined to think that proposal writing is about finding your own voice or style, and above all about ability to clearly present your ideas and concrete research work. To repeat, most of the funded proposals I have encountered are admirably clear, but they have not necessarily represented sophisticated language. They get the job done, and that is it.

I fully appreciate that science is a complex endeavor, and that it is not always possible to describe the research with language that is simple and easy to understand. However, at least the summary of the project should be written so that even a layman could understand what your project is about. This kind of summary is often located right at the beginning of a proposal, so that after reading the first page you have a pretty good idea about the project's central features. Many funding agencies also require a separate abstract on the project, and the abstract serves as a summary too. Moreover, an abstract can greatly affect how your proposal will be evaluated, for a funding agency's administrative staff may determine on the basis of the abstract in which review panel the proposal will be evaluated. In a way, the abstract or the first page of the proposal is your sales pitch.

4.2 PITCHING AND NABC

You have probably already been in situations where you have to talk about yourself and your research work in a short timeframe. At first these situations can be difficult, especially if you are accustomed to describing your work meticulously over tens of pages. If these kinds of situations arise, you have to be prepared and have practiced your sales pitch, so to speak. On any given occasion, if you have only three minutes to persuade your audience, it equals to 15 to 20 sentences. Thus, every word counts and you have to have thought beforehand of the structure and main points of your speech. Nowadays, many funding agencies interview the top candidates, who often have to give a brief presentation on the research project at the beginning of the interview. For example, the decision process for ERC grants includes interviews, and the nominees have 10 to 15 minutes for a presentation at the beginning. I can tell from experience that a good presentation can really make the difference. The jury or reviewers listen to several presentations on the same day, and you can imagine that it is relatively easy for them to differentiate between excellent and poor presentations.

The NABC template was developed to address the need for researchers to explain their work in a precise and concise way, or 'pitching'. Once again, there is a whole industry of pitching consulting, and I am only providing an overview here. However, a common guideline in the pitching literature is that you should prepare presentations of different lengths, being prepared to pitch your idea in 1 minute, 5 minutes, or 10 minutes. Pitching even in five seconds, using a one-liner, is possible, as the following examples neatly demonstrate:

COMPLEX IDEA	PITCHING
Discovering DNA	"I'm researching how human cells reproduce"
Defragmenting hard drives	"It makes computers run more efficiently"
Inventing light bulbs	"It's a way to make light from electricity."
Writing a brilliant novel	"The story explores twenty something angst in the digital age"

All sources refer to the Stanford Research Institute as the originator of the NABC model, but curiously I could not find a year when it was created, and the institute itself does not mention the model anywhere on its website. The story goes that the model was originally developed for business purposes, but it has been adapted to all kinds of sectors. Business Finland (former Tekes) prefers NABC as a structure for proposals in all their funding calls, and thus the model is very relevant for researchers here in Finland. Personally, I think that the model is an extremely handy tool for composing a summary of a research project, whether orally or in written form. There are also various versions of the model available, but at least they all agree on what the letters NABC stand for. Namely, N for need, A for approach, B for benefits, and C for competition. The idea is to present a convincing argument by first stating a pressing need or problem, then briefly introducing your approach or solution, and then moving on to the solution’s benefits over competitors. Figure 6 below provides my reading on the model, based on several available formulations of the guiding questions.

Figure 6. NABC model

In Figure 6, I have intentionally preserved the original spirit of the NABC model, namely that you have a concrete solution that will be sold for potential customers. Pitching means that you try to persuade a jury or investors in order for them to believe and invest in you. This characterization also captures the ‘ROI’ aspect of research funding, namely that you try to convince reviewers with your proposal that your research matters and is worth investment. The business aspect of NABC is especially useful, if you, as a matter of fact, would like to commercialize your research or you want to convince industry representatives of the market potential

of your research. Otherwise, you can interpret e.g. “entering the markets” more metaphorically, meaning that you should provide added value over competing theories within your discipline. Next section, Chapter 4.3, discusses more closely how to utilize the NABC model in the context of writing proposals. For the time being, however, we should focus on the original purpose of the model, i.e. being able to present your idea in a structured manner in a short time. Speaking from personal experience, it can take some time for the NABC to grow on you. Nowadays, I think it is one of the best practical tools for researchers, and the model can be utilized in writing proposals, composing compact presentations, or briefly presenting a project at an event. It can be applied to theoretical and mundane matters, as the following example shows:

“I am hungry, let’s have a lunch.” [NEED]

“Since we have to work late today, I propose going to Green Buffet.” [APPROACH]

“It’s nutritious and healthy, and it is much more value for our money than a meal at the company restaurant.” [BENEFITS / COMPETITION]

Next, we need to practice what we have been preaching.

EXERCISE 8 / NEED – APPROACH – BENEFITS – COMPETITION

Here the idea is to practice a one-minute pitch. Think about your research idea and try to pitch it according to the NABC model, and write your pitch into the Exercise Template. Do not bother if your pitch seems naïve to you – the purpose is to practice the structure and order using the NABC template. A one-minute presentation of research work implies that you have to simplify matters, but practice makes perfect.

EXAMPLE 1. Mental health problems cost Finnish society about 11 billion Euros annually [NEED]. Our research enables the development of a virtual self-care kit [APPROACH]. The kit will efficiently supplement existing treatments and with 5 million Euros investment we expect to decrease the costs to public health care by about 100 million Euros in three years, and also enhance the quality of life for hundreds of citizens [BENEFITS]. None of the currently available treatments come close to the cost-efficiency of our solution [COMPETITION].

EXAMPLE 2. In ten years, the Internet of Things (IoT) will be as common as the ordinary Internet we are used to connect with our laptops and smartphones. However, the IoT faces severe privacy and security issues [NEED]. Our research project will develop a security protocol for the IoT utilizing individual, virtual fingerprints [APPROACH]. The IoT is an inevitable technological advancement, and our unique innovation makes the IoT safe for everyone with due respect for privacy [BENEFITS]. Our transdisciplinary team has all the right competences and networks, and no other team in the world can deliver the solution as efficiently and quickly as we can [COMPETITION].

EXAMPLE 3. The nature of plasma phenomena is still poorly understood [NEED]. In this project, we will study the interaction between energetic particles and magnetohydrodynamic instabilities in a fusion plasma [APPROACH]. Our project will have a groundbreaking impact on the development of next-generation devices utilizing plasma. The project also enables us to better understand plasma phenomena and for example the solar corona [BENEFITS]. As our track record shows, we are spearheads in the research of plasma, and our group's Plasma Lab has defined the state-of-the-art in the area for the past two decades [COMPETITION].

In pitching it is recommendable to back up your claims with numbers, and in a business context the ultimate value is monetary. However, it is not a bad idea to utilize this in research proposals too. If you can show that e.g. the solutions your research generate can save public money, that arguably strengthens your case. That shows the economic impact of the project, a value many research funding agencies appreciate too. As said, pitching is about presenting your idea in a concise manner, and therefore quantitative statements should be used over qualitative, as the following example demonstrates:

NEED

[“The market is growing fast.”]

“Our market segment is 2 billion Euros and it is growing at 20% per year.”

APPROACH

[“The ROI is excellent.”]

“We have created a one-step process that replaces the current two-step process with the same quality.”

BENEFITS

[“We have a clever design.”]

“Our one-step process reduces our cost by 50% and results in an expected ROI of 50% per year with a profit of 30 million in three years.”

COMPETITION

[“We are better than our competitors.”]

“Our biggest competitor is Tank Dynamics, who exploit the standard two-step process. We own the IP for the new one-step process.”

In the above example, the qualitative statements in brackets are far less persuasive than the alternatives that utilize quantitative evidence. Each part in a NABC pitch should be easy to understand and remember, and preferably contain quantitative evidence. When a pitch format is utilized, a questions and answers session usually follows after the presentation. Quite often you can anticipate the questions, and you can prepare yourself by writing the questions you expect to hear and your answers to them beforehand. For example, you are usually asked to further justify some of your quantitative statements, and thus you must really know your numbers and the logic and references behind them.

In Chapter 2.5, we discussed academic impact and how you should be able to formulate the added value of your research in a clear and concise way. To this end, the NABC model provides an excellent tool. Again, I fully understand that it is not always possible to summarize complex scientific ideas into a few simple sentences. However, I have witnessed significant improvements in multiple proposals after researchers have

been introduced to the NABC, and they have contemplated and utilized it as they have seen appropriate. The NABC can be particularly useful when composing abstracts or summaries of research projects.

4.3 ONE-PAGER

In this section, we apply pitching in the context of writing research proposals. Namely, in nearly all funding calls you have to provide an abstract, rationale, summary, introduction, background or problem statement at the beginning. Regardless of the name of the first section, the opening paragraphs of your proposal should provide a concise overview of the project. The first page should be written so clearly that basically anyone could understand it, which also amounts to the very idea of pitching. The first page draws the big picture of the project, and the rest of the proposal fills in the details and answers all the questions a reviewer might have after reading the opening pitch. Therefore, I am suggesting that you should compose a unique one-pager that you could apply to different funding calls. Once you have created a one-pager that you are content with, you can update it when needed, and it becomes a sort of trademark for your research.

A one-pager can be well composed using the NABC model. However, the one-pager should reflect your style, and following some predetermined structure is not necessarily a good idea. I highlight below elements that should be considered to be included in a one-pager or an introduction of a proposal.

Why / need. Justify why the project is needed and what is the scientific problem to be solved. Explain also why the project should be carried out right now, for topicality is an important part of the project's relevance. State briefly why you or your group are the best option for solving the problem.

How / approach. Your chosen approach for solving the problem can be just briefly described, for the rest of the proposal will explicate how the research work is carried out.

Benefits. Present the major outcomes the project generates and describe also how the research can be valuable for non-academic parties and thus produce societal impact. State the crux or added value of the project and explicate how it will renew the discipline and what kinds of novel scientific results will be produced. Since multidisciplinary is a virtue, consider the benefits for other disciplines too.

Competition. Even though you are not competing in a business sense, the academic context still forms a kind of market with its own rules. You have to show how the project relates to state-of-the-art and how you will advance the area. You have to consider major risks hindering the research work, and you have to be aware of the general framework, such as relevant regulations and legislation.

Team and resources. You have to show that you and your research group have all the required competences, collaborators, networks, and infrastructure for successfully conducting the research.

Amount of funding. At the end of the one-pager you can state the sum of funding you are applying for.

As said, your one-pager should be unique and your individual business card, so to speak. If I would continue my research work on philosophy and theory of knowledge, my one-pager would be something along the lines of Figure 7 below.

1. { Even though for a layman it seems absurd to doubt whether we know anything, in the branch of philosophy called epistemology this has puzzled philosophers over two millennia. Currently, most epistemologists concentrate on different theories about the nature of knowledge, as witnessed by the well-known debate between externalism and internalism. This debate boils down to differing intuitions in the end, and since intuitions as such are basically beyond justification, the debate ends in a stalemate.
2. { Surprisingly, a comprehensive account on epistemic intuitions is missing and how does that relate to skepticism, or the problem of whether we have knowledge at all. In this study, we provide a unique account on skepticism by studying different intuitions, their conflicts and ways to resolve them. Our hypothesis is that the study provides a unique solution to skepticism, and the solution is also independent of internalism-externalism debate. This also implies that we avoid all kinds of problems those theories inherently have.
3. { The study is multidisciplinary, including (i) cognitive psychologists who provide empirical results on people's cognitive processes and intuitions; and (ii) philosophers who through conceptual analysis, taking into account the aforementioned empirical findings, provide a unique account and solution on skepticism.
4. { The project will provide a totally new methodology for epistemologists, and this could be a beginning of a new paradigm in theory of knowledge. Knowledge matters universally, and one of our objectives is to provide also material for the general public and schools, which enables people to better discern truth from falsehood and evaluate statements' truth in general. As pioneers of this new line of thinking, we see that UH becomes a new center for theory of knowledge in analytical philosophy in the future, and we continue to seek for funding opportunities in order to strengthen our position globally.

Figure 7. My one-pager

I am not saying that the above one-pager is perfect content-wise, and I think that it is still too academic and could be simplified further. However, the structure of the above one-pager has proven to be a useful tool, so I will elaborate the structure: In the first sentence of the first paragraph, the topic is introduced. The following sentences provide the context and explicate the current state-of-the-art. The first sentence of the second paragraph states the problem or the need for the project. The following sentences describe my approach and the hypothesis. The third paragraph is a brief summary on the implementation of research work and describes chosen methods. The last paragraph purports to show ROI and impact of the project.

A well-written abstract or first page gives a good first impression. It takes time to write a good one-pager and you have to trust your intuition, for at some point the text feels right, which means that you are close to finding your own voice. You can practice by formulating different one-pagers by following the NABC, the structure utilized in Figure 7 above, or just letting your pen flow without too much thought for structure. Trial and error is one of the fundamentals in science, and it applies to proposal writing too.

4.4 SUMMARY AND DISCUSSION

Communication is one of the key competences of a researcher, or any other expert profession, for that matter. If you fail to communicate clearly and understandably about your research work, it can make collaboration with stakeholders or even other scientists very difficult, and it may severely decrease your chances of getting research funding. The opposite holds true too: if you are able to clearly explain your research work without technical jargon, it is a great asset that can be utilized in different contexts and can open up new avenues for collaboration, and funding too. If I had to pitch the crux of this guide with one sentence, call it the **formula for impact**, it would be the following:

Figure out the major scientific and societal outcomes of your research work, map out different parties that could utilize your research and determine with whom to collaborate, and always communicate clearly about your research and its expected value for others.

The purpose of this chapter was to provide concrete tools that would help you in presenting your research work in a clear and concise manner. I hope I have succeeded in that, for basically now everything is said and done. Before wrapping up everything in Conclusion, the next and final chapter provides a few examples on specific funding agencies and how to apply what we have learnt in responding to their calls.

CHAPTER 5 – FUNDING AGENCIES

The purpose of this chapter is to demonstrate, via a couple of concrete examples, how to apply the lessons learnt so far in responding to specific funding calls. After briefly discussing how proposals are evaluated, I provide some hints for applying for funding from foundations, that are an important source of funding for Finnish researchers. The problem with foundations is that they very rarely provide any feedback on proposals; they just inform whether you receive funding. Next, I discuss the Academy of Finland's September Call, of which Postdoctoral Researcher, Academy Research Fellow, and Academy Project are probably the best known and most applied for forms of research funding in Finland. Finally, Strategic Research Council and Business Finland funding are discussed, in order to highlight agencies that emphasize stakeholder engagement and economic impact.

5.1 INTRODUCTION

Even though some funding calls discussed here may seem irrelevant to you, it is recommended to read the whole chapter. The examples of different funding calls may broaden your view on impact and how to write winning proposals. I think that mastering different forms of funding is a part of the expertise of a researcher nowadays, which is also necessitated by the fact that often you have to gather funding for your research from different sources. Moreover, funding agencies evolve and new forms of funding are established too, and the more familiar you are with different terms, the easier it will be to adopt new ones. Having experiences of different funding agencies and calls also helps in seeing the similarities between them. Namely, for each of them you must convince the funding decision makers about your excellence and impact. One of the central lessons in this book is that regardless of the funding call, argumentation on the added value of your research is pretty much the same. Of course, some funding agencies emphasize more scientific excellence, and others economic impact, but the logic of writing remains the same. You have to show that you have the best possible resources and competences for obtaining the desired outcomes.

Universities have administrative staff, usually referred as 'Research Services', who provide help and support for researchers in different calls. Figure out what kinds of services your host institution provides and contact these supportive staff well in time. They are professionals who have helped hundreds of researchers, and with their massive amount of experience and knowhow, they are able provide insights that can significantly enhance your chances of getting funding. However, due to the scarcity of resources, most universities have to prioritize and provide support only for a selected few calls. For example, universities crave ERC Grants and resources are allocated accordingly, and courses ordered from external consultants. But, as a consequence, no support is then available for the foundation or the Academy of Finland funding. This guide tries to fill that gap with tools and tips that could be applied to any forms of funding. Of course, the problem with a general

guide is that it will stay as general, after all. No book or course can match the specific support gained from discussing your proposal with a trained professional over several sessions.

Some funding calls are easy in that they clearly explicate what is expected impact-wise. I have always held the European Commission's Horizon 2020 (H2020) in high-esteem, since different Work Programmes clearly define objectives for projects and expected impact too. For example, Programme *Future Emerging Technologies* (FET) defines the expected impact as follows:

- Scientific and technological contributions to the foundation of a new future technology
- Potential for future social or economic impact or market creation.
- Building leading research and innovation capacity across Europe by involvement of key actors that can make a difference in the future, for example excellent young researchers, ambitious high-tech SMEs or first-time participants to FET under Horizon 2020.²²

In my opinion, the above characterization of expected impact creates a specified framework and objectives for proposals. Clearly defined objectives make proposal writing simpler, since you do not have to guess the expected outcomes or impact. Before we proceed to discuss specific funding agencies, we should consider how proposals are actually evaluated.

5.2 PROPOSAL EVALUATION

All grant writing courses emphasize the importance of reading the call text and evaluation criteria, and I am not suggesting an exception to this practice. A call text and evaluation criteria are the most important background documents that should be taken into account right from the onset. They are like a blueprint for a building. An important part in the game for funding is to understand the procedures for proposal evaluation, for they have practical implications for how your proposal is evaluated. The below chart, Figure 8, by the Academy of Finland neatly captures the key procedures.

Figure 8. An example of evaluation procedures / The Academy of Finland²³

If you look at Figure 8 above, a straightforward implication is that your proposal will be read by several different people, which once again highlights the importance of clear communication. At each stage, a number of proposals will not pass into the following stage. Even after the first stage, when all the applications have been submitted, some are rejected. This may happen if eligibility criteria are not fulfilled or formal requirements such as mandatory appendices are neglected. A funding agency's administrative staff recruit reviewers for proposals, and often the reviewers are further organized into separate review panels. If your proposal is hard to understand, however, those with the proper expertise may not be included in the review panel assessing your project, or your proposal may even end up being placed with the wrong review panel.

Most proposals are evaluated in review panels that are composed of about 4 – 8 experts in a given area. Review panels can be compiled on the basis of discipline or phenomenon, so you can have a review panel on analytical chemistry or migration, for example. The experts in a review panel are recruited so that as a whole the panel's expertise should cover all the proposals they have to assess. A review panel may have up to 50 proposals to be evaluated, and usually the funding rate is around 10%. Thus, the review panel acknowledges that 4 to 6 proposals will be funded in the end, and that consequently many very good proposals will not receive funding. The experts feel the huge responsibility they collectively share, and therefore they think very carefully about which proposals will be given excellent grades and ranked as the best in the pack. This collective evaluation procedure implies for an applicant that a proposal should convince everyone in the review panel. Presumably, there is one person in a review panel who genuinely understands everything in your proposal, and others in the panel understand it to varying degrees. Once again, communication is the

key here. Especially the abstract, summary, or the first page of the proposal should be written so that everyone should be able to understand it. The experts in a panel are interested in the deliverables or how the world will change if a project is granted funding. Thus, you should always communicate very clearly about what is the impact or added value of your project.

Since competition for funding is so fierce, your proposal should be excellent in every regard. Every section in a research plan should be thorough and convincing. For example, if your description of research collaboration or societal impact is vague and careless, that may well be a sufficient reason for a review panel to *not* rank you among the top candidates. It is often easy for a panel to name one or two top proposals, but for the following three or four top positions, there are a plenty of excellent candidates. Thus, do not give them any reason to exclude you from the top group. At the final table, when funding decision makers gather together, more tough decisions have to be made. The Council or respective Board have the reviews and rankings proposed by each review panel, and usually even more proposals have to be denied funding. Let us say that the Council has funding allocated for 50 projects, and there have been 20 review panels representing different fields. A standard solution is to ensure funding for the top two proposals in each review panel, but after that there are no easy solutions. The funding body also has to adhere to certain science policy objectives, and e.g. the Academy of Finland states such objectives as “promoting multi- and interdisciplinary research, advancing the research careers of early-career researchers and women, promoting gender equality in research, good scientific practice, and impact beyond academia”.²⁴

Finland is a small country, and scientific circles are even smaller. This implies that conflicts of interests often arise at tables where decisions are made, and therefore persons concerned have to leave a room and be excluded from discussions on final funding decisions. Sometimes this may lead to absurd situations so that the only person who understands the project proposed for funding, has to leave the room due to a conflict of interest. Conflicts of interests occur in review panels too, and the only remedy I can think of is a clear proposal that succeeds in communicating the main points and outcomes in an understandable, concise, and structured way. The bottom line is that there never is enough funding for all good proposals, and as an applicant you can only ensure that your proposal is carefully composed, and the impact convincingly communicated.

5.3 FOUNDATIONS

Finland has various foundations awarding grants for scientific research and artistic activities too, but they almost never give any feedback on your proposal. If you receive funding, your project obviously was seen as excellent. However, if they inform you that unfortunately you were not granted funding this time, there is hardly any way to tell what was missing or how to improve your proposal. Since foundations prefer short

applications, writing proposals for them very much resembles pitching. In this section, a few major Finnish foundations are introduced, along with the types of criteria they use to assess proposals and the kind of impact they are looking for in research projects. Finally, it is shown what components should be included in a proposal for a foundation.

Jane and Aatos Erkko Foundation “awards grants for projects in the fields of technology, economics, medicine and culture, and for other projects that promote emotional and physical well-being”.²⁵ As an appendix to an application, they request a summary of research plan that can be no longer than 3 pages. The foundation defines the criteria for funding as follows: “The Foundation awards grants for high-quality research that aims at significant international breakthroughs. Key considerations for assessing research projects include the project goals, the researchers’ professional skills and credentials, the project implementation plans and the significance of the results.”²⁶

As you can see, the Jane and Aatos Erkko Foundation is looking for projects that go beyond state-of-the-art and provide significant results. They also seem to value a clearly articulated research plan and strong track records from the researchers involved. They do not specify what counts as ‘significant’ research, but this has to be interpreted as breakthrough results advancing the field in question. Their list of funded projects on their website is also revealing.

Jenny and Antti Wihuri Foundation “awards grants for the promotion and support of cultural and economic development in Finland”, and grants for scientific work “are awarded broadly to different fields of science to both basic and applied research”.²⁷ The intended research work has to be summarized in the field ‘Reasoning’ in the online application system. A separate research plan can be attached, and its length is up to the applicant, ranging from 3 to 10 pages.²⁸ As for evaluation criteria, it is simply stated that “experts evaluate the applicant’s ability to execute the presented project successfully based on the application and the attached curriculum vitae and other documents.”²⁹ Interestingly, the English version of the foundation’s website does not mention the other criteria referred to in the Finnish version, namely “project’s laudability, feasibility, topicality, and ability to provide new insights”³⁰.

Again, the criteria referred to by the Wihuri Foundation are generic and not that helpful. However, since they emphasize the national aspect, it would be recommendable to specify how the project will benefit the Finnish society and advance research work here in Finland in a proposal.

Kone Foundation is interesting in that they seek “bold initiatives”³¹. They define boldness as follows:

By ‘boldness’ we mean the ability to question and examine the world from a new, critical perspective; we believe that it is through such an outlook that understanding of a particular subject deepens. Boldness can also mean crossing – and even breaking – boundaries. Our conception of boldness therefore includes experimental approaches, the courage to explore as-yet unrefined ideas, and to avoid predetermined definitions. The future holds a multitude of opportunities, and we seek to foster their development.³²

In line with the above characterization, Kone Foundation also states that they value multidisciplinary. The maximum length for a research plan is 4 pages for individual applicants and 8 pages for groups. Proposals are evaluated with respect to academic merit, topicality, new perspectives, and boldness.³³

The Finnish Medical Foundation awards grants for medical research. Their website provides no information regarding the recommended length of a research plan. However, they specify that a plan should include summary, background, goals, research questions and setting, execution and methods, applicant’s personal role in research, current stage of research, research schedule, cost estimate and plan, and ethical matters. In evaluation of the proposals they are looking for innovative research, clinical importance, and significant outcomes. They also value projects taking on challenging research fields or methods. It is stressed in several places that an application and plan have to be clear and carefully composed. They even explicate that an incoherent application or an unsatisfactory summary negatively affect evaluation.³⁴

Except for focusing on certain research fields, foundations do not differ much from each other. All of them want to have clear and concise proposals that promise breakthrough results. Some foundations have specific templates for research plans, but many leave the structure up to an applicant. Since you usually have only a few pages for composing a proposal, concise communication is a must. Hence, I propose that a research plan for a foundation should include the following parts: **Summary**, **Outcomes**, and **Credibility**. Of course, you can name the sections as you see best, but let me explain the logic behind the suggested trifold structure.

Summary is a concise presentation of the whole project. In Chapter 4.3 we already discussed how to compose an efficient one-pager that can be utilized as a summary too. A section on **Outcomes** should show the expected major outcomes, just as we discussed in Chapter 2. Read carefully all public information available on the foundation in question, and recognize what their objectives, founding principles, and strategic plans for the future are. Briefly, find out what kind of impact they expect from research, and then argue for it accordingly in your proposal. Do not forget to describe the state-of-the-art and how your project will go beyond that, providing added value. Career plans are often relevant too, since they are about to invest in you, after all. Thus, justify how the funding would advance your objectives as a researcher, enabling your

path toward even greater impact in the future. Finally, a section on **Credibility** should establish that you are trustworthy and capable of achieving the breakthrough results envisioned in the proposal. You have to show that you have the required infrastructure, resources, knowhow, competences, collaborators, and networks, like we discussed in Chapter 3. You also have to show that you have a feasible plan for carrying out the project, thus you have to describe the implementation of research work and methods with a clear schedule. Many foundations and funding agencies especially appreciate international collaboration, and supporting mobility periods could be involved in projects as well. Of course, your past achievements or track record, as well as those of your collaborators, are extremely relevant too. At the end of a proposal, it is recommended to have a few concluding sentences that summarize the significance – or impact or ROI – of the project.

Although it was said that funding calls of foundations resemble each other, it is still worthwhile to familiarize oneself with different foundations, read their guidelines, and check funding decisions. A good place to start is via the Aurora Database that lists over 400 Finnish funding opportunities in sciences and the arts. The database is regularly updated, and it can be found here: <https://www.aurora-tietokanta.fi/en/what-is-aurora-database/>.

5.4 ACADEMY OF FINLAND

The Academy of Finland operates under the Ministry of Education and Culture, and they are the most important public funder of scientific research in Finland. The annual September Call by the Academy of Finland is the most significant single funding call for research in Finland, and in 2019 they received over 3 500 applications.³⁵ In this section, it is shown how the lessons of this book on impact and added value could be applied to the Academy's major forms of funding that are Postdoctoral Researcher, Academy Research Fellow, and Academy Project. For these three, there is a specific research plan template, that will be utilized in the discussion to follow.³⁶ Please note that I am providing guidance only with respect to impact and other topics dealt with in this book. Other guidance on grant writing and insights or courses provided by your university's Research Services are also relevant.

The template for a research plan is divided into six sections, the last being 'Bibliography'. The first section, 'Aim and Objectives' reads as follows:

- 1.1. Significance of the research project in relation to current knowledge, premise underpinning the research:
 - How the project is linked to previous international and/or national research (state of the art).
 - Research premise, aims, and objectives of the project.
- 1.2. Research questions and/or hypotheses

1.3. Expected research results and their anticipated scientific impact, potential for scientific breakthroughs and for promoting scientific renewal:

- Impact within the scientific community.
- Project's novelty or added value for science.

In section 1.1 of the proposal, you must justify the need for the project, describe the state-of-the-art and how the objectives will advance the field. You are required to briefly describe what kinds of competences and resources are required and show that you and your collaborators have them all, thus answering the question as to why you are qualified to address the problem stated. Then, you need to formulate the exact hypotheses or research questions in section 1.2, and use the exact same formulations throughout the proposal – research questions are the core of your proposal, and it is very confusing if various formulations are employed. Section 1.3 should present your major outcomes and added value, just as we discussed in Chapter 2.5. If significant societal outcomes can be expected, I would also highlight them here. Sometimes it is hard to say whether outcomes are purely scientific but also societal, so you should summarize all the expected major outcomes, showing the impact and added value of the project. You should keep the whole section 1 as clear as possible, utilizing the lessons from Chapter 4. Ideally, you should compose the first section so that it works as an independent whole, a summary of the project that is complemented by the later sections of the proposal.

The second section is about 'Implementation' and section 2.2 asks you to describe the research environment and research infrastructures. Here you can refer to the discussion in Chapter 2.5 and the related Exercise 6, and accordingly justify what kind of relevant support your research environment provides. Section 2.4 asks for risk assessment, which was briefly discussed in Chapter 2.6. You can list the expected major outcomes, both academic and societal, and the most significant risks for their realization. Then state your remedial actions or plan Bs for each risk. To repeat, the principal challenge regarding claims about expected outcomes or impact is that they will occur in the future. In this book we have considered various ways of justifying these claims, for example by having detailed schedules with defined milestones or by referring to track record and supporting cases in the past. A thorough contingency plan also shows that you have really thought about how to generate the defined outcomes, and that they are not merely wishful thinking. If stakeholder engagement, such as cooperation with ministries, is relevant for your project, in the second section you should also define how the cooperation will be carried out in practice, as discussed in Chapter 3.3.

The third section in the Academy's research plan template asks for descriptions of the applicant and collaborators. Here reviewers assess whether your, and your collaborators', expertise are appropriate for tackling the proposed problem. Thus, you should describe how people's competences are relevant and what roles they have in the project. In other words, justify the added value of collaboration. You also have to show

how the previous activities in your scientific career support the current project and how the project will advance your career and competences. In addition to cognitive competences and knowhow, collaborators can also provide access to important data or specific research infrastructure. Even though mobility has its own section in the online application template, you should also briefly describe the planned mobility in the third section of the research plan. Arguably, visiting periods at other institutions are beneficial due to specific opportunities for collaboration, and therefore could be mentioned in the context of describing other collaborative activities too. Finally, if special competences are required e.g. for public engagement activities, remember to specify the persons with that expertise.

The fourth section in the Academy's template is labeled 'Responsible science' and it is divided into three parts: research ethics, promoting open science, and promoting equality and non-discrimination. Reviewers are asked to assess these issues in a simple 'yes / no' format.³⁷ Open science is related to a mandatory appendix, data management plan, for which e.g. library services of a university can provide support. If needed, you should ask the help of your colleagues or staff of research services for other parts in the fourth section.

Finally, the fifth section is devoted to 'Societal effects and impact'. Curiously enough, this area is not considered in the evaluation form at all. However, a thorough and convincing plan for advancing societal impact may well give you a competitive edge. Scientific impact is the core here, but it is definitely a plus if you have thought about how the project will generate societal impact too. The fifth section is as follows:

5.1. Effects and impact beyond academia:

- Brief description of the appeal, utilisation potential and application areas of the research results beyond the scientific community.
- For instance, provide a self-assessment of the expected societal impact of the research in the long or short term. Impact beyond academia may come in many different forms depending on the research field and the project. For example, science is a source of wealth and prosperity, but it also improves our understanding of the world and enhances the level of civilisation, supports the development of good practices and informs decision-making.
- More information on the wider impact of research: [effects and impact](#)

5.2. Considering principles of sustainable development:

- Brief description of how the project promotes one or more of the eight goals for sustainable development: equal prospects for wellbeing, a participatory society for citizens, sustainable employment, sustainable society and local communities, a carbon-neutral society, a resource-wise economy, lifestyles respectful of the carrying capacity of nature and decision-making respectful of nature.
- More information: [sustainable development](#)

Our discussion in Chapters 1 and 2 should help you in writing a narrative on societal impact for section 5.1. Sustainable development was discussed in Chapter 1.4, which should be useful for section 5.2. However,

there is a minor technical issue that must be clarified. Namely, it may seem puzzling that the description text of 5.2 refers to “eight goals for sustainable development”, since there are 17 Sustainable Development Goals. There is no contradiction, for in 2013 Finland as a nation accepted the “Commitment 2050 Objectives”, whereas “Agenda 2030” with the 17 SDGs was approved by the United Nations in 2015.³⁸ Figure 9 below illustrates the correspondence between these two. My advice is not to bother about this technical nuance, and instead focus on how your research work contributes to the 17 SDGs, just as discussed in Chapter 1.4.

Figure 9. Correspondence between Commitment 2050 and Agenda 2030³⁹

Applying for funding is a kind of game and you have to know the framework and the rules of the game. It was noted in our discussion on foundations, that you have to familiarize yourself with the funding agency in question in order to find out what kind of impact they are expecting from research. This publicly available information about their funding principles, objectives, strategy and other policies equal to the framework, and the rules are defined in call texts and evaluation forms. The Academy of Finland states as its general funding criteria quality, impact, renewal of science, and promoting multidisciplinary, phenomenon-based, and internationally oriented research.⁴⁰ Since the Academy is a governmental organization, they must ensure

the vitality and quality of the scientific work in Finnish research institutions too. Briefly, they want to have the best researchers and institutions here in Finland. Therefore, it is important that researchers are well connected nationally and internationally, are consistently developing their competences and careers, and contribute to the future generations of researchers by teaching and supervising thesis works. Scientific impact is paramount, but it is important to realize these other objectives of the Academy as well.

5.5 STRATEGIC RESEARCH COUNCIL

In 2014, the Finnish Government established the Strategic Research Council (SRC) within the Academy of Finland. The purpose of the funding provided by the SRC is to find concrete solutions to major societal problems. Projects applying for funding must be consortia that generate great societal impact on the basis of multidisciplinary, high-quality research. As a formal requirement, each project needs to include researchers from at least two different research organizations and three disciplines. In order to produce concrete solutions and have societal impact, projects are expected to collaborate with relevant non-academic stakeholders. To this end, each consortium must have detailed plans for interaction activities, and interaction is also evaluated by reviewers. The SRC calls for funding include two stages, first consortia are asked to submit letters of intent (6 pages), and those invited to the second stage submit full applications (19 pages). Review panels for letters of intent evaluate both scientific quality and societal relevance, whereas for full applications there are separate review panels for scientific quality and societal relevance.⁴¹ Projects' plans for interaction are included in the assessment of societal relevance, for which the highest rating '6: extremely significant' is defined as follows:

Research of crucial relevance to users, i.e., such novelty or timeliness and promise that an extremely significant contribution to policy or practice is likely; demonstrates exceptional novelty and innovation to address a solution to an important problem or a critical barrier.⁴²

Each year, the Finnish Government decides on the research themes for SRC funding calls, and the decision is based on a proposal by the Strategic Research Council. In preparing the proposal for research themes, researchers and various stakeholders are also consulted e.g. in workshops.⁴³ To name a few examples of previous research themes, there have been calls for *Dealing with Climate Change – the Human Perspective*; *Changing Role of Public Authority and the Potential for Steering Society*; *Changing citizenship – society in a state of global flux*; and *Knowledge, know-how and the changing working life*⁴⁴. Since the purpose of SRC funding is to provide research-based solutions to the challenges defined by the research themes, the call text and related programme questions are of the utmost importance. Briefly, you have to be absolutely clear about the aspired societal impact and the whole project must be planned toward that very goal. Below are

some general guidelines for composing a successful SRC application, and I would say that everything that is discussed so far in this book counts as relevant here.

Fit. The research theme of the call and the respective program questions should guide the planning of the consortium. Fit for the call must be ensured already in the beginning of planning. The planned research work has to be relevant for the programme questions, and the research together with stakeholder engagement must generate the aspired societal outcomes or solutions. Since projects are also evaluated in relation to scientific quality, a consortium has to be scientifically solid and provide significant and unique research outcomes. The programme questions function as a practical test for a consortium, and it should be constantly reflected upon what kinds of answers the project is providing.

Impact. The main message of this book is that a project's outcomes form the impact of a project. Hence, the aspired scientific and societal outcomes should be defined at the beginning, and then updated and refined along the way. After the outcomes are clarified, then the rest is about planning the implementation or how the different parts of the project have to progress in order to reach those grand objectives, what kinds of milestones should be set, and what kinds of competences and resources are needed. Since stakeholder engagement is a crucial part of each SRC project, the needs of the stakeholders must be taken into account early on. Planning the project with stakeholders affects the list of desired outcomes and even how they are co-created together with the stakeholders.

Partners. All research partners should have clear roles and bring added value to the consortium. SRC themes often focus on some specific phenomenon or problem, and in the planning of the consortium it is crucial to figure out which disciplines are needed to comprehensively address the problem. During planning, it is quite standard that needs for additional competences arise, and therefore research groups representing relevant disciplines need to be recruited. As always, international collaboration is appreciated, and thus appropriate international collaborators should be included in the project. A common problem with consortia is that all individual parts make sense, but together they may not form a coherent whole. Usually this disunity is caused by lack of time in preparing a proposal. Establishing a coherent consortium almost always requires gathering together with all the partners and discussing the project's objectives and the specific contributions from each party. This is an efficient way of ensuring that the proposal is a *common* enterprise and not just a collection of separate sub-projects.

Stakeholders. As was discussed in Chapter 3, research can be transformed into societal impact via stakeholder engagement. Collaboration with non-academics is needed for providing value outside of academia. The rules of academic collaboration apply into non-academic collaboration too: you have to be

clear about each other's roles, objectives, and involvement in the project. Again, this implies discussing and planning together. Sometimes plans for stakeholder engagement are excessive, and researchers try to engage with too many stakeholders. However, quantity does not equal quality in this context either, and you have to carefully think about who the most important collaborators are, and how you should work together in practice. Since stakeholder engagement is dependent on the research work, how they should be efficiently integrated needs to be planned. The more partners, collaborators, and other elements you have, the more complex and harder to manage the project will be. A good strategy may be to categorize the stakeholders on the basis of their relevance or intensity of collaboration, and accordingly some of them will be your key collaborators and others require less interaction and may only be provided a brief on the results in the end, for instance. Finally, you must define the required resources for taking care of activities for stakeholder engagement. For example, some projects have hired an external operator for running the interaction business with stakeholders.

Project structure. In a huge project such as an SRC consortium, the project management and steering of operations is crucial. The management of a multidisciplinary, multi-year research project full of stakeholder activities has to be carefully planned. It all comes down to the project structure, and how the consortium is divided into different work packages and how they are related to each other. Often some work packages are crosscutting and relevant for all operations, for example ethical procedures, data management or interaction activities. The flow of information between work packages and people have to be good, and there have to be mechanisms for resolution of conflicts or delays. There has to be room for error and the planned schedule should not be too unforgiving. A contingency plan for the most likely risks has to be defined as well. Since each project involves contributions from different fields, a key question is how it is ensured that the results produced by differing methods contribute to the whole and shared objectives. Stakeholder activities also have to be planned in concordance with the research work. As part of the steering of a consortium, indicators are defined for following progress of the project – these are often called 'key performance indicators' (KPIs).

Coherence. When the hectic process of composing the consortium proposal is reaching the end, or the deadline of the call, the project must be checked for consistency and coherence. A checklist includes e.g. that the given proposal structure is obeyed, programme questions are answered, the work packages and outcomes are consistently referred to through the proposal, budgeting of resources is sufficient, and the added value of the consortium is superb.

The best advice is to start early. Composing a consortium proposal for purely scientific collaboration takes a lot of time, and if you have to add stakeholder engagement, be prepared for hectic, intensive, and time-consuming project planning. I have also noted that it is very challenging to plan a project with both the

aspired societal impact *and* top-notch science. In other words, when you have to focus on stakeholder engagement and societally relevant research outcomes, sometimes the quality of research work waters down in a way. But successful applications have to be scientifically ambitious too. Since SRC is such a different kind of ball game, it is wise to discuss with researchers who have already applied for SRC funding. At first it may also be better to participate as a consortium partner rather than coordinating the whole. As for stakeholder engagement, I would try to take care most of the activities 'internally', instead of hiring an external operator for them. In my experience, this will make research and interaction activities more integrated with each other and will result in a more coherent project.

5.6 BUSINESS FINLAND

Business Finland (former Tekes) operates under the Ministry of Economic Affairs and Employment, and they are the most important public funder of R&D activities. Business Finland purports to enhance the Finnish economy by supporting the international growth of Finnish companies and creation of new exports and innovations.⁴⁵ Research institutions are funded insofar as they help in accelerating the Finnish economy. Briefly, Business Finland wants to advance the economic impact of research. Applying for funding from Business Finland is quite different than applying from the Academy of Finland or other research funding agencies. First of all, Business Finland does not utilize peer review where external experts assess the projects, but they rely on internally evaluating the projects with their own staff. Often each proposal for funding is case-specific, and there are various meetings and a constant dialogue between researchers and Business Finland officials before funding decisions are made. Below I briefly discuss Business Finland's two funding forms for research institutions, Research to Business and Co-Creation / Co-Innovation.

Research to Business.⁴⁶ This funding is meant for commercialization of a research idea. There are two calls for funding annually, and usually a project lasts around 12 months with a budget of a few hundred thousand Euros. In practice, all the research work should already be done, and during a 'Research to Business' project a viable plan must be established for commercializing the new product or service. The project funding can be used for costs such as IPR and freedom to operate analyses; 'Proof of Relevance' or evaluation of the research idea from the commercialization perspective; 'Proof of Concept' or experimental confirmation that the idea will work; determination of customer value via market surveys; and business model investigations.

Most research institutions have their own Technology Transfer Office (TTO) that provides support in matters pertaining to IPR, patents, and also 'Research to Business' funding. Namely, a viable project idea should have protectable IP in its core, and TTOs help in defining it. If the idea cannot be protected and can be copied, the competitive edge is lost quite soon in the markets. TTOs or Research Services also organize training for researchers intending to apply for the funding. For example, at the University of Helsinki, the training

provides useful information on commercialization of research, there are pitching rehearsals, and the NABC template is used both in pitching and writing a proposal for Business Finland. At least for myself and many researchers I have consulted with, the training and the funding form revealed a totally different but intriguing world. Universities provide a lot of support for commercialization, and you do not have to become a businessman. Namely, external business champions can carry out most of the marketing activities and you can continue focusing on your research work.

Co-Creation / Co-Innovation.⁴⁷ These relatively new forms of funding were established in 2018, and during the past two years the details on funding have evolved. However, the main ethos is to establish an ‘innovation ecosystem’, where research organizations and companies collaborate for the benefit of the Finnish economy and society. There are no fixed call times, so you can contact Business Finland whenever you think that you have a viable idea for a business consortium. ‘Co-Creation’ is funding awarded for a research organization in order to prepare a consortium, find the right partners, and submit a ‘Co-Innovation’ proposal in the end. This preparatory funding is for six months and around one hundred thousand Euros. The funding is usually used for organizing different events and workshops, as well as hiring a Project Coordinator who takes care of practical arrangements and composes the consortium proposal.

A ‘Co-Innovation’ consortium should be a big project with a significant impact. A project lasts around two years and the budget should be from one million Euros to even over three million Euros. Each consortium should involve at least one research organization and three companies, but usually there are more of both. Two research organizations partnering with five to six companies has proven to be a good and manageable consortium size. Business Finland neatly summarizes the purpose of the funding as follows: “Research organizations and companies jointly develop new knowledge and innovations for business needs. The funding accelerates the use of research knowledge, boosts the creation of new Finnish export products and strengthens networks in ecosystems.”⁴⁸ One research organization is defined as the main applicant and coordinator of the consortium, and this responsible unit submits the ‘Co-Innovation’ consortium proposal. All other parties submit their proposals or sub-projects of the consortium too, and companies’ applications effectively amount to their R&D plans for enhancing operations and increasing profits. Naturally, companies do not have to share their trade secrets with other companies in the consortium, but a certain degree of openness is required in order to establish a functioning ecosystem. For that reason, if all the companies in a consortium operate in the same market niche and are thus each other’s competitors, it is almost impossible to establish openness and collaboration. Consequently, if the companies represent different kinds of industries, this has proven to be a very fruitful setting for an effective building of an ecosystem.

In my opinion, the two most important things for a successful consortium are to define a shared vision and to establish an atmosphere of trust and openness. A vision captures the shared objective and theme each partner contributes for, and as such it connects everyone together. The idea of the funding is to establish an open ecosystem, where partners can share the challenges that they are facing in their operations and establish solutions for them together. Without trust, this kind of sharing and co-creation of solutions is impossible. The role of research is also purely instrumental, for companies define what kind of research or knowledge is ultimately needed to advance their businesses and profits. This requires intense collaboration between researchers and companies, so that the former understand the exact nature of problems and the latter see what kinds of tasks can be solved with research, after which optimal solutions can be sought together. Each consortium is a specific case, and therefore a continuous dialogue with Business Finland is another key to success.

5.7 SUMMARY

The purpose of this chapter was to demonstrate how to apply the lessons of the previous chapters into specific funding calls, and how different funding agencies emphasize different aspect of impact. For example, the Strategic Research Council expects that research has societal relevance and, together with stakeholders, concrete solutions for the society's needs are co-created, whereas Business Finland sees the value of research in boosting the Finnish economy and companies. I am painfully aware that I have succeeded only in scratching the surface of different forms of funding discussed in the chapter. However, the lessons of the book are intended to be applicable to all forms of funding, if any. Needless to say, this book cannot replace personal guidance by 'Grant Writers' or other support from a university's administrative staff or especially peers. I hope that this book can provide supplementary advice, that I have succeeded in clarifying the concept of impact, and that now you are better equipped to argue for the added value of your research.

CONCLUSION – ONLY IMPACT MATTERS

Before a few concluding remarks, it is time for one more exercise. Please, fasten your seatbelts.

EXERCISE 9 / IMPACT REVISITED

Go back to the very first exercise, read and reflect what you have written there. Now, consider what you have learnt from impact on the basis of this book and other sources since then. Using the Exercise Template, write your account on how your understanding of impact has changed and what 'impact' currently means to you.

A standard criticism of grant writing techniques is that the problem is not in the quality of how proposals are written, but in the amount of total funding. In other words, even if all researchers would perfectly adopt everything I have written in this book, the end result would still be the same: about 9 out of 10 researchers will receive negative funding decisions. This is undoubtedly true, but still I would be extremely satisfied, if all researchers would write perfectly clear proposals whose added value everyone would understand. I am pretty sure that integration and collaboration between scientific institutions and other stakeholders in society will increase in the future, and all the better if scientists were able to communicate their research with striking clarity. I also think that there would be much more collaboration between universities and the private sector if researchers could convincingly show the relevance of their research for different industries and their future development. This would imply more investments to research, and funding for more and more researchers.

I am not saying that everyone should engage with business collaboration, but it does not pose a threat to the integrity of science either. Scientific breakthroughs are paramount, and societal impact will follow after and from them. Humanity is capable of unimaginable horrors and destruction, but also of mind-blowing abstract thinking and theoretical innovations. Our ability to create something new with our minds is what is left of us for the future generations at the end of the day. Only impact matters.

NOTES

All photos are downloaded from Unsplash (<https://unsplash.com/>), a platform devoted to freely usable images. I am grateful for the Unsplash community for their superb work, and a special 'thank you' for the following individuals or organizations whose images are used in this book: Rafael Zamora (cover image), Josh Hild (image on page 11), National Cancer Institute (p. 14), Aaron Burden (p. 20), Brandon Morgan (p. 28), Chris Barbalis (p. 33), Mark Boss (p. 44), You X Ventures (p. 48), Luis Graterol (p. 54) and SpaceX (p. 75).

CHAPTER 1

¹ <https://www.ukri.org/innovation/excellence-with-impact/>, revived on 17.12.2019.

² <https://ec.europa.eu/assets/epsc/pages/espas/chapter1.html>, revived on 2.1.2020.

³ *Global Trends to 2030: Can the EU meet the challenges ahead?* European Union, 2015. The report is available at:

https://espas.secure.europarl.europa.eu/orbis/sites/default/files/espas_files/about/espas-report-2015.pdf

⁴ *Global Trends to 2030: Can the EU meet the challenges ahead?* Page 7.

⁵ *Megatrendit 2020*. Sitra, 2020. The report is available at:

<https://media.sitra.fi/2019/12/01114605/megatrendit-2020selvitys1.pdf>

⁶ *Megatrendit 2020*. Page 2.

⁷ <https://www.un.org/sustainabledevelopment/development-agenda/>, revived on 7.1.2020.

⁸ https://en.wikipedia.org/wiki/Sustainable_Development_Goals, revived on 7.1.2020.

⁹ <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>, revived on 7.1.2020.

¹⁰ Please refer to: <https://unstats.un.org/sdgs/indicators/indicators-list/> and https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework%20after%202019%20refinement_Eng.pdf

CHAPTER 2

¹¹ <https://www.ukri.org/innovation/excellence-with-impact/>, revived on 14.1.2020.

¹² <https://www.aka.fi/en/research-and-science-policy/effects-and-impact-of-research/>, revived 14.1.2020.

¹³ *The Challenges of Impact Assessment*. European Science Foundation, 2012. Page 7. The report is available at:

<http://archives.esf.org/coordinating-research/mo-l/evaluation-of-publicly-funded-research.html>

¹⁴ *Impact and the next Framework Programme for Research and Innovation*. Note from the League of European Research Universities (LERU), 2018. Page 4. The report is available at:

<https://www.leru.org/publications/impact-and-the-next-framework-programme-for-research-and-innovation>

Note that in the Figure 2, I have substituted, for consistency's sake, LERU's definition for impact with the definition by UK Research and Innovation. In the original table by LERU, impact is defined as follows:

Effect on, change or benefit to the economy, society, culture, public policy or services,
health, the environment or quality of life, beyond academia (HEFCE's definition)

In the above definition, LERU refers to 'HEFCE' that stands for 'the Higher Education Funding Council for England'.

¹⁵ This point of focusing on outcomes, and not so much on impacts, is also made by LERU: *Impact and the next Framework Programme for Research and Innovation*. Note from the League of European Research Universities (LERU), 2018. Page 7.

¹⁶ *Qualitative Evaluation of completed projects funded by the European Research Council*. European Research Council, 2016. The report is available at:
https://erc.europa.eu/sites/default/files/qualitative_evaluation_of_completed_projects_funded_by_the_erc.pdf

¹⁷ Much of the discussion here is derived from an excellent section (pp. 8 -12) in *The Challenges of Impact Assessment*. European Science Foundation, 2012.

¹⁸ *The Challenges of Impact Assessment*. European Science Foundation, 2012. Page 11.

¹⁹ The figure is courtesy of Research Councils UK (RCUK) that was transitioned into UK Research and Innovation (UKRI) in 2018.

CHAPTER 3

²⁰ <https://www.aka.fi/en/research-and-science-policy/research-infrastructures/>, revived 29.1.2020.

CHAPTER 4

²¹ "How to Pitch an Idea" by Scott Berkun, 2006. An online essay, available at
<https://scottberkun.com/essays/38-how-to-pitch-an-idea/comment-page-2/>, revived on 7.2.2020.

CHAPTER 5

²² European Commission, Horizon 2020, Work Programme 2018-2020, *Future and Emerging Technologies*, call text page 7. Call available at
https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-fet_en.pdf, revived on 17.2.2020.

²³ <https://www.aka.fi/en/review-and-decisions/reviews-and-decision-making/>, revived on 17.2.2020.

²⁴ <https://www.aka.fi/en/review-and-decisions/funding-decision-process/>, revived on 18.2.2020.

- ²⁵ Jane and Aatos Erkkö Foundation website, <http://jaes.fi/en/applying-for-donation-2/>, revived on 19.2.2020.
- ²⁶ http://jaes.fi/wp-content/uploads/2016/11/Kriteerit_ENGLANTI.pdf, revived on 19.2.2020.
- ²⁷ Jenny and Antti Wihuri Foundation website, <https://wihurinrahasto.fi/grants/hakuaika/?lang=en>, revived on 19.2.2020.
- ²⁸ <https://wihurinrahasto.fi/wp-content/uploads/2019/04/2019-forms-to-filled-in-1.pdf>, revived on 19.2.2020.
- ²⁹ <http://wihurinrahasto.fi/grants/handling-of-the-application/?lang=en>, revived on 19.2.2020.
- ³⁰ <http://wihurinrahasto.fi/apurahat/hakemusten-kasittely/>, revived on 19.2.2020.
- ³¹ <https://koneensaatio.fi/en/grants/grantapplicants/>, revived on 19.2.2020.
- ³² <https://koneensaatio.fi/en/grants/grantapplicants/>, revived on 19.2.2020.
- ³³ <https://koneensaatio.fi/en/grants/grantapplicants/>, revived on 19.2.2020.
- ³⁴ <https://laaketieteensaatio.fi/en/grants/guidelines/>, revived on 20.2.2020.
- ³⁵ <https://www.aka.fi/en/about-us/media/press-releases/2019/number-of-applications-for-the-academy-september-call-rose-since-last-year/>, revived on 21.2.2020.
- ³⁶ I will utilize the templates available on the Academy's website as of February 21, 2020. The templates can be found here: <https://www.aka.fi/en/funding/apply-for-funding/az-index-of-application-guidelines/research-plan-structure/>.
- ³⁷ The Academy's evaluation forms are available here: <https://www.aka.fi/en/review-and-decisions/application-review-guides-and-forms/>.
- ³⁸ <https://kestavakehitys.fi/en/agenda2030/correspondence>, revived on March 4, 2020.
- ³⁹ <https://kestavakehitys.fi/en/agenda2030/correspondence>, revived on March 4, 2020.
- ⁴⁰ See 'Academy of Finland in brief': <https://www.aka.fi/en/about-us/academy-of-finland-in-brief/>; 'Application review and decision-making': <https://www.aka.fi/en/review-and-decisions/reviews-and-decision-making/>; 'Our strategy': <https://www.aka.fi/en/research-and-science-policy/strategy/>; and 'How the funding decisions are made: <https://www.aka.fi/en/review-and-decisions/funding-decision-process/>.
- ⁴¹ Information on Strategic Research Council available at: <https://www.aka.fi/en/strategic-research-funding/> and <https://www.aka.fi/en/strategic-research-funding/apply-for-src-funding/faq/>. For guidelines for proposals, check their calls for funding, e.g. <https://www.aka.fi/en/funding/apply-for-funding/apply-now2/strategic-research-programme-climate-change/>.
- ⁴² <https://www.aka.fi/en/funding/apply-for-funding/az-index-of-application-guidelines/strategic-research/src-rating-scale-and-review-criteria-for-relevance-of-the-application/>, revived on 26.2.2020.
- ⁴³ <https://www.aka.fi/en/strategic-research-funding/themes/theme-process/>, revived on 26.2.2020.
- ⁴⁴ <https://www.aka.fi/en/strategic-research-funding/themes/>, revived on 26.2.2020.
- ⁴⁵ <https://www.businessfinland.fi/en/for-finnish-customers/about-us/in-brief/>, revived on 3.3.2020.

⁴⁶ Information about the funding form available at Business Finland webpage, see <https://www.businessfinland.fi/en/for-finnish-customers/services/funding/cooperation-between-companies-and-research-organizations/research-to-business/>.

⁴⁷ See <https://www.businessfinland.fi/en/for-finnish-customers/services/funding/cooperation-between-companies-and-research-organizations/co-creation/>; and <https://www.businessfinland.fi/en/for-finnish-customers/services/funding/cooperation-between-companies-and-research-organizations/co-innovation/#stored>.

⁴⁸ Business Finland presentation material, *Co-Innovation Funding*, page 4. The presentation is available at: https://www.businessfinland.fi/490c09/globalassets/finnish-customers/01-funding/04-research-organization/co-innovation_funding_100220.pdf.

APPENDIX – EXERCISES TEMPLATE

EXERCISE 1 / WHAT THE HILL IS IMPACT?

This exercise is all about free association; just try to capture your first impressions and thoughts. So, think about the word 'impact' and start writing down your thoughts on it into the Exercise Template. Your answer can be whole sentences, individual words, or a mind map; whatever suits you the best. Use a couple of minutes, or as long as you have a flow going on. Then have a brief pause and return to the book.

EXERCISE 1 / WHAT THE HILL IS IMPACT?

Impact?

EXERCISE 2 / LESSONS FROM THE PAST

First, write down your discipline and research theme(s) into the Exercise Template. Then think about what kinds of achievements there have been in the area and write them down. Do not be bothered whether those examples of yours are 'societal' or 'academic', or whether they are quite old or very recent. The point here is to think about what kinds of successes there have been in your research area.

EXAMPLE 1 / Food sciences: Due to significant advances in plant cell research, we are nowadays able to produce cultured meat.

EXAMPLE 2 / Cultural history: Meticulous studies have shown that history writing is often biased and thus replicating the power hierarchy between ruling class and minorities.

EXAMPLE 3 / Cancer research: Understanding the genetic changes tumors cause has led to a new era of 'personalized medicine': treatments will be tailored in accordance with each patient's unique traits.

EXERCISE 2 / LESSONS FROM THE PAST

My discipline:

My research theme(s):

Success stories from the past:

EXERCISE 3 / SUSTAINABLE DEVELOPMENT GOALS

First, think about the future and how you see what kinds of changes the world and humanity will face in the next decade. Write briefly about your thoughts into the Exercise Template. Next, read through all the Sustainable Development Goals, and think how your research work or discipline in general can be seen to promote sustainable development and SDGs. Choose one to three SDGs and justify briefly in the Exercise Template how your research (or discipline) contributes to them.

EXAMPLE 1 / Mechanical engineering: SDGs 7, 8, and 9. By developing more efficient electric motors, usage of renewable energy is promoted. New production chains and infrastructure have to be established too, which advances economic growth, innovations, and new branches of industry.

EXAMPLE 2 / Animal studies: SDGs 3 and 12. The relationships between humans and other animals are complex and, in many regards, still unexamined. Whether production animals, service animals, or pets, better understanding our relationships with them promotes our (and their) well-being, educates consumers to respect animals, and advances sustainable consumption.

EXAMPLE 3 / Mathematics: all SDGs. Mathematical research has had a huge impact on humanity, and without this abstract science we would still live in caves. Math is applied everywhere, and it is needed in promoting SDGs as well. Further, the value of many profound mathematical discoveries has been properly understood only centuries later, and quite likely that applies to recent abstract discoveries too.

EXERCISE 3 / SUSTAINABLE DEVELOPMENT GOALS

My thoughts on the future:

My research/discipline promotes the following SDGs:

Justification:

EXERCISE 4 / FROM RESEARCH TO IMPACT

Think about your research work and your future goals for it. Utilizing the Exercise Template, first write down some of your desired outcomes for your research. Then, reflect upon everything you have read about impact so far in this book and think about what kinds of societal or non-academic impacts could follow from your research.

EXAMPLE 1 / Geology. Outcomes: analyzing seismic waves in order to have knowledge on the Earth's composition and metallic core. Impact: Geological research can open up new possibilities for the utilization of our planet's resources, including forms of energy. If we can have access to so far unexploited resources or harness new forms of energy, that would have an enormous impact for the whole humanity and our future technological progress.

EXAMPLE 2 / Phonetics. Outcomes: understanding differing usage of vowels in English language. Impact: Linguistic research on spoken language will have an obvious training impact, for then more efficient courses can be developed for foreign speakers. Combined with AI-assisted language learning tools, research on phonetics can lead to new technological innovations, which can also help people with disorders such as dyslexia.

EXAMPLE 3 / Theology. Outcomes: understanding the development of the doctrine of trinity. Impact: Understanding religions and their conceptual and historical development has inherent cultural value or impact: it helps us to understand who we are and how our values and concepts on supranatural and eternity have been formed. Understanding the underpinning of a religion is also often a key to understanding a culture different from our own.

EXERCISE 4 / FROM RESEARCH TO IMPACT

The outcomes of my research work:

Societal impact:

EXERCISE 5 / BEYOND STATE-OF-THE-ART

Think about your research work and what kind of scientific or academic impact you are expecting from it. Envision the current state-of-the-art and how you are going to contribute to it, or even provide some breakthrough results beyond the state-of-the art. Try to figure out what will be the most fundamental scientific gain from your research and write that scientific core of yours into the Exercise Template.

EXAMPLE 1 / Medicine, research on brain metastases. Academic impact: Survival rates of patients with brain metastases are poor, and discovery of new therapies rely on 2D cultures and in vivo testing in mice. We will develop 3D-printed models of brain metastases, which establishes an efficient use of nano-vaccines and selective targeting of tumor cells. The project will result in a paradigm shift by generating new preclinical cancer models that will bridge the translational gap in cancer therapeutics.

EXAMPLE 2 / History, research on people's interactions with water. Academic impact: Water is vital for human cultures, yet it is neglected in history writing. The project aims to establish a new field of study, *Water Cultures*. There are several dimensions associated, for example symbolic beliefs and practices associated with water; the water management systems of large cities and demands on them; and the occupations of water, exploring the professions and trades associated with water. This transformative project conceptualizes a new way of writing history: the construction of identities and forms of self-representation based on relationships and interactions with water.

EXAMPLE 3 / Computer science, research on optimal AI. Academic impact: Currently machine learning is limited to function-based perception tasks that learn data associations. Achieving beneficial collaboration between human and artificial agents requires models of autonomy, inference, decision-making, control, and coordination that go significantly beyond perception. In this project, a model-based, probabilistic reasoning framework for autonomous agents is developed, and thus major advances are to be expected.

EXERCISE 5 / BEYOND STATE-OF-THE-ART

Scientific core / academic impact of my research work:

EXERCISE 6 / HOME SWEET HOME

Think about your research work and what kinds of prerequisites it needs, especially in terms of infrastructure. Then consider what kinds of administrative services and processes are required for running the project. Focus on your own university and envision all the options for scientific collaboration you have there. Recall the importance of track record and name a few past success stories in your department. Check the strategy documents of your institution, and also consider the big picture as to whether government's or EU's strategic programmes are supportive of your research objectives. Utilizing the Exercise Template, write a concise narrative about the support provided to you by your home institution.

EXAMPLE / The study on the common basis of environmental regulations in the area of EU will be conducted in the Faculty of Law, which has received four ERC grants and a Centre of Excellence funding during the past 5 years. We will be in close collaboration with two research groups in the Faculty, led by Professors Righteous and Triumph. The latter part of the project will benefit from case studies in collaboration with researchers from the Faculty of Environmental Sciences. The university's databases provide access to all relevant sources, and the project will also enjoy support from an ongoing development project of legal informatics. One of the project's expected outcomes is an improved regulatory framework for environmental matters in the EU, and thus we will contribute to sustainable development, which is also defined as the core theme in the university's strategy.

EXERCISE 6 / HOME SWEET HOME

Describe how your research environment supports the project.

EXERCISE 7 / COLLABORATIVE BENEFITS

The purpose of this exercise is to plan collaboration with a non-academic party, who has an interest in your research. Start by figuring out your potential stakeholders, choose one of them and sketch details on the collaboration. Think about what kinds of outcomes both of you are expecting, timeline, required resources and how the collaboration will be managed in practice. Then, write a concise narrative about the envisioned stakeholder engagement into the Exercise Template.

EXAMPLE 1 / Social science. The project studies the environmental attitudes of the citizens of Helsinki, their consumption patterns and participation in social media groups. Data will be gathered from a representative sample of citizens, including an extensive set of social variables. The city of Helsinki has already expressed their interest in the research results, and a market research company will pay for the research data. We are currently negotiating about the details of the contract with the company, and lawyers of the university are included in the process.

EXAMPLE 2 / Acoustics. The project studies concert hall acoustics and aims to develop novel algorithms for spatial sound analysis, as well as understand better the relationship between subjective and objective assessments of audio quality. The results of the project can be applied to build acoustically better concert halls and public places such as libraries. Thus, the research is of interest to cities, the general public, concert providers and other commercial organizations. The research is conducted together with the department of architecture, and we will together look for concrete applications at later stage. Further, a Finnish loudspeaker manufacturer is willing to continue our earlier collaboration in this project too.

EXAMPLE 3 / Astrophysics. The project studies super massive black holes that are found at the centers of massive galaxies. The research will provide new understanding on the formation of cores in galaxies, the formation of nuclear stellar clusters and the distribution of the gravitational wave background. The project will have a huge scientific impact, especially in gravitational wave astronomy. It is unlikely to produce any concrete commercial applications. The general public has always been interested in astronomy, however, and we will collaborate with a Finnish science center in organizing an exhibition on black holes in the year 2022. Moreover, we are collaborating with all space agencies and we are involved e.g. in the development work of gravitational wave observatories.

EXERCISE 7 / COLLABORATIVE BENEFITS

An example of my stakeholder engagement.

EXERCISE 8 / NEED – APPROACH – BENEFITS – COMPETITION

Here the idea is to practice a one-minute pitch. Think about your research idea and try to pitch it according to the NABC model, and write your pitch into the Exercise Template. Do not bother if your pitch seems naïve to you – the purpose is to practice the structure and order using the NABC template. A one-minute presentation of research work implies that you have to simplify matters, but practice makes perfect.

EXAMPLE 1. Mental health problems cost Finnish society about 11 billion Euros annually [NEED]. Our research enables the development of a virtual self-care kit [APPROACH]. The kit will efficiently supplement existing treatments and with 5 million Euros investment we expect to decrease the costs to public health care by about 100 million Euros in three years, and also enhance the quality of life for hundreds of citizens [BENEFITS]. None of the currently available treatments come close to the cost-efficiency of our solution [COMPETITION].

EXAMPLE 2. In ten years, the Internet of Things (IoT) will be as common as the ordinary Internet we are used to connect with our laptops and smartphones. However, the IoT faces severe privacy and security issues [NEED]. Our research project will develop a security protocol for the IoT utilizing individual, virtual fingerprints [APPROACH]. The IoT is an inevitable technological advancement, and our unique innovation makes the IoT safe for everyone with due respect for privacy [BENEFITS]. Our transdisciplinary team has all the right competences and networks, and no other team in the world can deliver the solution as efficiently and quickly as we can [COMPETITION].

EXAMPLE 3. The nature of plasma phenomena is still poorly understood [NEED]. In this project, we will study the interaction between energetic particles and magnetohydrodynamic instabilities in a fusion plasma [APPROACH]. Our project will have a groundbreaking impact on the development of next-generation devices utilizing plasma. The project also enables us to better understand plasma phenomena and for example the solar corona [BENEFITS]. As our track record shows, we are spearheads in the research of plasma, and our group's Plasma Lab has defined the state-of-the-art in the area for the past two decades [COMPETITION].

EXERCISE 8 / NEED – APPROACH – BENEFITS – COMPETITION

NABC / A one-minute pitch of my research project.

EXERCISE 9 / IMPACT REVISITED

Go back to the very first exercise, read and reflect what you have written there. Now, consider what you have learnt from impact on the basis of this book and other sources since then. Using the Exercise Template, write your account on how your understanding of impact has changed and what 'impact' currently means to you.

EXERCISE 9 / IMPACT REVISITED

Impact?