DECISION MODELLING ADAPTIVE RE-USE OF RELIGIOUS HERITAGE

P5 report for mastertrack Management in the Built Environment

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Foreword

In the Netherlands we often see that secularization is followed by the replacement of existing rituals by alternative 'secular' ones. The burial of the Dutch folksinger André Hazes, was explicitly non-religious in nature, but tv-broadcasts of the farewell for the popular artist, show that people took a fervour in embracing new ways of expressing their sorrow. Singing along to songs produced by Hazes, in one of the Netherlands biggest venues, people were caught up in a shared expression of the loss they felt by the death of the singer, which was in days past only reserved for religious services.

Somewhere then, we need some kind of symbolization of feelings we have, such as grief, joy and pride. Pride, such as pride for locale, is interesting to consider in a country which in most other nations would rank as a region or province at most. The Dutch show a lot of location bound pride and identity.

This identity used to be bound or connected to the religion predominant in local society. The North and Centre of the Netherlands have been the feeding ground of many protestant Christian denominations, while the South of the country stayed predominantly Roman Catholic. This has led to severe religious conflicts, and the greater part of the 20th century found the nation divided along borders set by historic religious development.

Society has been changing, or evolving, rapidly in the past years, including disruptive trends such as globalisation, secularization, digitalisation, and the dropping influence borders pose on the lives of people. Many writers have considered the need for new ways of expressing identity, which is found to be very important for the well-being and self-identification of people in this era of change.

Why then, do we not use the remnants and heritage of the identity that we not so long ago started explicitly avoiding. The monumental churches we have left are often the physical centres of communities, while their functional use has diminished. The loss of these monuments is something that should be avoided, while a new symbolic use might be found in creating local identity.

Improving the re-use of these old buildings that formed and defined communities, the unique context in which this specific obsolescence occurs, and the often-beautiful outcome of adaptive re-use of churches, are the reasons I wanted to contribute to this field of research and practice.

The problems arising in the processes of re-use for these churches are often very case specific. Considering the aims goals and stated wishes and demands from all actors and stakeholders in these processes can lead to insights that can help solve these complex problems. In this way, adaptive re-use of obsolete churches might become more common. Then more of this heritage might be saved, and people would find a new appreciation for the identity their local community might have.

I hope that this research shows the value of adaptive re-use of these churches, the usefulness of considering these projects in a different way, and that the implications might lead to more beautiful instances of preservation through adaptive re-use.

As a last note I would like to thank all interviewees and my mentors, Ruud Binnekamp, Hilde Remøy and Philip Koppels, for helping me complete this research.

-Sander van Engelen

Please note that this version of the research report is classified as public. The reason for this will be elaborated on further in section 3.6.

Decision Modelling Adaptive Re-use of Religious Heritage (Summary)

Abstract – Because of increased secularization and decreased parish revenues, obsolete churches are being sold. Adaptive re-use could preserve the cultural heritage these buildings represent, while having many further benefits. Decision modelling helps view these problems with every actor and their viewpoints in context and in relation with one another and the goal function. The case of the [church name] in [village name] was modelled in the original situation as well as an extended case, where more choice options were added and the new position of the Diocese was considered. Then more situations and aspects from various cases were modelled. In this way the fitness for use of a decision model for choices to be made in adaptive re-use of obsolete churches was proven. The use of decision modelling in adaptive re-use of obsolete churches might in the future lead to more successful outcomes.

Keywords: Adaptive Re-use, Obsolete Churches, Cultural Heritage, Secularization, Decision Modelling

Introduction

Churches in the Netherlands have seen a decline in active worshipers and financial contributions. This leads to parishes merging and not being able to pay upkeep for all the churches they own. These churches then are functionally obsolete, which Mine (2013) defined as the prime targets for adaptive re-use. These churches are often valued as physical objects of cultural heritage, and the need to preserve them is broadly felt. Adaptive re-use can offer a solution towards this end, with Langston (2008) even stating that “adaptive reuse is the future of the construction industry.” In practice still churches are being demolished (Jonkers & Van Doren, 2017; Koenen, 2017; Sluiter, 2017; Van Schijndel, 2017). This implies that possibly improvements can be made in the process of adaptive re-use to provide for more successful projects.

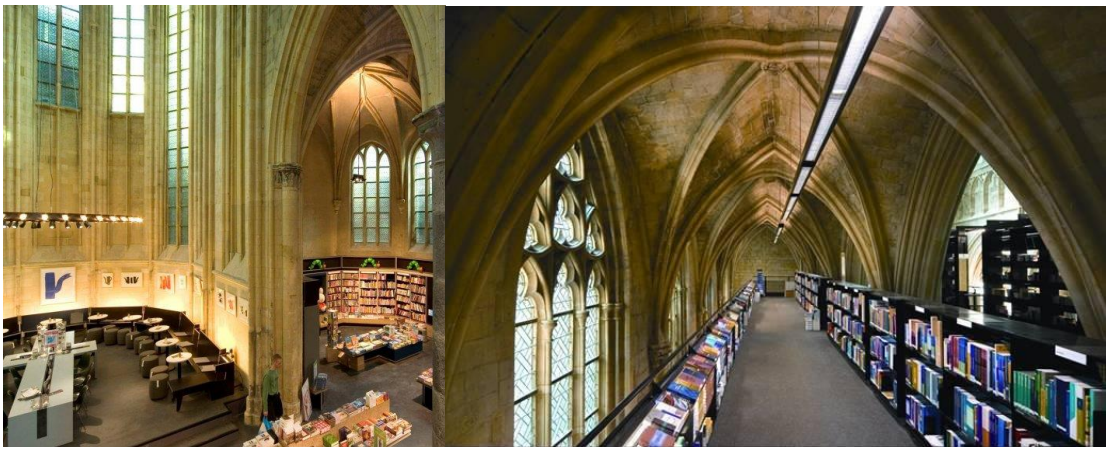

Figure 1. The Dominicanenkerk in Maastricht is in use as a bookshop. Image from (Herbestemming.nu, n.d.).

Considering multiple possible functions in future proposals for adaptive re-use, in order to provide options for all stakeholders, was recommended by (Mısırlısoy & Günçe, 2016). One way of doing this is considering options in relation to all wishes and demands stated by different stakeholders. The

method chosen to do this is by using decision modelling. Adaptive re-use of obsolete churches as a large group of involved actors, all setting different constraints on the solution of the problem posed. The individual constraint an actor might set, is meaningless when not regarded in the context of the problem as a whole. The relationships different constraints have to one another and their relation to the solution space in the problem are not defined by the constraint, but by their interaction. Solving this problem then asks for a starting point that does not consider loose parts, but rather the whole. Systems thinking is an expansionist view, wherein systems are always regarded as not being made of elements, but elements in a larger whole, with the connections being more important perhaps than the isolated elements (Binnekamp, Barzilai, & De Graaf, n.d.). The use of decision modelling is one approach of applying systems thinking to a problem and might provide for the relational perspective on the process of adaptive re-use to improve the number successful outcomes.

Figure 2. Student housing in a former church in Rotterdam. Image from (Stadswonen Rotterdam, n.d.).

The choice is made to narrow down religious heritage to consider only the churches of the Roman Catholic Dioceses in the Netherlands. One reason for this is that the Roman Catholic church, unlike other denominations, does not tolerate other religious use of its' obsolete churches (Task Force Toekomst Kerkgebouwen, n.d.) and does not allow selling obsolete churches for functions considered 'immoral', even though they may be profitable, such as nightclubs (Squires, 2009). This makes for more dynamic and complex adaptive re-use projects, for these extra constraints confine the solution space for the problem. A model able to improve the practice of adaptive re-use for these churches, will also then be able to deal with the "easier" cases, where re-use in a religious function for a different denomination might be possible. This research then aims to find a way in which decision modelling can be used to improve the process of adaptive re-use of obsolete Roman-Catholic churches in the Netherlands. This is translated into the research question: How can a decision model improve the practice of adaptive re-use of functionally obsolete Roman Catholic churches in the Netherlands?

The improvement of the practice of adaptive re-use of obsolete churches has two major benefits. The first benefit is contributing to the problem posed by vacant churches, and enabling their preservation as heritage. The second benefit consists of all positive outcomes of adaptive re-use. The use of decision modelling on complex problems is not new. The use of decision modelling through linear programming of adaptive re-use projects is. This research lends further insight into the applications of decision modelling and the contribution decision modelling might offer for solving societal issues.

Methods

Three main goals have to be reached. These goals are reached through different steps in the research methodology. The research, intended to produce a model for future use, is structured as a design problem, solved by prescriptive research. First the problem is analysed, through literature study, which is then synthesized with the aim of the research and the goal of the model, into the first model design, taking into account input given by the experts interviewed. This design is tested through simulation, which are evaluated and lead to a reflection on the fitness of the solution. This is done in three stages, first by modelling a known case in hindsight, the [village name] case. Secondly, this case is used for a new consideration by extending the model. Thirdly, other inputs are considered and proof is supplied that not only the case modelled extensively can be modelled, but the approach fits to different situations as well.

This modelling follows the process of modelling in operations research in which the steps from Ackoff & Sasieni (1968) are used; formulating the problem, constructing the model, deriving a solution, testing the model and evaluating the solution, and implementing and maintaining the solution. The last of these steps falls outside of the scope of this research, since the research aims to develop the model, for which the process from Ackoff and Sasieni is used, for testing the model design.

This design problem aims to translate the complex problem of adaptive re-use of obsolete churches in the Netherlands into a model, for which the [church name] in [village name] is taken as an example. In this problem, the physical constraints of the proposed construction and the existing object are combined with the constraints stemming from human sources, such as developers' profit, unallowable functions and preferences. Binnekamp (2015) defines these two as "physical variables" and "psychological variables" respectively. The point in the process that this decision model was designed for is the moment of sale, where different options are considered, such as re-development and adaptive re-use. In the [village name] case at this point three main soft constraints are posed on these options; the municipality disallows demolition of the building, the Diocese is opposed to adaptive re-use, and the parish cannot accept a negative net present value on their exploitation. The financial outcome of each option is taken into the goal function, but this does not imply that financial outcomes are the main goal of this consideration. The goal is to identify solution space, where one or more options lie within the constraints set.

There was no solution space in the [village name] case. It was then extended and reconsidered. The main changes were that more options of adaptive re-use were considered, and the position of the Diocese changed, which has happened in practice. These changes result in the finding of solution space. The option that was maximized, the adaptive re-use of the [church name] as a gym, was found to be an acceptable outcome for all three main stakeholders. This proves that reconsideration of the case [village name] using a decision model offers a viable solution. This however is of course a moot point, since the church has been demolished. It does show that the use of this tool could have proven helpful if reconsideration was still possible.

Findings

Three proofs are given that the use of a decision model can improve the practice of adaptive re-use for Roman Catholic churches in the Netherlands; proof that cases of potential adaptive re-use can be

successfully modelled in a decision model, proof that the way in which projects might fail can be identified in a decision model, and proof that (conflicting) constraints that have the largest impact on feasibility might be identified in a decision model.

Modelling the [village name] case and further cases proves that cases can be successfully modelled in a decision model. The information that is available on the case [village name] was successfully input into the model, and then successfully extended to make a new consideration. Then several other situations and constraints were modelled, to prove that not just the case [village name] can be modelled, but modelling of such problems is widely possible.

Proof for the second element was constructed by showing the unsolvable nature of the choice to be made by the parish in the case [village name] in the decision model. The constraints set were known at the time. The use of a decision model at the moment of making this decision would therefore have shown that no solution was possible, due to the conflicting nature of the demands set by the municipality, the Diocese and the involuntary constraint posed by the financial situation of the parish.

The third element was proven by using shadow pricing in both the original and extended case. This allows for identifying the impact that constraints have on the goal function. In the case [village name], the impact the constraints had on the net present value of the parish was identified.

Use in practice has not been proven. It was found that solution space was present in the reconsideration of the case [village name]. This was however dependent on a change of viewpoint from the Diocese. This means that possibly if the case was reconsidered, this might have been achieved, but is not proven. This however falls outside the scope of this research. According to the five steps in model production by R.L. Ackoff & Sasieni (1968), only the last step, that of implementation, is left. This has been plausibly proven, which is sufficient proof until implementation in practice has taken place and empirical evidence can be found.

Conclusions

The question this research aimed to answer was: How can a decision model improve the practice of adaptive re-use of functionally obsolete Roman Catholic churches in the Netherlands? It was found that three elements of proof required were obtained in this research, through the case [village name], extending the case [village name] and input of other case situation. Proving that use of a decision model might lead to the change of actors' positions was not empirically proven in practice. This can be further substantiated by using a decision model in a real-life case. The answer to the research question is then that decision models can be used in the practice of adaptive re-use of functionally obsolete Roman Catholic churches in the Netherlands in order to find solution space in the multi actor playing field. Ex post facto proof that use of the decision model improved practice is not sought or acquired in this research. But by proving that the model is fit for use in such cases, it is ensured that this evidence would be obtainable in future research.

One limitation of this research is that it heavily relies on the case [village name]. By reflecting the situation and results of the extended case with one of the involved actors, veracity was sought. Furthermore, proof for fitness for use in other cases was sought by inputting situations and factors from various other cases into the decision model. These two ways of proving fitness for use provide for a basis on which can be stated that the decision model might be applied to other instances of

choices to be made in adaptive re-use of Roman Catholic churches in the Netherlands. These situations are however always very case specific; therefore no conclusive generalisation can be stated. Fitness for use can only be stated to be extant until a case is found which cannot be modelled.

The last limitation applies to modelling and predicting in general. De Leeuw (2002) stated that knowledge from scientific study cannot be thoughtlessly applied to practical problems. The solution proposed by this research is therefore not a 'one-size-fits-all'-solution. Every application of the produced model should be viewed as utilising a helpful tool, with creativity required to enable sound output.

Decision modelling was chosen as a method for this study. This is not however the only method suitable for dealing with these problems. One of the main initial benefits that modelling in any way can bring towards solving problems in the process of adaptive re-use, is that goals, demands and interests are made explicit. This is done in order to be able to model them, but this in itself already offers big insights, and stimulates actors to explicitly phrase their wishes and expectations

Recommendations

A lot of information was obtained in interviewing on actors' demands, with some focus on the impact of the demands the Diocese sets. The difficult position the merged parishes are often put in was found to be a main influence on the possible success of adaptive re-use projects. Their legal independence, results in funds from the Diocese not being used for their exploitation. Their canonical dependence on the Diocese implies they cannot make totally independent decisions and are required in instances of church sale to often opt for the highest sale value. More insight into how the position of the parish influences the potential of adaptive re-use should be sought. Then possibly a change in this position might be proposed in order to increase viability of adaptive re-use and the resulting preservation of churches as cultural heritage.

The local community, including former churchgoers, may have different wishes for the obsolete church, but have no direct engagement in the decision-making process. To improve adaptive re-use practice for obsolete churches, the local community might be more intensively involved in the process, and possibly given the status of actor, instead of mere stakeholder.

Another party to be further considered is the municipality. It was found that a decision to award a listed status to the building brings along a lot of strain on the financial outcomes of a possible adaptive re-use project. If the preservation of the building is thought to be a public good, then possibly public funds should be allotted to the preservation of the building. In this way more projects of adaptive re-use might become financially feasible. How subsidies might be created, in light of the importance of preserving these churches, is an important consideration to make in the future, while still adhering to the separation of church and state.

In the coming decade a lot of Roman Catholic churches will become obsolete. It was found that preservation through adaptive re-use might prove to be the optimal solution for these problems. This research shows that decision models might be used to consider different choice options that exist at the time of sale. This might lead to more informed decisions, including the viewpoints of different actors in considerations. The urgency of the problem of church obsolescence asks for improvement

of the process in which the future of these obsolete churches is considered. If decision models are found to also be able to change actors' views and demands in practice, use of decision models might be the applied to increase the chance of adaptive re-use through considering the views all potential stakeholders have on the future of the church.

The decision model, as defined in this research, was produced for future use. In the coming decisions where sale of an obsolete church is considered, these steps might be taken in a decision model;

- Adding different choice options to the already considered options. By adding adaptive re-use for different functions (including (elderly) housing, offices, cultural centre, library, retail space, event space, gym and indoor playground), these can be taken into consideration. These choice options constitute the endogenous variables, of which one might be the outcome of the decision process.
- Calculating financial outcomes. The effect a sale of a church has on the exploitation of a parish is (one of) the most aspect of the sale decision. These calculations should always start with an end-user perspective, since financial value should be calculated in the opposite direction of transactions made between parties. The outcomes of these calculations constitute the value in the goal function for every endogenous variable.
- Scanning market conditions. By using information on local demography, competing present functions or developments, and commercial reasoning, decisions can be made on what function might or might not be feasible from a market perspective for the project. The (non-) inclusion of different factors are included in the model as constraints on the goal function.
- Defining actor constraints. By interviewing actors and other stakeholders, their wishes and demands on the project might be defined. These are set as constraints on the maximizable goal function.
- Find solution space. By using Microsoft Excel and WhatsBest! this problem then can be modelled. By doing this, solution space might be found, and the optimal solution in regard to the goal function identified. This can then be discussed foremost with the decision makers, then with other actors, to find if this solution is acceptable. If not, then more constraints are added to the model.
- If no solutions space is found, then shadow pricing might be used to find which constraints have the biggest impact on the goal function. Effective negotiation might start with the actors that placed the respective constraints.

By using this approach, more decision processes might lead to adaptive re-use of an obsolete church.

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Table of Content

1. Introduction

In this introduction, the research problem to be solved is first dealt with. The relevance of solving this problem follows, with a description of the research aim and a reading guide in the end.

1.1. Research Problem

As will be further elaborated in chapter 2, churches in the Netherlands have seen a decline in active worshipers and financial contributions. This leads to parishes merging and not being able to pay upkeep for all the churches they own. These churches then are functionally obsolete, which (Mine, 2013) defined as the prime targets for adaptive re-use. These churches are often valued as physical objects of cultural heritage, and the need to preserve them is broadly felt. Adaptive re-use can offer a solution towards this end, with Craig Langston (2008) even stating that "adaptive reuse is the future of the construction industry." Adaptive re-use is defined by Bullen & Love (2011) as "converting a building to undertake a change of use required by new or existing owners". In the case of adaptive re-use of obsolete churches, this entails changing a building from the religious purpose that is not viable anymore, towards a function that will contribute to the upkeep of the building. In practice still churches are being demolished (Jonkers & Van Doren, 2017; Koenen, 2017; Sluiter, 2017; Van Schijndel, 2017). This implies that possibly improvements can be made in the process of adaptive re-use to provide for more successful projects. Considering multiple possible functions in future proposals for adaptive re-use, in order to provide options for all stakeholders, was recommended by (Mısırlısoy & Günçe, 2016). One way of doing this is considering options in relation to all wishes and demands stated by different stakeholders. The method chosen to do this is by using decision modelling. Adaptive re-use of obsolete churches as a large group of involved actors, all setting different constraints on the solution of the problem posed. The individual constraint an actor might set, is meaningless when not regarded in the context of the problem as a whole. The relationships different constraints have to one another and their relation to the solution space in the problem are not defined by the constraint, but by their interaction. Solving this problem then asks for a starting point that does not consider loose parts, but rather the whole. Systems thinking is an expansionist view, wherein systems are always regarded as not being made of elements, but elements in a larger whole, with the connections being more important perhaps than the isolated elements (Binnekamp, Barzilai, & De Graaf, n.d.). The use of decision modelling is one approach of applying systems thinking to a problem and might provide for the relational perspective on the process of adaptive re-use to improve the number successful outcomes. This is then the goal of the research.

1.2. Relevance

The improvement of the practice of adaptive re-use of obsolete churches has two major benefits. The first benefit is contributing to the problem posed by vacant churches, and enabling their preservation as heritage. The second benefit consists of all positive outcomes of adaptive re-use. These include benefits for property values, local economy and environmental issues, and will be further elaborated on in chapter 2.

The use of decision modelling on complex problems is not new. The use of decision modelling through linear programming of adaptive re-use projects is. This research lends further insight into the applications of decision modelling and the contribution decision modelling might offer for solving societal issues.

1.3. Research Aim

Many actors have demands and wishes for any adaptive re-use of former churches, including, but are not limited to, municipalities, Dioceses, (merger) Parishes, (former) church visitors, neighbours and residents, project developers and investors. Sometimes these demands conflict one another (Herbestemming.nu, 2017). The actors that were involved in failed projects, often state that conflicting interests, translated in demands or goals for the project, are the reason the project failed (Asselbergs et al., 2008). This implies that improvements in the way interests are dealt with can lead to more successful instances of adaptive re-use of obsolete churches. This was found to have many beneficial outcomes. One way to deal with demands and goals actors set on potential adaptive re-use projects is by using decision modelling. The choice of using decision modelling will be further substantiated in chapter 2. In order to give a clear direction to the research and make for a solvable problem in the time allotted to it, a narrower scope is needed. The choice is made to narrow down religious heritage to consider only the churches of the Roman Catholic Dioceses in the Netherlands. One reason for this is that the Roman Catholic church, unlike other denominations, does not tolerate other religious use of its' obsolete churches (Task Force Toekomst Kerkgebouwen, n.d.) and does not allow selling obsolete churches for functions considered 'immoral', even though they may be profitable, such as nightclubs (Squires, 2009). This makes for more dynamic and complex adaptive re-use projects, for these extra constraints confine the solution space for the problem. A model able to improve the practice of adaptive re-use for these churches, will also then be able to deal with the "easier" cases, where re-use in a religious function for a different denomination might be possible. This research then aims to find a way in which decision modelling can be used to improve the process of adaptive re-use of obsolete Roman-Catholic churches in the Netherlands.

1.4. Reading Guide

In this research report, first the background of the problem and approach is elaborated on. Then the proposed solution is defined, and a research question is posed. The third chapter handles the research methods used for studying and refining the proposed solution. The aim in the third chapter is to prove fitness for use and usefulness of the intended solution to be applied to the problem of adaptive re-use of obsolete Roman-Catholic churches in the Netherlands. In the fourth chapter the findings are discussed, which are used in the fifth chapter to answer the research question as a conclusion. Furthermore, there the limitations of the research are stated. This is followed by recommendations for future research, a dissemination on the use of the model constructed in this research, and a reflection on the research process, the results produced and further insights gained. In the end of the research an overview is given of the references used, followed by the appendixes.

2. Background

This chapter deals with the background of the posed problem and the proposed solution. First the problem and nature of obsolescence of Dutch Roman Catholic churches is described. This is followed by the benefits that adaptive re-use of these buildings might offer. The difficulties with adaptive re-use of churches are then elaborated on, followed by the proposed solution for the problem and theoretical background on the proposed solution.

2.1. Obsolescence of Dutch Roman Catholic Churches

Prior to the 1960's, the Netherlands had, compared to other Northern European countries, a relatively high percentage of church going population (Kennedy & Zwemer, 2010). The secularisation that then started has led to several issues. Churches in the Netherlands see a decline in the number of active worshippers, as well as a drop in contributions. They are often forced into mergers and the number of buildings needed for worship and services drops. This leads to the existence of a functionally obsolete stock of churches. Currently in the Netherlands, yearly over 100 churches are taken out of religious use, of which about 40% belong to the Roman Catholic denomination (Jongmans, Linskens, & De Groot, 2008). These churches are not needed for religious purposes anymore, due to the shrinkage of the numbers of active church visitors, the shrinkage of paying contributors to the church, or the merger of separate religious communities into one. These churches are often thought of as important for local communities, but there are no budgets available for their often expensive upkeep. The Dutch cardinal Wim Eijk predicted that by 2025, over 1.000 Roman Catholic churches will be obsolete (Katholiek Nieuwsblad, 2013). He further states that between 2008 and 2013 the number of churchgoers declined by 27%, and financial motives are extant in decisions to close down churches. The churches that are becoming obsolete often are monuments in some sense of the word (the Dutch government uses different definitions and statuses for local, supra-local and national monuments) (Velthuis & Spennemann, 2007). These monuments are often threatened by their vacant state (Haasdonk, 2013).

2.2. Adaptive Re-use of Religious Heritage

The potential positive outcomes of adaptive re-use of obsolete churches is twofold. Firstly, this adaptive re-use enables preservation of these buildings. Secondly, adaptive re-use has shown to have further positive influences, touching a broad spectrum of topics. These two reasons for adaptive re-use of churches are elaborated on in the next two paragraphs.

2.2.1. Heritage Preservation

European citizens from the Netherlands and six other countries indicated that they value the religious built heritage in their built environments (Task Force Toekomst Kerkgebouwen, 2014). They indicated that they thought the 500.000+ religious buildings in Europe contribute to their cultural heritage, and may be key to European identity. Spennemann (2006a, 2006b) also identified that communities often value the cultural heritage these buildings might express. Where society has changed through trends of globalisation and digitalisation, people have started searching for explicit regional identity (Castells, 2010), which might be embodied by monumental churches. One way to tackle the risk of losing these heritage values, which are threatened by shrinkage in churchgoers and revenues, is through adaptive re-use, since this helps generate revenues for maintenance from a new

function (Wright & Eppink, 2016). Bromley et al. (2005) argue that adaptive re-use essentially is a form of heritage conservation.

2.2.2. Benefits of Adaptive Re-use

Besides providing the means for conservation of some of the most appreciated physical monuments in our built environments, adaptive re-use of obsolete churches, as cultural heritage, can have more direct and indirect positive influences (Wilkinson, Remøy, & Langston, 2014). Rypkema (2008) argued that incorporating heritage preservation, of which adaptive re-use can be part, in development policies is essential for city growth in a smart and sustainable way. A lot of research has been done into the positive influences adaptive re-use of cultural heritage might have, which are summarized in table 1.

Positive Externalities
Maintaining architectural integrity
Promoting sustainable development
Upscaling areas
Reaching sustainability goals
Conservation of heritage
Encouraging further conservation
Enhancing built environment quality
Maintaining cultural identity of communities
Reducing the use of private transport
Reducing demolition waste
Shrinking environmental load of the built environment
Lowering material, transport and energy consumption
Lessening disruption through construction activity
Marketing re-use projects
Raising property value of the object
Raising property values of the surrounding area
Solving need for housing and commercial space

Table 1. Inventory of positive externalities possible through adaptive re-use of churches. Data from: Bromley et al. (2005); P. Bullen & Love (2011); Conejos, Yung, & Chan (2014); Elsorady (2014); Lynch (2014, 2016); Mohamed & Alauddin (2016); Ruijgrok (2006); Tweed & Sutherland (2007); Watson (2009) and Yung & Chan (2012).

2.3. Difficulties in Adaptive Re-use of Obsolete Churches

Adaptive re-use in practice faces many barriers, such as regulations, sustainability goals and high costs (Conejos, Langston, Chan, & Chew, 2016; Shipley, Utz, & Parsons, 2006). Adaptive re-use of the obsolete church buildings often runs into some specific opposition. The reasons for this opposition are diverse and specific to each actor. (Former) Church visitors often associate the church building to their memories, resulting in a need of rationalising memory patterns, when faced with the reality of church closure (Clark, 2007). Factors and influences like these, lead to different actors placing demands on adaptive re-use projects, which might frustrate these projects. Then there are other important demands and expectations that are often not explicit in the process, namely the expectations the public might have from projects that are dealing with cultural heritage. Elsorady (2014) states that often the public is not consulted on what their expectations or wishes for a certain

building might be. When this is related to the previously discussed public good of heritage conservation, this becomes problematic. Since adaptive re-use is thought of as positive since in helps conserve cultural heritage, it is very important to identify in what way the public values these buildings, and what expectations they might have from projects that deal with these buildings. Consultation of the public might create the insight that more demands and expectations apply to the problem, which are excluded when only considering the directly involved parties as stakeholders.

Many actors then have demands and wishes for any adaptive re-use of former churches. Actors involved include, but are not limited to, municipalities, Dioceses, (merger) Parishes, (former) church visitors, neighbours and residents, project developers and investors. Sometimes these demands conflict one another (Herbestemming.nu, 2017). The actors that were involved in failed projects, often state that conflicting interests, translated in demands or goals for the project, are the reason the project failed (Asselbergs et al., 2008). C. Langston (2011) however states that using an adaptive re-use potential model, the building typology religious (or churches) can be classified as having moderate adaptive re-use potential scores, meaning they could potentially be re-used. Developers, however, have been known to prefer new build over adaptive re-use when producing city centre residential space, while urban planners might encourage adaptive re-use of existing obsolete stock, as was seen in the case of Sheffield in the paper by Rhodes & Wilkinson (2006). The focus on individual actor perspectives lead for instance to heritage experts' demands being in high contrast to economic use of heritage, while exploitation of an object has been proven to contribute to heritage preservation (Saris, 2013). Mapping the possible conflict of interests that can exist even within the perspective of a single actor may lead to reconsideration of the necessity of some demands stated.

2.4. Proposed Solution

The multi-actor nature of the processes leading to adaptive re-use of obsolete churches make that the views of the different actors have to be regarded in context to one another. Decision modelling was chosen as the method to do this. Using linear and integer programming, different choice options can be considered on their merit, and if they fit constraints set by actors.

It was identified that demands and goals are often conflicting. By mapping demands and goals actors have, and checking if projects are infeasible because of these demands and goals, insights into several topics are created. Firstly, the way in which projects might fail can be identified. Secondly, the (combination of) goals and demands that are most difficult to cope with for project success are identified. Lastly, project failure attributed to conflicts of interest can be checked, since maybe the problem was solvable, and the conflict of interests did not exist in the way involved actors think it did. The model that solves all these issues will then be able to be used as a tool, in situations where actors (often project developers) are interested in adaptive re-use of an obsolete church. This would enable them to find solution space in these complex problematics more easily and through this, lead to more successful instances of adaptive re-use of religious heritage. In the next paragraphs the use of a decision model is theoretically founded.

2.4.1. Multi actor problem

Bullen & Love (2011) developed a model to support decision making on adaptive re-use, but this model fails to quantify different solutions in order to make them comparable. This model then does not solve the issues discussed in the previous paragraph. Therefore this research aims to create a

decision model, capable of reaching all the goals discussed in the previous paragraph. One other problem mentioned in previous research by Plevoets & Van Cleempoel (2011) can be solved, namely the lack of dealing with location specific context (or genius loci) in adaptive re-use. The inclusion of all actor and stakeholder wishes and demands, including for instance local residents and neighbours, but also architects and preservation agencies might ensure that the genius loci and the uniqueness of every specific potential project are more extensively dealt with. Another reason for a transdisciplinary approach to heritage consideration is that it might lead to better decision making processes, through improved involvement of stakeholders (Bazelmans, 2013). These reasons, and the difficulties in adaptive re-use of obsolete churches stemming from conflicting viewpoints (as described is section 2.3.), call for a consideration of these cases that takes into account all actors and their views in relation to one another.

2.4.2. Systems Thinking

Instead of taking a reductionist view, a holistic approach is taken for this problem. A holistic approach tries not only to consider parts of a system, but their interrelations and the way they constitute to a greater entity (Jackson, 2003). The actors involved in the processes of potential adaptive re-use have to cooperate to reach success, since designing a solution for a problem has become a collaborative process (Van Loon, 1998). This calls for considering the relation between actors and their interests to regard if collaboration might be possible. The multi actor nature that the adaptive re-use of obsolete churches embodies then calls for a view not only on the individual actors, but also on their relations and the resulting apace for solutions from all their demands and wishes.

2.4.3. Operations Research

Operations research is a form of 'hard systems thinking' (Jackson, 2003), which emphasises on the application of a systematic methodology, which after establishing objectives is able to identify problems standing in the way of optimization or of solution. Since the aim of applying a model in this research is trying to find solution space and identifying conflicting demands and wishes, operation research is highly suited for use. One limitation on 'hard systems thinking' is its inability to cope with issues of politics and power (Jackson, 2003). This offers no serious problems for this research, since there is only one decision maker, operating in an arena of demands and wishes set on the eventual solution. The issues of politics and power are therefore not dealt with in the model, rather a demand that is difficult to include in the solution is identified, which can then be dealt with in negotiation and discussion with the actor stating the demand. A limitation of operations research is that it requires a 'formulation of the problem', while different stakeholders and actors might have very different opinions on the nature of the system and its purpose (Jackson, 2003). With setting the perception of the selling party, the decision maker, as the goal function (as described later on), and the perceptions of other actors as constraints, this potential fallacy of using operations research is avoided.

Operations research can be defined as a mathematical representation of a system that is being studied (Russell L. Ackoff, 1956). The outcome of the basic representation of this is: $E=f(x_i,y_j)$. Here the effectiveness of the system (E) follows from the function of the controllable variables (x_i) and the uncontrollable variables (y_j). Restrictions on the values of the variables may then be set in supplementary equations.

2.4.4. Decision Modelling

The problem of choosing between possible adaptive re-use or other uses of former church locations can be stated to be a limited allocation process. Ackoff (1956) defined allocation process as situations where a number of activities can be performed, but not enough resources or facilities are available for performing each activity. In the case of obsolete churches, one might consider adaptive re-use for different functions or demolition and new build into different functions as activities that can be performed. Since only one church is considered in each case, these different activities that can be performed are limited to one. That makes the problem one of allocating one facility (the chance of performing some activity on the church) to one option.

2.4.5. Linear Programming

Linear programming is chosen as the method for modelling the sale decision to be made. Linear programming has three limitations (Binnekamp, 2010). The first limitation is that only a single objective can be optimized. This is mainly a problem when dealing with group decision processes. Since the decision for a certain sale is made by a single actor, this is not a problem here. The optimizable objective is simply the objective the selling party sets. The views and demands of the other actors are set in the constraints on the goal function. If feasibility is found, the solution is already acceptable to all parties. If there are secondary objectives that the decision making party would like to think of, the possibility for this exists by selecting a feasible, but not the optimal, solution. The second limitation is the hard distinction between feasible and infeasible solutions. The aim of the model use is to find feasibility, which might be achieved by altering the set constraints. A harsh distinction is therefore important to make, since no decision will be made for an infeasible solution. By tweaking the constraints, feasibility might be achieved, but this can only be done up to the point where actors will not change their demands (translated into constraints) any more. If no feasibility is then present, no common ground is found, and the harsh distinction of infeasibility is wanted. The third limitation is the linearity requirement. This tends to produce extreme values, and makes it difficult to identify compromise solutions. The different endogenous variables might be expanded if options that are different and more broadly carried are needed. The aim is to find feasibility after all, and producing extreme values is not a problem, since feasible solutions are already acceptable to all actors involved.

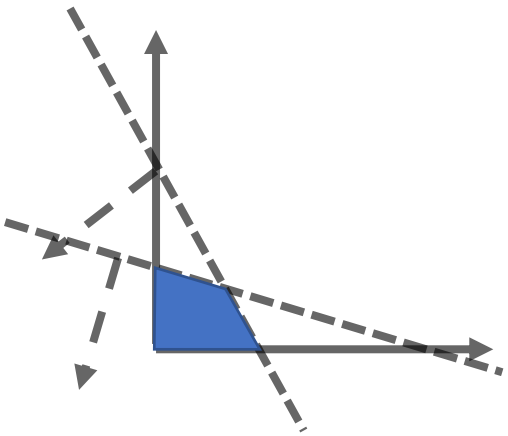


Figure 1. Working of linear programming. Two functions (1x+2y=<0 and 3x+1y=<0) constrain a goal function. The blue area is the resulting solution space. Own illustration.

2.4.6. Model Production

The production of a mathematical representation within the field of operations research is a five step process, according to (R.L. Ackoff & Sasieni, 1968);

1. Formulating the problem
2. Constructing the mathematical model to represent the system under study
3. Deriving a solution from the model
4. Testing the model and evaluating the solution derived from it
5. Implementing and maintaining the solution

On the first of these steps a section is dedicated in this chapter, the other steps are identified in the Methods chapter.

2.4.7. Formulating the Problem

Ackoff (1956) names three steps to be taken when formulating a research problem, in order for it to be effective. The first is that a measure of efficiency to be used relative to an objective has to be defined. The second step is that there has to be a common measuring standard (or transformation into one) has to be found. The last step is stating the definition of which end the 'most effective' solution lies in. The diocese in this case stated that the parish should aim for the highest financial outcome. This leads to the measure of efficiency being produced by each option being defined as financial outcome. The common measuring standard is set at the resulting net present value of the parish exploitation over a period of ten years. The last step is translating highest financial outcome into the maximizing the goal function provided by measuring each option in their resulting net present value of the parish exploitation. The choice for this financial goal function might be seen as taking a decision into what the most important aspect in adaptive re-use might be. The choice for this goal function was made on a basis of convenience, since often the financial outcome is the most easily quantified factor. The aim of the model is to check for solution space. An additional output of using linear programming as discussed is that a maximized value for the goal function is sought. If solution space is present, then choice for a specific solution does not have to comply with this maximized value. The decision makers are free to deviate from this as long as the solution they opt for does not contradict one of the constraints.

2.5. Research Question

Since there is a decline in the need for religious function, churches can become obsolete. Parishes are not able to pay the upkeep for these churches with their decreased incomes through a decrease of active worshippers and revenues. These churches have cultural heritage values which might be preserved through adaptive re-use. A lot of actors are involved in projects of adaptive re-use of obsolete churches, which makes them complex projects. In order to improve the practice of adaptive re-use of religious heritage, more insight is needed into the effect of the demands and wishes that different actors have for adaptive re-use projects. Combining the demands and wishes of different actors into a model, could create insight into the feasibility of the project while adhering to these constraints. Decision models are highly suited for this. The aim of the research is;

-Producing a decision model for use in adaptive re-use projects in religious heritage.

When narrowing this aim down, in order to ensure the scope of the research matches with the time allotted to it, the question this research seeks to answer is defined as;

> -How can a decision model improve the practice of adaptive re-use of functionally obsolete Roman Catholic churches in the Netherlands?

This can be answered by proving the fitness for use applying decision modelling. In order to prove the fitness for use, the model has to be able to incorporate all elements of a situation that might impact the feasibility of a potential project, prove that the way in which projects might fail can be identified and prove that the (conflicting) constraints that have the largest impact on feasibility might be identified.

3. Methods

This chapter elaborates on the research methods used. The research design in first described, followed by information on sampling, interviewees, data collection procedures, the input of cases into the model as data analysis and the research ethics involved in this research.

3.1. Research Design

As mentioned in the previous chapter, three main goals have to be reached. These goals are reached through different steps in the research methodology. The research, intended to produce a model for future use and prove its usefulness, is structured as a design problem, solved by prescriptive research. First the problem is analysed, through literature study, culminating in the Background chapter, which is then synthesized with the aim of the research and the goal of the model, into the first model design, given in section 3.5.1., and taking into account input given by the experts interviewed. This design is tested through simulations in sections 3.5.3. through 3.5.5., which are evaluated and lead to a reflection on the fitness of the solution. This is done in three stages, first by modelling a known case in hindsight, the [village name] case. Secondly, this case is used for a new consideration by extending the model. Thirdly, other inputs are considered and proof is supplied that not only the case modelled extensively can be modelled, but the approach fits to different situations as well. After these simulation in the next chapter the final reflection on the model is given and new synthesis is proposed. This approach is summarized, with the input used in every step, in figure 2.

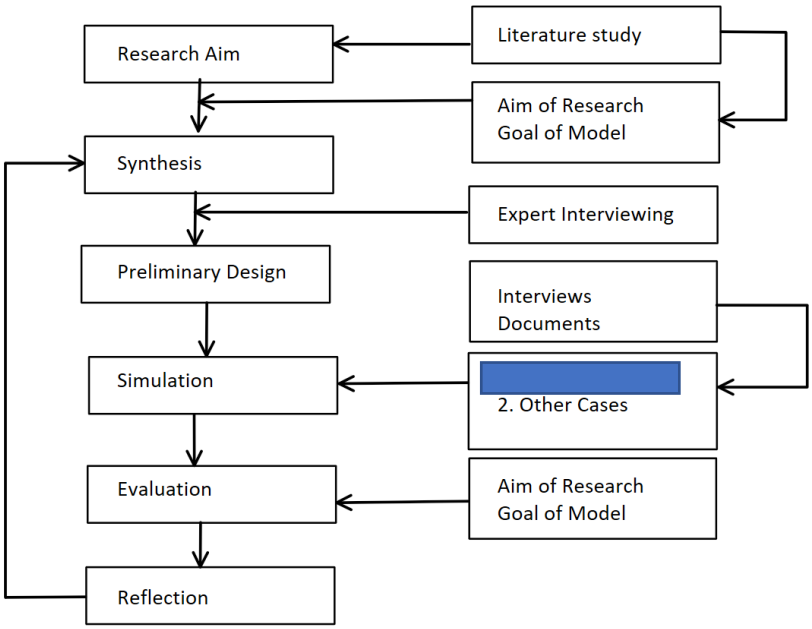


Figure 2. Overview of steps in research (left) and corresponding research methodology (right). Own illustration.

The first part of the study then is literature and document study, with expert interviewing to produce the first overview of variables and constraints to be used in modelling. This is followed by part of the process that strictly takes place in the field of Operations Research. The steps taken for this are based on Ackoff & Sasieni (1968), who identified the following steps;

- Formulating the problem.

- Constructing the model.
- Deriving a solution.
- Testing the model and evaluating the solution.
- Implementing and maintaining the solution.

The first step in this process, the problem statement, was garnered through interviewing actors involved in the case and collecting data through document and literature study, and has been dealt with in section 2.4.7. The second step, model construction, was performed in the manner described in section 3.5. The third step will propose a choice to be implemented in an adaptive re-use project of an obsolete church. The fourth step will check if this proposed solution was used in reality or was viable for use. If so, the model correctly captured the case. If not, the model may be incorrect, or the problem statement was incorrect. The last step, implementation and maintenance of the solution, falls outside of the scope of this research, since the research aims to develop the model, for which the process from Ackoff and Sasieni is used, for testing the model design. In practice, the iterative process of the first four steps described above, would be done in sessions, as can be seen in figure 3.

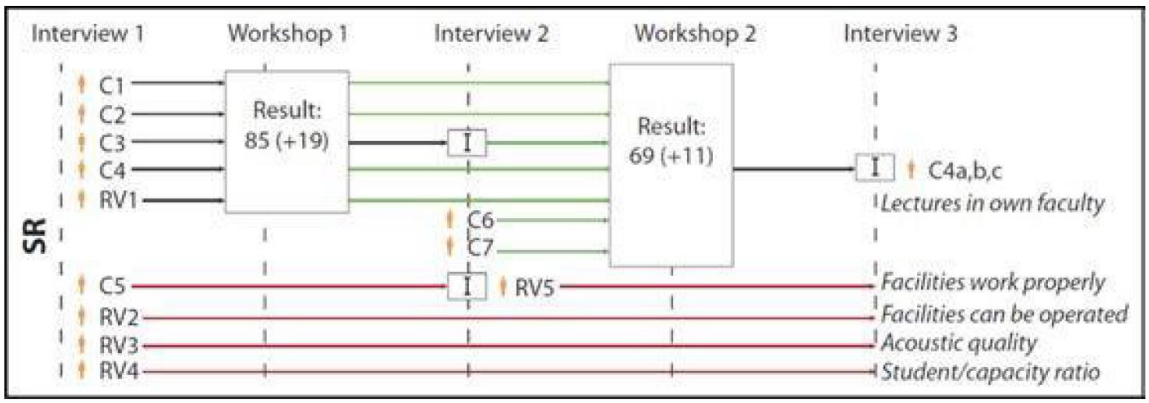


Figure 3. Example of steps or iterations following one another. This research this example was taken from, used a different kind of modelling, but the same optimisation of the outcome for different actors, while staying within constraints was used. Figure from Arkesteijn, Valks, Binnekamp, Barendse, & De Jonge (2015).

The figure illustrates how normally the constraints and conditions of the problem are garnered by interviewing, followed by using workshops with the model, to identify if either the solution fits the problem, or to identify that the constraints gathered previously weren't the complete set.

3.2. Sampling

The input needed for modelling the main case includes financial calculations done at the time, as well as statements that might have politically sensitive implications. Therefore, a case was sought in which these inputs might be gathered, for which willingness was required for actors involved to share sensitive information. Therefore, the case and respondents were selected on a basis of convenience.

3.3. Respondents

Four actors previously involved with the process of adaptively re-using obsolete churches were interviewed. Sander van Schijndel was involved as an advisor, and was interviewed on his experience

with and the general process of adaptive re-use of obsolete churches, used in section 3.5.5. He was involved with the case [village name] and provided insight into the process in this case, as well as provided the study done by PRC for this case, which is used in sections 3.5.2., 3.5.3. and 3.5.4. Lucas Sluiter was involved as an advisor specifically for the selling parties, the parishes in this case, and was interviewed on the general process of adaptive re-use. In the interview small discussions were held on several cases. These are mainly used in section 3.5.5. Gerko Koenen was involved as a project developer in multiple cases, and provided the commercial parties view on adaptive re-use of obsolete churches. This input is mainly used in section 3.5.5. Rick Jonkers and Marian van Doren were involved as building advisors for the Diocese of Den Bosch. They were interviewed on their experience with adaptive re-use, used in section 3.5.5. Their view on the case [village name] was discussed, on the initial outcome as well as if new insights might have led to a different outcome, which is discussed in sections 3.5.2., 3.5.3. and 3.5.4.

3.4. Data Collection Procedures

Three different methods of data collection are used, interviewing, document study and literature study. The way in which these methods were used are given in this section.

3.4.1. Interviews

Expert interviewing is the main source of information used in both the case [village name] and as further information used. The interviews were held in a semi-formal structure, where a shortlist of topics was used that would ensure for extensive interviewing, but due to the exploratory nature of the research to be done, a very open stance for deviation was taken. The exploratory nature of the research has its origin in the fact that any considerations on adaptive re-use of obsolete churches are very case specific. Thus, if an interviewee made a statement, it was not generalized, but it was sought after if this was a case specific aspect. If it was, then some background information on the specific case was searched for. This ensured that no generalizations were made, where none were intended, as well as more insight into the relation that for instance a demand or wish might have to the specific situation of the case it occurred in. As a starting point a framework was used from Remøy & van der Voordt (2014), covering five areas; Legal, Financial, Technical, Functional and Cultural-historical, wherein risks and opportunities are identified. The original study was based on cross-case study of 15 office buildings that were adaptively re-used. The framework used to categorise these risks and opportunities, however, is generic in nature, meaning it can be used to consider the religious heritage this research focusses on. Added to this were three factors from of Bullen & Love (2011). They identified three main factors influencing the decision-making process for adaptive re-use; Capital investment, Asset condition and Regulation. Adding these three factors to the five already discussed, should make for an extensive overview of important aspects of (potential) adaptive re-use projects.

3.4.2. Document Study

Document study for the case [village name] focussed on the information provided by Sander van Schijndel, the PRC report on the [church name] case. This was used both for the case description (Appendix 1), as well as the financial calculations that are made to produce a value for every choice option in section 3.5.3. and onwards. The other source of document study was factual research done in small quantity in news sources. From this only occurrences and situations are included in this research, with objective values given intently left out.

3.4.3. Literature Study

Literature study was mainly performed for providing the scientific background and context as given in the Background chapter. Furthermore, some other parts of information in this report might be substantiated by literary references. This literature was mainly searched for via the reference lists of articles previously studied, or through finding more work of authors found to be invested in the fields of cultural heritage and adaptive re-use. One other topic that literature was sought for to substantiate was on the use of decision modelling, which is found in section 2.4.

3.5. Data Analysis

Data analysis in this research was the inputting of cases into the decision model. This was done first for the case [village name], then for an extension of this case, followed by various situations that occurred in other cases.

3.5.1. First Model Design

The problem this research tries to solve is a design problem, it aims to design a model which translates the complex problem of adaptive re-use of obsolete churches in the Netherlands. In this problem, the physical constraints of the proposed construction and the existing object are combined with the constraints stemming from human sources, such as developers' profit, unallowable functions and preferences. Binnekamp (2015) defines these two as "physical variables" and "psychological variables" respectively. An example of a physical variable present in the problem is the building itself. The size of the building is a physical given, as is the constructional strength of its components. A psychological variable is for instance the unallowable functional change toward a discotheque of an obsolete church, as well as the goal of making profit.

A decision model has certain features. The first is that a choice has to be made. This is set at the moment of sale. There, a consideration will be made between different options, including re-development and adaptive re-use (Sluiter, 2017). At this stage in time different actors have different views on the potential project. One of the main actors as is found, the Diocese, at this point in time sets a lot of demands that the selling party, the parish, has to take into account (Van Schijndel, 2017). One of these is in the parish's best interest, namely that an option should be chosen that will ensure financial stability for the parish on a longer term. Using a decision model at this point in time would help anyone forming plans to consider if their plan is a viable option, and for the decision makers, the parish board, to make a well-informed decision, while placing all actors demands and wishes in relation to one another, to ensure consideration of each. The endogenous variables are then the choice to be made, in this case various potential sales. This could be sales to different parties, or sales to one party for different future functions that are to be considered. The maximizable function is then the financial stability of the parish on a longer term, represented by either sale value of the church, or a net present value of the parish exploitation. It should be noted that the parish is the decision maker at this point in time. It can however be expected that other actors take initiative in such a process, which would result in the model not taking the direct perspective of the actor using is. It is then still a helpful tool, since the position and attitude of the decision maker in regard to the proposed initiative can be assessed.

The constraints on the goal function can be hard constraints, such as that only one choice option can be made simultaneously, or soft constraints, such as that neighbours would prefer a choice option

that leaves part of the church intact. These last ones constitute 'flexible' constraints, since actors might set them and render them free again (Van Loon, 1998). These constraints are set in according to the wishes and goals of an actor, and are not universally true. The actor also has the option not to pose these constraints, and might alter them if his interest changes or if they do not meet their intended goal.

3.5.2. Case Description

In sections 3.5.3. and 3.5.4. a case in [village name] is modelled. A case study on this case ([church name]) can be found at the end of this research as Appendix 1. Research into this case was done in order to gain information on it to be able to model the case. For this the financial outcomes, considered options and demands and wishes from the different actors had to be known. The situation modelled in section 3.5.3. was the situation at the moment the research by PRC was originally performed. In section 3.5.4. this case was extended to consider if a different outcome might result from one actor changing his set demands and by considering more options. This is then a retrospective reconsideration of the case, in which the Diocese has changed their position, and in which more options for adaptive re-use are considered. Both considerations are based on the ex post case study in Appendix 1.

3.5.3. First Model Input

The first simulation uses a case in [village name], the [church name]. A case study on the [church name] is presented in Appendix 1, the original situation is used as input here. In this section the modelling of the case is described and a reflection is given on how the model performed.

3.5.3.1. Modelling

The three options PRC identified are used as endogenous variables. The Diocese stated that the parish should aim for the highest financial value out of these three options (Van Schijndel, 2017). The parish has to take this position, due to being subservient to the Diocese (Sluiter, 2017). This leads to the maximizable function being the financial outcomes of the three options. The maximizable function is then:

Maximize 421.000*CU + 1500000*RD + 500.000*MU

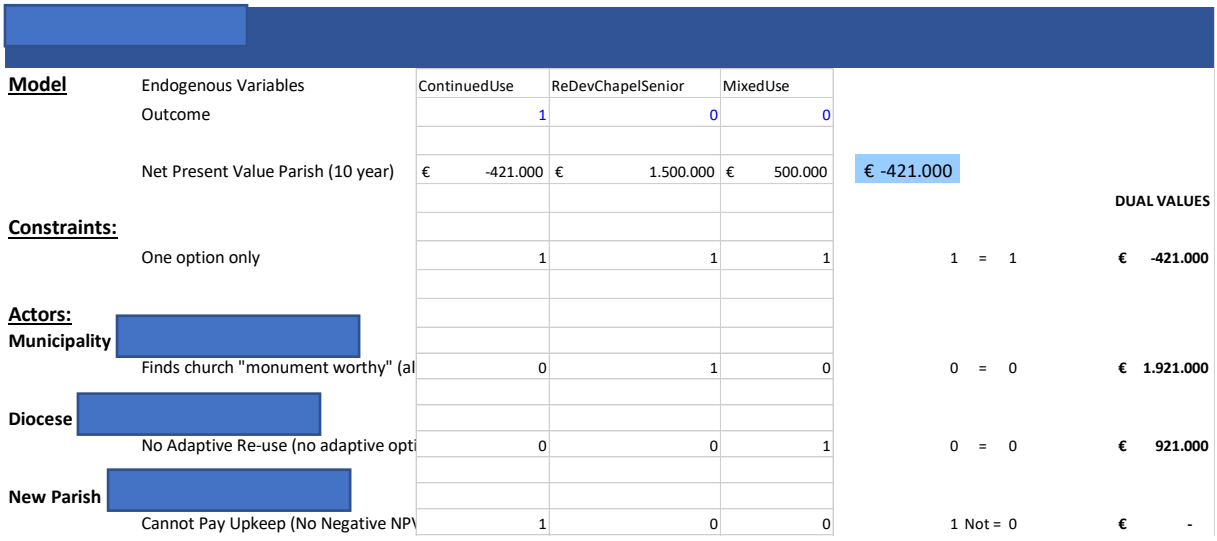
With CU, RD and MU being the binary choice options for continued use, re-development and mixed use respectively, and the number values indicating the financial outcome for each option. This approach of integer programming was chosen, since this was the way the situation was considered at the time; as a choice between three options, with no mixing of these options allowed. The goal function values are calculated as the net present values of a period of ten years of the exploitation of the parish. The potential sale of the church is taken into these exploitations, its value being based on the project development exploitation, it in turn being dependent on the exploitation of the eventually realized functions. This is important, since value can only be created through calculating what a potential end-user would be willing to pay for a certain space (Jonkers & Van Doren, 2017; Sluiter, 2017; Van Schijndel, 2010). The calculations used to determine the net present value of the parish exploitation are shown in Appendixes 2 through 4. The next step is to identify the constraints that stakeholders set for the problem. The municipality wanted to research if the church should have a status as a listed monument, and eventually awarded that status. This disallows the option of re-development, since demolition of the building is no longer allowed. The Diocese did not approve of

mixed use of the building, which disallows that option. They viewed that creating confusion between the ecclesiastical exterior of the building and profane use of its interior was not a positive outcome (Van Schijndel, 2017). The parish cannot pay the upkeep for the building, and was not able to accept a negative net present value on their exploitation. When we take these constraints into account, the problem is:

Maximize -421.000*CU + 1.500.000*RD + 500.000*MU
Under constraints:

1*CU + 1*RD + 1*MU = 1	(Only one choice can be made simultaneously)
0*CU + 1*RD + 0*MU = 0	(Municipality regards church as monument)
0*CU + 0*RD + 1*MU = 0	(No adaptive re-use is allowed by Diocese)
1*CU + 0*RD + 0*MU = 0	(No negative NPV option is allowed for parish)

The model produced in Microsoft Excel, a spreadsheet tool, is shown in figure 4. When we utilise WhatsBest!, a program for calculating linear or integer programmed problems, it is found that no feasible solution exists for the function under these constraints. WhatsBest! Dual function is then used to find out, through shadow pricing, what the impact of the constraints of the goal function is. The impact the constraints have on the goal function is given from the perspective that the lowest value option, would be chosen. If the continued use scenario is chosen, the municipality awarding a listed status and disallowing re-development has a negative impact on the goal function of €1.921.000. The condition that no adaptive re-use is allowed has a negative impact on the goal function of €921.000. With this knowledge, the parish might negotiate with the Diocese on their posed constraint. A positive net present value might be reached by loosening either constraint, but the Diocese should be invested in the financial wellbeing of the parishes, so this would be the logical starting point for negotiations.



Model	Endogenous Variables	ContinuedUse	ReDevChapelSenior	MixedUse				
	Outcome	1	0	0				
	Net Present Value Parish (10 year)	€ -421.000	€ 1.500.000	€ 500.000	€ -421.000			
								DUAL VALUES
Constraints:								
	One option only	1	1	1	1	=	1	€ -421.000
Actors:								
Municipality	Finds church "monument worthy" (al	0	1	0	0	=	0	€ 1.921.000
Diocese	No Adaptive Re-use (no adaptive opti	0	0	1	0	=	0	€ 921.000
New Parish	Cannot Pay Upkeep (No Negative NP\	1	0	0	1	Not =	0	€ -

Figure 4. Decision model entered into Microsoft Excel and utilising WhatsBest! to find a solution. Own illustration.

3.5.3.2. Reflection

The model aptly captures the stalemate that existed when sale of the church was considered. None of the options would satisfy all stakeholders, if they retained their stated demands. Then the input

from the case study in the model, when modelled, can be identified as resulting in a non-solvable problem, as was the case. By constructing this first model however, already insights are gained. By interviewing on demands, and making points of view from different actors explicit, already knowledge is gained that was previously not available (Bots, Van Twist, & Van Duin, 1999).

3.5.4. Second Model Input

To prove that a more complex case can also be modelled, the case [village name] is extended. More functions and constraints from other stakeholders are added, and a scan on market potential of functions is included. The case is considered in the new context, in which the Diocese allows for adaptive re-use more (Jonkers & Van Doren, 2017; Koenen, 2017; Sluiter, 2017). This reconsideration of the case then captures what would be a possible outcome if the sale would have taken place in the present or what a possible outcome would have been if the Diocese had allowed adaptive re-use. One of the uncontrollable variables (or constraints), the disallowance of adaptive re-use, has changed in this new situation. Ackoff (1956) stated that "A solution derived from a model remains a solution only as long as the uncontrolled variables retain their values." The new situation then calls for and justifies a new model.

3.5.4.1. Description

To find out if another option might have been feasible, other choice options will be added. These are taken from functions that have been known to be incorporated in adaptive re-use of obsolete churches from (Jonkers & Van Doren, 2017; Koenen, 2017; Sluiter, 2017; Van Schijndel, 2010). The functions considered are shown in Appendix 5.

The same exploitation and end-user based calculations were made as were used in section 3.5.3. The inputs used in these calculations are shown in Appendix 6.

The first set of constraints are market conditions. As mentioned, value can only be created if an end-user can be found. Therefore, the first options to be taken out of consideration are the options that have no market potential. The market potential is taken from the interview with Sander van Schijndel.

Then all constraints held by specific stakeholders are considered. Some changes are made here, due to the change of position of stakeholders. This is done, since the addition of other functions as choice options always implies either re-development or adaptive re-use, which were not acceptable in the situation modelled in section 3.5.3. The former notoriety the Diocese of Den Bosch had in disallowing adaptive re-use has however changed, and they do allow adaptive re-use more often currently (Jonkers & Van Doren, 2017; Koenen, 2017). Therefore, this new position is used in this section.

3.5.4.2. Modelling

The same modelling principles as described in section 3.5.3. were used. Given the new choice options and calculations of values for these options, a new goal function is constructed. Then all functions are constrained by market conditions. The market in [village name] was found to not take up apartments, except for senior apartments. Furthermore the retail space and supermarket space markets were saturated. The new situation was subject to the original constraints (with exception to the diocesan viewpoint), as well as added constraints. The resulting mathematical structure and underlying reasoning can be found in Appendix 7.

Again WhatsBest! and Excel were used to find a solution, the resulting model looks as shown in figure 5.

Petruskerk, Berlicum

Model	Choice options	ContinuedUse	ReDevChapelSenior	MixedUse	ReDevHousing	AdaptiveHousing	AElderlyHousing	ACultural	AdaptiveOffice	AdaptiveBooks	AdaptiveRetail	AdaptiveEvent	AdaptiveGym	APlayground	
	Endogenous Variables	CU	RCS	MU	RH	AH	AEH	AC	AO	AB	AR	AE	AG	AP	
	Outcome	0	0	0	0	0	0	0	0	0	0	0	1	0	
	Net Present Value Parish (10 year)	€ -421.000	€ 1.500.000	€ 500.000	€ 5.715.530	€ 1.833.654	€ 2.208.098	€ 1.282.873	€ 2.196.012	€ 1.730.048	€ 5.743.282	€ 8.629.322	€ 3.899.751	€ 3.332.529	€ 3.899.751
Constraints:															
	One option only	1	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
Market Conditions (is market saturated?)															
	Housing	1	1	1	0	0	1	1	1	1	1	1	1	1	1 = 1
	Elderly housing	1	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Cultural	1	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Office	1	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Bookstore/library	1	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Supermarket/retail	1	1	1	1	1	1	1	1	1	0	1	1	1	1 = 1
	Horeca/eventspace	1	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Gym	1	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Indoor playground	1	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
Actors:															
Municipality															
	Monument status	0	1	0	1	0	0	0	0	0	0	0	0	0	0 = 0
Diocese															
	Adaptive re-use allowed	0	0	0	0	0	0	0	0	0	0	0	0	0	0 = 0
	Perpetual clauses (functions)	0	0	0	0	0	0	0	1	0	0	1	0	0	0 = 0
Project Developer															
	No Negative NPV of Adaptation Development	€ -	€ 0	€ 0	€ -0	€ 0	€ -	€ -0	€ -0	€ -	€ -0	€ -	€ 0	€ 0	€ 0 =>0
	Max Price of Church (Investment Space)	€ -	€ 1.225.577	€ 465.274	€ 4.052.662	€ 805.589	€ 1.118.801	€ 344.877	€ 1.108.691	€ 718.926	€ 4.075.876	€ 6.489.962	€ 2.533.817	€ 2.059.353	€ 2.533.817 <= € 3.000.000
Neighbours															
	No Noise Nuisance	0	0	0	0	0	0	0	0	0	0	1	0	0	0 = 0
	No Parking Problems	0	0	0	0	0	0	0	0	0	0	1	0	1	0 = 0
New Parish															
	No Negative NPV Allowed	1	0	0	0	0	0	0	0	0	0	0	0	0	0 = 0
Architect															
	Not suited for conversion to housing	0	0	0	0	1	1	0	0	0	0	0	0	0	0 = 0

Figure 5. Decision model of extended case [village name], produced with Microsoft Excel and WhatsBest!. The working of this model is illustrated in Appendix 8. Own illustration.

3.5.4.3. Outcome

The maximization of the net present value of the exploitation of the parish shows that the adaptive re-use of the former church as a gym would prove most valuable under the set constraints. This function is not disallowed by the Diocese of Den Bosch (Jonkers & Van Doren, 2017), and fits in the current municipal zoning plan [source of land use plan]. Further research would have to be done into the market conditions for gym space in [village name], and more informed calculations would have to back this suggestion. It has however been found, that given the changed position of the Diocese, and by taking more functions into consideration, a solution can now be found. The aim of the model has then been achieved, even though the adaptive re-use of the church as a gym might not be the preferred outcome. Multiple options were found to be feasible given the set constraints. Solution space has been found, which was the aim. Whether the outcome with the highest value for the goal function is chosen or one of the other feasible options then is moot.

Furthermore, using WhatsBest! Dual function, we can apply shadow pricing. This offers insight into the impact that constraints might have on the maximized outcome. It is shown, for example, that the market constraint placed on retail and supermarket space, lowers the maximized value by €1.843.532. If this market condition was not present, the outcome of maximizing the goal function would be over €1,8 million higher. In this way, if the sale of the church for the option that has the current maximized value does not meet the goals the parish has for this sale contributing to their exploitation, the constraints that have the most impact on this can be found. If these are constraints that are controllable to the parish or other actors, then through negotiation the parish might reach their financial goals.

3.5.4.4. Reflection

The simulated new consideration of the case [village name] has two differences in regard to the case as discussed in section 3.5.3. Firstly, the Diocese has changed its opinion on adaptive re-use, whereas more dialogue is possible into the definition of "worthy" use. This is a plausible situation as was found in the interviews held. Secondly, more options are taken into consideration. The financial calculations for some part are based on implicit knowledge on what functions can realize certain rents and gross initial yields. The values however stay close to those of the originally considered choice options, which indicates that they are not wildly off. The outcome of a solvable problem, maximized in value for the parish by the adaptive re-use as a gym, would be acceptable as a function for the Diocese (Jonkers & Van Doren, 2017). The other two main constraints that were present in the case as discussed in section 3.5.3. are both still taken into account. This proves that reconsideration of the case [village name] offers a viable solution. This however is of course a moot point, since the church has been demolished. It does show that the use of this tool could have proven helpful if reconsideration was still possible.

3.5.5. Further Input of Cases

Since the processes involved in adaptive re-use of obsolete churches vary greatly in each case (Jonkers & Van Doren, 2017; Koenen, 2017; Sluiter, 2017; Van Schijndel, 2017), it is important to consider multiple cases, when trying to prove the fitness for use of applying a decision model to these potential projects. The main case was extensively modelled, with every aspect input into the model. In Appendix 9, other cases are identified, and new situations or aspects of the case are isolated and modelled. It is found that all new situations and aspects can be incorporated into a decision model as used in this research.

3.6. Research Ethics

Four main ethical principles were considered in this research, as prescribed by (Bryman, 2016);

1. Whether there is harm to participants
2. Whether there is a lack of informed consent
3. Whether there is an invasion of privacy
4. Whether deception is involved

The first point of harm has two distinctive risks; physical harm and non-physical harm. The first is non-existent in this study, since no experimenting in any way is done. The second might mainly constitute harm to reputation of the interviewees. This is dealt with by clearly placing responsibility for the interview summaries with the researcher. Secondly, the interviewees were all asked to give consent on the summaries being publicized. In order to construct the case [village name] as realistic as possible, insight was needed into the financial feasibility studies done. Since this is highly sensitive information, non-disclosure is required. The political sensitivities that exist in public publicizing of part of the actors' analysis, as well as more pronounced statements that are made in hindsight when dealing with the case, lead to anonymizing of the main case. This version of the research report is therefore to be considered public. Anonymization has been made done. An indication of information omitted is always given as: [subject of information]. In pictures a blue square covers any sensitive information.

Consent was acquired for the publication of personal details and interview summaries from each interviewee. They were clearly informed in what way the information they provided would be used in the research.

The third principle was dealt with by requesting consent for any publication of personal details. Any interviewee who did not wish to have his personal details published, was anonymized. Their permission for publishing any personal details including, but not limited to, names, functions and company names, was acquired with each interview. Any sensitive information obtained at the graduation internship company was also treated confidentially.

By clearly informing the interviewees in what way information they provided would be used and acquiring assent before any publication of interview summaries, deception was avoided. The last measure taken to ensure no deception was involved, was by paraphrasing only, so no literal quotes could be attributed to any interviewee, that might not constitute the exact way they intended information to be portrayed.

4. Findings

In section 2.5. three goals were described for proving that the use of a decision model can improve the practice of adaptive re-use for Roman Catholic churches in the Netherlands;

- Proving that cases of potential adaptive re-use can be successfully modelled in a decision model
- Proving that the way in which projects might fail can be identified in a decision model
- Proving that (conflicting) constraints that have the largest impact on feasibility might be identified in a decision model

Sections 3.5.3. through 3.5.5. prove that cases can be successfully modelled in a decision model. The information that is available on the case [village name] was successfully input into the model, and then successfully extended to make a new consideration. In section 3.5.5. several other situations and constraints were modelled, to prove that not just the case [village name] can be modelled, but modelling of such problems is widely possible.

Proof for the second element was given in section 3.5.3., where the unsolvable nature of the choice to be made by the parish in the case [village name] was successfully modelled. The constraints set were known at the time. The use of a decision model at the moment of making this decision would therefore have shown that no solution was possible, due to the conflicting nature of the demands set by the municipality, the Diocese and the involuntary constraint posed by the financial situation of the parish.

The third element was proven in both sections 3.5.3. and 3.5.4. where the original and extended case [village name] were both considered with shadow pricing. This allows for identifying the impact that constraints have on the goal function. In the case [village name], the impact the constraints had on the net present value of the parish was identified.

In section 3.5.4. it was found that solution space was present in the reconsideration of the case [village name]. This was however dependent on a change of viewpoint from the Diocese. This means that possibly if the case was reconsidered, this might have been achieved, but is not proven. This however falls outside the scope of this research. According to the five steps in model production by R.L. Ackoff & Sasieni (1968), only the last step, that of implementation, is left. This has been plausibly proven, which is sufficient proof until implementation in practice has taken place and empirical evidence can be found.

5. Conclusion and Discussion

The question this research aimed to answer is:

> -How can a decision model improve the practice of adaptive re-use of functionally obsolete Roman Catholic churches in the Netherlands?

In chapter 4 we found that all of the four elements of proof required were obtained in this research, through the case [village name], extending the case [village name] and input of other case situation. The last element, proving that use of a decision model might lead to the change of actors' positions was not empirically proven in practice. This can be further substantiated by using a decision model in a real-life case. The answer to the research question is then that decision models can be used in the practice of adaptive re-use of functionally obsolete Roman Catholic churches in the Netherlands in order to find solution space in the multi actor playing field. Ex post facto proof that use of the decision model improved practice is not sought or acquired in this research. But by proving that the model is fit for use in such cases, it is ensured that this evidence would be obtainable in future research.

One limitation of this research is that it heavily relies on the case [village name]. By reflecting the situation and results of the extended case with one of the involved actors, veracity was sought. Furthermore, proof for fitness for use in other cases was sought by inputting situations and factors from various other cases into the decision model. These two ways of proving fitness for use provide for a basis on which can be stated that the decision model might be applied to other instances of choices to be made in adaptive re-use of Roman Catholic churches in the Netherlands. These situations are however always very case specific; therefore no conclusive generalisation can be stated. Fitness for use can only be stated to be extant until a case is found which cannot be modelled.

The last limitation applies to modelling and predicting in general. De Leeuw (2002) stated that knowledge from scientific study cannot be thoughtlessly applied to practical problems. The solution proposed by this research is therefore not a 'one-size-fits-all'-solution. Every application of the produced model should be viewed as utilising a helpful tool, with creativity required to enable sound output.

Decision modelling was chosen as a method for this study. This is not however the only method suitable for dealing with these problems. One of the main initial benefits that modelling in any way can bring towards solving problems in the process of adaptive re-use, is that goals, demands and interests are made explicit. This is done in order to be able to model them, but this in itself already offers big insights, and stimulates actors to explicitly phrase their wishes and expectations.

6. Recommendations

A lot of information was obtained in interviewing on actors' demands, with some focus on the impact of the demands the Diocese sets. The difficult position the merged parishes are often put in was found to be a main influence on the possible success of adaptive re-use projects. Their legal independence, results in funds from the Diocese not being used for their exploitation. Their canonical dependence on the Diocese implies they cannot make totally independent decisions and are required in instances of church sale to often opt for the highest sale value. More insight into how the position of the parish influences the potential of adaptive re-use should be sought. Then possibly a change in this position might be proposed in order to increase viability of adaptive re-use and the resulting preservation of churches as cultural heritage.

The local community, including former churchgoers, may have different wishes for the obsolete church, but have no direct engagement in the decision-making process. To improve adaptive re-use practice for obsolete churches, the local community might be more intensively involved in the process, and possibly given the status of actor, instead of mere stakeholder.

Another party to be further considered is the municipality. It was found that a decision to award a listed status to the building brings along a lot of strain on the financial outcomes of a possible adaptive re-use project. If the preservation of the building is thought to be a public good, then possibly public funds should be allotted to the preservation of the building. In this way more projects of adaptive re-use might become financially feasible. How subsidies might be created, in light of the importance of preserving these churches, is an important consideration to make in the future, while still adhering to the separation of church and state.

In the coming decade a lot of Roman Catholic churches will become obsolete. It was found that preservation through adaptive re-use might prove to be the optimal solution for these problems. This research shows that decision models might be used to consider different choice options that exist at the time of sale. This might lead to more informed decisions, including the viewpoints of different actors in considerations. The urgency of the problem of church obsolescence asks for improvement of the process in which the future of these obsolete churches is considered. If decision models are found to also be able to change actors' views and demands in practice, use of decision models might be the applied to increase the chance of adaptive re-use through considering the views all potential stakeholders have on the future of the church.

The decision model, as defined in this research, was produced for future use. In the coming decisions where sale of an obsolete church is considered, the following steps might be taken in a decision model;

- Adding different choice options to the already considered options. By adding adaptive re-use for different functions (including (elderly) housing, offices, cultural centre, library, retail space, event space, gym and indoor playground), these can be taken into consideration. These choice options constitute the endogenous variables, of which one might be the outcome of the decision process.
- Calculating financial outcomes. The effect a sale of a church has on the exploitation of a parish is (one of) the most aspect of the sale decision. These calculations should always start with an end-user perspective, since financial value should be calculated in the opposite

direction of transactions made between parties. The outcomes of these calculations constitute the value in the goal function for every endogenous variable.

- Scanning market conditions. By using information on local demography, competing present functions or developments, and commercial reasoning, decisions can be made on what function might or might not be feasible from a market perspective for the project. The (non-) inclusion of different factors are included in the model as constraints on the goal function.
- Defining actor constraints. By interviewing actors and other stakeholders, their wishes and demands on the project might be defined. These are set as constraints on the maximizable goal function.
- Find solution space. By using Microsoft Excel and WhatsBest! this problem then can be modelled. By doing this, solution space might be found, and the optimal solution in regard to the goal function identified. This can then be discussed foremost with the decision makers, then with other actors, to find if this solution is acceptable. If not, then more constraints are added to the model.
- If no solutions space is found, then shadow pricing might be used to find which constraints have the biggest impact on the goal function. Effective negotiation might start with the actors that placed the respective constraints.

By using this approach, more decision processes might lead to adaptive re-use of an obsolete church.

7. Reflection

The research question has been answered, but it can be stated that proof of usefulness of the model has not been given in full. The main lack to be able to prove this is that a real-life case can be improved at the moment of consideration. Modelling a case whilst it is in the process of becoming a potential project would possibly produce this proof. The timeframe within which this research was performed did unfortunately not allow for this. This however did not mean the research has an open ending. The use of decision modelling was found to be able to work, implementation would constitute for another study. Through logical reasoning the research question can be conclusively answered in this research.

The research provided for holding very interesting interviews, with parties one might not visit if the research subject was not so specific. The willingness of all interviewees to help further the research was very important and showed the way in which the importance of adaptive re-use of obsolete churches is broadly endorsed. It was furthermore interesting to regard the level of professionalism that was involved with the cases, the considerations and processes the interviewees were involved with.

The problem of obsolete churches is growing. When the importance of the built heritage that these buildings represent is known, it is very important to find manners in which to preserve them. This research aimed to provide some progress in this regard. The interviews done for this research were found to provide much more information than was needed to answer the research question posed. A lot of insights and information from these interviews were not used in this report, while they might still offer possibilities for improving the practice of adaptive re-use of obsolete churches. It is important to keep searching for ways in which to improve this practice, and some of the knowledge garnered through interviewing, that was not used for answering the research question, is dealt with in this reflection.

One of the main findings was that the position of the Diocese on adaptive re-use is crucial for project success, but is not set in stone. This might imply that the policy of one Bishop might allow for a certain outcome, whilst the policy of another might disallow a certain project. This makes it more difficult for actors to take initiative, since the playing field in which for instance project developers have to operate does not seem equal across time and geographical borders. A shared viewpoint on adaptive re-use, at least by the Dutch Roman Catholic Bishops, might alleviate this problem.

Other notions still remain with the author. The higher levels of the church hierarchy are known to be quite wealthy, with the Roman Catholic Church being the largest owner of real estate in Italy for instance. If churches have to be closed down, financial aid might help preserve them. The moneys held by Dioceses and even the Holy See, might not be intended for this use, but these moneys were historically gifted to these parties by, or even taxed from, the former churchgoing population. If there is no other urgent use for these funds, then possibly these funds might be returned to the progeny of the original benefactors by helping provide financial support for cultural heritage, which is related to the history of the Church, and providing this public good.

The current legal and economical ownership of churches by the parishes, combined with the dependency of the parishes on the Dioceses by church law, make for an untenable situation. Whilst any other legally independent market party, as the parish is regarded in regards to the legal system,

has full control of its dealings, the parishes do not. They are under a separate legal system, dependencies of the Dioceses. The interests they have in these both legal systems might not always be the same interests. Furthermore, the interests a parish has might differ from the interests of the Diocese. Partly, this situation can be compared to the municipalities and national government. The municipalities are dependent on the national government, both financially as in their legal position in the public law field. The difference between these two cases lies that the relation between the municipality and the national government is set in the legal system that the rest of society functions in, whilst the relation between the parish and Diocese is set in a legal system that operates separately from the general system that structures society. This means that the position of the parish (as the dependency) in the normal system is often influenced by its position in the church law system. These systems however do not take into account such a situation, which means that the parish's room to manoeuvre in the general legal system is limited.

The relation described above also leads to one potential conflict of interests. As we see in the relation between the national government and municipalities, their interests do not always coincide. Whilst the national government might propose to lay a new highway to stimulate a regional economy, the municipality in which the road might be situated, might protest the direct impact the road has on local liveability. The national government then plans on a larger scale, and accepts that certain local impacts might exist. The Dutch Dioceses often have plans for merging parishes, to work more efficiently in a time where the number of churchgoers declines. The parishes that are to be merged, are not always content with this. Local issues can be less easily dealt with by organisations that span a larger area. Furthermore, merged parishes face different changes. The Diocese might not like the financial position of a merger parish, and decide that they are to close down some churches. This is only an option because the merger parish has a multitude of churches in its portfolio, which stem from the former parishes. This will often incite local protests, where former or current churchgoers, who were formerly active in the former, smaller parishes, actively go against the decision of the merger parish on what churches to close. Securing the future existence of these buildings through adaptive re-use might help address some of the emotions leading to these protests, but the way in which the parishes are somewhat forced to take decision that might inflame part of their flock, might be reconsidered.

One way of considering this is making a comparison with the protestant Christian denominations in the Netherlands. When they want to sell a church, the only thing that the umbrella organisation for Church Stewards regards, is if the price offered is realistic and the local religious community is not taken advantage of. These local religious communities act with total independence, which enables them to incorporate the local situation and positions of local stakeholders more easily into their decision making processes. The Roman Catholic Church in the Netherlands might decide to adopt some form of this system. Even if more control is required, this might be possible. The Dioceses could set strict but clear rules into what parishes are allowed to do with their real estate. Combined with the constraint the parish sets for itself, namely that a non-negative exploitation is required, this would be the playing field for decision making within the parishes. This allows for the parish to consider local issues independently, and could possibly lead to more decisions that are considered appropriate by the local population.

The preservation of built heritage has gathered a lot of support in the recent past. Much more than previous, it is seen that the buildings that remain of past eras, should be preserved. For churches, as stated earlier, the way in which this preservation should be funded, is a difficult matter. It was already stated that it would be reasonable to allocate public funds to the preservation of buildings that are deemed public goods. Maybe the French model could be used in the Netherlands as well. In France, often church towers, which are costly to maintain, and have the biggest impact in the urban or rural structure, as they can be seen from afar, are owned by local governments. Travelling in the south of the Netherlands has been described as moving from church tower to church tower. This implies that mainly the church towers have a significant perceptual impact. By at least allocating funds to upkeep these objects, already a lot of heritage might be preserved. Furthermore, this would contribute to the success of the adaptive re-use of the other building parts, since one of the most costly to maintain parts of the building is taken out of the picture.

The author hopes the insights from this research might be taken up in practice to create more successful instances of adaptive re-use.

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Appendixes

Appendix 1: Case Study ([village name])

Appendix 2: Calculation continued use

Appendix 3: Calculation re-development to chapel and senior housing

Appendix 4: Calculation mixed use with healthcare centre

Appendix 5: Functions Considered

Appendix 6: Input for Financial Calculations

Appendix 7: Mathematical Structure of Extended Case [village name]

Appendix 8: Working of model

Appendix 9: Further Input of Cases

Appendix 10: Summary Interview Sander van Schijndel

Appendix 11: Summary Interview Lucas Sluiter

Appendix 12: Summary Interview Gerko Koenen

Appendix 13: Summary Interview Marion van Doren and Rick Jonkers

Appendix 14: Background Section P1 Report

Appendix 1: Case Study ([village name])

The [church name] in [village name] was built in phases from [building period of church] (Van Schijndel, 2010), as can be seen in figure 6. [Information on church history].

Figure 6. Overview of phases in which the [church name] was built. Image from (Van Schijndel, 2010).

Situation

In 2010 the church was owned by the [parish name], which was a new fused parish of two villages, [village name] and [second village name]. They had to sell one of their churches, since dwindling numbers of active worshipers and lower contributions meant that they could not pay upkeep for all churches. In addition to that revenues generated from the sale of a church might be used to ensure continuity for the other churches in the parish (Jonkers & Van Doren, 2017). They wanted to close the church in [village name]. PRC was assigned by the municipality of [municipality name] to perform a study into the possibilities that were then extant for the [church name] in [village name] (Van Schijndel, 2010). The municipality also wanted insight into whether or not to assign a status of municipal listed building to the [church name].

Original consideration

Three different options were considered by PRC (as can be seen in figures 7 through 9); the continued use of the church by the parish; the mixed use of the church by the parish, combined with the realization of a healthcare centre via a box-in-box principle and new build of care apartments; and demolition of the church and new build of apartments, a healthcare centre and a small chapel. The financial feasibility, technical feasibility and planning procedural feasibility of all three options were considered.

Figure 7. Continued use option. Image from Van Schijndel (2010).

Figure 8. Mixed use option. Image from Van Schijndel (2010).

Figure 9. Re-development option. Image from Van Schijndel (2010).

Original findings

The financial outcomes for respectively the continued use, mixed use and re-development option were -€421.000, €1.500.000 and €500.000. It was found by PRC that if the municipality did not award a listed status to the building, the church would be demolished, since that provided the highest sale value of the church, which was the outcome that the diocese stated that the parish should aim for (Van Schijndel, 2017). If they did award a monument status, the re-development option would be disallowed, the value of the mixed-use option would decrease and the church would be closed, since the parish could not pay for the upkeep of the building. The Diocese did not approve of mixed use of the building. They viewed that creating confusion between the ecclesiastical exterior of the building and profane use of its interior was not a positive outcome (Van Schijndel, 2017).

Figure 10. View of church tower and construction for preservation. Image from Google (2017).

Outcome

The municipality eventually did award a monument status to the building, based on research performed by Monumenten Advies Bureau (Van Schijndel, 2010). This resulted in the building being closed down eventually (Van Schijndel, 2017). The church was closed on [date] ([source on case]). The church was eventually demolished, partly as a result from the growing deferred maintenance, with plans for the church tower to be preserved ([source on case]) and even possibly adaptively re-used as office space ([source on case]).The church tower and the manner in which it was temporarily preserved is shown in figure 10. After the new founded foundation for preservation of the church tower did not meet their financial goals for conserving the church tower, the church tower was also demolished ([source on case]). [Information on court decision on case]. The conclusion was that the municipality, if they wanted to award a listed status, should have allocated funds, time, energy and planological means to create financial feasibility for the parish.

Appendix 2: Calculation continued use

Parish Exploitation	*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Continued use CU	Own equity parish	€ 1.200.000	€ 1.200.000	€ 1.220.671	€ 1.240.468	€ 1.308.477	€ 1.379.513	€ 929.365	€ 979.158	€ 1.031.016	€ 1.085.050	€ 1.141.377
	Current exploitation costs church		€ -45.675	€ -46.360	€ -47.056	€ -47.761	€ -48.478	€ -49.205	€ -49.943	€ -50.692	€ -51.453	€ -52.224
	Renovation costs						€ -524.374					€ -729.472
	Current exploitation costs parsonage		€ -1.020	€ -1.040	€ -1.061	€ -1.082	€ -1.104	€ -1.126	€ -1.149	€ -1.172	€ -1.195	€ -1.219
	Parish income		€ 34.741	€ 34.483	€ 34.228	€ 33.974	€ 33.722	€ 33.472	€ 33.224	€ 32.978	€ 32.734	€ 32.491
	Current lease of parsonage		€ 15.375	€ 15.759	€ 16.153	€ 16.557	€ 16.971	€ 17.395	€ 17.830	€ 18.276	€ 18.733	€ 19.201
	Extra renovation costs CU		€ -46.350	€ -47.741								
	Interest own equity		€ 63.600	€ 64.696	€ 65.745	€ 69.349	€ 73.114	€ 49.256	€ 51.895	€ 54.644	€ 57.508	€ 60.493
	Cashflow		€ 20.671	€ 19.797	€ 68.009	€ 71.037	€ -450.149	€ 49.793	€ 51.858	€ 54.034	€ 56.327	€ -670.730
	PV		€ 19.488	€ 17.596	€ 56.989	€ 56.120	€ -335.275	€ 34.964	€ 34.330	€ 33.724	€ 33.143	€ -372.081
	NPV	€ -421.000										

Appendix 3: Calculation re-development to chapel and senior housing

Sale Parking				
Re-development	RCS parking		40	places
Chapel and senior housing	Rent parking underground	€	1.000	Per space, per year, at t=0
RCS	BAR parking underground		8,0%	
	Sale value	*€*	*500.000*	

Sale care centre				
Re-development	G/N care centre RCS		80%	
Chapel and senior housing	RCS care centre		1500	m²
RCS	Rent care centre RCS	€	15,26	€/m²/month
	BAR care centre RCS		6,0%	
	Sale value	*€*	*3.662.932*	

Sale care apartments				
Re-development	G/N care apartments RCS		55%	
Chapel and senior housing	RCS care apartments		3000	m²
RCS	Rent care apartments RCS	€	13,50	€/m²/month
	BAR care apartments RCS		6,5%	
	Sale value	*€*	*4.112.308*	

Sale senior apartments				
Re-development	G/N senior apartments RCS		70%	
Chapel and senior housing	RCS senior apartments		3000	m²
RCS	Rent senior apartments RCS	€	11,00	€/m²/month
	BAR senior apartments RCS		5,0%	
	Sale value	*€*	*5.544.000*	

Sale of apartments				
Re-development	G/N sale appartments RCS		90%	
Chapel and senior housing	RCS sale apartments		2200	m²
RCS	Sale apartments RCS/RH	€	2.461	Per m², at t=0
	Sale value	*€*	*4.871.831*	

Church Redevelopment CF	*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Re-development	Demolition church				€ -63.925							
Chapel and senior housing	New build church					€ -614.528						
RCS	Sell church						€ 717.676					
	New build parking				€ -1.664.067							
	New build care centre				€ -2.770.063							
	New build care apartments				€ -4.687.799							
	New build senior apartments				€ -4.474.717							
	New build sale apartments					€ -3.058.007						
	Public space						€ -81.381					
	Sell parking					€ 530.682						
	Sell care centre					€ 4.122.662						
	Sell care apartments					€ 4.539.218						
	Sell senior apartments					€ 6.119.539						
	Sell sale apartments						€ 5.512.029					
	Profits on sales					€ -1.224.968	€ -440.962					
	Buy church				€ -1.244.053							
	Cashflow		€ -	€ -	€ -14.904.623	€ 10.414.597	€ 5.707.362	€ -	€ -	€ -	€ -	€ -
	PV		€ -	€ -	€ -12.514.209	€ 8.249.336	€ 4.264.873	€ -	€ -	€ -	€ -	€ -
	NPV	€ 0										

Church Exploitation CF	*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Re-development	Current exploitation costs church		€ -45.675	€ -46.360								
Chapel and senior housing	Exploitation costs church (RCS new)						€ -10.773	€ -10.934	€ -11.098	€ -11.265	€ -11.434	€ -11.605
RCS	Sale church				€ 1.244.053							
	Buy church						€ -717.676					
	Cashflow		€ -45.675	€ -46.360	€ 1.244.053	€ -	€ -728.449	€ -10.934	€ -11.098	€ -11.265	€ -11.434	€ -11.605
	PV		€ -43.061	€ -41.206	€ 1.042.475	€ -	€ -542.555	€ -7.678	€ -7.347	€ -7.031	€ -6.728	€ -6.438
	NPV	€ 380.431										

Parsonage Redevelopment CF	*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Re-development	Transformation parsonage to residential		€ -273.076									
Chapel and senior housing	Apartments parsonage (sale)				€ 497.523							
RCS	Profit apartments				€ -39.802							
	Buy parsonage		€ -21.500									
	Cashflow		€ -	€ -294.576	€ 457.722	€ -	€ -	€ -	€ -	€ -	€ -	€ -
	PV		€ -	€ -262.171	€ 384.312	€ -	€ -	€ -	€ -	€ -	€ -	€ -
	NPV	€ 122.141										

Parsonage Exploitation CF	*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Re-development	Current lease of parsonage		€ 15.375									
Chapel and senior housing	Current exploitation costs parsonage		€ -1.020									
RCS	Sale of parsonage			€ 21.500								
	Cashflow		€ 14.355	€ 21.500	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
	PV		€ 14.005	€ 20.464	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
	NPV	€ 34.469										

Parish Exploitation		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Re-development	Own equity parish		€ 1.200.000	€ 1.200.000	€ 1.267.021	€ 1.343.796	€ 2.693.298	€ 2.870.016	€ 2.327.401	€ 2.473.291	€ 2.626.501	€ 2.787.419	€ 2.956.452
Chapel and senior housing													
RCS	Parish income			€ 34.741	€ 34.483	€ 34.228	€ 33.974	€ 33.722	€ 33.472	€ 33.224	€ 32.978	€ 32.734	€ 32.491
	Church Exploitation CF			€ -45.675	€ -46.360	€ 1.244.053	€ -	€ -728.449	€ -10.934	€ -11.098	€ -11.265	€ -11.434	€ -11.605
	Parsonage Exploitation CF			€ 14.355	€ 21.500								
	Interest own equity			€ 63.600	€ 67.152	€ 71.221	€ 142.745	€ 152.111	€ 123.352	€ 131.084	€ 139.205	€ 147.733	€ 156.692
	Cashflow			€ 67.021	€ 76.775	€ 1.349.502	€ 176.719	€ -542.616	€ 145.890	€ 153.210	€ 160.918	€ 169.033	€ 177.578
	PV			€ 63.185	€ 68.240	€ 1.130.837	€ 139.611	€ -404.145	€ 102.442	€ 101.426	€ 100.433	€ 99.461	€ 98.509
	NPV		€ 1.500.000										

Appendix 4: Calculation mixed use with healthcare centre

Sale care centre

	Care centre	850 m²
Mixed use	G/N care centre RCS	80%
Church and healthcare centre	Rent care centre RCS	15,0 €/m²/month
MU	BAR care centre RCS	6,0%
	Sale value	*€ 2.040.000*

Sale senior apartments

Mixed use	MU apartments	1650 m²
Church and healthcare centre	Rent senior apartments RCS	7,9 €/m²/month
MU	BAR senior apartments RCS	5,0%
	G/N senior apartments RCS	70%
	Sale value	*€ 2.193.457*

Church Project Development

Mixed use
Church and healthcare centre
MU

Year	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
BiB care centre			€ -696.067								
New build senior apartments			€ -2.461.094								
New build reception			€ -277.006								
Extra renovation ground floor			€ -16.391								
Public space				€ -103.153							
Sell care centre				€ 2.296.038							
Sell senior apartments				€ 2.421.166							
Profits on sales				€ -377.376							
Buy church			€ -472.288								
Cashflow		€ -	€ -	€ -3.922.847	€ 4.236.675	€ -	€ -	€ -	€ -	€ -	€ -
PV		€ -	€ -	€ -3.114.082	€ 3.114.082	€ -	€ -	€ -	€ -	€ -	€ -
NPV	€ 0										

Church Exploitation

Mixed use
Church and healthcare centre
MU

Year	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Current exploitation costs church		€ -45.675	€ -46.360								
Exploitation costs church (VMU small)					€ -15.920	€ -16.159	€ -16.402	€ -16.648	€ -16.897	€ -17.151	€ -17.408
Sale part church				€ 472.288							
Renovation part church				€ -180.956							
Cashflow		€ -45.675	€ -46.360	€ 291.333	€ -15.920	€ -16.159	€ -16.402	€ -16.648	€ -16.897	€ -17.151	€ -17.408
PV		€ -1	€ -0	€ 0	€ -0	€ -0	€ -0	€ -0	€ -0	€ -0	€ -0
NPV	€ -1										

Parsonage Project Development

Mixed use
Church and healthcare centre
MU

Year	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Transformation parsonage to residential			€ -273.076								
Sale parsonage for residential				€ 497.523							
Profit apartments				€ -39.802							
Buy parsonage			€ -21.500								
Cashflow		€ -	€ -294.576	€ 457.722	€ -	€ -	€ -	€ -	€ -	€ -	€ -
PV		€ -	€ -252.551	€ 363.354	€ -	€ -	€ -	€ -	€ -	€ -	€ -
NPV	€ 110.803										

Parsonage Exploitation

Mixed use
Church and healthcare centre
MU

Year	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Current lease of parsonage		€ 15.375									
Current exploitation costs parsonage		€ -1.020									
Sale of parsonage			€ 21.500								
Cashflow		€ 14.355	€ 21.500	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
PV		€ 13.937	€ 20.266	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
NPV	€ 34.203										

Parish Exploitation

Mixed use
Church and healthcare centre
MU

Year	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Own equity parish	€ 1.200.000	€ 1.200.000	€ 1.197.539	€ 1.201.666	€ 1.522.459	€ 1.553.255	€ 1.585.696	€ 1.619.864	€ 1.655.844	€ 1.693.729	€ 1.733.612
Parish income		€ -34.741	€ -34.483	€ -34.228	€ -33.974	€ -33.722	€ -33.472	€ -33.224	€ -32.978	€ -32.734	€ -32.491
Parsonage exloitation		€ 14.355	€ 21.500	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
Church Exploitation		€ -45.675	€ -46.360	€ 291.333	€ -15.920	€ -16.159	€ -16.402	€ -16.648	€ -16.897	€ -17.151	€ -17.408
Interest own equity		€ 63.600	€ 63.470	€ 63.688	€ 80.690	€ 82.322	€ 84.042	€ 85.853	€ 87.760	€ 89.768	€ 91.881
Cashflow		€ -2.461	€ 4.126	€ 320.793	€ 30.796	€ 32.441	€ 34.168	€ 35.981	€ 37.884	€ 39.883	€ 41.982
PV		€ -2.389	€ 3.889	€ 293.571	€ 27.362	€ 27.984	€ 28.615	€ 29.256	€ 29.906	€ 30.567	€ 31.239
NPV	€ 500.000										

Appendix 5: Functions Considered

The functions considered in the modelling as described in section 3.5.4. are described here (with an abbreviation in between brackets):

- Continue current use by parish (CU, was already modelled)
- Re-development (demolition and new-build) to a chapel and senior apartments (RCS, was already modelled)
- Mixed use by using a box-in-box principle (BiB) to create a healthcare centre, with the addition of senior apartments (MU, was already modelled)
- Re-development (demolition and new-build) to apartments (RH)
- Adaptive re-use with BiB to apartments (AH)
- Adaptive re-use with BiB to senior citizens apartments (AEH)
- Adaptive re-use with BiB to a cultural centre (AC)
- Adaptive re-use with BiB to office space (AO)
- Adaptive re-use with BiB to a library or a bookstore (AB)
- Adaptive re-use with BiB to retail space or a supermarket (AR)
- Adaptive re-use with BiB to event space (AE)
- Adaptive re-use with BiB to a gym (AG)
- Adaptive re-use with BiB to an indoor playground (AP)

Appendix 6: Input for Financial Calculations

Gross Initial Yields

GIY cultural adaptive re-use	8,0%
GIY office adaptive re-use	8,5%
GIY books adaptive re-use	10,0%
GIY retail adaptive re-use	7,0%
GIY event adaptive re-use	6,0%
GIY gym adaptive re-use	6,0%
GIY playground adaptive re-use	7,0%
GIY elderly adaptive re-use	5,0%
GIY underground parking	8,0%
GIY senior apartments RCS	5,0%
GIY care apartments RCS	6,5%
GIY care centre RCS	6,0%

Rents

Rent cultural adaptive re-use	€ 12,00	€/m²/month
Rent office adaptive re-use	€ 14,00	€/m²/month
Rent books adaptive re-use	€ 13,00	€/m²/month
Rent retail adaptive re-use	€ 16,00	€/m²/month
Rent gym adaptive re-use	€ 12,00	€/m²/month
Rent playground adaptive re-use	€ 12,00	€/m²/month
Rent elderly adaptive re-use	€ 12,50	€/m²/month
Rent parking underground	€ 1.000	Per space, per year
Rent senior apartments RCS	€ 7,91	€/m²/month
Rent care centre RCS	€ 15,00	€/m²/month

Church sale values

AC buy old church	€ 344.877	At t=0
AO buy old church	€ 1.108.691	At t=0
AB buy old church	€ 718.926	At t=0
AR buy old church	€ 4.075.876	At t=0
AE buy old church	€ 6.489.962	At t=0
AG buy old church	€ 2.533.817	At t=0
AP buy old church	€ 2.059.353	At t=0
AEH buy old church	€ 1.118.801	At t=0
Buy old church RCS	€ 1.225.577	At t=0
Buy old church MU	€ 465.274	At t=0
Buy old church RH	€ 4.052.662	At t=0
Buy church AH	€ 805.589	At t=0
Sale new church RCS	€ 700.000	At t=0

Sale values

Sale parsonage for residential	€ 21.500	Given PRC scenario 2
Apartments parsonage	€ 2.000	Per m², at t=0
Sale apartments RCS/RH	€ 2.461	Per m², at t=0
Sale apartments AH	€ 2.800	Per m², at t=0

Building and renovation costs

BC BiB Care centre	€	700	Per m² GFA, at t=0
BC BiB Housing	€	800	Per m² GFA, at t=0
BC Care centre reception	€	1.300	Per m² GFA, at t=0
BC senior apartments	€	1.050	Per m² GFA, at t=0
BC apartments	€	950	Per m² GFA, at t=0
BC Care centre	€	1.300	Per m² GFA, at t=0
BC new church	€	1.400	Per m² GFA, at t=0
BC underground parking	€	820	Per m² GFA, at t=0
BC RCS care apartments	€	1.100	Per m² GFA, at t=0
BC public space	€	30	Per m², at t=0
BC BiB cultural	€	800	Per m² GFA, at t=0
BC BiB office	€	800	Per m² GFA, at t=0
BC BiB books	€	800	Per m² GFA, at t=0
BC BiB retail	€	800	Per m² GFA, at t=0
BC BiB event	€	800	Per m² GFA, at t=0
BC BiB gym	€	800	Per m² GFA, at t=0
BC BiB playground	€	1.400	Per m² GFA, at t=0
BC BiB elderly	€	1.000	Per m² GFA, at t=0
RCC cultural	€	500	Per m² GFA, at t=0
RCC office	€	500	Per m² GFA, at t=0
RCC books	€	500	Per m² GFA, at t=0
RCC retail	€	500	Per m² GFA, at t=0
RCC event	€	500	Per m² GFA, at t=0
RCC gym	€	500	Per m² GFA, at t=0
RCC playground	€	500	Per m² GFA, at t=0
RCC elderly	€	500	Per m² GFA, at t=0
RC Church AH	€	500	Per m² GFA, at t=0
Extra RC Church for church use	€	50	Per m² GFA, at t=0
Demolition costs church	€	30	Per m² GFA, at t=0
Transformation parsonage to residential	€	600	Per m² GFA, at t=0

Indices

Index exploitation costs church	1,5%	Based PRC
Index exploitation costs parsonage	2,0%	Guess
Index parsonage lease	2,5%	Guess
Index parish income	-0,7%	Calculated based on PRC
Index renovation costs	3,0%	From Calculations PRC
Index building costs	3,0%	Guess
Interest own equity parish (pos)	5,3%	From Calculations PRC
Interest own equity parish (neg)	8,0%	Guess
Index yearly subsidy	2,0%	Guess
Index housing prices	2,5%	
Index parking	1,5%	
Index care centre	3,0%	
Index sale church	0,5%	
Inflation	2,0%	

Discount rates

DR Parish	4,9%	Goalseeked for PRC value (-421.000) for CU
DR Project developer	6,0%	Guess
DR Investor care centre	8,0%	Guess
DR Investor senior apartments	4,0%	Guess

Start values

Own equity parish	€ 1.200.000	At t=0, based on PRC
Rate BC to TCC	1,3	Constant
Rate RC to TRC	1,2	Constant
Profit project developer	8%	%sale value

Exploitation and recurring costs

Exploitation costs church (current)	€ 45.000	At t=0, based on PRC (85.000 for 2 churches)
Exploitation costs church (RCS new)	€ 10.000	At t=0
Renovation costs (low)	€ 452.330	At t=0, every 5 years, start at t=5, guess
Exploitation costs parsonage (current)	€ 1.000	At t=0, guess
Exploitation costs parsonage (residential)	€ 500	At t=0, guess

Income

Parish income	€ 35.000	At t=0, based on PRC (bankrupcy in 11 years and over 100.000 total for parish (2 churches))
Current lease of parsonage	€ 15.000	At t=0, based on PRC (bankrupcy in 11 years and over 100.000 total for parish (2 churches))

Appendix 7: Mathematical Structure of Extended Case [village name]

The new goal function for the reconsidered situation is:

Maximize -421.000*CU + 1.500.000*RCS + 500.000*MU + 5.715.530*RH + 1.833.654*AH + 2.208.098*AEH + 1.282.873*AC + 2.196.012*AO + 1.730.048*AB + 5.743.282*AR + 8.629.322*AE + 3.899.751*AG + 3.332.529*AP

All functions have their own market constraint formula here, with a zero value if they cannot be taken up by the market. The formulas presented here constrain the potential functions in section 3.5.4. and Appendix 5 to market conditions. The texts describe which market is constrained and on what grounds this is done.

1*CU + 1*RCS + 1*MU + 0*RH + 0*AH + 1*AEH + 1*AC + 1*AO + 1*AB + 1*AR + 1*AE + 1*AG + 1*AP = 1

The apartment market in [village name] is virtually non-existent, and competing apartment complex developments in the direct surroundings imply that apartments would not be taken up well by the market (Van Schijndel, 2010).

1*CU + 1*RCS + 1*MU + 1*RH + 1*AH + 1*AEH + 1*AC + 1*AO + 1*AB + 1*AR + 1*AE + 1*AG + 1*AP = 1

The municipality of [municipality name] has seen a large growth in its number of senior citizens (aged 65 years or over). In 2008 these citizens made up [percentage] of the total population. In 2017 this has grown to [percentage] (Centraal Bureau voor de Statistiek, 2017). The aging population makes that for care apartments and senior apartments a large consumer basis is present. In this formula, which captures the market for elderly housing, all other functions have one values as well. The market for elderly housing being good, does not (directly) affect the market for other functions in this model.

1*CU + 1*RCS + 1*MU + 1*RH + 1*AH + 1*AEH + 1*AC + 1*AO + 1*AB + 1*AR + 1*AE + 1*AG + 1*AP = 1

The constraint line for the cultural centre market has only one values as well. It is still important to include this line, since if the market changes, this enables for an easy way to correct this market.

1*CU + 1*RCS + 1*MU + 1*RH + 1*AH + 1*AEH + 1*AC + 1*AO + 1*AB + 1*AR + 1*AE + 1*AG + 1*AP = 1

This line represents the office market, and shows again that the office market is not saturated.

1*CU + 1*RCS + 1*MU + 1*RH + 1*AH + 1*AEH + 1*AC + 1*AO + 1*AB + 1*AR + 1*AE + 1*AG + 1*AP = 1

This line represents the market for library or bookstore space, and shows this market is not saturated.

1*CU + 1*RCS + 1*MU + 1*RH + 1*AH + 1*AEH + 1*AC + 1*AO + 1*AB + 0*AR + 1*AE + 1*AG + 1*AP = 1

[village name] has a sufficient supply of retail space (Van Schijndel, 2017). A supermarket might be attracted as a potential tenant. For an additional supermarket in [village name], not a large enough consumer basis is present (Van Schijndel, 2017). A new supermarket would then lead to vacancy in one of the current supermarket properties. Additionally, local supermarket and daily goods entrepreneurs will try to block the addition of an extra supermarket, due to the large impact a greater competition would have on their own businesses. Another risk of attracting a supermarket as a tenant, is that these organizations are not really bound to the real estate they use. They consider real estate a necessity for business but not a goal on itself. As soon as they then have the opportunity to move to a more attractive or more attractively located property, the main, and only potential, tenant is lost (Sluiter, 2017). Additional retail space will either not be taken up in the market or cause vacancy in other buildings in [village name].

1*CU + 1*RCS + 1*MU + 1*RH + 1*AH + 1*AEH + 1*AC + 1*AO + 1*AB + 1*AR + 1*AE + 1*AG + 1*AP = 1

The event space market is not saturated.

1*CU + 1*RCS + 1*MU + 1*RH + 1*AH + 1*AEH + 1*AC + 1*AO + 1*AB + 1*AR + 1*AE + 1*AG + 1*AP = 1

The gym market is not saturated.

1*CU + 1*RCS + 1*MU + 1*RH + 1*AH + 1*AEH + 1*AC + 1*AO + 1*AB + 1*AR + 1*AE + 1*AG + 1*AP = 1

The indoor playground market is not saturated.

The new constraints posed by stakeholders are:

0*CU + 1*RCS + 0*MU + 1*RH + 0*AH + 0*AEH + 0*AC + 0*AO + 0*AB + 0*AR + 0*AE + 0*AG + 0*AP = 0

The municipality disallows demolition and new build, since the church has a municipal listed building status.

0*CU + 0*RCS + 0*MU + 0*RH + 0*AH + 0*AEH + 0*AC + 0*AO + 0*AB + 0*AR + 0*AE + 0*AG + 0*AP = 0

The Diocese does allow for adaptive re-use or mixed use. This potential constraint formula is however kept in place, since knowing the position of the Diocese in advance is very important in future considerations.

0*CU + 0*RCS + 0*MU + 0*RH + 0*AH + 0*AEH + 0*AC + 1*AO + 0*AB + 0*AR + 1*AE + 0*AG + 0*AP = 0

The Diocese, if allowing adaptive re-use, want to have a worthy use of the former church, this is laid down in perpetual clauses in the sale contract by the parish. Some functions are hereby not allowed, namely offices and event space.

0*CU + 0*RCS + 0*MU + 0*RH + 0*AH + 0*AEH + 0*AC + 0*AO + 0*AB + 0*AR + 0*AE + 0*AG + 0*AP ≥ 0

For any adaptive re-use project, the involved project developer wants to make profit. These profits are incorporated in the profit and risk premium at 8% of the project turnover made from the project development of adaptive re-use in each option. If this is met the net present value of each adaptive re-use choice option should be a positive value or zero. Note that since this is a demand taken into account while setting up financial calculations, all choice options meet this constraint.

0*CU + 1.225.577*RCS + 465.274*MU + 4.052.662*RH + 805.589*AH + 1.118.801*AEH + 344.877*AC + 1.108.691*AO + 718.926*AB + 4.075.876*AR + 6.489.962*AE + 2.533.817*AG + 2.059.353*AP ≤ 3.000.000

The project developer involved would have to find financing for buying the church. Since these are riskier projects, a maximum amount of financing to be found is expected. This is set here at €3.000.000.

0*CU + 0*RCS + 0*MU + 0*RH + 0*AH + 0*AEH + 0*AC + 0*AO + 0*AB + 0*AR + 1*AE + 0*AG + 0*AP = 0

The neighbours of the former church would not accept noise nuisance from a potential new use. Event space obviously produces this. But supermarkets also often induce noise nuisance. This can however be solved by taking measures against this (Sluiter, 2017). These measures have been taken into account as additional building costs in the financial calculations for the choice option of retail and supermarket. Note that neighbours are not legal stakeholders, they can however seriously frustrate a process, which would lead to worsened acceptance by other stakeholders, such as the municipality or involved project developers.

0*CU + 0*RCS + 0*MU + 0*RH + 0*AH + 0*AEH + 0*AC + 0*AO + 0*AB + 0*AR + 1*AE + 0*AG + 1*AP = 0

Neighbours would not accept parking problems arising from a potential new function. Though the church already has a certain amount of parking spaces, there are some functions that would enlarge the need for parking still further, namely event space and an indoor playground. Both these functions have peak occupancies, whereas their use of GLA per occupant is smaller than it is in a church. This makes for more occupants at peak hours, enlarging the need for parking.

1*CU + 0*RCS + 0*MU + 0*RH + 0*AH + 0*AEH + 0*AC + 0*AO + 0*AB + 0*AR + 0*AE + 0*AG + 0*AP = 0

The parish still cannot accept a negative net present value. The only option which still has a negative net present value in this situation is the continued use option. Note that this is made into a binary constraint. This was done through conditional programming; any negative net present value for a choice option translates into a one in this formula, and positive or neutral net present values translate into zeroes.

0*CU + 0*RCS + 0*MU + 0*RH + 1*AH + 1*AEH + 0*AC + 0*AO + 0*AB + 0*AR + 0*AE + 0*AG + 0*AP = 0

Architect [architect name] made a study that showed the church was not suited for conversion to housing.

Appendix 8: Working of model

Model	Choice options	ContinuedUse	ReDevChapelSenior	MixedUse	ReDevHousing	AdaptiveHousing	AElderlyHousing	ACultural	AdaptiveOffice	AdaptiveBooks	AdaptiveRetail	AdaptiveEvent	AdaptiveGym	APlayground
	Endogenous Variables	CU	RCS	MU	RH	AH	AEH	AC	AO	AB	AR	AE	AG	AP
	Outcome	0	0	0	0	0	0	0	0	0	0	0	1	0
	Net Present Value Parish (10 year)	€ -421.000	€ 1.500.000	€ 500.000	€ 5.715.530	€ 1.833.654	€ 2.208.098	€ 1.282.873	€ 2.196.012	€ 1.730.048	€ 5.743.282	€ 8.629.322	€ 3.899.751	€ 3.332.529
														€ 3.899.751
Constraints:														
	One option only	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
Market Conditions (is market saturated?)														
	Housing	1	1	1	0	0	1	1	1	1	1	1	1	1 = 1
	Elderly housing	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Cultural	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Office	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Bookstore/library	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Supermarket/retail	1	1	1	1	1	1	1	1	1	0	1	1	1 = 1
	Horeca/eventspace	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Gym	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
	Indoor playground	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1
Actors:														
Municipality														
	Monument status	0	1	0	1	0	0	0	0	0	0	0	0	0 = 0
Diocese														
	Adaptive re-use allowed	0	0	0	0	0	0	0	0	0	0	0	0	0 = 0
	Perpetual clauses (functions)	0	0	0	0	0	0	0	1	0	0	1	0	0 = 0
Project Developer														
	No Negative NPV of Adaptation Development	€ -	€	0 €	-0 €	0 €	- €	-0 €	-0 €	- €	-0 €	- €	0 €	0 =>0
	Max Price of Church (Investment Space)	€ -	€ 1.225.577	€ 465.274	€ 4.052.662	€ 805.589	€ 1.118.801	€ 344.877	€ 1.108.691	€ 718.926	€ 4.075.876	€ 6.489.962	€ 2.533.817	€ 2.059.353 <= € 3.000.000
Neighbours														
	No Noise Nuisance	0	0	0	0	0	0	0	0	0	0	1	0	0 = 0
	No Parking Problems	0	0	0	0	0	0	0	0	0	0	1	0	0 = 0
New Parish														
	No Negative NPV Allowed	1	0	0	0	0	0	0	0	0	0	0	0	0 = 0
Architect														
	Not suited for conversion to housing	0	0	0	0	1	1	0	0	0	0	0	0	0 = 0

On the previous page, areas in the snapshot of the decision model are highlighted. The substantiation for the model is given in given in Appendixes 5 through 7. The highlighted areas are;

Orange: This area gives the choice options (endogenous variables), and depicts the outcome. This outcome here is only a binary choice option, whilst only one (combined) function can be set for the building. This constraint is depicted in blue.

Green: These are the end results of the financial calculations. Maximizing the outcome of this row is the goal function. At the end of this row the final outcome is depicted.

Purple: Constraints resulting from market conditions. These exclude options that would not find an end user or investor from consideration. By modelling these as binary 'switches' these are easily adapted to changing conditions.

Grey: These are the constraints that actors pose on the solution. When no solution is found, these are the constraints that might be released or relaxed after negotiations.

Appendix 9: Further Input of Cases

New cases and situation are as examples input into a model. The base model in which this last step is taken is the first iteration of the main case used in the research (see figure 4 and section 3.5.3.).

The mathematical structure of this base problem is:

Maximize -421.000*CU + 1.500.000*RD + 500.000*MU
Under constraints:
1*CU + 1*RD + 1*MU = 1 (Only one choice can be made simultaneously)
0*CU + 1*RD + 0*MU = 0 (Municipality regards church as monument)
0*CU + 0*RD + 1*MU = 0 (No adaptive re-use is allowed by Diocese)
1*CU + 0*RD + 0*MU = 0 (No negative NPV option is allowed for parish)

CU, RD and MU here are the endogenous variables, based on the three choice options considered. To this mathematical problem new situations, from literature and through interviewing, are fictitiously added, in order to test if these situations and aspects can be modelled.

Desired outcome: The desired outcome mostly is a good selling price for the church (Sluiter, 2017). This is already incorporated in this model, since the maximizable function is the net present value of the exploitation of the parish. This is calculated while taking into account the selling price of the church for different functions.

Perpetual clauses: Non-allowance of certain functions. Through the use of perpetual clauses in sale contracts, some functions can be disallowed from being placed in the church (Sluiter, 2017; Van Schijndel, 2017). These functions include sale of alcohol or drugs, or use as a shooting range. These functions might be added to the maximizable function (with a fictitious and high maximizable value), where SA stands for adaptive re-use for the sale of alcohol or drugs and SR stands for adaptive re-use as a shooting range.

Maximize -421.000*CU + 1.500.000*RD + 500.000*MU + 2.000.000*SA + 2.000.000*SR
Under constraints:
1*CU + 1*RD + 1*MU + 1*SA + 1*SR = 1 (Only one choice can be made simultaneously)
0*CU + 1*RD + 0*MU + 0*SA + 0*SR = 0 (Municipality regards church as monument)
0*CU + 0*RD + 1*MU + 1*SA + 1*SR = 0 (No adaptive re-use is allowed by Diocese)
1*CU + 0*RD + 0*MU + 0*SA + 0*SR = 0 (No negative NPV option is allowed for parish)
0*CU + 0*RD + 0*MU + 1*SA + 1*SR = 0 (Perpetual clauses prohibit SA and SR)

Other functions that would be disallowed through the use of perpetual clauses are discotheques and mosques (Van Schijndel, 2017). The use of very strict perpetual clauses seems to be diminishing (Koenen, 2017). More often a dialogue is possible in what options are allowed. This means that more choice options can be considered, but in negotiation with the Diocese disallowed options are identified.

Zoning plan: The zoning plan prescribes a designated land use for the land the church is situated on. For churches this is ordinarily societal use (Sluiter, 2017). When considering a project on such a location, the process might be sped up by not changing from this function or the municipality might not be willing to change the zoning plan to enable a different land use. If that is the case only societal use is allowed, for which every municipality has a different definition. For the municipality of [village name] currently, this would be use of the land for social services, provisions for sports, games and

scouting, culture and leisure in the form of a theatre and housing for senior citizens ([source of land use plan]). Formerly, this list of land use options would have included religious use. These new functions; adaptive re-use for social services (SO), re-development to provisions for sports, games and scouting (SG), adaptive re-use as a theatre (TH); can be added (with fictitious values), with a new constraint on only allowing land use within the zoning plan restrictions. The option of re-development for senior citizen housing was already present in RD.

Maximize -421.000*CU + 1.500.000*RD + 500.000*MU + 200.000*SO + 200.000*SG +200.000*TH
Under constraints:
1*CU + 1*RD + 1*MU + 1*SO + 1*SG + 1*TH = 1 (Only one choice can be made simultaneously)
0*CU + 1*RD + 0*MU + 0*SO + 1*SG + 1*TH = 0 (Municipality regards church as monument)
0*CU + 0*RD + 1*MU + 1*SO + 0*SG + 1*TH = 0 (No adaptive re-use is allowed by Diocese)
1*CU + 0*RD + 0*MU + 0*SO + 0*SG + 0*TH = 0 (No negative NPV option is allowed for parish)
0*CU + 0*RD + 0*MU + 0*SO + 0*SG + 0*TH = 0 (Only land use within zoning plan is allowed)

Note that all functions originally considered are included in the allowed functions of the zoning plan.

Public support, subsidies and heritage conservation costs: In one case, Stichting Kerkelijk Waardebeheer held a questionnaire and found that 2.000 town residents were willing to pay €100 annually to preserve the church building (Sluiter, 2017). This improves the business case of options that leave the building intact. If an exploitation period of 10 years and a discount rate of 4,7% are taken into account (as were used in the calculations of the base situation), combined with circa this would amount to an improvement of the net present value of each option that preserves the church by circa €157.000.

Maximize -264.000*CU + 1.500.000*RD + 657.000*MU
Under constraints:
1*CU + 1*RD + 1*MU = 1 (Only one choice can be made simultaneously)
0*CU + 1*RD + 0*MU = 0 (Municipality regards church as monument)
0*CU + 0*RD + 1*MU = 0 (No adaptive re-use is allowed by Diocese)
1*CU + 0*RD + 0*MU = 0 (No negative NPV option is allowed for parish)

In different cases, mainly when monuments are involved, attracting subsidies might be possible (Jonkers & Van Doren, 2017; Sluiter, 2017). Since these generate money to be incorporated in the project cashflow, they have the same effect on the values in the maximizable function, by having higher values for certain, or all considered options.

Another situation that might generate such a positive effect on the project cashflow, is lowering costs. Often the roof is one of the elements of an obsolete church that is in the worst state of disrepair, and was originally constructed with expensive slates (Koenen, 2017; Sluiter, 2017). For any changes made to nationally listed monuments, the national organization for cultural heritage has to approve. They originally often wanted any renovation to use the materials originally used. Currently they sometimes allow for synthetic substitutes for the expensive slate, which reduces construction costs, and therefore has positive value increases for all choice options that require renovation. For every monument the normal legal planning procedures are valid. But for listed monuments, a permit for any construction work has to be acquired, including any extensive renovations (Hobma & Koolwijk, 2013). This might lead to permits being required, which would not be required in changes made to non-listed buildings. Time needs to be allotted to this, and any delays always impact the

financial outcome of a project. For work done where permits might be needed, extra costs have to be taken into account in the financial calculations of the value of a choice option.

Lease: In Barchem, Stichting Kerkelijk Waardebeheer was involved with a project where a physiotherapist was interested in the building, but was not able to gain a mortgage for buying the building (Sluiter, 2017). Since no other potential buyers applied, it was decided that the physiotherapist could let part of the building. The business flourished, and other care providers started sub-letting from the physiotherapist, who later was able to get a mortgage and buy the church. Letting a building instead of selling it outright for a certain function can be seen as gaining a different exploitation as a parish. The lease income paid by the physiotherapist is added to the exploitation, but a longer period of carrying the costs of exploitation is taken into account, as can be seen in figure 11.

Parish exploitation, based on sale of church						
t	0	1	2	3	4	5
Income from sale		€ 150.000				
Costs of exploitaiton		€ -10.000				
Total cashflow		€ 140.000	€ -	€ -	€ -	€ -
Discounted cashflow		€ 133.333	€ -	€ -	€ -	€ -
Net present value		€ 133.333				

Parish exploitation, based on lease of church, and then sale						
t	0	1	2	3	4	5
Income from sale						€ 175.000
Income from lease		€ 10.000	€ 10.700	€ 11.449	€ 12.250	€ 13.108
Costs of exploitaiton		€ -10.000	€ -10.000	€ -10.000	€ -10.000	€ -10.000
Total cashflow		€ -	€ 700	€ 1.449	€ 2.250	€ 178.108
Discounted cashflow		€ -	€ 635	€ 1.252	€ 1.851	€ 139.552
Net present value		€ 143.290				

Figure 11. Parish exploitation for sale of an obsolete church in the first year, versus letting the church and sale after five years. A discount rate of 5% and a rent increase of 7% are used in this example. Own illustration.

As shown in figure 11, this may imply that a higher net present value can be reached. Letting (part of) the church might give other parties time to open options for financing, such as was shown in the example in Barchem. This means that whilst at first a certain end-user might not be able to pay any realistic price for the church, later they could pay a certain price. This thus enables sale for a certain function as an option, which might even have a better selling price (and impact on the parish exploitation) than sale outright to the highest bidder would have reached.

Parsonages: Stichting Kerkelijk Waardebeheer always advises to sell the parsonage not before the church is sold (Sluiter, 2017). These buildings are often very often to find a new use for, they are in essence already residences (Koenen, 2017; Van Schijndel, 2017). By incorporating these parsonages into the sale of a church, an extra component is added, which is often profitable. This means that every sale option will have an increased value. If one of the options had only a small negative

outcome, this might lead to it not being disregarded in considerations, since it through inclusion of the parsonage in the sale, does not constitute a negative net present value, which is often unacceptable for the parish selling a church. In practice however, often parsonages are already sold when the sale of a church is being considered (Koenen, 2017).

Stakeholders: Though former church goers might not be by Dutch law legal stakeholders in processes of the change of use of a former church, they can frustrate the process, by delaying zoning plan changes for instance, through voicing concerns in public participation (De Bruijn-Dedic, Chao-Duivis, Festen-Hoff, Hobma, & Schutte-Postma, 2011). This risk can be reduced by incorporating stakeholder demands in choice options. In one example, the local religious community wanted to retain their old church, but this was financially infeasible for the parish (Sluiter, 2017). In the end, the eventual buyer decided to incorporate a meeting place for the parishioners in their plans for re-development, which was highly appreciated by the public. In this way protests may be avoided. This can also help guarantee the support of the municipality for the plans, since the former parishioners are part of their constituency, and going against their will might lead to political loss of face (Koenen, 2017). In this way, not only protests might be avoided, but more support from the legal planning powers might be attained. This enables some options, though it might cost money which could have constituted part of the residual value.

Another way in which this community appreciation might be gained is by preserving the church tower, which is often viewed as the most important defining physical element for the church building as a central point in town (Sluiter, 2017; Van Schijndel, 2017). In France, for instance, the local government often owns whole churches or parts of the church. If the church tower is owned by the municipality, preservation costs for the parish are lowered significantly, since the tower is often costly to maintain (Jonkers & Van Doren, 2017). Adaptive re-use of the tower is often next to impossible, since no functional spaces can be fitted into it. For considering options wherein the municipality owns the church tower, some choice options have to be changed. Re-development plans that include the land on which the tower stands are not possible then. All other options, in which the church tower is left intact and maintained, will have a positive boost of their value. This stems from the high (deferred) maintenance costs transferring from the parish to the municipality. In the example below the transferred costs for the church tower are set on 400.000 and the re-development option is no longer possible.

Maximize -21.000*CU + 1.500.000*RD + 900.000*MU
Under constraints:
1*CU + 1*RD + 1*MU = 1 (Only one choice can be made simultaneously)
0*CU + 1*RD + 0*MU = 0 (Municipality regards church as monument)
0*CU + 0*RD + 1*MU = 0 (No adaptive re-use is allowed by Diocese)
1*CU + 0*RD + 0*MU = 0 (No negative NPV option is allowed for parish)
0*CU + 1*RD + 0*MU = 0 (Church tower is not included in the sale and cannot be demolished)

In Tilburg, an adaptive re-use project was infeasible due to the total costs of construction not being compensated by project revenues (Koenen, 2017). A compromise was made, where the church tower was left intact, and detached housing was realized on the site of the former church building. In this way, leaving the church tower intact and demolishing the rest of the building proved to be another choice option.

Other functions: A large variety of other functions might be suitable for adaptive re-use projects of obsolete churches. These include functions that can be seen as serving a societal goal, of which examples are a library, mixed use with temporary societal functions and use for social work places for the disabled (Sluiter, 2017). Other functions, with a more commercial character also might fit, such as flexible room rental or supermarkets (Sluiter, 2017). All these new functions can be added as endogenous variables in the options to consider in the decision to be made. Note that these functions may not be those that are deemed 'immoral' by the Roman Catholic Church (Squires, 2009). One other consideration to be made is that every newly created endogenous variable should be different from the already established ones. If every small change would result in the definition of a new endogenous variable, then an infinite number of solutions should be regarded. Calculating such a problem using a computer would be fruitless (Binnekamp, 2010), and requires discretization. It would therefore be prudent to only create a new endogenous variable when a change in a consideration for an option leads to the main functional outcome of that option not already being present.

Appendix 10: Summary Interview Sander van Schijndel

This interview summary was produced and edited by the researcher. The interview subjects have been bundled at his discretion. The interviewee has been informed of the nature of the research and has been given the option to check and correct this summary.

Sander van Schijndel currently works as an investment manager at OMU, a government agency which aims to restructure commercial real estate and office locations to create an attractive business climate in the Utrecht Region. While working for PRC consultants (acquired in 2011 by engineering and advisory firm ARCADIS), Sander was involved in advising for adaptive re-use projects, amongst others for obsolete churches.

Process: Catholic churches have to be deconsecrated before another use might be found. Then there are some taboo functions, which are unacceptable. Due to the nature of 'soft' problems that might be existent, it is very difficult for a project developer or advisor to, without diving into the problem deeply, to consider the situation in a quick-scan. The barriers in these processes can be taken away, but they lie in the difficult balance of forces. PRC applied stakeholder analysis and spiderweb models to try and capture these complex problems. The goal was always to find overlap in points of view of different actors. These were then used as input for a study using different options.

Feasibility: These days, technologically more is possible than before, there are increasing examples in the Netherlands of fantastic solutions. Even with limitations from the building code, due to government policies promoting adaptive re-use, more possibilities exist. But technological conditions are not the main issue. The balance of forces, the wishes and demands, the invisible interests of stakeholders and shareholders, are very important. It is not only these demands and wishes that have to be charted, but also the underlying interests.

Dioceses and parishes: The situation differs for every Diocese, which makes it difficult to consider the Roman Catholic Church in the Netherlands as a whole. One Diocese might be much more generous in allowing adaptive re-use than another is. The Diocese of 's-Hertogenbosch and the Archdiocese of Utrecht were notorious for their strict interpretations. They stated that due to historic errors, they actually wanted to make adaptive re-use virtually impossible. Churches should either stay churches or be demolished, after which the land could be deconsecrated and sold for other purposes. This money could then be used by the parishes. The interests of the Dioceses sometimes do not match the interests of individual parishes. Around each parish there is also a community present. Current parishes mostly consist of mergers between earlier smaller parishes. There is no longer one parish for each town or village, but parishes serve three, four or five different villages. Then the choice is made for one main church and several smaller churches or chapels. Every other former church building may then be sold off. And in this manner, the Diocese, and not the parish boards, make decisions. The parish boards might prefer a church in village X, but it might actually become a chapel, or it may be omitted entirely. And village X is off course especially unhappy, since they have to take a 10 kilometre drive to reach a main church or chapel, whilst the church in their village is demolished.

As a result, we see that there are already three different interest which don't align: the religious community as a whole, the leaders of each individual parish and the regional Diocese. These are all 'soft' constraints, which are not always formalized in policies. But these are often just as important as 'hard' demands and laws and regulations that are written in paper or legislation. The Diocese then

were clear but very strict in doctrine. They stated that the number of churches was going to decline, and they had to demolish some churches. The discussion starts when every village wants their church to be the remaining main church of every parish. Then a negotiation starts, also along the lines of emotional, social and monumental values, or heritage values. These are aspects to consider when deciding to demolish a church. But every church has certain value, and not all of them can be preserved, since vacancy is only increasing. Every week at least one church becomes obsolete in the Netherlands, and certainly not every church lends itself for adaptive re-use. Some will have to be demolished and new purposes have to be found for the land. In peripheral areas it is often difficult or even impossible to find economically viable new land uses. The Diocese have a lot of wealth, but they state that if they pay for preserving and restoring all churches, whilst in five years only two out of five are needed, then they'd rather sell three. And they won't sell those for 'undesirable' or 'unfit' uses such as discotheques or mosques, but will rather demolish those churches, and use the land. This may be a logical choice from their point of view, but is not necessarily a desired outcome for society as a whole. They do take into account cultural and historical values, but they take rational decisions on which church to deconsecrate. Like the national government, they are further removed from specific local issues and problems, and take more rational and larger scale decisions, though these may be harsh on individual villages and communities. One consideration then is to consider in which Diocese one operates, before considering adaptive re-use. The parish is often the least powerful actor in these situations, since they are subordinated to the Diocese. And the Dioceses already have their own policy.

[village name]: One project Sander van Schijndel worked on while at PRC Consultants, was in [village name] in the municipality of [municipality name], which consisted of a merger of several local councils. [village name] already [information on location] and had preferred to be taken over by another municipality, but was added to [municipality name]. The municipality of [municipality name] commissioned PRC to carry out a feasibility study including a determination of the heritage preservation value of two churches, in [village name] and in [second village name]. The Diocese wanted to close both churches, demolish the buildings and sell of the land. The local parish stated they couldn't pay the upkeep anymore, and concurred. One of the churches, the [church name], was in a reasonable condition, but the situation worsened. The parish stated that the upkeep costs couldn't be paid with the decrease in churchgoers, and they also had to maintain a graveyard, so they wanted to close and demolish the church. Then a new, smaller chapel would be built, maybe even incorporating and preserving part of the old church, so that a location for prayer could be maintained on this historic site. On the remainder of the site, a complex of senior apartments was to be realized. In this way the parish wanted to use the profits for use elsewhere. The parish stated that as owners that was their decision to make. The municipality thought that the church might be worthy to be a listed monument, and wanted research done. Then PRC got an assignment to make a cultural and historical analysis and a feasibility study. Three scenarios were then considered. Continued use after renovation, adaptive re-use and re-development, which the parish planned. The conclusion was that continued use was strictly financially infeasible for the parish, and that in four or five years the parish would be bankrupt. Adaptive re-use, could, with some luck, break even. But the functions were difficult, since residential use was found by architect [architect name] to be technologically impossible. The only function that, given commercial considerations and market conditions, would be feasible was a community center or health care center. But for a healthcare center there were

already plans elsewhere in [village name], for which the council and most other stakeholders had already decided. It was just financially feasible, but would be a solution for the building, and could technologically be beautifully incorporated, via a box-in-box principle. The third option, re-development, was financially most attractive, but if the municipality gave the building a listed status, would be very difficult to realize. The municipality then had both these options. The research showed that the building was worthy to be listed as a protected heritage item, but again if the municipality wanted to give a listed status, then moneys should be provided. In the end the municipality did award a listed status, without allocating the necessary funds for renovation or upkeep. [Information on court decision on case.] They stated that if the municipality wanted to award a listed status, they, as PRC advised, should have allocated, funds, time, energy, planning regulations, and/or they should have stopped the other project for the healthcare center, in order to create financial feasibility for the parish.

At the time of writing, [information on outcome of case]. This illustrates the difficult context in which these problems operate, with emotions people have with these churches. At this time no other commercial functions were considered, since the deacon of the Diocese stated that they would not allow such functions. That was based on the ownership situation and Diocese policy. At the most a societal function would be allowed, but even then it would be difficult. The reasoning was that people would see a church and then find a healthcare centre in the interior, which was something the Diocese did not want. They had a policy of demolition. The parish wanted to preserve the building, but [architect name] already stated that the building nature and state made residential use very difficult due to problems with i.a. construction and daylight. There was no need for a supermarket in [village name], and there was enough retail space available in the villages. The most fitting function was a semi-societal function, where the healthcare centre would pay a competitive rent to the future owner. The box-in-box costs were quite high as well. A negative value of around €800.000 was reached for the continued use option, cost neutrality was reached for adaptive re-use and for re-development a positive value of €500.000 to €1 million would be reached. In the direct surroundings a care centre from a housing association and a care provider was present. They thought realizing senior apartments would be great, considering the aging population, the location of the village and the facilities offered in [village name]. [village name] had a local centre function for several villages, with societal and commercial functions, such as a supermarket and community centre. The location, near facilities, made it an ideal location for senior apartments. Public transport was lacking, but the local population was used to that. At the time of the study PRC did not directly converse with other community organizations or monument agencies, but they would later perhaps have been involved. In Brabant there are just a lot of churches that have to be dealt with. There are three main issues. The history and emotions involved, the non-professional owners whom are not only financially driven, and the demand or consumer basis for residential use is not always present. There is simply not enough demand to change every church into apartments. And then Brabant is already easier to deal with in market terms than for instance Groningen, Limburg or Northeast-Friesland, where shrinkage is present. In larger cities more is possible, on grounds of functions, consumer basis and market potential. Back then the Bishop of Den Bosch stated that no adaptive re-use was desired. At the same time the Bishop of Amsterdam found adaptive re-use a good way of dealing with obsolete churches. In Den Bosch in one church a discotheque was established, and the inventory was still present. People were dancing underneath the statues of Mary that were present.

That was extensively portrayed in the media, and it was decided that nothing like that situation should ever be allowed to happen again. Maybe afterwards the situation was entirely the other way around, since nothing was made possible anymore, but that was the viewpoint then. In [village name] a local contractor, together with the local housing association, had a plan to make a project. There was also a local community association that wanted to preserve the church. Some members were disillusioned former churchgoers, not agreeing with the decision to close the church. Other members were next door neighbours and notables from the village, such as the notary. They tried to preserve the church and their interests opposed those of the parish and Diocese. The municipality has to try and deal with all these positions. They at least have to ensure for transparent decision making when giving a permit for demolition or awarding monument status. The municipality could have made the project feasible, not just financially by subsidizing, but also by enabling a function.

The function of the church was left intact in the adaptive re-use in this instance, by having the sacristy remain. With this side use of the building the religious function was retained. The side use program was positioned all the way up into the bell tower and amounted to about 1.000 m². It might have been a feasible and executable option for the Diocese, but the intended use was already planned for another location. The general practitioners and apothecary and other parties in the healthcare centre wanted to move from the outdated property they occupied, so wanted new housing fast. For the municipality uniting these two functions in one central place would probably have been the most desired outcome. Any other function was not financially feasible, not supported by market conditions, not allowed or not supported by the community. Maybe the bell tower could have been kept intact, even though that would have been taken out of its context. The municipality decided to award monument status, which led to a stalemate and the buildings demise. The building itself was eclectic in style, a mix of different building styles. It stood in a central location in [village name], but a bit back positioned from the street. It was not the main symbol of the village and not the most beloved building of the village. It was only visible from one perspective and the view offered was of the ugly tower. The more vulnerable building behind the tower was not visible, the view blocked by other buildings and trees. It might have been more pressing to preserve the building if the view on it was more prominent.

Municipalities: The municipalities have power, planning power (both strategic and statutory) and administrative power, but municipalities are increasingly unwilling to financially contribute to the preservation of heritage items. So, they may have financial power, but don't use it. This has two reasons; since the financial crisis, the municipalities have adopted a stance of not directly acquiring land and property themselves, but rather to facilitate and coordinate, developers, investors, other market forces and community initiatives to take the lead. Municipal councils promote and facilitate this, but usually don't actively participate. With churches they do even less, since as neutral government agencies they don't want to mingle in religious communities and affairs. If they do, then other religious communities might feel left out, since often in small villages several churches are present: the Roman Catholic Church and (more than one) Protestant Church. This is an additional reason for local government not to especially interfere with church communities, but treat church organizations as regular private market actors. This might not be correct, since church buildings are of great importance for the local community. In France, often the government or municipality often owns the church (or at least the church tower) and the religious community rents the building. Then the government pays for the upkeep of the buildings. In the Netherlands we don't use this

construction, which means upkeep and management costs have to be carried by the individual religious community, which more often than not cannot afford that.

Community: Willingness of the local community to be involved in the adaptive re-use of a church can really help plans. It is difficult for a project developer or advisor to ensure this, but it is important to involve the local community at an early point in the process. Proactivity might be reached where the local community helps speed plans or even helps fund plans trough crowdfunding.

Appendix 11: Summary Interview Lucas Sluiter

This interview summary was produced and edited by the researcher. The interview subjects have been bundled at his discretion. The interviewee has been informed of the nature of the research and has been given the option to check and correct this summary.

Lucas Sluiter has as an independent advisor and as an advisor for Stichting Kerkelijk Waardebeheer been involved in numerous processes of re-development, adaptive re-use and sale of church buildings. Stichting Kerkelijk Waardebeheer is a foundation that aims to help Christian organizations in i.a. the processes of selling real estate, valuing real estate and finding complementary users of real estate.

Arnhem: In Arnhem five churches were sold and considered as a whole, instead of considering each separate. One of those was the Willibroduschurch, which was sold to the Syriac Catholic Church. This was a very clean transaction and the sale price was good, which shows that not every sale of a church for a different denomination has to realize a lower sale price than sale for commercial re-use. The Syriac Catholic Church bought the whole church complex, including a church, a parsonage, a parish communal space, an interior garden, garages and a school. The price that was paid was comparable to the price a project developer, intent on realizing care apartments in the buildings, was willing to pay. The St. Janschurch was also sold well. The sale did not have a high transaction value, but €1,5 million of deferred maintenance could be written off. A third church, the Heilig Hartchurch, is in the process of being sold. It lies in an area with an older, wealthier and more highly educated population, who understand that a new function is needed for the church if preservation is wanted. They understand the need for preservation through adaptive re-use. The intended future use is a healthcare centre, which is a public function. The design was made with respect for the original church design. The adaptive re-use of the church is seen as a good outcome by the neighbourhood. Since the church is a municipal listed building, the quality and preservation of the church will be guarded by the municipal advisory building aesthetics committee. The good sale of these three churches enabled a sale for a lower price of another church. The Heilige Geestchurch had already been in use by a Mennonite Church community for 30 years and been taken proper care of. The Mennonites were then asked how much they could spare, and after paying that sum became the new owners of the church. When selling multiple church buildings, the consideration might also be to make a profit on one, to continue using another church.

Ownership, Dioceses and sale process: The owners of most churches in the Netherlands are the Catholic Church and Protestant Churches. The Protestants are not hierarchical structures and can act more flexibly. Only the umbrella organization for Church Stewards have to check if sales were handled correctly. In the Roman Catholic Church in the Netherlands, the parishes are the legal owners of churches, but church boards (made up of volunteers) can only take action when authorized by the Diocese. The administrative liability lies with the Diocese, and for every major action the Bishop has to issue a mandate. The different Bishops act differently when considering possible sales. Mostly the desired outcome is a good sale price for the church. Additionally, some qualitative obligations are incorporated into the sale contract through use of perpetual clauses. One of these is non-allowance of certain functions, such as sale of alcohol or drugs, or use as a shooting range. If these obligations and limitations are met, anyone can buy a church, which is then deconsecrated, after which it simply is a building designated for societal use. The difference lies in

the emotions that former churchgoers and neighbours feel for the building. They have their own networks, which can enable or disable any potential project regarding the building. It is therefore important to mobilize these interested parties early on in every process. This mainly involves a lot of work for the church seller. Parish boards involved in the sale of church first have to consult location board (the organized local parishioners), and involve them in the process of sale. Besides posing a financial issue, an empty church also is demotivating for churchgoers. If the local stakeholders are involved in the sale process, a project developer can create a plan with broad support. In one instance in the rural area of Gelderland, a project developer used a classic approach to the process, and the resident stakeholders halted the process. It later turned out that the location board themselves wanted to take over the church. Now a smaller part of the floor area is religiously used, and the rest of the building is used for temporary societal functions. Besides the use of specific contractual obligations, a church building is like any other listed building. The re-use of a building close to its original societal function always is a good option. These new functions can include funeral homes, wedding rooms and columbaria. The financial situation of the selling party is important to consider. The Diocese simply states that the highest bid should be accepted, given that all limitations and obligations are met. But a good bid consists of a sum and an intended use. This could include the use of the building as a library or a healthcare centre. These are publicly accessible and preserve the church building. Healthcare centres form an interesting adaptive re-use category. They are considered societal functions. If a general practitioner and apothecary are included in the plan, it is a very safe option, since the need for their services doesn't ever go down. Physiotherapist are included in this regard as well. Hospitals are going to deal with more problems not within the walls of the hospital, but closer to the patients. Churches could provide a solution for this, since they are already located in central location within areas or towns.

Valuation: The valuation of church buildings is not hard per se, but sometimes can be arbitrary. Stichting Kerkelijk Waardebeheer often advises the selling side in these transactions. The value of a church should be residually calculated. Then the intended plan a project developer has be known to some extent. Since project development is performed with a reason (a demand for a certain function), the process should start with the intended end-user. The selling party then has to consult an advisor who does more than a realtor would. The advisor needs to know how project development works, and can then residually calculate the price that should be paid for the church.

Monuments: In the late '80s and '90s a lot of church buildings were made listed monuments. The consideration is always if a building is unique or special enough to preserve it for future generations. If the church is fully used this is no problem. If that is not the case, and no one would buy the building to use is for its intended use, then all stakeholders should ask themselves if the responsibility for preserving the building can be laid with the parish. The monumental value however has broader impact, and the parish cannot pay for the upkeep of the building. Dangerous situations can even come into existence from deferred maintenance.

Questionnaires: Stichting Kerkelijk Waardebeheer uses questionnaires to gain insight into if residents know the church building, if they want the building to be preserved, if they would be willing to contribute for preserving the building and how much they would be willing to contribute. In one instance a response rate of 98% was reached amongst 2.500 residents. 2.000 of those residents would be willing to contribute, on average, €100 every year towards preservation of the building.

This annual €20.000 offers a lot of opportunity for conservation. Covering the unprofitable part of an investment in this manner, can make functional re-use feasible.

Heeswijk: In Heeswijk within 700 meters three churches and a monastery were present. After consulting the province, municipality and a housing association, a questionnaire is now being produced. In Brabant there are always some old industrial families with a lot of capital and Catholic roots. They often have a heritage foundation as a result of Corporate Social Responsibility policies. Not a huge amount of money is needed, just enough for conservation. In this case no other functions were feasible due to financial considerations and market conditions. The question was then how to cut the building loose of the parish organization. There was deferred maintenance worth approximately €2 million. The idea was to start a foundation, install a board and then transfer the church building to the foundation for €1. The foundation would then be funded by donations from the community, different authorities, budgets for diverse things (such as tourism and creating bike routes, employment opportunities and participation). There was interest from a foundation who provided social employment for youth and elderly, a housing association that was interested in exploiting the real estate of this foundation, and the province that had earmarked funds for these activities. All stakeholders were put together and asked; how do you have a stake and what do you want from the project? Now the project seems to be feasible, only the deferred maintenance has to spread out over time. The roof is the problem here, as it often is. The slate is extremely expensive, and maybe another material could be used. The national organization for cultural heritage (RCE) has to look at a question like that. In these cases in rural areas, solutions have to be found in the direct surroundings, since no one else has a stake in the project. Stichting Kerkelijk Waardebeheer proposes the method checking all stakeholder interests and looking into the financial side of the project. Then the owner can be shown that a high selling price is unrealistic, but at least the deferred maintenance costs can be avoided. Currently the intended use for the church in Heeswijk is to have youth with disabilities run a market with local produce in part of the church, have cooking courses with these local produces in another part of the church and use part of the church for flexible room rental. A lot of churches acted as marketplaces in the past, which the national organization for cultural heritage finds positive. This would ordinarily be financially infeasible, but the intended end-users are given a budget for i.a. participation, the housing association has different yield requirements, a budget can be used for the impulse that would be given to local tourism, the parish will invest one annual rent from the parsonage (which is rented by a day-care facility for approximately €36.000 annually), and the local community will donate money annually (for preserving the building, which is done through a “Friends of…” foundation). This all adds up to €500.000 easily. This can be seen as (indirect) subsidizing by an allotment of different actors.

Barchem: In Barchem, a small church with little deferred maintenance (only a few tens of thousands euros) was handled. Stichting Kerkelijk Waardebeheer initially also did not know what to do with the church building. There was a physiotherapist interested in buying the church, but could not get a loan towards that end. Stichting Kerkelijk Waardebeheer then advised to first rent a small part of the church. This was done, and business for the physiotherapist flourished, and more footfall was created. Then another room was rented, eventually virtually the whole building was rented. Other care providers sublet parts of the building from the physiotherapist. This went on for some months, almost half a year, after which another meeting at the bank was requested. The physiotherapist could then loan approximately €175.000 and the church was sold. This now is a healthcare centre

without a general practitioner. Stichting Kerkelijk Waardebeheer advised the church to consider that not being able to buy, does not change the space demand of the physiotherapist. This again is considering more than a normal realtor would. There do have to be funds available for this lengthier process. The next question was, what do square meters designated for societal use cost in the area? That was a difficult question to answer. In the end it was regarded by capitalizing the turnover of the physiotherapist. It ended up being €200.000 minus €25.000 for deferred maintenance, which was reasonable.

Box-in-Box: In the experience of Stichting Kerkelijk Waardebeheer box-in-box constructions with multiple floors often is not worth it. A lot of different things are involved, including foundation work, steel constructions and the restriction on attaching to the exterior walls. Often it is more profitable to ensure a quick start of operations. The yields might be less, but so are the costs. Sometimes simply just using the ground floor is the way to go, since constructing within the church is dependent on a lot of variables.

Apartments: When trying to re-use a church for residential functions, a lot of considerations have to be given to creating daylight openings and ventilation measures, which might not be approved of by heritage conservation committees. It is not disapproved of in advance, but it can be difficult to get approval for certain measures. Furthermore, the measures to be taken are very expensive. These projects are often not financially successful. When it is done, often housing associations perform these projects, and accept the unprofitability of the investment. But for creating apartments in former churches, demolition and new build is often the logical approach, with an exception for square boxes from the reconstruction period following World War II.

Land-use plan: When adaptively re-using a church, first new functions within the designated land use should be considered. The intended use is societal use, so functions such as healthcare centres, libraries and theatres always apply. Only if another function would better suit the building, one should look at starting procedures for changing land use plans. Another important consideration is that if for instance a healthcare centre already exists within 500 meters of the church, then opening a new one is not an option.

Towns: Re-use of church buildings in smaller towns is possible if the town lies close to a larger city. They also have more of a community meeting function than the churches in bigger cities have. If you can find a use that serves this purpose, then a solution for these churches can be found. This function can however not be religious any longer, since religion doesn't bind people together anymore per se.

Supermarkets: Realizing supermarkets in obsolete churches is interesting to consider, they generate a high yield per square meter. But does the floor plan of the church fit a supermarket? They have very specific demands for the spaces they use. If the floorplans fit, this could be a financially attractive adaptive re-use. The selling party from a financial perspective might be positive towards such a project, the local community often is somewhat more negative. The supermarket then has to ensure things such as battling littering outside and not changing to much of the exterior. Supermarkets are not a disallowed function, if you can buy it and the municipality allows you to realize retail square meters. This is difficult however, since all major supermarkets watch each other warily. For the church it might not be a profane use of a church building per se, but parishioners and neighbours might not be positive. But if you adequately incorporate or handle points of view from

different stakeholders, it might be that no objections are raised, especially if no supermarket was near. But emotionally parishioners simply do not want a supermarket in the church building. They are not legal stakeholders, but they can delay the process, therefore careful explanation of why the supermarket is a good use of the building is advisable. Creating an underground parking garage also helps. In a case which eventually was not realized, we planned to construct a garage under a terrace garden. Additionally, trolleys would not be allowed to leave the building, but instead a lift to the garage was to be used. There was then no visual pollution, noise disturbance or increased use of existent public parking spaces. Another major supermarket in the end blocked the change of the land use plan, about four years ago, and the church building remains vacant. The building was sold to a project developer with reservations, and the contract was dissolved. Another thing to consider with supermarkets is that they need large floor areas, which might change. Supermarkets often need 1.100-1.200 square meters of retail floor area. Additional space is required for i.a. storage. But in ten years maybe even bigger floor areas are wanted. The building is for a supermarket organization not a goal, merely a tool. If space becomes available in a different location, they will move there.

Parsonage: It is advisable to either include the parsonage in the sale of a church, or to sell the church first, since parsonages are often profitable. If the parsonage and grounds are sold, then not a lot of land can be included in the sale of the church.

Parking: Churches have a certain parking demand, so often parking spaces are already present.

Appraisals, residual value and end-users: The Dioceses don't/didn't have specialists for their real estate considerations. Only six persons formed the whole organization, of whom one was responsible for buildings and one other for economy. The Diocese, also due to their lack in experience, states that certified appraisers should value the worth of a church that is to be sold. The parishes should not invest too much time into this process. The main issue is however to create real value for the parish in the sale process. The Diocese however does not have the capacity to go very deeply into these considerations. The valuations made by the aforementioned appraisers often are based on intended use, since a buyer and end-user are already known. If the future function is not yet known, the appraiser shortly considers what can be done with the building, and make an educated guess based on that. That offers very divergent valuations. Stichting Kerkelijk Waardebeheer finds that residually calculating the value is the best method. A buyer has to be known then, the intended end-use might be contractually be recorded. Also knowing the future investor might prove helpful in appraising the church building. Often when a project developer displays interest in a church, he already has an end-user in view. Sometimes even the end-user might display interest himself. Near Leiden a general practitioner showed interest in an obsolete church and asked for the process to be arranged. Then a project developer and an investor are easily found. In the crisis the idea that the end-user should be known was created, because financing was only granted if a rental agreement was present. Since almost everyone needs financing for projects, and additionally the leverage that financing offers for own equity, end-users were found before a sale was made. This still is the case. Societal end-users are easily accepted by the community, since if such a function is feasible, there is a demand for such a function from the community. That is how free market economy leads to feasible projects. There are churches that were renovated with millions of euros of government subsidies, which are vacant. If you let the market do it, often you have good examples of adaptive re-use.

Developers and housing associations: The parties interested in adaptive re-use of obsolete churches vary. The five biggest Dutch contractors might be involved, but also smaller local parties. These last parties sometimes try to make a quick gain on these projects, but by putting an anti-speculation clause in the sale contract, you can prevent this damaging the value of the church for the selling party. But all kinds of project developers might be involved, but also for instance housing associations are interested. In one case where demolition and new build was realized, a small chapel was incorporated into the new building, to meet the interests and wishes from stakeholders. The stakeholders wanted to retain a meeting place. They preferred the old church, but that was not possible. The housing association ensured that a good meeting place of about 100 square meters would be incorporated for them in the new building. They incorporated some items form the former church in the new room, which could also be used by the housing association. After ten year a lot of the original parishioners had aged, and the parish decided that when they would have to start paying rent for use of the room, to discontinue use of the room. This is another example of going beyond what a realtor would normally do when considering the sale of a church.

Problems: There are a lot of church buildings for sale, there is a lot of vacancy, but adaptive re-use will not work everywhere. Not every case is feasible. Some churches will have to be demolished, stay vacant for years, or even collapse.

Europe and church towers: Across all of Europe (except for East-Europe) secularization is present, not just in the Netherlands. But in Italy and France the problems we are discussing do not exist. In France the government buys or already owns (part of) the church. In Noord-Holland a lot of church towers are owned by the municipality. Not the nave that lies behind it, there is a separation of ownership up to the cadastre. That can be a solution, since the church towers are often the main issue. The government can't use the separation of state and church as an excuse, especially when considering listed buildings, since the building is considered, and not the religious organization. There is not enough money to sustain all monuments, so either the market will have to solve it, or listed buildings might collapse.

Funds, knowledge and capacity: The Dutch Catholic Church and Dioceses themselves are quite wealthy. The Dioceses lack knowledge and capacity and the parishes lack funds. Selling requires time. If there is a pressing need to sell, the value goes down. A good transaction in a free market always takes place between a well informed and unconstrained seller and a well informed and unconstrained buyer. If the sale is mandated, then friction arises. If parishes take their time, the desired good function will show up. Mainly the selling parties need more knowledge, the buying market parties have it. They do however prefer to collaborate or negotiate with professional parties on the other side of the table.

Appendix 12: Summary Interview Gerko Koenen

This interview summary was produced and edited by the researcher. The interview subjects have been bundled at his discretion. The interviewee has been informed of the nature of the research and has been given the option to check and correct this summary.

Gerko Koenen works as a director with Hazenberg Bouw, a contractor and project developer within the TBI group. They have a lot of experience, both with new build of commercial and residential real estate, as with renovation, transformation and adaptive re-use. For adaptive re-use of monuments they have a specialized subsidiary, Nico de Bont, which focusses on preservation through adaptive re-use.

Process: Within Hazenberg, trying to first get an option on a church building and time to research possibilities prior to investing, is the approach taken. Making a conditional bid is the usual method used. If an unconditional bid is desired, which is possible, the bid will be lower. At the time of making a bid too many government agencies have to be dealt with and too many tests have to be passed, to put a financial value on a church. Most building owners realize this, and accept conditional bids that offer the possibility of studying feasibility, which takes about one year. The enticement lies with the financial side of the bid; if certain things are allowed, the price for the church is given.

Selling parties: Dealing with selling parties who have professional advisors is preferred, since otherwise emotions might outweigh rationality. If a professional advisor is not present at the start of conversations with all parties, a lot of energy and time might be wasted. Hazenberg recommends that selling parties seek professional advice, or act on a basis of confidence (through prior experience) with Hazenberg.

Market conditions and feasibility: In Tilburg, a church was considered for adaptive re-use, but the total costs of construction could not be compensated by revenues for the project. The compromise was later made to leave the church tower intact and have detached housing on the site where formerly the rest of the church stood. In Vught, Hazenberg is adapting a chapel, which turns out to be a feasible project. The difference is the revenues that can be made from a project. In Tilburg, the church stood beside the Ringbaan, while in Vught the chapel was located next to another monument, which, combined with the local markets, led to the obtainable price per square meter in Vught being twice as high as in Tilburg. Especially for churches, these revenues are very important to reach the tipping point, where a project becomes feasible. If a church is located in cities in the Randstad, then probably one wouldn't be able to buy such a church, since it would already be sold. The challenge lies with the churches that are not so perfectly located. There has been a shift in this as well. BOEI, an authority in adaptive re-use, stated for some time, that churches outside of the Randstad should not be considered. This is changing, since more revenues can be made. If residential use is the most financially feasible function for obsolete churches, then in declining market conditions, adaptive re-use might also decline. It is then possible that feasibility of these cases is cyclically sensitive. The size of interventions to be done and the restrictions on projects lead to higher costs, resulting in infeasibility of adaptive re-use of churches. New build is always more efficient and feasible, or at least floor space can be more efficiently used. Churches often have too much unusable floor area. Buyers have to be willing to pay for the emotional value of the church and the location it is on.

Technical feasibility: Hazenberg has a lot of experience with adaptive re-use into residential functions. They use almost a standard installation package to realize apartments in churches. It is always a challenge to improve the energy efficiency, but mostly the same technical solutions are used in each case. This consists of a steel construction, steel plate concrete floors and metal stud interior walls. This allows for filling in the building up to the façade, where you also have to get light into the building. You also have an existing building with a roof, so you can't use concrete floors, since you cannot use a crane to get those into the building. You have to look at the foundation and stability of the building, then use steel construction and light weight interior dividing walls. If work on the roof is not required, this is avoided, since church roofs are cost intensive to deal with. Ventilation outlets and other technical necessities may be realized on roofs, after negotiation with the authorities. But if residential use is allowed, then already bigger interventions, such as opening up the façade, have been dealt with.

Monuments: The church in Tilburg did not have a listed status, the chapel in Vught was a municipally listed monument. This creates some difficulties in for instance creating openings for letting daylight into the apartments. About fifteen years ago the exterior of a church was not to be intervened with. Then no function could be placed in a church from the '50s with small windows and deep interior. The advice committees on preservation of built heritage however, are growing more open to the idea of preservation through adaptive re-use. They then allow some more interventions in the building in order to facilitate these functions. In Tilburg, an action group for preservation of the monastery and chapel wanted to obtain a monument status. They believed it would help preserve, but in the end a status would have made adaptive re-use more difficult, and in that way work against preservation. Owners are therefore not always interested in monument statuses, since it places restrictions on the building, which might also impact the value of the building. The chapel in Vught had stained glass windows, all starting from higher than four meters. If the stained glass had to be preserved, no conversion to housing was possible. It took some time, but in the end approval was given to a design with larger windows, without preservation of the stained glass, and addition of small balconies. This stretching of what can be done, in regard to the regulations on listed monuments, combined with the revenues made this project feasible. The advice committees still want to stay in control with these projects, so no license for everything is given, but dialogue on certain issues is possible. Most listed buildings are not listed in their entirety. Only nationally listed monuments are regarded as being important as a whole. Municipally listed buildings are often listed for certain features, such as the entrance, stairways or floors. This has to be known. Removing a monumental stairway leads to the end of dialogue, but if you incorporate the monumental features in a good plan, dialogue is possible. This shift is a positive change, since otherwise adaptive re-use of all our monuments would be nearly impossible.

Diocese: The parishes own church buildings, but they act according to the plans the Diocese sets. In Brabant the Dioceses of Den Bosch and Breda have different points of view. In Den Bosch, a former church was adapted as event space, where according to the media at the time, parties were also hosted for the gay community, which did not sit well with the Diocese, who then wanted more control on former churches. The strict control seems to be loosened up a bit, but the Diocese still set a lot of boundaries. The Diocese of Den Bosch is still difficult to deal with. Other Dioceses have a somewhat more business minded approach to selling churches, where conditions are set in a bid book, and the rules of the game are known. In some instances of sale, all demands and restraints are

known from the start, but this is decreasing. Where formerly limitations on use were clearly stated, now conditions such as worthy use are more common, giving more room for interpretation.

Land value: After a church is deconsecrated, to the stricter religious Roman-Catholic community, it remains a church building, and deserves a worthy function. They however also desire a good selling price, while revenues are dependent on what can be done with such a building. Then often demolition and new build generates the highest profits, since then for instance taller buildings can be realized. This creates the highest value for a former church, purely in land value.

Parsonages and community: Parsonages are often already sold when a church is being sold. The parsonages are not troublesome, these can easily be sold as is, or as refurbished dwellings or apartments. The church is where the difficulty lies, but they are more often than not sold separately. Churches are often part of a larger ensemble. Then it is possible to compensate for the church with residential development in an included garden for instance. In Tilburg a former monastery is considered as a project, here the whole business case will be feasible or not, dependent on if a use for the chapel is found. Chapels and churches face the same problems in this regard. Hazenberg is the third party already, trying to make a feasible business case for this monastery. It is owned by the municipality, who are willing to converse on what can be done with the chapel, since they realize it is a problematic building. The municipality does not pose a lot of restrictions, only that the chapel has to be preserved and not demolished. There are a lot of local interest groups that seemingly don't see the benefits of adaptive re-use. They aim to preserve the building as is, which frustrates efforts to allocate a new function to the building. These parties may have no official standing, but in the Brabantian municipalities their interests do count, also from a political point of view. An alderman may make a rational decision for something, but if local interest groups disapprove, it is difficult to still enforce plans. Local community interest groups have, in Hazenbergs' experience, never really added to project feasibility for churches. For other buildings, a contractor is regularly sought for organizational and technical capacity, to realize a local initiative. With churches, the local interest groups are mainly interested in retention. It is very important to communicate with all stakeholders involved with a former church building, to prevent disapproval, but they have not been mobilized in order to make a case feasible.

Functions and project development: Currently, residential use is most fitting for adaptive re-use, since market conditions provide financial feasibility for this function. Every instance in which municipalities might have realized a community home have already been realized. For healthcare centres, the general practitioners and other users really have to back any plans to generate feasibility. Currently a lot of money is invested in small scale care facilities, but these organizations aren't interested in churches, since this is not the expression their clientele is looking for. In Weesp a combination of residential use and commercial use was proposed, where an investor already owns the building. As he finds functions to fill up floor space, he extends the functional program within the church. That is not the approach Hazenberg likes to take. They are interested in project development until completion and then buyers have to be present, and residential use is preferred. Not intervening in the building as much can be beautiful, but that is not as interesting for Hazenberg, since they also have to generate revenues from construction work done on the building. They are interested as project developers in projects to enable construction work, since it not their core business. It is important for contractors and project developers to have a specialized focus. There lies

the reason for Hazenberg to be interested in adaptive re-use, of churches and otherwise, since with Nico de Bont they have a great restauration contractor. This also helps when dealing with monument committees, since they are assured of the output being of a high level. These specialists do want to work only with the best outputs, but sometimes choices have to be made to restore the building in a cost efficient way. Financing these projects is also gathering different financing sources. It is not simply sale value versus building costs. If the building has a monument status, some subsidies might be attracted. These subsidies also have demands on the restauration level, so quality is then ensured in different ways. And in a lot of cases of monumental buildings, these subsidies are needed for feasibility. Attracting these subsidies is an integral part of the development process. In Tilburg the municipality was aware of the fact that awarding a monument status would come with the implicit commitment to award subsidies to the project.

Appendix 13: Summary Interview Marion van Doren and Rick Jonkers

This interview summary was produced and edited by the researcher. The interview subjects have been bundled at his discretion. The interviewee has been informed of the nature of the research and has been given the option to check and correct this summary.

Marion van Doren and Rick Jonkers are building advisors for the Diocese of Den Bosch. The building advisors help parishes with managing their real estate. Fields that they cover include inspecting building states, producing plans for maintenance and restauration, procuring permits, procurement, project management and calculations. The Diocesan building advisors have been involved in the past with several adaptive re-use projects.

[village name]: The building advisors were only involved with the building aspects of the case, such as supervising the demolition of the [church name]. [village name] formerly was an independent parish, but in the new merger parish, a lot of churches were present. The revenue generated from the sale of the [church name] was then needed to ensure continuity of the other churches in the parish of [second parish name]. The other churches, often nationally listed monuments, require maintenance. In that way, the sale of churches is not performed to get rid of churches. If preserving all churches leads to an infeasible situation in ten years, then churches have to presently be sold. The [church name] had a lot of deferred maintenance, with even tarping used to close holes in the roof. A critical point was reached, where the deferred maintenance was too much for restauration to be viable. Every church has unique features, the [church name] also had a large history. This church disappearing also leaves a hole for the parish and local community. But for the parish the outcome, with losing their deferred maintenance, might also have been seen as a relief. If the alternative was that the church would become a ruin, then demolition might not be such a bad thing. It is important to consider in each case what the alternative outcome is. In [village name], the local graveyard near the former church location also has a small chapel. This might also be a reason for not opting to retain a religious function on the church site, since a facility for in example lighting candles, and prayers, is still present. The questions whether to retain part of the building and whether to have some small chapel in town, can be considered separately. Leaving the tower intact whilst demolishing the church was extra difficult in the case of the [church name], since the tower and church were strongly interwoven. [Information on church history.]

Diocese, parish and church sale: The Diocese does not take opting for the highest financial value as a general starting point, the societal background is also taken into account. The parish makes the decision whether to close a church, but the Diocese advises them to critically consider their finances. But what is to happen with each building that lies within the parishes. For the parish it is important that financial continuity can be assured, to provide religious services et cetera in the future, which asks for a thorough substantiation. Therefore the financial outcome of the sale of a church is very important. If demolition of a church offers a high value, this can contribute to the financial position of the new parish. In addition to that, the possibilities to contribute to the local community are regarded. But giving a building away freely is not possible, certainly not if the buyer might try to adapt the building for a year, and end up having to sell it again. The buyer has to be a long term viable party, since otherwise the parish, the new owner, and the local community have not gained anything. The location of the building, the size of the deferred maintenance, and the actual situation are important to consider then, since these all impact the financial outcome of a sale. A church has

been sold, for instance, where a 'stench circle' is present, which makes sale and adaptation very difficult and decreases the potential value of the building. For every church, that possibly might be adaptively re-used, the Diocese makes a valuation, to identify a realistic, and possibly mandatory obtainable, value for the church. This includes the consideration of what is feasible; in a small town, where a huge church is sold, no function might be found. If a party applies that is interested in the church, this is seriously considered, also on the merits of the potential project for the future of the building. Finances are then in two ways considered; firstly the long term viability of the business case of the new use has to be ensured, secondly the value of sale to ensure pastoral continuity has to be achieved.

Subsidies and monument status: If the former church is a nationally listed monument, subsidies might be attracted for maintenance. This does not entail large restauration but simple yearly maintenance or partly restauration of a church. Additionally these are not full subsidies, but for only half of the costs. This means the parish have to contribute still. Often for municipal monuments these subsidies don't exist, and some churches are liabilities for the parishes. Not only the municipality can start considerations for awarding monument statuses, but also third parties can bring a building into consideration. There is a subsidy program with the province, which can only be used for keeping a building wind- and watertight, but this is difficult to obtain and apply for at the right opportunity. Also for instance boarding up stained glass windows is something you want to avoid, since it looks bad. If a municipal monument status is awarded, without financial contribution by the municipality for i.a. maintenance, protest will be made. This status then offers no value, but only limits what can be done with the building. If the building cannot be demolished, but no maintenance is done, then the status also does not achieve its goal, since only a ruin is left, which no actor would find a good outcome. This deferred maintenance could result in viable plans not being feasible anymore. A monument status can then both hinder and help projects, though a national listing is preferable over municipal listing in this regard. There has been a time in which most churches have been awarded municipal monument statuses, which might now lead to less successful outcomes. Municipalities may be very strict in wat was described as a monument and disallow everything that would hurt this perceived value, then municipalities should also bear part of the costs. The owner now has to pay for restauration and maintenance, but this is often not possible.

Functions: Presently, many different function are considered viable business cases. Preferably societal use is continued, since the building, and the zoning plan, dictate societal use. Societal use is then the first function sought after. Examples of viable societal, and partly also commercial, functions are healthcare centres, theatres and gyms. Then commercial functions are considered, such as supermarkets or residential use. The church building always retains the exterior image of a church. Therefore, some functions are disallowed, such as a casino and discotheque. These are all functions that anyone might agree that are not viable to associate with a church and these disallowed functions are often broadly carried by (former) parishioners, neighbours et cetera. The future use does have to fit with the building, in architecture, state of maintenance, and other building aspects. The building is vital to consider in possible adaptive re-use. A modern building allows for more than a neogothic church. Post-war churches are easier to adapt to different functions, since the religious function is less interwoven with its architecture. If for instance a nationally listed neogothic church is considered for adaptation to apartments, the monument status might be very problematic. The urgency of the problem of obsolete churches is broadly known, so also for instance the national

agency for monument preservation is becoming more flexible in what is or is not allowed with these buildings. Also the diocese for instance has become more flexible, but every case remains an individual search for the optimal outcome. The position of the Diocese has shifted some, where a broader view on what is possible now exists, also since the urgency has grown. Even in the current market conditions, adaptive re-use and a positive exploitation are impossible to find for some smaller towns, since all amenities have already left the town and the former church requires a future use of a certain scale. Some of the smallest churches then are used for dwellings, but for some of the larger former churches no solution is known.

Building: The explicit religious icons are in principle always removed from the church. For instance the cross on the tower will be taken down. All interior, such as altars, benches and pulpits, is taken away, since these explicitly belong to religious use. Some statues might be left, since they are interwoven with the church. They are sometimes wrapped up if they do not match the future use of the building. Building aspects, such as the tower remain, also because they might be explicitly included in the monument status. Elements such as these also might add quality for the future use of the building. It is then always a search for what should be taken away and what can remain.

Demands, wishes and municipalities: People have certain memories with a former church building, since they attended baptisms, marriages and funerals in it. These memories also restrict what a building can be adapted to. Often parties have ideas on what should be the outcome, and then a middle road is often advisable. If no parties shift in their positions, no solution might be possible. If for instance no change in the zoning plan is allowed by the municipality, then adaptive re-use might just become impossible. One outcome may be something that no party is happy with, but is unavoidable, since there are no acceptable alternatives left. A good understanding between the municipality and parish is important, so regular consultation is advisable. This can be sought both by the parish and the municipality, but might logically be initiated by the municipality. In Oostelbeers this led to a community centre being housed in a church. A parish might for instance inform the municipality of their plans to sell a church in the future and ask what the municipality's view on this would be. There are municipalities that made spatial town plans including plans for the churches in a town. This can be a good thing, but the view of the parish and diocese must be included in these plans. Communication between different actors is key in this regard. One danger however is that parties, who are not yet stakeholders, start stating demands on the potential project, which might frustrate the process of adaptive re-use in this initial phase. There is a big difference in the way municipalities deal with these processes. A lot of different actors want to have their say when churches are involved. Sometimes these parties take the position of the owner, the parish, which might frustrate the process. Also if all parties are asked what their wishes would be for a certain church, these parties will feel that they have a voice. However not all wishes can be taken into account, which results in some parties being disappointed and possibly these parties frustrate the process. It might be better to propose a plan and ask for views on the plan, instead of presenting a blank slate. Where the owners provide steering in the process, adaptive re-use is more often the outcome. Taking a broad approach leads to time consuming and frustrating processes, and some disappointed parties.

Sale of churches, parishes and advisors: Deferred maintenance is not leading in whether a church could constitute a viable project or should be sold. There is an example where a church has been

restored to perfect condition, but no buyer can be found. This probably has to do with its size and location. The parish might make a decision based on where the most lively religious community is still present when considering which church to sell. Whether enough churchgoers are still present, and if there is a need for a church or a chapel are the first considerations made in potential sales. Parish boards might ask for advice from the Diocesan building advisors on what the state of their churches is, but the choice on whether to sell a church is theirs. They can then, when a choice has been made, get advice on legal procedures et cetera. Each parish has their board, with each their unique composition, with even project developers or contractors as experienced advisors being part of a board. They can also enlist outside advise on aspects they are not knowledgeable on, which might be especially useful for supporting the complex process leading up to adaptive re-use. Due to the emotional commitment the parish board might have in this process, it might be advisable to enlist an impartial third party as an advisor.

Market conditions and end users: It is important not only to consider what is possible for a certain building, but also if a buyer and end user can be found. If no end user is known, producing plans does not lead to viable projects. The end user is the party that constitutes what the future function might be. It is important for a future function also to generate revenues, since otherwise the preservation of the church is impossible either way. The base value existent is also the value of the land underneath the church, which should be considered for every separate building. Possible adaptive re-use is also dependent on the law of supply and demand, if no demand can be found for a fitting function, no feasible projects exist. Changing market conditions might lead to project feasibility, it is therefore important to look into the future on what market conditions might exist in a few years. It might be advisable to even continue using a church for some time if a better sale might be expected in the near future, though making expectations on the future change of revenues to be made from adaptive re-use lies mainly with the project developers. Currently project developers are actively seeking churches that are fit for adaptive re-use. The Diocesan building advisors can help link these developers to parishes that have churches possibly to be sold.

Speelhuis Helmond: In Helmond a theatre burnt down, while a church was still in use. In one way this was regarded as an opportunity to close the church and then instantly had a new function for the building. The parish has to know which churches they want to keep, and which churches in the long term are going to be sold. If then, in time, a good offer or good plan for one of the churches to be sold in the future is offered, that might be a good moment to sell. This also helps lighten the emotional load, since preservation and a new function are already present.

Church towers and government: The national government has made an agenda to increase adaptive re-use of churches. The problems are however very case specific and deal with a lot of different policy areas. This makes it difficult to propose a general plan of approach. For some churches it might be a solution for the municipality to buy the church and then consider what can be done with the rest of the building. The towers often are the most expensive part of a church for maintenance and are difficult to adaptively re-use. The towers do not offer a big value for the building, whilst for the appearance they are the most important part of the building. In Germany they even have a church tax that pays for church upkeep, which would be a relief for the parishes. Often half of their income is spent on keeping their buildings intact. A lot of the church towers in Brabant are also used by mobile service providers, so losing these towers would also mean a loss of income. These incomes

however do not weigh up to the costs of a large restauration. Demolishing the church and leaving the tower intact (as a cultural monument) is not per se a bad outcome. The towers are often viewed as one of the characteristics of Brabant, the landmarks. But when these are preserved it is again important to consider if the plan for the church tower is financially feasible in the long term.

Appendix 14: Background Section P1 report

In the Netherlands, yearly over 100 churches are taken out of religious use, of which about 40% belong to the Roman Catholic church (Jongmans et al., 2008). These churches are not needed for religious purposes anymore, due to the shrinkage of the numbers of active church visitors, the shrinkage of paying contributors to the church, or the merger of separate religious communities into one. The churches that are becoming obsolete often are monuments in some sense of the word (the Dutch government uses different definitions and statuses for local, supra-local and national monuments) (Velthuis & Spennemann, 2007). These monuments are often threatened by their vacant state (Haasdonk, 2013).

Why then is it important to preserve these buildings? Society has changed through a globalisation and digitalisation trend, in which networks connect people all over the planet. Contrary to this, people have started searching for regional identity (Castells, 2010). Local religious heritage, in the form of built artefacts can help contribute to this feeling of local identity. Cultural heritage, which churches are part of, can provide direct (monetary), and indirect (spatial) positive influences on areas and cities (Wilkinson et al., 2014).

What positive influences does adaptive re-use of churches have? Among the positive externalities are: architectural integrity can be maintained, sustainable development promoted, areas upscaled, sustainability goals reached, demolition waste reduced and the environmental load of the built environment shrunk (Conejos et al., 2014; Elsorady, 2014; Lynch, 2016; Mohamed & Alauddin, 2016; Tweed & Sutherland, 2007; Yung & Chan, 2012). For developers the religious values that are represented could be used as marketing tools for adaptive re-use projects (Lynch, 2014), while historic features reach the value of the property itself, as well as increasing property value in the area around the building (Ruijgrok, 2006).

Adaptive re-use in practice faces many barriers, such as regulations, sustainability goals and high costs (Conejos, Langston, Chan, & Chew, 2016; Shipley, Utz, & Parsons, 2006). Adaptive re-use of the obsolete church buildings often runs into some specific opposition. The reasons for this opposition are diverse and specific to each actor. (Former) church visitors often associate the church building to their memories, resulting in a need of rationalising memory patterns, when faced with the reality of church closure (Clark, 2007). Factors and influences like these, lead to different actors placing demands on re-use projects, which might frustrate these projects.