Connecting institutional logics and technological frames

An institutional perspective on how actors make sense of artificial turf as a new technology in football

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Summary

This study aims to explore the connection between institutional logics and technological frames to understand the literature gap why different actor groups within a social system make sense of technologies differently. These differences in sensemaking induce different beliefs among actor groups, which results in different perceptions about the legitimacy of a technology. This can cause social contestation where actor groups with opposite beliefs engage in collective sensemaking to predominate a common understanding.

This phenomenon is researched in the context of the debate surrounding the adoption of artificial turf in Dutch football. This adoption shows dissimilar rates between amateur and professional adopters and contains quantum jumps of adoption at the professional level. This led to various kinds of speech acts in media by different groups of actors to show or convince others of their beliefs regarding artificial turf at the amateur or professional level in football.

A media content analysis was done to study these speech acts in Dutch regional and national newspapers by retrieving these newspapers from the LexisNexis database. By using qualitative and quantitative methods, the concepts of actor groups, evaluation criteria, institutional logics, and beliefs were defined and linked to each other to identify how actor groups differ in terms of the institutional logics and evaluation criteria they connect that determine their beliefs.

The findings of this thesis show that the concepts of institutional logics, evaluation criteria, and actor groups were multilayered and that different actor groups articulated a different set of speech acts. These speech acts could be classified by using institutional logics and evaluation criteria. Over time, six different periods were identified that could be characterized by different speech acts of different actor groups and different developments.

From the results of this analysis, a model was created that identifies the process of sensemaking between different embedded actor groups in a social system whose connection between institutional logics and evaluation criteria steer their beliefs about a technology. These embedded actors can be influenced by endogenous or exogenous events that can make them reconsider the connections between the institutional logics and evaluation criteria that they use. Therefore, this thesis deepens our understanding of the variation in beliefs among actor groups created by their surrounding normative and cognitive structures and how these structures can change over time, which may explain the fluctuations in the legitimacy of technologies, such as artificial turf.

TABLE OF CONTENTS

1 INTRODUCTION

The diffusion and adoption of an innovation are often difficult because, even when an innovation has obvious advantages, innovations are accompanied by alterations in the structure and function of a social system (Rogers, 2003). A social system consists of members or units that are interrelated and affected by debates or actions to accomplish common goals within the system (Lockwood, 1956; Rogers, 2003). Additionally, Rogers (2003, p.12) stated: "the same innovation may be desirable for one adopter in one situation, but undesirable for another potential adopter whose situation differs". Therefore, within such a social system, members debate and take actions to evaluate innovations, such as a new technology, and determine its value. When interrelated actors in a social system disagree about the utility of a technology, social contestation, and collective sense-making will occur to redefine the system (Devos, Maeseele, Reheul, Van Speybroeck, & De Waele, 2008). This debate can lead to the eventual large-scale adoption of the technology, e.g. bicycles, electric lightning, steamships and cars (Binz, Harris-Lovett, Kiparsky, Sedlak, & Truffer, 2016) or non-adoption, e.g. TV program 'the golden cage' (Kleijnen, Lee, & Wetzels, 2009).

Previous research in innovation literature has focused on the characteristics of technology and adopters to explain why some innovations have a successful or limited diffusion and adoption rate (Rogers, 2003; Utterback, 1994; Christensen, 2013). These early theories assumed that when an innovation does not diffuse in society, the characteristics or features of the technology should be adapted in such a way that it does comply with the preferences of the user groups. Consequently, diffusion is expected to take-off by establishing favorable product characteristics that fit specific or big market demands. For example, Betty Crocker's early introduction of instant cake-mixes was unsuccessful, because it did not comply with 'genuine cooking' according to society's standards then. However, the adaptation of including the cracking of an egg into the mix made the product appeal to the traditional way of cooking experience (Kleijnen et al., 2009).

Nonetheless, recent insights have shown that the adoption of technologies may not be solely determined by adapting the technology to society. Diffusion of a technology into a social system is sometimes less influenced by technological characteristics and more influenced by the social debate around a technology and the uncertainty about its value to society and specific actor groups involved, e.g. nuclear energy (Geels & Verhees, 2011). The legitimacy of a technology within a social system can be understood as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, p.574). As a result, the focus in recent work in innovation literature shifted from adapting the technology to society, to changing perceptions of legitimacy and trust in favor of the technology (Anderson & Tushman, 1990; Bergek, Jacobsson, Carlsson, Lindmark, & Rickne, 2008; Geels & Verhees, 2011). In order to understand the change of legitimacy research in understanding perceptions is essential.

A theoretical perspective that reflects on the understanding of cognitive structures of how people perceive and interpret the value of a technology is the Technological Framing Theory (TFT). Garud & Rappa (1994) have contributed to the TFT by providing a framework, which characterizes how producers make sense of a technology in terms of what a technology is (artifact), whether it is useful (evaluation criteria) and future viability (beliefs), which all together compose their technological frame. Additional research has added to the TFT development by stressing that it is important to identify how trust in new technologies is created among multiple actors, besides producers, within a social system (Binz et al., 2016; Kaplan & Tripsas, 2008; Orlikowski & Gash, 1994). The TFT has shown that different types of actors frame a similar technology in different ways, which can result in a lack of a common understanding which may undermine legitimacy (Anderson & Tushman, 1990; Kaplan & Tripsas, 2008). Also, Science and Technology Studies (STS) have recognized the importance of actors from multi-institutional backgrounds influencing technology development (Chompalov & Shrum, 1999).

However, there is a gap in the current literature regarding why technological frames differ among different actors. Research ambiguously has suggested that this might be caused by different

actor backgrounds (Kaplan & Tripsas, 2008) or different social domains (Cook, Pieri, & Robbins, 2004) that influence how actors are interrelated towards each other. This interrelatedness supposedly has an effect on how a difference in technological frames occur (Kaplan & Tripsas, 2008). However, this theoretical mechanism of how interrelatedness shapes cognitive structures is currently underdeveloped. So far, literature has been mostly oriented towards the sometimes conflicting viewpoints of 'experts' versus 'non-experts' in Science and Technology Studies (STS) e.g. genetic modification (Cook et al., 2004; Potthast, Verhelst, Hughes, Stone, & De Clercq, 2010) or producers versus users in the TFT, e.g. groupware technology "Notes" (Orlikowski & Gash, 1994). Therefore, a framework should be considered that enables the understanding of the differences between actors embedded in a social system and that helps to understand how the structure of a social system creates differences in the way people make sense of a technology and whether this evolves over time.

One particularly fruitful approach to understand technological innovation processes from the structure of social systems could come from recent insights from institutional theory (Binz et al., 2016). Institutional theory aids in the understanding of the normative structures that are present in a social system, and which shapes the interpretations of actors (Thornton, Ocasio, & Lounsbury, 2012), and which can be understood as organizing principles (Friedland & Alford, 1991). Connecting the normative structure to the cognitive structure provides a perspective into the mechanism of how different embedded actors have a different normative structure and, therefore, see a technology differently. In view of these considerations, this thesis uses Institutional Theory of Thornton, Ocasio, & Lounsbury (2012). Thornton & Ocasio (1999, p. 804) defined institutional logics as 'the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality.' This means that if people differ in the way they give meaning to technological frames, this could be indicated by a difference in the institutional logics they use.

The aim of this thesis is to explore the connection between institutional logics and technological frames to understand why actor groups differ in the way they make sense of a technology. This is done by performing a media analysis on the social debate around artificial turf (AT) in the Netherlands from 2002 till the beginning of 2017. Over the last fifteen years, there has been a contestation about the use and value of AT in Dutch football, which has caused dissimilar rates of (non-)adoption between the amateur and professional level. At the amateur level diffusion and adoption increased rapidly with the construction of 15 fields per year in 2001 to eventually a yearly 220 additional new fields in 2008 ("Feiten en cijfers," 2010). The diffusion and adoption at the professional level, however, appeared to have stabilized in 2007 when 6 out of 40 clubs had adopted AT (Sintenie, 2007). In 2008 this amount even declined to only 5 ("Kunstgras," 2008). These differences may indicate that actor groups between these levels perceived the same technology differently.

However, between 2013 and 2015 the adoption rate increased at the professional level to 21 out of 39 clubs playing on AT (Pertijs, 2015; van Schuppen, 2014). This quantum jump may indicate the presence of an event that triggered a change in actors' perceptions in favor of the adoption of AT at the professional level. These unique circumstances in the Netherlands may provide a window of opportunity to study the debate about AT in written media to gain insights into a change in overall dominant societal perceptions in football regarding AT. This study may reveal the differences between Dutch actor groups in terms of the logics they perceive relevant and the way they evaluate the utility of the technology and how this changes over time. This thesis is guided by the following research question: *How does the embeddedness of actor groups influence the connection they make between institutional logics and technological frames, and how do events influence this connection over time"*

Without understanding how institutional logics and technological frames are related, there seems to remain a black-box in the literature concerning how different actor groups can be characterized in a social system and why different actors frame a technology differently. This thesis adds to the understanding of how the sensemaking of technologies can be understood by connecting institutional logics to technological frames, which characterizes the normative and cognitive structures of actor groups. Additionally, the notion of events over time adds another explanatory variable of how this connection can change over time.

Furthermore, this research could provide insights into the value AT has in sports, such as football. This is practically relevant since the presence of AT in the Netherlands has become prominent in both amateur and professional football in the Netherlands. This is interesting because compared to other European leagues only the Dutch league shows a relatively high adoption rate. In Germany or England, there are no clubs that have adopted AT in their stadium at the highest professional level (Dessal, 2018). Therefore, this value determination can be insightful for non-adopters to reconsider the technology, but also for adopters to see different sides of the technology.

2 THEORY

This chapter starts by explaining the concept of institutional logics and displays an overview of how actor groups within the world of football may relate to these logics. The second section will focus on the concept of technological frames and how the concepts of technological frames may connect to institutional logics. The third section will discuss how this connection between institutional logics and technological frames can be influenced by the embeddedness of actor groups and how events can influence this connection that actor groups make.

2.1 INSTITUTIONAL LOGICS

Institutions can best be understood as stable, valued, recurring, patterns of behavior that ensure reproduction by new individuals that become embedded within this institution because they perceive these organizing principles as present and adapt to them (Friedland & Alford, 1991; Huntington, 2006). These organizing principles are defined by Thornton & Ocasio (1999) as institutional logics. These institutional logics vary due to the presence of broader belief systems, which they call institutional orders (Thornton et al., 2012), and are classified as the market, the corporation, the profession, the state, the family, the community or the religion. These institutional orders contain different institutional logics, which aim for different goals in a social system (Thornton et al., 2012).

However, within a social system, multiple institutional orders can play a role in the actor decision making, which means multiple institutional logics could be applied to guide cognition (Wagner, 2018). According to Thornton et al. (2012) conflicts among logics remain unresolved and actor groups choose a focus of attention to one of the logics to guide their cognition and action. However, Smets et al. (2015) stated that it is not that simple and actor groups need to deal with conflicting logics, which they call institutional complexity. They argue that sometimes actor groups need to find a way to bridge these logics in order for different logics to co-exist and properly guide their cognition of reality.

Another reason for logics to differ is that actors are rationally bounded to the availability or accessibility of certain logics (Thornton et al., 2012). For example, football players are less likely to think about the financial consequences of adopting artificial turf as they do not have this responsibility, while clubs could end up in a discussion with them about their normative structure to control financial situations. This shows that actor groups are not embedded equally in all institutional orders, which can lead to different strategies to give meaning to things which can cause a discussion about which logics are more appropriate to apply (Thornton et al., 2012).

Previous literature within the world of football has identified profession order strategies that aim to increase the quality of the craft playing football (Garcia-del-Barrio & Szymanski, 2009; Szymanski, 2003; A. Walsh & Giulianotti, 2007), strategies that aim to increase the community spirit that is often related to sport (A. Walsh & Giulianotti, 2007), and strategies that aim to generate profit efficiencies (Garcia-del-Barrio & Szymanski, 2009; Giulianotti & Robertson, 2004; A. Walsh & Giulianotti, 2007), respectively representing the earlier mentioned profession, community and market orders. Table 1 provides an overview of these three institutional orders with their basis of strategy and the logics that were found in previous studies within the world of football. Table 1 will be discussed next.

7

	Institutional order	Basis of strategy	Focus of attention (logic)
Field frame	Profession	Increase craft quality	Quality of the conditions
			Quality of the athlete
			Fair Play
	Community	Increase community spirit	Participation in football
			Football culture values
			Safety
	Market	Increase efficiency profit	Generate revenue
			Cost Reductions

Table 1 - Characterization institutional orders in previous research

Professional logics can be defined as logics on which individuals focus within the strategy to excel in sports. First, Walsh & Giulianotti (2007) discussed the ideal to compete at one's best against other skilled athletes. This means that in order for sportsmen to measure themselves at one's best, the conditions should facilitate them to perform optimally. This leads to the goal of having a high quality of fields in football. Second, Walsh & Giulianotti (2007) argued that sportsmen find satisfaction in the realization of a certain excellence. The development of skills determines the quality of the athlete and this focus leads to the goal of having conditions that reinforce the specific excellences they are trained for, such as ball control. Third, Walsh & Giulianotti (2007) said that sportsmanship and fair play are important principles. This means that the sportsmen qualities should be measured as fair and none of them should experience an unfair advantage or unequal competition (Szymanski, 2003).

Community logics can be defined as logics that individuals focus on within a strategy to increase the social function that football provides to establish a shared connection and inclusiveness between individuals by being part of a social group. First, this can be seen in the ideal to pursuit the activity simply for the pleasure of it (A. Walsh & Giulianotti, 2007). Therefore, the focus of attention for people is on participation in the sport and their goal is to have sufficient opportunity to play. Second, a sport is a representation of the community, be it at a club on regional or national level (A. Walsh & Giulianotti, 2007). The way the community is represented creates a certain culture which individuals aim to maintain. Third, it should be safe to practice football. Every sport has taken their own requirements to keep people safe while practicing the sports (e.g. helmets, gloves or shin guards). The focus of attention is therefore on health and actors aim to prevent harm from practicing sports to ensure safety.

Market logics can be defined as logics where the strategy of individuals is based on the pursuit of profit. Giulianotti & Robertson (2004) even state that football clubs should be evaluated as corporations since they often aim for commercialization opportunities and cost reduction. Research often declares that these kinds of logics are in conflict with sports conditions because it can undermine the community ideal to play sports-for-sports sake (A. Walsh & Giulianotti, 2007). Furthermore, Garcia-del-Barrio & Szymanski (2009) researched the conflict between the profession and market order and showed that in common win maximization principles triumph over profit maximization ones, where the focus is on cost reductions or generating money rather than sports performance. However, they also state that profit maximizers are invading the football sport because they are buying clubs and running it more profit-oriented as football clubs were used to do. However, the influence of money in football does not merely cause conflicts. For example, the increase in salaries for players that make it possible for them to make a living from playing football gives them more time to invest in their qualities.

The institutional logic perspective provides a way to characterize the normative structure of actor groups (Thornton et al., 2012) that can be connected to how they understand technological frames. Previous literature has already identified certain logics from market, profession and community orders. This thesis adopts this perspective and relates this theoretical reasoning to better understand why actors make sense of technologies differently.

2.2 TECHNOLOGICAL FRAMES

A technological frame describes how people make sense of a technology (Orlikowski & Gash, 1994). Garud & Rappa (1994) state the cognitive structure of how actor groups compose technological frames are determined by three dimensions. They state technological frames are determined by (1) beliefs people have about the prospects of the technology, (2) the artifacts which are the components that create a technology and (3) the evaluation criteria actor groups use to estimate the value of a technology (Table 2).

	Constructs	Description
Technological frame	Evaluation criteria	Describes the (dys)functionality an individual currently perceives regarding technology.
	Beliefs	Describes the positive or negative potential an individual sees for the future
	Artifact	Describes the physical components an individual perceives.

Table 2 - The three constructs of a technological frame

The three constructs of technological frames can be different among actors (Kaplan & Tripsas, 2008). Potthast et al. (2010) have researched that producers and users differed in the soccer-specific movements they used to evaluate AT. This shows that people can understand the functionality of the exact same technology differently due to evaluating the technology differently. Consequently, this can also result in different beliefs about the future potential of a technology. Potthast et al. (2010) showed that this led to reconsidering artifacts such as infill material for AT by AT producers. This example illustrates the reciprocal interaction between beliefs and artifacts, which means they influence and co-evolve along each other. Garud & Rappa (1994) found that this reciprocal interaction is present for all three constructs.

Orlikowski & Gash (1994), furthermore, remarked that when people make sense of a technology that the components of the technology can only be assigned to the technology as the functionality of these components is also noticed or noticeable. For example, the cruise control of a car can only be part of the technological frame of a car if the individual knows about the existence of the functionality. This indicates that 'non-experts' are likely to not perceive all distinguishable components (artifacts) as intended by producers and evaluation criteria can only be based on an evaluation of perceived attributes, which also strengthen the idea that technological frames differ among actor groups.

Kaplan & Tripsas (2008) have focused on how technological frames gain legitimacy by establishing a dominant design that encompasses the key features the technology should have and how this progresses over the product life cycle. This perspective is more focused on the physical components and architecture of the technology that producers need to reconsider in order to gain market share, which links evaluation criteria and beliefs by the reciprocal interaction of the constructs.

However, this could have underexposed the roles of beliefs and evaluation criteria because the reciprocal interaction between the three constructs beliefs, evaluation criteria, and artifacts may be less prominent in different actors groups as producers mostly perceive and have to reconsider the components to add functionalities. For example, producers of AT see AT as a multilayered field with E-layers, shock pads, sand, a tufted top layer, fibers of polyethylene, a latex backing and infill materials of round grains made of SBR crumb rubber, where non-experts are likely to refer to just the competing technologies as AT or natural grass without the notion of their specific components. This means they might be unaware of all components when they try to define the utility of the innovation. The technical artifacts of an innovation do not define utility in itself but are a tool for producers to reconsider their technological frame in terms of evaluation criteria and beliefs of what is feasible, nevertheless could be used to identify technological development and the variety of options that exist around competing technologies (Garud & Rappa, 1994).

Also, the architecture of a technology becomes more common in later stages of the product lifecycle when preferences get well-established (Kaplan & Tripsas, 2008). Where the dominant design is set, the way to evaluate this dominant design can still be influenced by trying to frame established

evaluation criteria in new ways, which can change the beliefs about a technology. Therefore, evaluation criteria and beliefs may be the best applicable source to compare actors groups in terms of the utility and the legitimacy they perceive because evaluation criteria are used to legitimate the use of a technology (Garud & Rappa, 1994).

This framing of the cognitive structure can be extended by understanding the connection it has to the normative structure of actor groups. This can be done by making use of the institutional logics, which could provide a way to explain why actors differ in the evaluation criteria and beliefs they have. When actor groups' basis of strategy arises from different institutional orders, it is likely that they search for different evaluation criteria in a technology. Despite, that all actors have a similar understanding of the dominant design and the ways it could be evaluated, they focus on different evaluations because actor groups have a different normative structure that enables different strategies. These different strategies will provide a focus on evaluation criteria that are more applicable to the utility an actor group is searching for. For example, a municipality that has a profit efficiency strategy that prescribes a logic that aims for cost reductions is likely to focus on the evaluation criteria based on cost and value other evaluations as less important to determine their beliefs. Therefore, researching which evaluation criteria connect to which institutional logics and how this connection influences the beliefs actor groups have about a technology applies best to the evaluation of the utility and legitimacy of a technology.

In conclusion, discussion among different actor groups is more likely to focus around the connection of certain logics and evaluation criteria and how this reinforces different beliefs rather than what components should be included. Additionally, it is important to recognize that this contestation of beliefs about the connection between evaluation criteria and institutional is a process that proceeds over time. Looking at how the compositions of logics and technological frames change over time makes it possible to see how actors adapt to new logics or made sense of technologies differently. The current view, however, does not take into account endogenous and exogenous events that could change the focus of logics and technological frames which would provide access to new perspectives.

2.3 ACTOR' EMBEDDEDNESS AND EVENTS

2.3.1 Roles obtained from social relations

Previous research has stated that actor groups differ in the way they make sense of technologies (Chompalov & Shrum, 1999; Cook et al., 2004; Kaplan & Tripsas, 2008). Previous sections have discussed that actor groups connect institutional logics and technological frames to make sense of technologies. Linking this connection to how actors are differently embedded in a social system could provide insights on why different actor groups differ in the way they make sense of a technology. Institutional logics arise from different institutional orders. Thornton et al. (2012) argue that actor groups differ in institutional logics because they are different culturally embedded. This means that actors differ in the availability/accessibility to perceive certain institutional logics because they are not embedded within the institutional orders that prescribes these logics (Dequech, 2003).

Studies on embeddedness state that the participation of actors in social relations determine in which institutional orders actors are embedded (Granovetter, 1985; Hess, 2004) which prescribes the interpretation of cognitive frames and logics (Dequech, 2003). This means that the sensemaking of actors differ because they have different relationships with others and therefore fulfil different roles (Friedland & Alford, 1991). Finally, the activation of these roles in actor groups determine how they make sense of new technologies (Thornton et al., 2012) which can be further defined in terms of the institutional logics and technological frames they connect.

This means that actor groups can have different roles, which guide their sensemaking. The actor groups of this thesis will now be further. The social system for this case includes actor groups that are active within the Dutch football society at the amateur or professional level. A distinction between actor groups in terms of being active at the professional or amateur level is needed because the

professionalization of actor groups have resulted into the commodification of sports ethos of actor groups at the professional level (A. Walsh & Giulianotti, 2007).

2.3.2   Roles in football

According to Kaplan & Tripsas (2008), actors groups can be divided into three type of actors that can have different technological frames. They argue actors belong either to the producer category, user category or institutional actor category. However, this research distinguishes media and experts as two additional different categories because their role and perception are most likely to differentiate from institutional actors, such as the FIFA, whose main job is to govern football. The media could be seen as a different actor type because they are less related to the social system. The same applies to experts whose expertise is mainly outside the social system of football, e.g. toxicologist. Media and experts do not carry the same responsibilities or governing power of the actor types that are included within institutional actors, which means their role is different and their sensemaking could therefore differ considerably (Thornton et al., 2012). Previous research also shows that classification of these type of actors exists within the social system of football (Andreff & Staudohar, 2000; Croci, 2001; Fyrberg Yngfalk, 2013; Potthast et al., 2010; Spaaij, 2013).

Producers are in the case of AT the actors who have to perform the role as the manufacturer in the supply chain of football undergrounds. Users are actors who use, interact or have the decision power to adopt AT. This adoption provides users with some kind of gratification. Institutional actors, such as the international football association (FIFA), do not adopt the technology but have some governing or guiding power related to the technology and have a certain interest in the field of football. Their role is to guide certain developments or create structures of rules in a way that it is in the interest of certain groups. Media have, similar to previous institutional actors, a guiding and correcting power and role by having a big platform for articulating their ideas. This articulation, however, is less influenced by responsibilities or dependencies to other actors and could lead to distinctive ideas about AT. Expert actors that are presented as being independent, which should make them reliable about the research they conduct. Kaplan & Tripsas (2008) incorporates this category in the producer category, but their independent role has resulted that they should be considered as a distinctive category.

2.3.3   Change of roles that influence sensemaking

Previous research stated that at the start of a technological life cycle there are ambiguous beliefs among actors, technical uncertainties and high variation of technologies (Kaplan & Tripsas, 2008). Additionally, these preferences differ because actor groups will focus on various roles because actors' bounded rationally causes that they lack the accessibility/availability to oversee how a technology applies to the roles they need to fulfill.

Over time it is likely that actors try to achieve with a common goal in their social system (Rogers, 2003), which means they reconsider their roles and how they make sense of the technology in terms of the institutional logics and technological frame they apply. Dequech (2003) states that this can change due a change in the rule of relevance, which means that certain roles become more important over time or in a certain point in time than others. A different notion of relevance can change the focus of actors groups on which institutional logics or evaluation criteria should be connected.

Four ways to change the relevance of certain roles by which the embeddedness of actor groups change can be identified from using studies of van Woerkum, Aarts, & Van Herzele (2011) and Greenwood, Hinings, & Suddaby (2002). Firstly, change can happen from influences within the system and are defined by Greenwood et al. (2002) as precipitating jolts that can cause the institutional change from social, technological or regulatory events. These events can be considered as endogenous events that change the embeddedness of actor from developments happening within the social system.

Van Woerkum et al. (2011) added to this by stating that change can also be influenced from outside the social system by the notion of chance. This takes into account the unpredictability of the social world and the notion of chance, such as tricks of nature (van Woerkum et al., 2011). These events

can be considered as exogenous events that change the embeddedness of actors from developments happening outside the social system.

In conclusion, actors groups connect the institutional logics and the evaluation criteria in order to determine their beliefs about a new technology. The effect of evaluation criteria may be more important because architecture is likely to become more common over time and research on dominant designs is more executed, while evaluation criteria could provide a closer connection to beliefs and institutional logics. The change of beliefs may, therefore, be mostly influenced by a change of institutional logics and/or evaluation criteria. How actors make initially use and change logics and evaluation criteria over time can be explained by their embeddedness in institutional orders and occurrence of social, technological, regulatory, or chance events.

3 METHODOLOGY

The aim of this thesis was to explore how actor groups connect institutional logics and technological frames over time while building on Institutional Theory as described by Thornton et al. (2012) and Technological Framing Theory as depicted by Kaplan & Tripsas (2008). Qualitative (interpretative) content analysis was applied to examine the framing of AT in the Dutch press. This exploration started with specific sensitizing concepts or categories from previous studies, which guided observation and analysis in order to reveal new directions and formation of theory (Entman, 1993; Runhaar, Runhaar, & Vink, 2015).

3.1 RESEARCH DESIGN

A retrospective longitudinal study was conducted to examine existing Dutch press data over a long-term time frame (January 2002 until March 2017), which enabled this study to analyze the developments over time (Bryman, 2013). A media analysis was applied to identify how actors utilize and connect logics and frames to gather qualitative insights into how actor groups think about a subject, in this case AT (Bohensky & Leitch, 2014). Historical and recent data was collected in such a way that it became comparable, systematic and reproducible (Runhaar et al., 2015).

However, following limitations of media analysis should be kept in mind. Media can sometimes give a distorted picture of reality (Taylor, Boisvert, Sims, & Garver, 2013) and can reinforce certain perceptions and framings because of its guidance power (Miller, Tyler, Rozanova, & Mor, 2012). It is therefore important to control for the view of the media sources itself and determine whether their view influences the view articulated in the media. This is done by explicitly taken into account the sources and authors of media articles by adding a variable 'media name' and 'journalist name' to the coding form, which makes it possible to check whether certain identified developments are only found in a specific regional or national newspaper. Additionally, journalists were included as an actor type who can give their own opinion, which means the steering power of media has been accounted for in the results of this thesis. Furthermore, the media also shows only the front stage negotiations and it is important to take into account that actor groups have the power to lobby in secret with others as well (Fuchs, 2005). Sometimes this could be coded as an event if happened to be described in the media but it is hard to get access to these background developments. At last, the media does not have to represent all actors equally, because some actors are more convenient to communicate with the media (Schäfer, 2011). With these limitations taken into account, a media content analysis makes it possible to get insights into the development of perceptions over time of different actors.

3.2 DATA COLLECTION OF NEWSPAPER ARTICLES

3.2.1 Content sources

Taking the limitations of press media into account, a mix of media sources that represent the different type of actors at the Dutch professional and amateur level was searched for. A digital newspaper media

source LexisNexis was selected since it appeared to be an extensive media source that could effectively represent different actors at the amateur and professional level as this database entails a varied amount of national and regional newspapers published by Dutch media directed to the Dutch audience. Appendix I describes that 69 different newspapers were part of the LexisNexis data collection. This variety of papers strengthened the assumption that there may be no bias of a single based view from one media source. LexisNexis was therefore considered as an adequate source to obtain information from for underlying study.

3.2.2 Content sampling

The selection covered the newspaper editions from January 2002 until February 2017. The start of the data collection was one year before the first AT playground in the Netherlands was introduced in professional football, as this event was assumed to have generated media attention. A discussion in 2002 was expected between actors related to the Dutch Football Association and the first club, Heracles Almelo, that had adopted AT (Verseput, 2014). The end of the data collection in February 2017 was chosen because this time frame was expected to incorporate the moments in time when AT would be adopted in the Netherlands. In retrospect, the timeframe 2014-2017 contained the period in time where resistance towards the technology rose and actors from multiple levels in society had beliefs in favor of non-adoption of AT. The timeframe selected also incorporated the significant events that would aid to understand the case of the adoption of AT. At last, the time frame incorporates 15 years of developments which are likely to contain insights able to support convincing conclusions to understand our research question by also taking the retrieved sample size into account retrieved from these 15 years as will be discussed next.

The search scheme for the data collection with LexisNexis is displayed in Figure 1. Four search filters were used. First, articles were searched that contained both Dutch terms for AT (kunstgras) and football (voetbal) that could be 'stated anywhere in the article'. More specific search filters, such as 'search terms only in the header' were compared to the initial results but resulted in missing out too many relevant articles. Second, relevant articles were searched and collected per year, because the database did not allow to process more than 2000 articles at a time. Third, the filter 'all Dutch news' was chosen to limit the results to the scope of this thesis, which is the debate in the Netherlands. From this result, the duplicates were filtered out based on 'high similarity'. Duplicates were articles with identical content in the database.
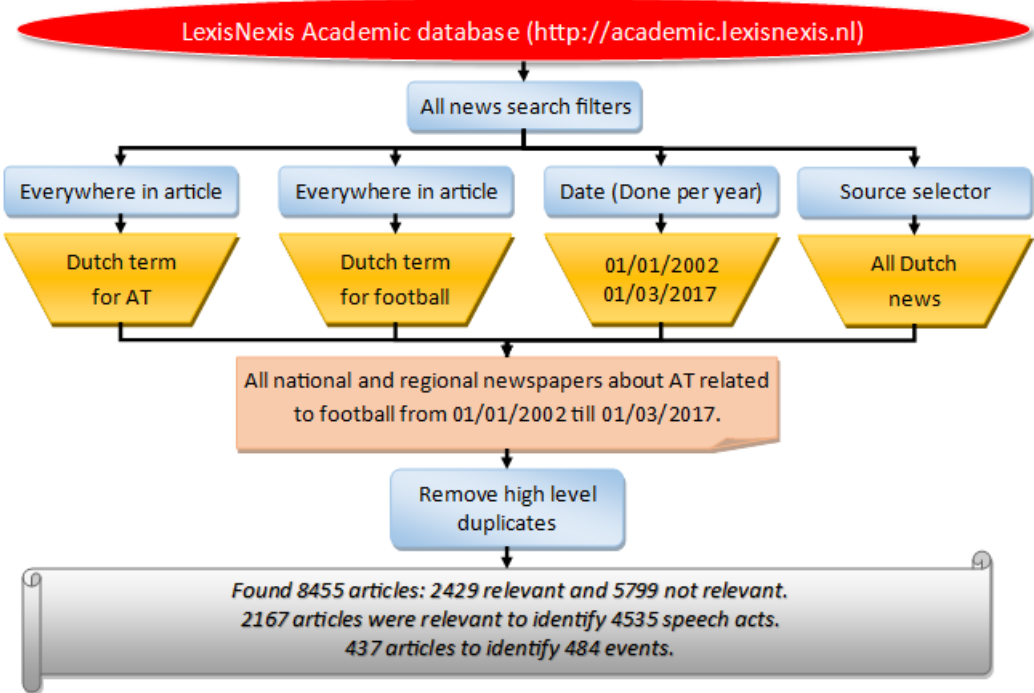

Figure 1 - Search scheme to find articles in Dutch newspapers about AT in football.

3.2.3 Search results

Eventually, a total of 8455 articles were revealed of which 2429 were relevant to identify speech acts and events. A reason that articles were considered irrelevant was that the articles just mentioned the presence of AT in a match or training without giving any or too limited value to this mentioning to conclude the presence of an institutional logic, evaluation criteria or belief. Also, applications of AT as decoration during the World Championships is an example of an irrelevant theme. At last, irrelevant articles had speech acts that were focused on the adoption of AT in other sport disciplines or in a different country, which were determined to be out of the scope of this research if they did not represent a certain influence on the framing of AT in the Netherlands. For example, if an international champion league match was played on AT abroad and prominent Dutch actors articulated their opinion about AT in Dutch football based on this match, this speech act would be included.

3.3 MEDIA CONTENT ANALYSIS

A purpose-built checklist was developed to assess sensitizing concepts which were initially derived from existing literature on logics within the world of football and general Technological Framing Theory (Carrasco et al., 2017). A first draft of the checklist was developed by the author of this thesis. The draft was evaluated by two professional experts who had a background in sociology and innovation sciences. During the coding process, the checklist was adapted several times after a solid discussion in order to further refine the concepts and to keep the coding manageable. For example, changes were leaving out the characterization of speech acts types referring to mythologizing or demonizing the technology in perspective of certain logics because it did not add additional information compared to just using the beliefs variable for this indication. Secondarily, it appeared that only producers distinguished the specific components of AT which led to the decision to code artifacts in terms of hybrid, natural grass, artificial turf and old artificial turf. The final checklist entailed institutional logics, evaluation criteria, artifacts, beliefs, actor identity, and events over time. Furthermore, the relevant text fragment (string), the title of an article, month published, year published, media name and journalist name were also coded in order to make it possible to analyze variables over time or to check certain limitations of media content analysis as described previously (Table 3).

The unit of analysis was a speech act that an actor performed in an article in the media. Speech acts are ways by which actors communicate a meaning that can be designed to accomplish something, such as convincing someone of a belief or to get others to do something (Austin, 1962; Nastri, Peña, & Hancock, 2006). A relevant speech act contains at least an actor with a belief about AT stating at least an institutional logic or evaluation criteria. A complete speech act contained an actor identity, artifact, evaluation criteria, belief and logic (Table 3 as bold). When a variable was missing, it would be coded as 99. One actor can rely on multiple logics or evaluation criteria, which meant that actors could articulate multiple speech acts. Furthermore, articles describing events were relevant. A logic would be perceived if an actor described a certain normative direction of what should be considered part of the ethos of football, while evaluation criteria were perceived if actors described a cognitive consideration about the value of the underground. Logics are therefore more related to the football society, while evaluation criteria are related to the technology itself.

The text fragments that contained certain developments that could cause a change in the relevance of roles to identify events were also a unit of analysis. Events could be indicating when actors often refer back to a certain development in time. This could be related to influences that are technological, social, regulatory or by chance.

Excel was used as the program to document the speech acts in a database using the checklist. The excel file contained three pages with coding tables. Every article was reviewed first in terms of relevance. If it contained a speech act it was filed in the excel page with relevant articles. If it contained any relevant events, then it was filed in the event page and if it was none of both the article was considered irrelevant and the connection of the article with the search terms of AT and football would be coded. The codification was checked several times and refinements of inconsistencies were carried out. In the case of inconsistencies or new insights, the coding was adapted as described earlier.

Table 3 contains the operationalization of the variables and classified them over the three excel pages of related to relevant, not relevant and events. The further analysis will be described next.

Coding table with relevant speech acts			
Variable	**Dimension**	**Description**	**Possible value(s)/measurements**
String	-	Contains the relevant text fragment.	Sentences with speech acts.
Title article	-	Contains title of an article.	ID number to count frequencies.
Media name	-	Contains name of newspaper.	ID number to count frequencies.
Journalist name	-	Contains name of journalist.	ID number to count frequencies.
Month	-	Shows month article is published.	Scale of 1-12
Year	-	Show year articles is published	Scale of 2002-2017
Actor name	-	Name of actor giving a speech act.	ID number to count frequencies.
Actor group	Level field	Describes focus of actor within the field.	- Amateur - Professional
	Actor type	Describes the specific identity of an actor.	- Producer - User (e.g. player) - Institutional actor - Media - Expert
Institutional logic	-	Describes a goal an actor holds high within the social system.	Sensitizing concepts are based on basis of strategy within institutional orders: - increase craft quality - increase community spirit - increase efficiency profit
Technological frame	Perceived artifact	Describe the components of the technology that are evaluated. Provided an indication for the point of reference evaluation criteria and beliefs where build on.	Based on data insights: - Artificial turf - Natural grass - Hybrid - Old artificial turf
	Evaluation criteria	Describe the perceived (dys)functionality used to determine their beliefs about AT.	Categories found in data: - Football culture - Play experience - Endurability - Health effects - Economic effects
	Beliefs	This was coded from the perspective of AT. The vulnerability of grass or the endurability of AT are both positive.	- Positive: In favor of adoption. - Negative: Not favor adoption. - Neutral: Nor refuse nor adopt AT.
Coding table with irrelevant articles			
Title article	-	Contains title of an article.	ID number to count frequencies.
Reason irrelevant	-	Contains a reason why the article is out of scope of this thesis.	Various reason, some examples: - Mentioning match on AT - Perception of AT in Curacao - Etc.
Month	-	Shows month article is published.	Scale of 1-12
Year	-	Show year articles is published	Scale of 2002-2017
Coding table with event			
String	-	Contains the relevant text fragment.	Sentences with events.
Event	-	Contains a description of an event	Various events were found based on sensitizing concepts: - Technological - Social - Regulatory - Chance
Month	-	Shows month article is published.	Scale of 1-12
Year	-	Show year articles is published	Scale of 2002-2017

Table 3 - Operationalization variables

The author of this thesis undertook the search and identified the news items. A defined section of 200 articles of the database was searched by a second independent rater. By comparing the selection of the news items of both raters the level of agreement was assessed (Cohen's Kappa inter-rater reliability). This analysis resulted in a kappa of 0.78, which indicates sufficient to good correspondence between the selectors. Observed differences were most likely the result of the learning curve of one of the researchers in recognizing certain developments, since after comparison conformity was obtained.

During the coding, codes were identified based on the sensitizing concepts retrieved from the theory and displayed in Table 3. When text fragments could not be characterized by the current concepts, new concepts arose from the data. From the data, five categories for evaluation criteria arose and for institutional logics five additional categories were identified. The eight logics that were already identified in the theory section are confirmed. Actor categories were first coded as their individual identity that was described in the newspaper, such as player, in order to determine how they are embedded. Next, these identities were categorized over the five identified actor type categories as described in the theory and Table 3.

At last, appendix II shows whether some actors were not overrepresented by articulating many speeches acts in one article. It should also be noted that in the coding process a similar argument of an actor was not coded twice, because it was stated twice in an article, which makes every speech act per article unique in the composition of logic, evaluation criteria, and belief. The majority of the actors have one speech act per article. The highest amount of speech acts in one article was reached in a column that contained 12 different speech acts of a journalist (Appendix II). These outliers seemed not to cause too much suspicion of influential articles that could skew the analysis.

3.4   MEDIA DATA ANALYSIS

A manageable number of categories were obtained for institutional logics, evaluation criteria, actor groups, beliefs, and artifacts, which could be analyzed by counting frequencies and subsequently plot them over time. In order to do this, the codes were counted and stored in a database that could be analyzed quantitatively. Hence, access to the original qualitative data was retained (Bazely, 2018). Combining both qualitative and quantitative methods can be understood as a mixed method analysis that is done for the purpose of the breadth and depth of understanding the concepts of actors, beliefs, institutional logics, and evaluation criteria and the corroboration of these concepts (Johnson, Onwuegbuzie, & Turner, 2007).

In a first analysis, the frequencies for the variables actor, institutional logics and evaluation criteria categories were counted. The excel file from the qualitative analysis was imported into MS Access. The excel file can be imported into MS Access. These categories can be explained and an overview of present logics, evaluations, and actors can be obtained in frequency tables, bar charts or pie diagrams with absolute and relative numbers by running queries in MS Access. This provided a first overview of the variety of actors, logics and evaluations and aided in reconsidering what variables played a role in the debate and how to understand these variables.

A second analysis investigated which logics occurred more frequent with which evaluations. This analysis was done by making a cross-tabulation in MS Access that showed which logics and evaluations were more frequently used together. This was done twice. The first time, the logics and evaluation criteria categories were linked to identify broader patterns. Next, the subcategories of these variables were cross-tabulated to see whether distinguishable speech acts could be identified by linking specific goals to specific evaluation criteria. This resulted in 28 speech acts types, which were determined by only taking combinations of subcategories of logics and evaluation criteria that occurred at least 20 times. This threshold was chosen to keep a manageable number of speech act types that could be supported with a reasonable number of occurrences in the data that presented a clear speech act. This ended at 21 speech acts where commercial advantages were linked to profitability. To illustrate the type of speech acts, text fragments from the data were added to the results to support the assumption of the speech acts types and increase the internal validation.

A third analysis was performed to link these speech acts to actor groups and beliefs. This made it possible to see in which institutional orders actor groups were embedded and what beliefs actor groups hold based on what speech acts. This is presented in a Table that provided a good overview of these three variable. This provided an overview of how different actor groups are embedded in the social system and how this relates to the speech acts they performed.

A fourth analysis studied the variables over time. First, the number of speech acts was graphically presented by counting the number of times people had a belief in a certain moment in time. This is presented in a line diagram that showed the number of speech acts per half a year. This diagram indicated when the discussion was more and less prominent. Additionally, these beliefs were divided into positive, neutral and negative, which could also be displayed over time. This analysis is presented in the results with 3D area charts to study and show trends. This was also done for the dimensions of the variables actor, evaluation criteria and institutional logics. These analyses resulted in having the frequencies and relative proportions of beliefs, logics, evaluation criteria and actor identity per month which could be exported to excel. After experimenting with analyzing the variables per month, per quarter, per half a year or per football season, the best representation of trends was noticed per half a year. Fluctuations were not too much flattened out or seemed to show randomly fallouts. These fluctuations within variables were investigated and were, whenever possible, linked to certain events that were coded over time. Seeing changes in these trends analysis could indicate the rise of certain or new speech act types. The change in speech act types could relate to a change in perceptions over time within the social system. Based on these changes, periods were identified to divide the time frame.

In a fifth analysis the variables actor, logics, evaluations and beliefs were linked. This was done for each distinguished time period. These time periods were characterized by the change in speech acts frequencies, change in beliefs and change in the composition of variables used in speech acts. These compositions can be displayed in tables that connect actor groups to the institutional logics and the evaluations they use to determine their beliefs.

The last analysis intended to link previous outcomes to certain events over time. The linked events were displayed on a timeline for each period. This enabled to develop a narrative that could be supported with quantitative research methods. The results will be discussed next.

4   RESULTS

The structure of the results chapter links to the method by having the first part of the results presenting outcomes of the 1st analysis. Analysis two composes the second part and analysis three is included in the third part of results. The results of analysis 4 to 6 will be described in the fourth part. Part 1 discusses the variables institutional logics, evaluation criteria and actor groups in terms of their interpretation and frequencies to get an overall impression of general descriptive results of the main concepts. Part 2 discusses the link between evaluation criteria and institutional logics by looking at a cross-tabulation of these concepts and text fragments to validate these connections and develop speech acts types. Part 3 links these speech acts types to actor groups and beliefs. Part 4 discusses the developments over time and shows how different periods can be identified in the artificial turf debate based on the looking at developments of frequencies of speech acts and beliefs over time, the composition of these speech acts over time in terms of institutional logics, evaluation criteria and beliefs, and how these can be linked to events occurring over time.

The relevant 2429 articles contained 4535 speech acts that were analyzed in terms of the variables institutional logics, technological frames, actor groups, and events. However, a few remarks about the dataset need to be made. The evaluations regarding fire safety and environmental effects were neglected because they were rarely mentioned compared to the other variables in the evaluation criteria categories. Additionally, the variable of artifacts did not provide rich detailed information because the debate focused more on comparing artificial turf to natural grass or hybrid undergrounds as general components of competing technologies. This has led to focus in the analysis more on the

constructs evaluation criteria and beliefs of technological frames. Another point to take into account is that the discussion is focused on competing technologies in general instead of the different components of these technologies.

4.1 INSTITUTIONAL LOGICS, EVALUATION CRITERIA, AND ACTOR GROUPS

To answer the research question "*How does the embeddedness of actor groups influence the connection they make between institutional logics and technological frames,* it is first needed to give meaning to the independent concepts of actor groups, evaluation criteria and logics in the coded data set. These will be discussed next.

4.1.1 Institutional orders and logics

This thesis argues that institutional logics provide an indication of how actors make sense of a technology. Actors make use of logics and evaluation criteria in order to determine their beliefs about a new technology. Institutional logics arise from the institutional orders that are present in a social system, which is defined in this research project as the world of football. Within this system, three institutional orders seemed to be present in which the roles of actors could be embedded: market, profession and community. These orders contained institutional logics that guided and gave meaning to the interpretation of AT.

Figure 2 displays the frequencies of logics in speech acts per institutional order in a bar chart. In total 4316 speech acts articulated a logic that was related to one of the three orders (Appendix III). Figure 2 shows that within the three institutional orders thirteen institutional logics were found and that the community order seemed to be most dominant followed by the profession order. The market order seemed to be less prominent and had also smaller logic categories. It seemed that most actors perceived a relevant role related to the community or profession order.

Figure 2 - Amount of speech acts per logic categories stacked per institutional order in absolute numbers
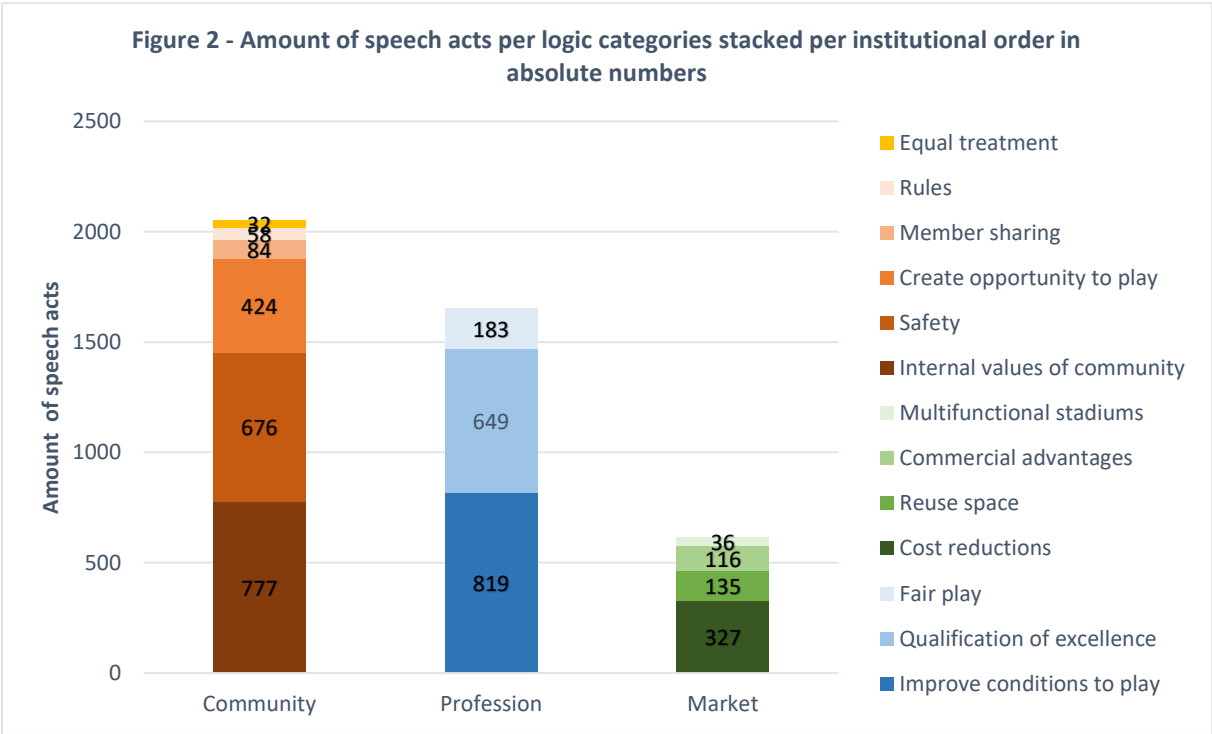
Figure 2 shows that the community order is the most commonly articulated institutional order accounting for 2051 (48% overall) speech acts. The community order within football entailed 5 logics. In figure 2, internal values of the community is the most prominent community logic with 777 speech acts, which accounted for 18% (2nd biggest logic overall) of all the speech acts. Furthermore, preventing harm (676) and create the opportunity to play (424) were overall prominent logics that were

articulated from the community order, respectively 16% and 10%. Less frequently occurring logics were member sharing, rules and equal treatment with respectively 2%, 1% and 1% of all the speech acts.

Professional order accounted for 1651 (38% overall) of the speech acts. The professional order encompassed 3 categories in Figure 3. Two logics within the professional order seemed to dominate with 819 speech acts (19%, most prominent logic overall) for the logic improve conditions to play and 649 speech acts (15% overall) for the logic qualifications of excellence. The fair play logic accounted for 4% of the speech acts in total.

The last and considerably smallest in number was the market order that accounted for 614 speech acts (14% overall). The market order within football consisted of 4 logics. Most important, with 327 speech acts, was the cost reduction logic, which overall accounted for 7% of the total amount of speech acts. Less frequent were the reuse of space and commercial advantages logics, which accounted for 3% (135), and 3% (116) of the speech acts in general. At last, the market logic of multifunctional stadiums was revealed in 36 speech acts (1%).

In conclusion, Figure 2 indicated that the community and profession order were overall more dominant than the market order and had respectively 3 and 2 dominant logic categories that were responsible for 10% to 19% of the total speech acts. However, these logics appeared to be multilayered concepts that needed to be categorized at a lower hierarchical level since each logic could represent different goals within the social system. The next sections will discuss the logics and their underlying goals in order to provide a deeper understanding of the variables. Figures 3, 4 and 5 will show a more detailed overview of the logics categories. A comprehensive overview and explanation of all the logics is provided in Appendix III.

Figure 3 - Amount of speech acts per logic goal stacked per community logic in absolute numbers

Legend:
- Football should not be business oriented.
- Football needs time to get used to changes and find acceptance
- Football should be played on the conditions of a good natural grass field
- Football should maintain the sentiments of grass such as smell
- Football should maintain its charm and identity
- Football should not cause health issues
- Football should not cause open wounds
- Football should not cause injuries
- Football should reduce the chance of cancelled matches
- Football should provide and stimulate sufficient leisure for members
- Football should aim for efficient use of one space by multiple parties
- Football has guidelines for the use of AT
- Football rules do (not) allow AT fields
- Football rules about the winter period should be reconsidered
- Football has certification for AT
- Aim to have same facilities as others in football

4.1.1.1 Community – Internal values of community

Internal values of community was the logic most speech acts referred to within the community order and accounted for 38% of the speech acts in the community order (Appendix III). Internal values of the community can be defined by goals that aim at preserving certain symbols, traditions or historical values that were considered to be part of football according to the community. Figure 3 presents five options that describe the goals actors have formulated based on this logic. Overall, four goals appeared to be relatively prominent among the community logics (Figure 3). Internal values of football were mostly associated with having a certain *charm or identity*, which accounted for 30% of the speech acts in the logic internal values of the community. Furthermore, *the sentiments around natural grass* seemed to be mythical in football and accounted for 25% of the speech acts. *Natural grass* also seemed to *set the standard conditions for what football is* according to 22% of the speech acts. The fourth relatively present goal was *acceptance by members*, which accounted for 21% of the speech acts in this logic. The goal that *football should not be business oriented* was also indicated, but was in comparison to the other subcategories very small (Figure 3).

4.1.1.2 Community – Safety assurance

The logic to ensure conditions were safe to use was the second logic that is related to the spirit of the community and accounted for 33% of the speech acts in the community order (Appendix III). The safety logic can be defined by goals that aim at maintaining people's health conditions in good state and prevent harm from practicing a sport. Actors referred to this in the three ways as is shown in Figure 3. *Prevention of injuries* or *health issues* seemed to be the main concern with 48% and 34% of the speech acts within this logic, respectively. The *prevention of open wounds* was discussed less frequently with 17%.

4.1.1.3 Community – Create the opportunity to play

The third logic concerned the opportunity to play and accounted for 21% of the community order (Appendix III). Create the opportunity to play can be defined by goals that aim to secure sufficient opportunity to play for members in order to increase and maintain the practicing of football. Figure 3 displays two goals in which 52% of the speech acts talk about *increasing leisure opportunities for members*, while 48% of the speech acts focused on the *prevention of canceling leisure activities*. In other words, increasing the amount of matches/training or decreasing the chance of a cancellation were central in this logic.

4.1.1.4 Community – Member sharing

The fourth logic within the community order focused on space sharing and accounted for 4% of the speech acts within community order (Appendix III). Member sharing is defined by goals that aim at the efficient use of one space by multiple parties of which some are unrelated to football. Figure 3 shows that member sharing could be defined by one goal. This goal referred to the *social function fields of sports clubs have for other parties* such as schools, who can use these fields to also increase leisure. Furthermore, other sports such as rugby or korfball can often benefit from the fields of football clubs which was seen as desirable for the overall community. Overall, member sharing was a relatively less prominent community logic.

4.1.1.5 Community – Rules

The penultimate logic within the order of the community were the rules present in the institution, which accounted for 3% of the speech acts in the community order (Appendix III). Rules can be defined as actors setting goals based on the written rules about AT. Figure 3 presents that actors referred to this logic in four ways. Firstly, the *certification of AT* was prominent within rules (34%). Secondly, 26% of the speech acts referred to *rules about the winter period*. These rules are particularly about when and for how long the winter period ideally should take place. Thirdly, *rules that allow or prohibit AT* seemed to be present in 24% of the speech acts in this logic. At last, 16% of the speech acts focused on *the guidelines one needs to follow* when dealing with AT.

4.1.1.6   Community – Equal treatment

The last and smallest logic of community concerned equality of members, which was stated in 2% of the speech acts in the community order (Appendix III). This logic can be defined as goals that members should be *treated equally* and *should have the same facilities* as other members of the community. Figure 3 presents only one goal. This logic was sometimes utilized when clubs were the last one within a municipality without an AT field compared to all the other clubs in the municipality and they had the desire to have one as well. When this happened an actor presented this logic of equality. Another case was that top players referred to other top players who had made a public statement about not switching to AT, in order to ask for equality. Overall, equal treatment and its goals were both relatively small and did infrequently occur in speech acts (Figure 3).

Figure 4 - Amount of speech acts per logic goal stacked by per professional logic in absolute numbers
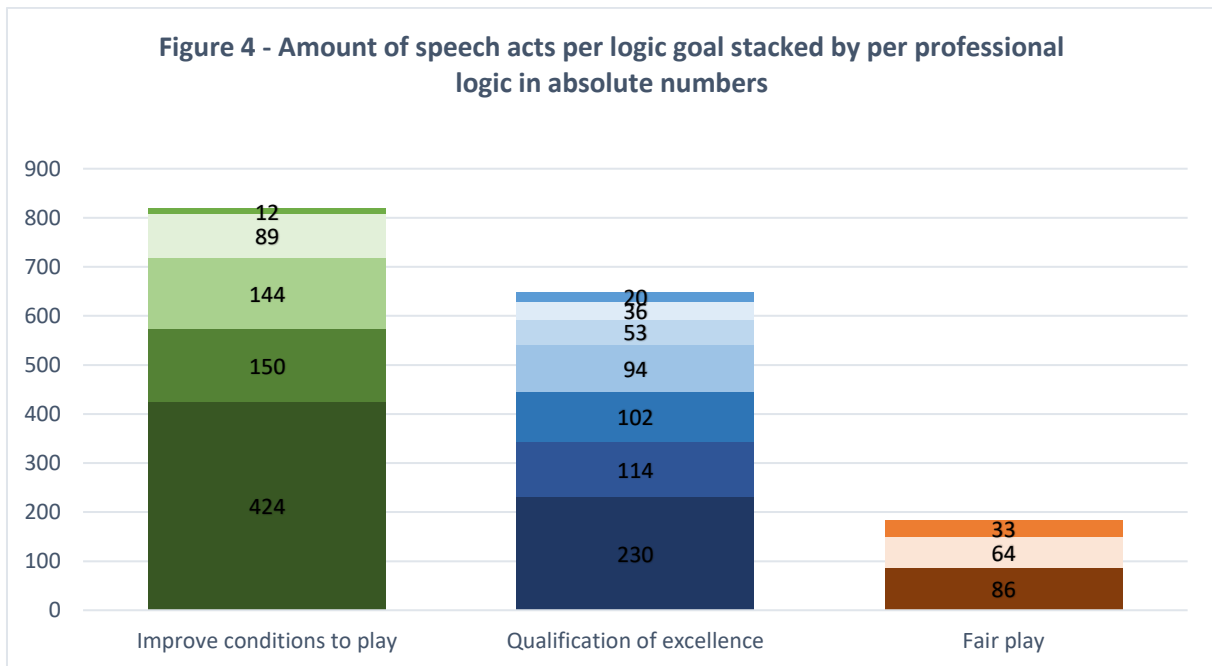
■ Football conditions should spare the natural grass of the main field.
■ Football conditions should keep up with developments, such as new stadiums, and should not fall behind in evolution
■ Football conditions should increase sports quality.
■ Football training conditions should be of high quality.
■ Football conditions should be of high quality
■ Football excellence is being able to play a physical game.
■ Football excellence is performing on any undergrounds.
■ Football excellence is being prepared for undergrounds that mimic match conditions.
■ Football excellence is mimicking the conditions of the top level.
■ Football excellence is playing neat and technical football with combinations.
■ Football excellence is incorporated in current game characteristics and therefore gameplay should stay the same.
■ Football excellence can be increased by achieving competitive advantages .
■ Football teams should play on equal undergrounds.
■ Football teams should have the same amount of matches played.
■ Football teams should not have an unfair advantages in home games from their field that clouds the measurement which athlete is the best.

4.1.1.7   Profession – Improve conditions to play

The largest logic of the second order, labelled as profession, was *improve conditions to play*, which accounted for 50% of the speech acts in this order (Appendix III). This logic can be defined by the goal of actors to aim for a high quality of fields that are updated and facilitate good sport and training conditions. Figure 4 shows that five subcategories could be indicated. The goal that aims *for improvements that increase the quality of conditions* compared to their current conditions accounted for 52% of the speech acts within this logic. Furthermore, three goals that related to this, but had a different focus, were a *high quality of training conditions*, *better sports quality or keep up with developments*, which accounted for respectively 18%, 18%, and 11%. The last goal represented by 1% of the speech acts stated that high-quality conditions of *natural grass fields can be maintained* by using

AT to spare the natural grass. Overall, the first three goals were relatively prominent within the profession order, where the aim for high quality of fields dominated (Figure 4).

4.1.1.8   Profession – Qualification of excellence

The second logic that is related to the pursuit of excellence is the logic of qualifications of excellence, which accounted for 39% of the speech acts (Appendix III). The qualification of excellence describes goals that entail what should be pursued to end up with a high quality of football. Figure 4 displays three goals for this profession logic. First, 35% of the actors referred to *excellence and competitive advantages* that can be obtained by having fields that favor different excellences. This was not perceived as unfair, but rather tactical and was the biggest goal. Three smaller goals were the aim to *keep the same game* with 18%, the aim *to play neat and technical football* with 16% and the aim *to mimic the conditions of top-level clubs* with 14%. These goals also focused more on what kind of game should be desired rather than whether it would be beneficial for a team. The goal of being able to *play a physical game* also addressed these kinds of ideas but was rather minor with 3%.

The last two remaining goals in the profession order stated that you should be *prepared for all game conditions* and was stated in 8% of the speech acts, while 6% of the speech acts stated *being excellent means that you can triumph on any underground*. These goals aimed to adapt tactics to the field and be prepared for these conditions. Overall, the logic qualification of excellence was most prominent within the profession order and the prominence of the goal of *gaining competitive advantages* was relatively high compared to other goals in the profession order (Figure 4).

4.1.1.9   Profession – Fair play

The third and last logic within the profession order was fair play and accounted for 11% of the speech acts in the profession order (Appendix III). Fair play can be defined by goals that aim for a fair measurement of which individual or team is the best without unfair significant influences from the underground that is used to play on. Figure 4 displays three goals. The most stated goal was that teams should not have an *unfair home advantage* of being more used to their home situation than others, which was stated by in 47% of the speech acts in this logic. The second goal referred to the goal of *equal undergrounds* because consistent conditions should neutralize influences from differences in undergrounds and accounted for 35% of the speech acts. The last goal within fair play and the profession order is that teams should be *corresponding in the number of matches* played. Actors referred to this in 18% of their speech acts within the logic fair play.

Figure 5 - Amount of speech acts per logic goal stacked by per market logic in absolute numbers

4.1.1.10　Market - Cost Reduction

Cost Reduction was the most frequent logic in the market order and accounted for 53% of the speech acts in this order (Appendix III). Cost reduction can be defined by goals that aim to save financial resources or reduce expenses. Figure 5 presents that Cost reduction consist of four goals. The most frequent goals within cost reduction were goals related *to cost in the long run* and in the *short run* with respectively 44% and 39% of the speech acts. Furthermore, the aim for *financial stability and survival* accounted for 10% of the speech acts in this logic. At last, the aim of *reducing volunteer activities* indirectly also reduced cost since these efforts can be used somewhere else to save those cost. This last goal was stated by 6% of the speech acts in this logic.

4.1.1.11　Market - Reuse space

The second logic in the market order was the reuse of space and accounted for 3% of the speech acts in this order(Appendix III). The logic reuse of space related to the lack of resources and lack of free space to expand sports complexes and can be defined by the aim to deal with space scarcity in a financially responsible way. Actors referred to this logic in two goals displayed in Figure 5. Actor mostly wanted to *intensify their current space*, since expansion was often not possible which accounted for 78% of the speech acts in this logic. The other 22% referred to a more *intensive use of the main field* by using it for matches and training.

4.1.1.12　Market - Commercial advantage

The third logic was called commercial advantage, which accounted for 3% of the speech acts in the market order. Commercial advantages can be defined by goals that aim to generate profit. Figure 5 displays five different goals. The most prominent goal was aimed at the opportunities for the *rental of the field*, which accounted for 40% of the speech acts in this logic. The other goals aimed to *generate profit from the current interest in football*, such as maintaining the interest of supporters. This goal accounted for 19% of the speech acts in this logic. Another way profit can be generated was by *getting market share in an expanding market*. This goal of selling the product related to 17% of the speech acts. The last two goals of commercial advantages were *selling redundant land* or *generate more canteen revenue* which respectively accounted for 13% and 11% of the speech acts in this logic.

4.1.1.13　Market – Multifunctional stadiums

The last logic, multifunctional stadiums, was derived from only one goal and was only 1% of the total amount of speech acts which made it the second smallest logic with 36 speech acts. Multifunctional stadiums can be defined as the motive to *increase revenue streams by better exploiting the possibilities of a football stadium*. Overall, this logic and its goal were infrequently mentioned in speech acts (Figure 5).

4.1.1.14　Reflection institutional logics

From this analysis can be concluded that the concept of institutional logics seemed multilayered. First, three orders could be identified from which logics arose. Secondly, thirteen logics could be observed within these orders. For example, this could mean that embeddedness in a market order, based on the common strategy to increase profit efficiency, might result in using one or more of the four market logics. Thirdly, institutional logics could be understood by 43 goals related to these logics. These goals present slight differences within a similar logic theme. These layers provided a better understanding of how the institutional logic variable in speech acts may be characterized.

4.1.2 Evaluation criteria

Speech acts were classified into five evaluation categories, which are displayed in Figure 6 and 7. Figure 6 displays the absolute and relative numbers of the five evaluation categories identified in speech acts. From Figure 6 can be observed that the total amount of speech acts that articulated evaluation criteria is 4206. Figure 7 displays the absolute numbers and relative proportions of the evaluation subcategories.

Figure 6 - Amount of speech acts per evaluation category

- Play experience; 1059; 25%
- Endurability; 1420; 34%
- Health effect; 709; 17%
- Economic effect; 461; 11%
- Football culture; 557; 13%

Figure 7 - Amount of speech acts per evaluation subcategories stacked per evaluation category in absolute numbers

Legend:
- the field can be used more/less intensively,
- the field is (not) always playable
- the field is more/less vulnerable,
- the field is more/less even
- the field is more/less weather (in)dependent
- the field is more/less durable
- the field conditions are more/less consistent
- the field does perform more/less well in ball play characteristics
- the field does stimulate more/less high quality of football
- the field is easy/hard getting used to play on
- The fields' gameplay does (not) change the odds of winning
- the field offers more/less cushioning, stability or grip
- the field does stimulate more/less technical/physical/faster gameplay
- the field causes more/less injuries
- the field does (not) cause cancer or other diseases
- the field does cause more/less open wounds due its sliding resistance.
- the field has more/less traditional/nostalgic value
- the field represents more/less the emotional connection with natural grass
- the field smells more/less like natural grass
- the field is more/less accepted by members
- the field looks more/less like a natural grass
- the field facilitates getting (not) dirty from mud
- the field has low/high construction cost
- the field its annual cost are high/low
- the field has more/less maintenance cost
- the field has more/less commercial advantages

4.1.2.1 Endurability

The category endurability was the most prominent category in media articles with 1420 (34%) speech acts (Figure 6). Endurability can be defined as the degree that a football field can maintain consistent field conditions of high quality under intensive usage by any environmental condition over a longer period of time. Figure 7 displays that seven subcategories were distinguished that describe how actors phrase their statements based on endurability. The first three subcategories encompassed the majority with 78% of the speech acts, which were phrases that focused on intensifying leisure on good

playable fields rather than consistent conditions (Appendix IV). Sometimes this category also took natural grass or hybrids as a point of reference when AT was compared to other technologies.

4.1.2.2   Play experience
Play experience was, with 1059 (25%) speech acts, the second largest category (Figure 6). Play experience can be defined as the degree that a football field can maintain a gameplay that fit with the desired experience actors search for in football. Actors described the play experience of fields in six ways as shown in Figure 7. It can be observed that subcategories were distributed more equally within play experience, which could indicative for a more heterogenic discussion in multiple dimensions (Appendix IV). This category also used natural grass as a point of reference to determine whether the underground fitted with certain preferences.

4.1.2.3   Health effects
The third evaluation criteria category (709, 17%) was related to health effects related to the football fields (Figure 6). Health effects can be defined as the degree that a football field prevents/causes injuries, cancer or open wounds. Health consequences of using AT for football fields got the attention of actors since actors referred to this category within the following three subcategories as shown in Figure 7. The difference between the highest (42%) and the lowest (27%) frequencies was only 15% which may indicate that multiple topics were valued as important within this category (Appendix IV). The point of reference was sometimes made with previous versions of AT and this category focused more on performances of the technologies around AT itself than on comparing it to alternatives.

4.1.2.4   Football culture
The fourth category of football culture was used 557 (13%) times in speech acts (Figure 6). Football culture can be defined as the degree that a football field smells and looks like natural grass and evokes the emotional, nostalgic and traditional connection that are inherent to football. Actors referred to this in six ways, as shown in Figure 7. The main argument seemed to concentrate on traditions and nostalgic value with a frequency of 28% (Appendix IV). Also, the statement of having some emotional connection to natural grass is prominent with 21% of the speech acts (Appendix II). One of these emotional, nostalgic and traditional values, that became a subcategory for itself, was the smell of natural grass which had 20% of the speech acts. Also, the acceptance among players accounted for 18% of the speech acts. For this category, it was very likely to evaluate AT compared to natural grass.

4.1.2.5   Economic effect
The category economic effects was concerned with the money AT costs or generates and accounted for 461 (11%) speech acts (Figure 6). This category is discussed in four different subcategories as shown in Figure 7. The main discussion seemed to be about the different cost of AT (82%) on which the first three categories focused (Appendix IV). The profit-oriented speech acts only represented 18% of the speech acts. This category was often a comparison of cost and profit with alternatives for AT or the possibility to gather the financial resources for AT itself.

4.1.2.6   Reflection evaluation criteria
In conclusion, the concept of evaluation criteria could be classified over five categories that could be specified by using 26 subcategories. Endurability appeared to be the most discussed evaluation category, while economic effects was the smallest category. However, the smallest category still had 461 speech acts, which may still indicate a significant influence. Furthermore, ball characteristics that defined play experience and injuries that defined health effects were frequently used subcategories in evaluation criteria categories. Football culture focused mainly on the emotions, traditions and nostalgic feelings present in the football underground. The notion of 26 subcategories to evaluate an underground and 43 goals presented in the social system may indicate that different actor groups in theory can connect institutional logics and evaluation criteria in 1118 ways.

4.1.3 Actor categories

At last, the actor frequencies will be discussed in order to determine which actors were more prominent in the media than others. Within the data, 2070 unique actors could be identified over time making 4503 speech acts. Reoccurrence of actors occurred when actors made multiple statements or joined the discussion again at different moments in time. This explains why there are more speech acts than actors. The numbers in Figure 8 represent the number of speech acts that could be connected to a certain actor category (See also Appendix II).

Figure 8 - Amount of speech acts per level field stacked per actor group in absolute numbers

	Producer	User	Inst. Actor	Media	Expert
■ Amateur		1662	358	310	
■ Professional		1095	103	424	
■ Both	393				158
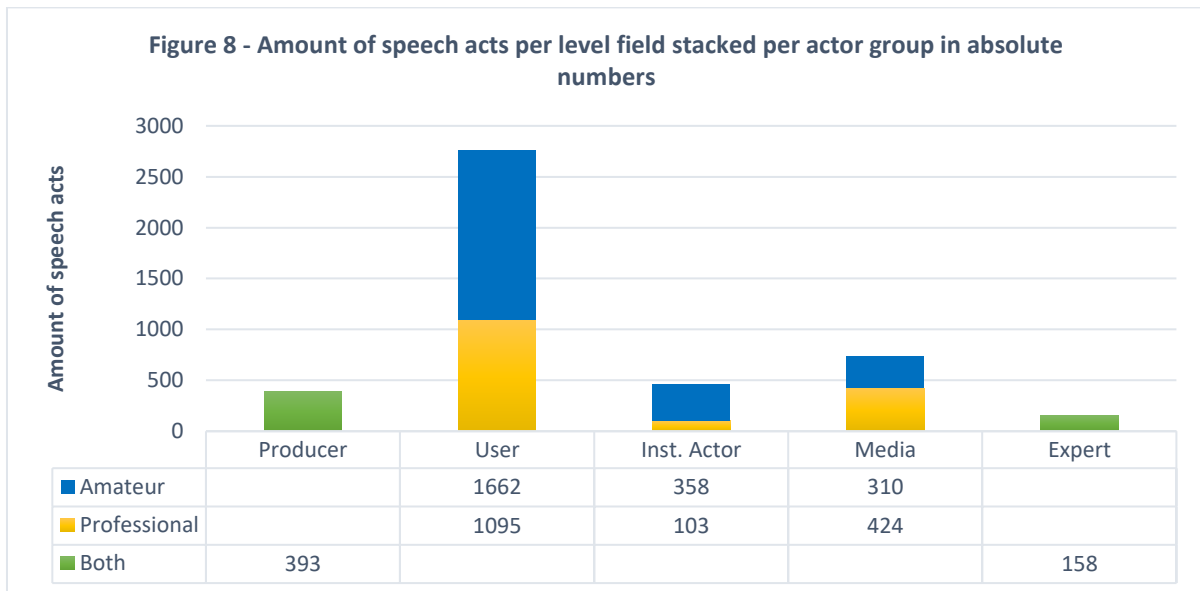
The variable actor group was composed by two dimensions which are the type of actor and the level of the field an actor was active. User, media and institutional actor were divided into six actor groups by dividing them by their focus on the professional or amateur level because this focus seemed to influence their speech acts and beliefs. Experts and producers remained one actor group because their speech acts and beliefs were mostly focused on football in common rather than on a specific level of the field, which brings the total of actor groups at eight

From Figure 8 and Appendix II can be derived that users were most prominent in the media with 1662 (37%) speech acts at the amateur level; 1095 (24%) speech acts were revealed at the professional level. The user category in total accounted for 61% of the speech acts which was considerably larger compared to the second biggest category represented by the media (16%). Overall, the experts produced the smallest amount with only 158 (4%) speech acts. However, be aware that the relative influence of the user category should maybe kept in mind for later analyses. The absolute and relative numbers of these actor groups and actor types within this group are given in Table 4.

Actor group		Actor type	Absolute amount	Relative amount in category
Producer		Producer AT	284	72%
		Producer natural	69	18%
		Producer hybrid	34	9%
		Producer rubber	2	1%
		Producer sport product	4	1%
User	**Amateur**	Club	727	44%
		Trainer	417	25%
		Player	413	25%
		Supporter	77	5%
		Facility stakeholder	28	2%

	Professional	Player	374	34%
		Trainer	323	29%
		Club	309	28%
		Supporter	50	5%
		Facility stakeholder	39	4%
Inst. actor	**Amateur**	Municipality	273	76%
		Association	80	22%
		Union	4	1%
		National politician	1	0%
	Professional	Association	52	50%
		Union	24	23%
		Municipality	22	21%
		National politician	5	5%
Media	**Amateur**	Journalist	309	100%
		TV program	1	0%
	Professional	Journalist	423	100%
		TV program	1	0%
Expert		Scientific expertise	109	69%
		Practical expertise	49	31%

Table 4 - Actor categories and subcategories in numbers

4.1.3.1 Producers

The actor category of producers consisted of five subcategories as shown in Table 4. AT producers seemed to be most prominent in this category with 284 speech acts, which accounted for 72% of the speech acts in the category producers. A prominent producer of AT was Ten Cate with 78 speech acts over 35 articles in 9 different years from 2002 till 2015, and also seemed to be the most important actor within the producer category. At first, the Dutch company Ten Cate was a supplier of materials to construct AT fields, who later incorporated their AT clients into their own business. Another producer, the Belgian producer Desso, had 33 speech acts over 11 different articles in 6 different years in the period 2002-2011. Desso was one of the first AT manufacturers who also invested in the hybrid natural grass and uses 3% of AT in the underground. They called this the Grassmaster system. Ten Cate and its suppliers did not market a hybrid field until 2012 when the Dutch company Greenfields developed Xtragrass that combined natural grass and 7-10% AT. The rise of this hybrid underground showed that AT companies were betting on multiple possibilities of which technology might become dominant.

The other important subcategory among the producers was the natural grass producer with 69 (18%) speech acts (Table 4). The most occurring defenders of the natural grass market in media were the Dutch company Barenbrug, which had 29 speech acts over 9 articles in 5 different years from 2006 till 2014 and Nico van Vuuren of the Dutch company Stadium Grow Lighting who had 20 speech acts over 8 articles in 6 different years from 2006 till 2014. Overall, natural grass producers seemed to be less prominent in the media. AT producers seemed to be more powerful in reaching the media. They might have experienced more urgency to create legitimacy where natural grass producers did not have to deal with legitimacy issues. It might be also likely that Ten Cate as multinational had more connections and was better able to stimulate AT lobby activities, such as media presence.

4.1.3.2 Users

The actor category of users consisted of five subcategories (Table 4). These user subcategories could be distinguished in the professional level, which means people play for, represent, work for or watch a professional club in the first or second league in the Netherlands, or the amateur level which entailed people who do these things for a lower league team. This difference was made because users on these

levels differ from each other. For example, where professional football clubs have their own fan clubs, the amateur level often has a few people standing next to the sideline. Furthermore, professional and amateur clubs differed in financial resources for facilities. In continuation, professional players earned their money with football compared to the amateur player who had the main aim to play sports for leisure. At last, facility managers needed to manage stadiums, where groundkeepers of amateur clubs had to maintain open fields with different maintenance issues and fewer resources.

At the amateur and professional level players, trainers and clubs representatives were most prominent in the media with respectively 93% and 97% of the speech acts in their category (Table 4). An interesting observation was that club representatives at the amateur level had the most (727 speech acts, 44% within category user amateur) within all categories. This may indicate that AT and opinions of clubs at the amateur level were often related. Remarkable was that on the professional level players were the dominant subcategory with 34% of the speech acts and clubs accounted for 28% of the speech acts in this category. This may indicate that the opinion of players at the professional level mattered more or was perceived as more interesting to report on than on club representatives.

4.1.3.3 Institutional actors

The actor category of institutional actors consisted of four subcategories, as displayed in Table 4. Since these categories have some kind of governing or guiding power in relation to the user's category, this category was also divided into amateur and professional level since they need to govern and guide different users. This can also be derived from the differences in the relative amount within the categories. At the amateur level municipalities accounted for 76% of the speech acts (272 speech acts). This indicated that at the amateur level municipalities played a more prominent role in the discussion of AT compared to the professional level where municipalities accounted for 21% of the speech acts (22 speech acts).

Furthermore, the frequencies of associations seemed to be similar on both levels with respectively 80 speech acts focusing on the amateur level and 52 speech acts focusing on the professional level (table 4). The most prominent actor in this subcategory were the KNVB, who had 39 speech acts over 33 articles in 13 years in the period 2003 till 2017, and the FIFA, who had 12 speech acts over 7 articles in 6 years in the period 2004 till 2012. However, the governing power of these types of actors may be more important than their discursive power in media. These associations made the rules and did allow AT to be used in football. Their decisions could be a source for actors to respond to, such as the plans to hold the world championship on AT or the rule that clubs needed to dodge to AT fields with bad weather.

Unions seemed to only play a relatively minor role on the professional level with 23% of the speech acts (Table 4). A rise in numbers was most likely when professional players were wronged because unions represented a voice of the rights of the player. National politicians seemed to remain absent from the discussion at both levels and only rarely popped up in the discussion. However, they could exercise tremendous power if they would have intervened, which apparently did not happen frequently.

4.1.3.4 Media

The actor category of media consisted of two subcategories (Table 4). For the same reason as discussed for institutional actors, media was divided into amateur and professional. This category was defined by the journalist who reported on or criticized developments at either the amateur or professional level. Remarkable was that the professional level with 424 speech acts was for the first time larger than the amateur level with 310 speech acts. This could indicate that the media was more interested in writing or giving their opinion about the professional level. The subcategory TV program accounted for only 1 speech act, but was integrated because the effect of the speech act of the TV program Zembla turned out to be very significant as will be shown later.

4.1.3.5   Experts

The last category that is left to discuss are the experts. Experts were split in two groups (Table 4): practical expertise and scientific expertise. Practical experts are people like physiotherapist or a physician, who have experience and are educated in a specialism. Scientific experts are scientists or institutes, such as the RIVM or ISA sports who do research and provide scientific evidence about a certain phenomenon. Actors with scientific expertise were more prominent and accounted for 109 (69%) speech acts. Experts were not likely to join the AT discussion unless asked upon and their appearance displayed that the discussion surround AT sometimes needed scientific proof to determine what was true.

4.1.3.6   Reflection actor groups

In conclusion, actor groups were composed by certain type of actors and the level of the field they are active. The actor groups were dominated by the user categories in size of speech acts. At the amateur level, clubs dominated, while at the professional level players were more prominent. The media seemed to be more focused on the professional level than on the amateur level and seemed rather prominent in the discussion. Producers of different undergrounds also seemed to be present in the discussion, but AT producers appeared to reach the media more easily than competitors. Furthermore, institutional actors at the amateur level were defined mainly by municipalities followed by associations. At the professional level, institutional actors were more defined by associations, unions, and municipalities. At last, experts seemed to be present to a lesser extent, and their relevance was most likely to provide some scientific truth about particular situations.

For further analysis it is important that actor groups can be linked to multiple layers of evaluation criteria and institutional logics. This was done on the level of goals and evaluation subcategories, which provided 1118 options of speech acts types. However, it could be that not all options can be combined in practice and a certain limitation may be needed to distinguish prominent speech acts from speech act of minor influence. The characterization of speech acts will be discussed in the next part of the results section, which will analyze multiple layers of institutional logics and evaluation criteria and connect these to different actor groups.

4.2   OVERVIEW LINK BETWEEN LOGICS AND EVALUATION CRITERIA

At last, the frequencies of occurrence of institutional logic and evaluation criteria categories will be discussed. This is done in order to strengthen the internal validity of the statement that certain logics may increase the chance that actors use certain evaluation criteria. First, an overview is provided of the overarching categories. Next, the most prominent subcategories will be discussed for each connection between a logic and an evaluation category.

Table 5 displays how often a logic was connected with an evaluation category. This table shows that some evaluation criteria are more embedded within certain institutional orders, which confirms that certain roles within a social system are more likely to cause different ways of how a technology is evaluated. Firstly, football culture and health effects seemed mostly related to the community order, while economic effects mostly related to the market order. From Table 5 can be observed that often one logic was dominant within this connection with respectively internal values, safety and cost reductions. This indicated that discussion was mostly associated with these connections. This may have happened for two reasons: either this connection provided room for discussion and was debated by people in favor or not in favor to adopt AT, or this connection provided a strong way to strengthen a certain belief and was therefore used a lot. This will be discussed after indicating the important speech acts within the categories.

Play experience seemed to be connected to the order of profession, but also had a considerable high frequency of speech acts arising from the community order. Endurability had high frequencies in all three orders but was relatively more connected to the community or profession order. From Table 5 can be observed that a few logics were dominant within this connection with respectively internal

values, qualification of excellence, and improve conditions to play for play experience, and create opportunity to play, improve conditions to play, and reuse space for endurability.

It seemed that some evaluation criteria rose from only a certain role in the field. For example, only actors embedded within a community order seem to connect a logic to the evaluation criteria football culture. Next, a deeper understanding of the possible speech acts in each category were analyzed in order to link them to later to beliefs and actor groups to identify whether the connection between logic and evaluation criteria was related to single or multiple beliefs. Rules and equal treatment were evaluated as logics with scattered results and too low frequencies to identify speech acts, which did result in not one speech act based on these dimensions.

Institutional order	Institutional logic	Evaluation criteria category				
		Football culture	Health effects	Play experience	Economic effects	Endurability
Community	Safety assurance	1	599	46	-	16
	Internal values	454	41	164	26	70
	Create opportunity to play	1	1	-	15	375
	Member sharing	-	-	1	2	72
	Rules	2	5	12	3	20
	Equal treatment	-	-	15	3	8
Profession	Qualification of excellence	35	19	469	1	61
	Improve conditions to play	27	14	203	43	487
	Fair Play	5	8	88	2	58
Market	Cost reduction	8	4	1	287	23
	Reuse space	1	-	2	6	110
	Commercial advantage	11	2	16	42	35
	Multifunctional stadiums	-	-	-	2	32
TOTAL	TOTAL COMMUNITY	458	646	238	49	561
	TOTAL PROFESSION	67	41	760	46	606
	TOTAL MARKET	20	6	19	337	200

Table 5 - Frequencies of connections between logics and evaluation criteria categories

4.2.1 Safety assurance

From Table 5 can be derived that 599 speech acts with a safety logic focused on the concepts in the evaluation category health effects. Secondly, 46 speech acts with a safety logic were related to play experience. Table 6 displays which subcategories were mostly connected in speech acts.

	Health effects			Play experience
	Injury sensitivity	Risk diseases	Sliding resistance	Cushioning
Aim to prevent injuries	256			29
Aim to prevent long term health issues		213		
Aim to prevent open wounds			113	

Table 6 - Safety logic with evaluations criteria health effects and play experience

The first connection is between the aim to prevent injuries and proneness of injuries to AT, which occurred 256 times. Actors referred to the desire that they did not want to get injured from playing football and that certain injuries were more likely to occur on AT. The following fragment was used that indicates such speech acts:

"Coach Gert-Jan Verbeek of the second league club of Almelo is content about the trial. According to him, players have less problems with groin and hamstring injuries" ("Alle amateurvoetbal mag nu op kunstgras," 2004).

The second connection used the same institutional logic, but evaluated AT in terms of its stability and accounted for 29 speech acts. The prevention of injuries was often discussed by evaluating the cushioning or stability of playing on AT. An example could be a speech act in an article that introduced AT to the readers:

"An elastic layer of foam that is 14 mm thick is used as shock absorber to prevent harm for knees and joints" ("Hoe zijn de nieuwste kunstgrasvelden opgebouwd?," 2009)

The third connection was based on a different logic that focused on the safety in the long term, and evaluated AT in terms of risk of diseases. These speech acts occurred 213 times and can be illustrated by the following fragment:

"University professor Bob Löwenberg in Hematology of the Erasmus MC calls practicing football on crumb rubber grains an experiment on healthy people. He points out that grains contain benzene substances that cause leukemia or lymph node cancer" (Paulussen, 2016)

The fourth connection is made between the aim to prevent open wounds and evaluating AT in terms of sliding resistance. This connection was revealed in 113 speech acts. Speech acts were designed in the following way:

"Verbeek is not satisfied with the practice of the sliding resistance on artificial turf. Players have an increased chance to abrasion through the sharp edges of artificial turf" ("Alle amateurvoetbal mag nu op kunstgras," 2004)

In conclusion, four types of speech acts could be distinguished based on a safety logic. These were mainly related to health effects and some connected safety to play experience. Injuries, sliding resistance, risk for diseases and cushioning were the most prominent connected evaluations to this logic of which the aim to prevent injuries and health risk were used most in speech acts.

4.2.2 Internal values of community

From Table 5 can be observed that people with goals that aim at preserving certain symbols, traditions or historical values of football often connected to evaluation criteria related to football culture (454 speech acts), play experience (164 speech acts) and endurability (70 speech acts). Endurability could be observed in Table 7, but a distinguishable link between goals within the logic of internal values of the community and subcategories of endurability were to scattered and ended in low frequencies. Therefore, the presence of a distinguishable speech act could not be assumed.

	Play experience	Football culture			
	Ball play	*Emotions*	*Nostalgia*	*Preference members*	*Smell*
Aim to maintain the charm of football		46	84		
Aim to maintain sentiments of grass			40		87
Aim to find acceptance by members				51	
Aim to play on the conditions of a good natural grass field	30				

Table 7 - Internal value logic with evaluations criteria football culture and play experience

People declared the smell and nostalgia of natural grass as sacred and used these to evaluate the technology in terms of emotions. Previously, the choice was made to see emotions, nostalgia and smell as different goals because of their frequency and slightly different focus, which made them a distinctive subcategory. Smell and nostalgia were a more precise linguistic description of how an emotion was used to evaluate AT. The same could be said for charm and sentiments, where the charm could be the presence of a sentiment, but could also have been a certain unpredictability in football. The first speech acts showed how nostalgic (40 speech acts) and smell of grass (87 speech acts) were used through reliance of an actor on the aim to maintain the sentiments of natural grass. The second speech acts showed how the charm of football evoked emotional (46 speech acts) and nostalgic (84 speech acts) evaluations. For the sake to keep the amount of speech act types limited, these four connections were valued as one and can be illustrated as:

"One thing is sure: promotors of fake grass had a bad youth. O, what was it amazing to roll around in the green natural grass as a child. Erotic. That memory should be sufficient to end the artificial discussion, but traditions and pleasure fail the challenge… …The divine smell of the green fluff cannot be matched by artificial turf." (Camps, 2014)

"One of the statements fulfill the desire to maintain the nostalgic feeling of grass compared to the fake grass because there was stated: the main field should be of natural grass to maintain the charm of football." (Pluijmert, 2015)

Furthermore, internal values of community could be related to acceptance within the field that was used as an evaluation for other actors to determine their choice. This had been the case in 50 speech acts. An example of this is:

"FC-director Hans Nijland: "The cultural shock of the transition from the Oosterpark to Euroborg was that big for the fans that we did not want to add another cultural shock of switching from natural grass to artificial turf" (Mulder, 2006a).

Another variation within speech acts that used an internal value of community logic was to connect it to play experience. These speech acts referred to natural grass as the blue print that should be imitated by artificial turf in terms of ball play. This connection accounted for 31 speech acts. A speech acts that relates to this is:

"An even field, without bumps, ensures a ball can roll. Grains of rubber ensure sufficient roll resistance. This way natural grass is being imitated" ("Diepenveen voetbalt op kamerbreed tapijt," 2004).

In conclusion, the logic of internal values of the community was mostly connected to football culture and play experience. Six types of speech acts could be distinguished, but four types seemed to have a bit of blurred lines and were valued as one type of speech act. Internal values were 257 times connected in speech acts to evaluation criteria that related to certain emotions of which smell and nostalgia seemed to be a distinctive category. Furthermore, internal values were a blueprint to set up ball play characteristics and account for 31 speech acts. At last, the acceptance among members was used as an evaluation connected to internal values in 50 speech acts.

4.2.3 Create opportunity to play

From Table 5 can be observed that actors with goals that aim to create the opportunity to play often connected to evaluation criteria related to endurability. It seemed that actor groups that use these logics favored a certain connection to endurability and in total 375 speech acts could be identified. The different subcategories will next be discussed in Table 8.

	Endurability		
	Always playable	*Intensified use*	*Weather independent*
Aim to increase leisure for all members	53	108	
Aim to prevent cancelled matches	100		34

Table 8 - Create opportunity to play logic with evaluations criteria endurability

The logic of preventing cancelled matches and creating conditions that make it possible for more members to engage were both dominant and created connections to the evaluation category endurability. Both logics related to the evaluation that the fields were always playable at any moment in time. However, the first logic focused on the intensified use that connected to this logic, while the aim to prevent canceled matches had a focus on weather independence. The following two text fragments show how these four speech acts can better be understood as two.

"According to Metten, an artificial turf field is needed, because they have training capacity issues. Artificial turf can be used more intensively, 250 versus 1500 hours a year… …Furthermore, natural grass is not always playable. From June till August you are not allowed on it" ("Clubs pleiten samen voor kunstgrasveld," 2002)*.*

"The amateur football will get a new impulse when AT becomes legal to play on as of 1 juli 2004. Canceled matches will belong to the past. The crumb rubber fields are always playable, despite any weather" (Dagevos, 2004)*.*

In conclusion, this meant that the first type of speech act could be identified 161 times in speech acts, while the second type was identified 134 times. This meant that leisure could be increased by intensified use; AT made it possible to play more, while the prevention of canceled matches made the underground less often a spoilsports, and which enabled that actors could play more.

4.2.4   Member sharing

From Table 5 can be derived that the logic of member sharing was mainly related to the evaluation category endurability with a frequency of 72 speech acts connecting these categories. It seemed that actor groups, that use these logics, always used the evaluation criteria endurability, which can also be observed in Table 9.

	Endurability
	Intensified use
Aim for efficient use of one space by multiple parties	57

Table 9 -Member sharing logic with evaluations criteria endurability

The aim to make efficient use of one space by multiple parties connected mainly to the evaluation criteria that fields can be used more intensively and accounted for 57 speech acts. The following fragment indicates how member sharing and intensified use were combined in speech acts:

"The club can share its field with pupils of the new school De Sprankel… …Alderman Eric van Dungen: the advantages of intensified usage of the AT field are that schools can use it during the day and football clubs during the afternoon and evening" (Linssen, 2015)*.*

In conclusion, when football fields could maintain consistent good field conditions under intensive usage by any environmental condition it was likely that owners of accommodations were willingly to cooperate or grant permission to other parties over and above the initial user group of football clubs to share facilities. These type of speech acts connected member sharing and endurability.

4.2.5 Qualification of excellence

Table 5 displays that the logic qualifications of excellence was often used with play experience (469 speech acts), endurability (61 speech acts) and football culture (35 speech acts). Table 10 displays that only football culture and play experience remained, which meant that despite the higher frequency of endurability, the connections between subcategories were too scattered to identify reliable (fitting) speech acts.

	Play experience					Football culture
	Accustomed	*Ball play*	*Competitive advantage*	*Quality of the game*	*Technical game*	*Preference members*
Aim for a competitive advantage	73		67		37	
Aim to keep the same game		63				
Aim for conditions that secure high level of football in the Netherlands				38		22
Aim to play neat football				30		

Table 10 - Qualifications of excellence logic with evaluations criteria play experience and football culture

The pursuit of excellence was closely related to the evaluation theme of play experience in four ways and to football culture in one way. First, actors that aimed to have a competitive advantage in football may evaluate artificial turf in terms of whether they or the opponent have a competitive advantage, which accounted for 67 speech acts. However, two more specific evaluations could be observed. 73 speech acts argued from a perspective that debates whether being accustomed to a field is a competitive advantage, while 37 speech acts presented a focus on whether being able to play a technical game connects to a competitive advantage. The following two fragments illustrate how actors combined these subcategories:

"I do not think it is a disadvantage to play against RKEDO at home. RKEDO is used to artificial turf which will make the match more difficult for them at our natural grass than when they would have played at home" (Kaandorp, 2012)*.*

"I am a team player and I like direct play. I am able to increase the game quality of a team by being a strong in keeping possession, and by making combinations making room for another player. The artificial turf of Lienden is perfect for this kind of play" (Hol, 2009)*.*

Furthermore, 63 speech acts combined the aim to keep the same game and the evaluation of ball play characteristics. These speech acts were not necessarily focused on the imitation of natural grass conditions, but was more concerned about keeping the game the same in essence. The following speech acts presents an example of this:

"Bergkamp: Football on artificial turf is a different game. It is predictable. Natural grass demands to play hard passes and is uneven which increase the chance of mistakes. Artificial turf facilitate perfect gameplay and is therefore predictable. It bounces and rolls predictable. And on artificial turf is it not possible to make a chip" (Visser, 2014)*.*

Next, the aim to maintain high quality of football within the Dutch league was 38 times combined with the evaluation criteria quality of the game. This speech acts states that AT develops players with less favorable qualities to play a high quality of play. A speech acts that illustrates this is:

"Artificial turf teaches you to play a different kind of football than what is internationally favorable. It has a negative effect on the development of players and, therefore, on football in common. This worries me" ("Ten Hag: Kunstgras mag geen excuus zijn," 2016).

Furthermore, to maintain high quality of football within the Dutch league, good players should be attracted. However, the field conditions of AT seemed to play a role in the recruitment of good players from abroad and accounted for 22 speech acts. An example of such a speech act is:

"According to Feyenoord chairman Martin van Geel, players from abroad do not want to come to the Netherlands for two reasons. At first, they loans are too low. Secondly, the Netherlands has artificial turf" (Mossou, 2014).

At last, the aim to play neat football was used 30 times in speech acts with the evaluation criteria quality of the game. This means that actors desired to play neat and combination football. The extent that they perceived that this would lead to a higher quality on AT created their beliefs. This can be illustrated as follows:

"Artificial turf favors the play and culture of AGOVV: Dominant, neat football" (Arends, 2006).

In conclusion, different aims could be articulated within football to determine how excellence should be defined or stimulated. Different evaluation criteria were linked to different institutional logics. In total, five kinds of speech acts were distinguished. This variety in speech acts may indicate that the combination of this institutional logic and evaluation criteria was debated or established new directions over time in the debate by reinventing new combinations.

4.2.6 Improve conditions to play

Table 5 displays that the logic to aim for improvement of play conditions was often used with endurability (487 speech acts), play experience (203 speech acts). Table 11 displays that six different combinations with subcategories existed. These will be discussed next.

	Endurability			Play experience		
	Always playable	*Intensified use*	*Vulnerability*	*Ball play*	*Quality of the game*	*Technical game*
Aim for high quality of fields		82	168			
Aim for conditions that increase sport quality				34	34	20
Aim for better training conditions	61					

Table 11 - Improve conditions to play logic with evaluation criteria endurability and play experience

At first, speech acts made use of the logic to aim for high quality of fields. In this case, high quality of fields was used in combination with either intensified use or vulnerability. Since intensified use means that a field could be used without becoming vulnerable, for the sake to keep speech acts limited, these were evaluated as similar. An example that illustrates these types of speech acts is:

"Artificial turf or natural grass? There is nothing better than a perfect maintained natural grass field but these are so rare that in reality I would choose for artificial turf" (Haveman, 2012).

Secondarily, the endurability category was also used in speech acts when actors aimed for better training conditions. The dimension of always able to train seemed to be the subcategory used most often in speech acts for this logic. An example of a speech act that illustrates this is:

"An advantage of artificial turf, stated by Budel en Wigt, is that clubs can train all year on a good field" (Borgman, 2003)

The third way speech acts were composed by linking the aim to have conditions that increase sports quality to play experience variables. This speech act differed from the logic aim for conditions that secure high quality of football in the Netherlands, and belongs to a different logic category because it does not focus on whether it improves the quality of the player itself. It acknowledges that conditions increase the play quality, but does not discuss this in terms of change of qualities, but considers it more as a stimulation by conditions that aid in playing football.

Additionally, the three variables of play experience were quite similar in these speech acts. Speech acts focused on a higher quality of the game by playing a more technical game, which meant that ball play was stimulated. Therefore, these were taken as one type of speech act. An illustration from the data is:

"To increase ball control and speed artificial turf is better, says Harvey Bischop. You do not need to touch the ball twice which means the ball is easier placed" (Kloosterman, 2003)

In conclusion, three speech acts could be identified. The aim for a high quality of fields was used with evaluation criteria focusing on avoiding bad fields after intensive usage in 250 speech acts. Furthermore, aim for conditions that increased the sport quality was used with evaluation criteria that looked at ball characteristics that increased the quality of technical game play in general and accounted for 88 speech acts. At last, the aim for better trainings conditions was used in 61 speech acts with the evaluation criteria that trainings could always take place. These type of speech acts connected improve conditions to play with endurability and play experience.

4.2.7 Fair play

Table 5 presents that the fair play logic was connected with endurability (58 speech acts) and play experience (88 speech acts). From these categories, fair play had three subcategories that connected to two endurability subcategories and one play experience subcategory (Table 12).

	Endurability		Play experience
	Always playable	*Consistent*	*Competitive advantage*
Aim for underground that does not lead to an advantage in the competition			47
Aim for equal undergrounds		25	
Aim to keep teams at the same amount of matches played	22		

Table 12 - Fair play logic with evaluation criteria endurability and play experience

The first connection was between the aim for undergrounds that do not lead to an advantage and the evaluation criteria competitive advantage which accounted for 47 speech acts. This speech act type discussed to what extend the competitive advantage of AT leads to competition distortion. This can be illustrated with the following text fragment:

"Nac-player Kees Kwakman did blame themselves. But, at the same time the talked about pure competition distortion. He stated: Cambuur has a competitive advantage by the fact that they play half of their games on artificial turf, and can get used to it on a daily basis" (Spekenbrink, 2013).

Another composition of a logic and evaluation was the aim for equal undergrounds and consistent play conditions and was used in 25 speech acts. The extent that conditions could be consistent in any game

was connected to the aim for equal undergrounds which would increase fair play. An example of a speech act related to this is:

"… artificial turf creates the most fair imaginable competition. All clubs play under equal circumstances" (Verweij, 2003)*.*

The last speech act related to fair play combined the logic that teams should stay even in the number of matches played in the competition with the evaluation criteria always playable in 22 speech acts. The extent that the technology was always playable seemed to disturb or enhance the logic to keep teams at the same amounts played. The following speech acts illustrates this:

"Stiphout does not dodge to the artificial tur field… …To avoid distortion of competitions. If you play games on artificial turf, games will never by canceled and result in difference in the league tables compared to other team, thinks De Wit" (Daniels, 2014)*.*

In conclusion, three speech acts could be identified from the fair play logic. The first logic focused on the unfair advantages team have within the competition by evaluating the advantage a team has from being used to AT. Secondarily, the aim for equal undergrounds was related to AT and combined with evaluations that reconsidered the consistency of the technology. At last, the extent that AT could always be played was put in perspective of the logic to keep teams at the same amount of matches played. These three speech acts combined the fair play logic to endurability and play experience evaluations.

4.2.8 Cost Reduction

Table 5 presents that 287 speech acts connected a market logic to the evaluation criteria economic effects. Table 13 shows that three logics could be combined with three evaluation criteria. These will be discussed next.

	Economic effects		
	Construction cost	Cost	Maintenance cost
Aim to control investments	95	26	
Aim to control the budget	41	43	28
Aim for financial stability		23	

Table 13 - Cost reduction logic with evaluation criteria economic effects

First, it is important to define the different evaluation subcategories in regard of this logic. Cost were the overall cost of construction compared to maintenance cost, which can, therefore, be combined. First of all, actors can have a logic that is aimed at looking the short term investments. When actors looked at short term investments, maintenance cost was often not taken into account. An example of such a speech act is:

The club wants artificial turf. Because of the financial situation of the municipality is adoption of artificial turf not possible. Therefore, artificial turf is not adopted and the main field is renovated ("VAN DE VELDEN," 2013)*.*

Secondarily, when actors evaluated the investment over time, construction and maintenance cost did play a role. The overall costs were most likely to be compared over time to the extent that the investments were cheaper in total. This can be illustrated with the following speech act:

"Lesterhuis has his reasons: It is primary an economic story. A field of artificial turf cost three ton but the field can be used day and night as a matter of speaking. Additionally, the maintenance cost are lower especially when an artificial turf field last for 20 years (Heuvelman, 2004).

Thirdly, when actors aimed for financial stability they were apparently more likely to evaluate the overall cost. Actors with this logic were probably more concerned about their budget and took all costs into account because they could not afford to risk wrong investments. A speech act that illustrates this is:

Leo Beenhakker, who is in charge of the technical business at Sparta, confirms that Sparta will adopt artificial turf unfortunately. The club needs the 1,5 million cost reductions. I am a traditional man and I prefer grass, but with the financial situation of Sparta is that not realistic, states Beenhakker ("'Kunstgras hoort bij hockey'; Oud-Spartanen zien liever echt veld bij traditieclub," 2014).

In conclusion, the first type of speech act could be identified 121 times in speech acts, while the second type was identified 74 times. The third type was used 23 times in speech acts. These three speech acts combined the cost reduction logic to the evaluation criteria economic effects.

4.2.9 Reuse Space

Table 5 shows that the logic of reuse of space was mainly related to the evaluation category endurability with a frequency of 110 speech acts connecting these categories. It seemed that speech acts that connected these logics always used the evaluation criteria endurability, which can also be observed in Table 14.

		Endurability
		Intensified use
Reuse space	Aim to decrease space scarcity by efficient re-use of space	59

Table 14 - Reuse of space logic with evaluation criteria endurability

The aim to make efficient use of one space to decrease space scarcity connected mainly to the evaluation criteria that fields can be used more intensively and accounted for 59 speech acts. The following fragment indicate how space scarcity and intensified use are combined in speech acts:

"Intensified use. The West Frisians came to the conclusion that they did not wanted to move. We are now in the middle of the village which is nice. But more squared meters was not possible. Our accommodation will be used more intensively. It appeared that artificial turf was the best and cheapest solution" (Buysman, 2008)

In conclusion, one type of speech acts could be observed for reuse of space. 59 times did a speech act contain a connection between the aim to deal with space scarcity and the evaluation of AT in terms of intensified use.

4.2.10 Commercial Advantage

From Table 5 can be observed that the logic of commercial advantage was connected to the evaluation category economic effects with a frequency of 42 speech acts. It seemed that actor groups that use these logics always used the evaluation criteria economic effects, which can also be observed in Table 15.

	Economic effects
	Profitability
Aim for commercial advantages	21

Table 15 - Commercial advantage logic with evaluation criteria economic effects

The aim to gain commercial advantages related in 21 speech acts to the evaluation criteria profitability. This meant that actors tried to legitimize or delegitimize AT by providing insights in ways to generate more revenue. This can be illustrated with the following text fragment:

"Many Frisian clubs know the artificial turf field of Opeinde, Nijega and De Tike. To play on the artificial turf field with lights, one needs to pay EUR150, by daylight the price is EUR120. Cambuur has done this more than ten times in Opeinde. Per hour they pay EUR50" (Fischer & van der Meer, 2010)*.*

In conclusion, one type of speech acts could be observed for commercial advantages. 21 times did a speech act contain a connection between the aim for a commercial advantage and the evaluation of AT in terms of profitability.

4.2.11 Multifunctional Stadiums

Table 5 illustrates that the multifunctional stadium logic was related to the evaluation category endurability in 32 speech acts. It seemed that speech acts that contained these logics always used the evaluation criteria endurability, which can also be observed in Table 16.

	Endurability
	Intensified use
Aim for multifunctional stadiums to increase revenue streams	28

Table 16 - Multifunctional stadium logic with evaluation criteria endurability

The aim to generate revenue from multifunctional stadiums connected in 21 speech acts to the evaluation criteria endurability. This means that actors tried to legitimize or delegitimize AT by providing insights in the way the underground can be used more intensively. This can be illustrated with the following text fragment:

"The stadium will get the fourth, newest, generation artificial turf. This field has three stars and can be used permanently. The aim is to use the stadium in a multifunctional way. This means different events than football should be organized in it" (van Schuppen, 2010)*.*

In conclusion, one type of speech acts could be observed for the aim to generate more revenue from multifunctional stadiums. 21 times did a speech act contain a connection between this aim and the evaluation of AT in terms of endurability.

4.2.12 Reflection speech acts types

Previous sections have identified 28 different types of speech acts. By using the institutional logic and evaluation categorizations, different speech acts types can be characterized and are lifted to a more conceptual level. These are presented in Table 17. These speech acts can be linked to actor groups and beliefs. This will show whether actor groups make sense of technologies differently and whether some kinds of speech acts are used to strengthen a certain belief or are debated in the discussion.

Speech act name	Logic	Evaluation	#
Mythical grass	Aim to keep the football charm and grass sentiments	Emotions	257
Injury safety	Aim to prevent injuries	Injury sensitivity	256
Field quality	Aim for high quality of fields	Vulnerability	250
Health safety	Aim to prevent long term health issues	Health risk	213
Intensify leisure	Aim to increase leisure for all members	Intensified use	161
Weather cancellation	Aim to prevent canceled matches	Weather independent	134
Funding	Aim to control investments	Construction cost	121
Habit excellence	Aim for a competitive advantage	Used to field	114
Sliding safety	Aim to prevent open wounds	Sliding resistance	113
Game quality	Aim for conditions that increase sport quality	Game quality	88

Money-conscious	Aim to control the budget	Cost	74
Preserve excellence	Aim to keep the same game	Ball play	63
Technical excellence	Aim for a competitive advantage	Technical game	63
Training quality	Aim for better training conditions	Always playable	61
Manage space	Aim to decrease space scarcity by re-use of space	Intensified use	59
Multi Member use	Aim for efficient use of one space by multiple parties	Intensified use	57
System acceptance	Aim to find acceptance by members	Preference members	51
Unfair advantage	Aim for underground that does not lead to an advantage in the competition	Competitive advantage	47
Dutch Play Quality	Aim to secure high level of Dutch football	Game Quality	38
Game blueprint	Aim to play on the conditions of a natural grass field	Ball play	30
Neat football	Aim to play neat football	Game Quality	30
Field safety	Aim to prevent injuries	Cushioning	29
Intensify stadium	Aim for multifunctional stadiums to increase revenue streams	Intensified use	28
Consistent fields	Aim for equal undergrounds	Consistent	25
Survival	Aim for financial stability	Cost	23
Dutch attractiveness	Aim to secure high level of Dutch football	Preference members	22
Equal tables	Aim to keep teams equal in terms of matches played	Always playable	22
Revenue model	Aim for commercial advantages	Profitability	21

Table 17 - Classification of speech acts by logic and evaluation criteria

4.3 Overview embeddedness and beliefs of these actor groups based on speech acts

The previous identified speech act types can be linked to actor groups. Based on the goal a speech acts connected, the institutional order from which a speech act arose could be identified. These links of how actors are embedded within the institutional order will be discussed first. Secondly, whether their embeddedness and therefore their role in the field resulted in positive, negative or neutral beliefs about AT will be analyzed.

Actor group	Speech acts	Positive	Neutral	Negative	Community	Profession	Market
Producer	Field Quality	10	8	16	-	34	-
	Mythical Grass	13	1	8	22	-	-
	Sliding Safety	17	3	-	20	-	-
	Health Safety	8	3	-	11	-	-
	Funding	6	1	3	-	-	10
	Game blueprint	9	-	-	9	-	-
	Total beliefs	**63**	**16**	**27**			
	Total order				**62**	**34**	**10**

Table 18 - Producers embeddedness and beliefs

Table 18 displays that producers of undergrounds articulated 62 speech act from the community order. Furthermore, they thought in terms of the strategies to increase the quality of craft by articulating 34 field quality speech acts. At last, they were less embedded within the market order to make sense of AT turf, which accounted for 10 speech acts. To conclude, producers tried to frame AT from the community and profession order and to a lesser extent from the market order.

Table 18 shows that the producer category had 63 positive and 27 negative speech acts, which relates back to section 4.1 where AT producers were also more present than natural producers. Within the producer category there seemed to be a discussion with speech acts based on the field quality and mythical grass. Interesting was that the frequencies could be opposite among users where field quality was a positive speech act and mythical grass a more negative speech act. This could indicate that

producers tried to frame their negative points in a positive way to overcome non-adoption. This also seemed the case with sliding safety, health safety, and game blueprint where AT producers needed to convince others of the achieved improvements. Funding seemed to be a speech act that could be positive or negative.

In conclusion, producers showed embeddedness within all three orders to determine their sensemaking in press media. Producers speech acts were most dominant embedded in the community order by stating positive beliefs in order to probably connect to the community spirit of their consumer base.

Actor group		Speech acts	Positive	Neutral	Negative	Community	Profession	Market
User	*Amateur*	Intensify Leisure	118	-	-	118	-	-
		Health Safety	1	68	42	111	-	-
		Field Quality	88	3	5	-	96	-
		Mythical Grass	12	-	66	78	-	-
		Injury Safety	15	3	55	73	-	-
		Weather Cancelation	58	1	3	62	-	-
		Training Quality	51	-	-	-	51	-
		Habit Excellence	27	6	18	-	51	-
		Money-Conscious	28	1	13	-	-	42
		Sliding Safety	15	1	26	42	-	-
		Technical Excellence	30	6	5	-	41	-
		Funding	20	2	18	-	-	40
		Game Quality	30	2	6	-	38	-
		Manage Space	26	-	-	26	-	-
		Multi Member Use	24	1	-	25	-	-
		Neat Football	20	-	-	-	21	-
		Total beliefs	*563*	*94*	*257*	*535*	*298*	*82*
		Total order						

Table 19 - Amateur users embeddedness and beliefs

Table 19 displays that the amateur user group had 16 different kinds of speech acts that were most prominent in the press media. The amateur user was mostly embedded within the community order with 535 speech acts arising from this order. The profession order accounted for 298 dominant speech acts, while the market order accounted for 82 often used speech acts.

Amateur users were positive in 563 speech acts, neutral in 94 speech acts, and negative in 257 speech acts. Speech acts that were mainly positive could be observed. These were Intensify Leisure, Field Quality, Weather Cancelation, Training, Quality, Technical Excellence, Game Quality, Manage Space, Multi Member Use, and Neat Football. Negative speech acts were Mythical Grass and Injury Safety. A debate on how a connection of institutional logics and evaluation criteria should determine beliefs was observed for Health Safety, Habit Excellence, Money-Conscious, Sliding safety, and Funding.

In conclusion, amateur users seemed to be relative more positive than negative. Positive speech acts also had a wider variety of speech acts than negative kinds of speech acts. Amateur users were embedded in the different institutional orders and the variety of speech acts indicates they may focus on a variety of different goals.

Actor group		Speech acts	Positive	Neutral	Negative	Community	Profession	Market
User	*Professional*	Injury Safety	20	8	81	109	-	-
		Mythical Grass	11	-	73	84	-	-
		Field Quality	51	2	13	-	66	-
		Habit Excellence	19	7	13	-	39	-
		Game Quality	16	1	12	-	29	-
		Unfair Advantage	12	-	11	-	23	-
		Sliding Safety	12	1	10	23	-	-
		Funding	17	-	5	-	-	22
		Preserve Excellence	3	1	18	-	22	-
		Money-Conscious	15	1	2	-	-	18
		System Acceptance	6	-	9	15	-	-
		Technical Excellence	12	2	1	-	15	-
		Dutch Play Quality	2	-	13	-	15	-
		Dutch Attractiveness	4	-	10	-	14	-
		Consistent Fields	13	-	1	-	14	-
		Survival	10	-	2	-	-	12
		Intensify Stadium	9	-	2	-	-	11
		Total beliefs	**232**	**23**	**276**			
		Total order				**231**	**237**	**63**

Table 20 - Professional users embeddedness and beliefs

Table 20 displays that the professional user group had 17 different kinds of speech acts that were most prominent in the press media. These speech acts seemed to be embedded within the profession and community order which respectively account for 237 and 231 speech acts. Speech act that arose from embeddedness in a market order were 63 times observed. This indicated that professional users were relatively more embedded in the profession order than amateur users, which makes sense of course.

Table 20 shows that the professional user category had 276 negative speech acts, 232 positive speech acts, and 23 neutral speech acts. Within the professional user group, a debate seemed to be going on how a connection of institutional logics and evaluation criteria should determine beliefs because speech acts vary over multiple beliefs, such as Habit Excellence, Game Quality, Unfair Advantage, Sliding safety, and System acceptance. More negative speech acts were Injury Safety, Mythical Grass, Preserve excellence, Dutch Play Quality, and Dutch Attractiveness. Positive speech act were Field Quality, Money-conscious, Technical Excellence, Consistent fields, Survival, and Intensify Stadium.

In conclusion, professional users seemed to be in a debate about their beliefs about AT, which seemed to be more concentrated to the negative side than the positive side. Professional users were embedded within the community, profession and market order but mostly used speech acts related to a goal from a community or profession order.

Actor group		Speech acts	Positive	Neutral	Negative	Community	Profession	Market
Inst. actor	*Amateur*	Funding	17	1	18	-	-	36
		Intensify Leisure	31	-	-	30	-	-
		Health Safety	1	20	9	29	-	-
		Money-Conscious	18	-	11	-	-	23
		Weather Cancelation	21	-	-	21	-	-
		Manage Space	21	-	-	-	-	21
		Field Quality	16	-	1	-	17	-
		Total beliefs	**125**	**21**	**39**			
		Total order				**80**	**17**	**80**

		Positive	Neutral	Negative	Community	Profession	Market
Professional	System Acceptance	6	4	-	10	-	-
	Intensify Stadium	7	1	-	-	-	8
	Injury Safety	4	3	-	7	-	-
	Field Quality	5	1	-	-	6	-
	Total beliefs	**16**	**9**	**-**			
	Total order				**17**	**6**	**8**

Table 21 - institutional actors embeddedness and beliefs

Table 21 displays that the institutional actor group focused on the amateur level had 7 different kinds of speech acts that were most prominent in the press media. This actor type focused on the professional level and had 4 different kinds of speech acts. The institutional actor group focused on the amateur level, was mostly embedded in a role related to the market or community logic with both 80 speech acts. Speech acts of institutional actors focused on the amateur level were 17 times embedded within a profession order. For the institutional actor focused on the professional levels were 17 speech acts related to the community order, 8 to the market order and 6 to the profession order. This showed that on the amateur level institutional actors were more embedded in the market order.

Table 21 shows that the institutional actor group focused on the amateur level had 125 positive speech acts, 39 negative speech acts, and 21 neutral speech acts. For the professional level 16 speech acts had positive beliefs, 9 had neutral beliefs and none had negative beliefs. This indicated a kind of similar presence of beliefs. On both levels most speech acts were related to positive beliefs or a neutral statement such as Intensify Leisure, Money-Conscious, Weather Cancelation, Manage Space, and Field Quality at the amateur level, and System Acceptance, Intensify Stadium, Injury Safety, and Field Quality at the professional level. At the amateur level two speech acts seemed to be debated, which were Funding and Money-Conscious, which was in line with the notion that the market order plays a more prominent role within the embeddedness of institutional actors focused on the amateur level.

In conclusion, Institutional actors at the amateur and professional level were embedded in the community order. The institutional actors focused on the amateur level seemed to be influenced additionally by the role they have in the market order. This was less the case on the professional level. The profession order was less prominent within both levels. Both levels also seemed to have positive beliefs about AT, which could, taken their role into account, be positive for the steering and guiding of the adoption of AT.

Actor group		Speech acts	Positive	Neutral	Negative	Community	Profession	Market
Media	**Amateur**	Mythical Grass	2	3	26	31	-	-
		Weather Cancelation	23	2	5	30	-	-
		Health Safety	-	7	11	18	-	-
		Field Quality	14	1	1	-	16	-
		Injury Safety	3	2	11	12	-	-
		Total beliefs	**42**	**15**	**54**			
		Total order				**91**	**16**	**0**
	Professional	Mythical Grass	3	2	46	51	-	-
		Preserve Excellence	1	-	20	-	21	-
		Habit Excellence	5	6	9	-	20	-
		Field Quality	8	2	6	-	16	-
		Dutch Play Quality	2	-	14	-	16	-
		Injury Safety	3	1	12	16	-	-
		Unfair Advantage	4	3	5	-	12	-
		Game Quality	3	1	8	-	12	-
		System Acceptance	2	1	9	12	-	-
		Total beliefs	**31**	**16**	**129**			
		Total order				**79**	**97**	**0**

Table 22 - Media embeddedness and beliefs

43

Table 22 displays that the media focused on the amateur level had 5 different speech acts that were most prominent in press media. The media focused on the professional level had 9 different kinds of speech acts. Where the media focused on the amateur level was mostly embedded within the community order with 91 speech acts and less in the profession order with 15 speech acts, the media focused on the professional level had respectively 79 and 97 speech acts in these orders. This indicated that at both levels the media was not embedded within the market order and the professional level was more embedded within the profession order.

Table 22 shows that media focused on the amateur level had 42 positive speech acts, 15 neutral speech acts, and 54 negative speech acts. For the professional level 129 speech acts were negative compared to 31 positive and 15 neutral speech acts. This indicated that when the media focused on AT at the professional level speech acts changed and became more negative. At the amateur level speech acts seemed to be related to or negative, which were Mythical Grass, Health Safety, and Injury Safety, or positive beliefs, which were Field Quality and Weather Cancelation. AT the professional level speech acts were overall always more related to negative beliefs than positive beliefs, which indicated that the media focused on the profession is most likely to be a strong opponent of the adoption of artificial turf.

In conclusion, media at the amateur level seemed to provide overview of negative and positive sides of the technology, where the media focusing on the professional level concentrated on mainly negative speech acts. Both levels were not embedded in the market order and the professional level of media was relatively more embedded in the profession order than the amateur level.

Actor group	Speech acts	Positive	Neutral	Negative	Community	Profession	Market
Expert	Health Safety	-	18	19	37	-	-
	Injury Safety	14	9	7	30	-	-
	Sliding Safety	4	2	2	8	-	-
	Field Safety	3	1	3	7	-	-
	Total beliefs	**21**	**30**	**31**			
	Total order				**82**	**0**	**0**

Table 23 - Experts embeddedness and beliefs

At last, the actor group of the experts is displayed in Table 23 from which can be observed that experts used 4 different kinds of speech acts. Most interesting is that the experts vary in beliefs about AT, while their judgement should be independent and objective. Experts were only embedded in the community order and could even be limited to the safety logic. This indicated that their role was to give their judgement on whether something may cause harm to members of the football community. The discussion will further reflect on this remarkable finding of experts with different objective beliefs.

4.3.1 Reflection embeddedness and beliefs of actor groups based on speech acts

Section 4.3 provided an overview of what speech acts types that connected institutional logics and evaluation criteria are used by different actor groups and how this influenced the beliefs within these actor groups. Based on the order these speech acts arise, the ways actors were embedded in the social system could be observed. The next analysis has investigated how this embeddedness can change over time by the notion of endogenous and exogenous events. Over time this may vary because at a certain moment in time an event change the rule of relevance and another role can become more important, which means actor can aim for different goals or evaluation criteria. For example, previous section has shown that professional users were equally embedded in a role related to the community and to the profession order, which over time could have been a development of community to profession due a change of role by certain events. These developments will be discussed next.

## 4.4 ESTABLISHING A TIMELINE OF AT IN THE DUTCH WORLD OF FOOTBALL

This section first describes some common developments that could be observed in the discussion on AT and then six periods will be discussed that characterized the development of AT in the world of football. For each period, the rise of certain actor groups in the discussion is discussed first. A rise indicates that their role in the media became more prominent and their embeddedness in the system colored their opinion. Secondly, how this rise of a certain actor group influenced the beliefs that are accepted in the system will be discussed. Third, the speech acts that belonged to these actor groups with certain beliefs are given. At last, these developments were connected to events to understand how these actor groups became more relevant in the media.

4.5 COMMON OVERVIEW OF DEVELOPMENTS

Four overall developments are discussed. The amount of speech acts in the media is discussed first to get an indication when the discussion was more prominent. Secondarily, the development of beliefs in the system is discussed. Thirdly, the institutional order variable is plotted over time to see how the embeddedness of actor groups changed over time. Fourth, an overview is provided of the evaluation categories over time to see if certain evaluation became more important.

4.5.1 Amount of speech acts

First, the total amount of speech acts over time is presented in Figure 9. Figure 9 displays when the discussion about AT was more prominent in the press media. This analysis indicated that the discussion became more prominent in some moments of time. A rise could indicate certain developments were taking place around a certain topic. A subsequent drop in the number of speech acts may indicate that actors had come to any kind of agreement about the outcome of the discussion and that the topic was not considered relevant anymore. A rise could furthermore be analyzed in terms of which actor groups were relevant in the media to identify what kind of developments took place over time and how the relevance of different actor groups and speech acts varied . Based on this analysis, Figure 9 was divided in six parts that were analyzed. A period meets the conditions if it contains a certain rise of speech acts that debates a certain topic more intensively than before. This could further be indicated by a change in type of actors that became more relevance a in the media. For example, the first period was partly characterized by producers who became more relevant in the media and who debated the topic that AT was improved so it could now be used for football. However, first a few common developments will be analyzed.

Figure 9 - Speech acts over time in absolute number per half a year
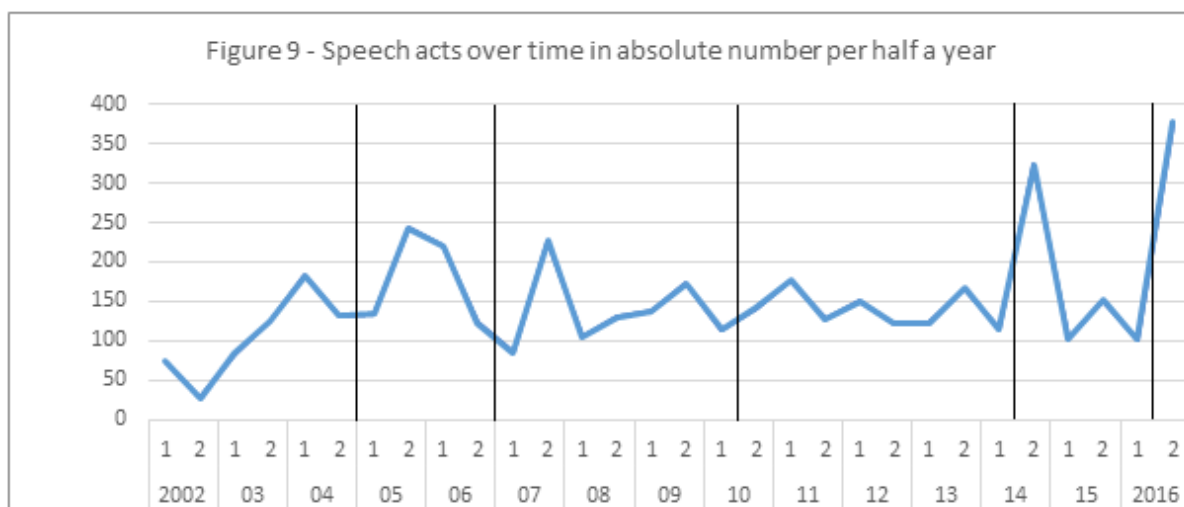
4.5.2 Beliefs over time

Figure 10 displays that speech acts became relatively more negative/less positive over time. First, the relative rise of negative speech acts seemed to increase until 2008. After 2008, the positive speech acts became relatively more prominent in the press media. However, from 2008 to 2016 a new relative increase of negative speech acts could be identified. This indicated that there were fluctuations in the acceptance of AT over time.

Figure 10 - Proportions (%) of beliefs per half a year
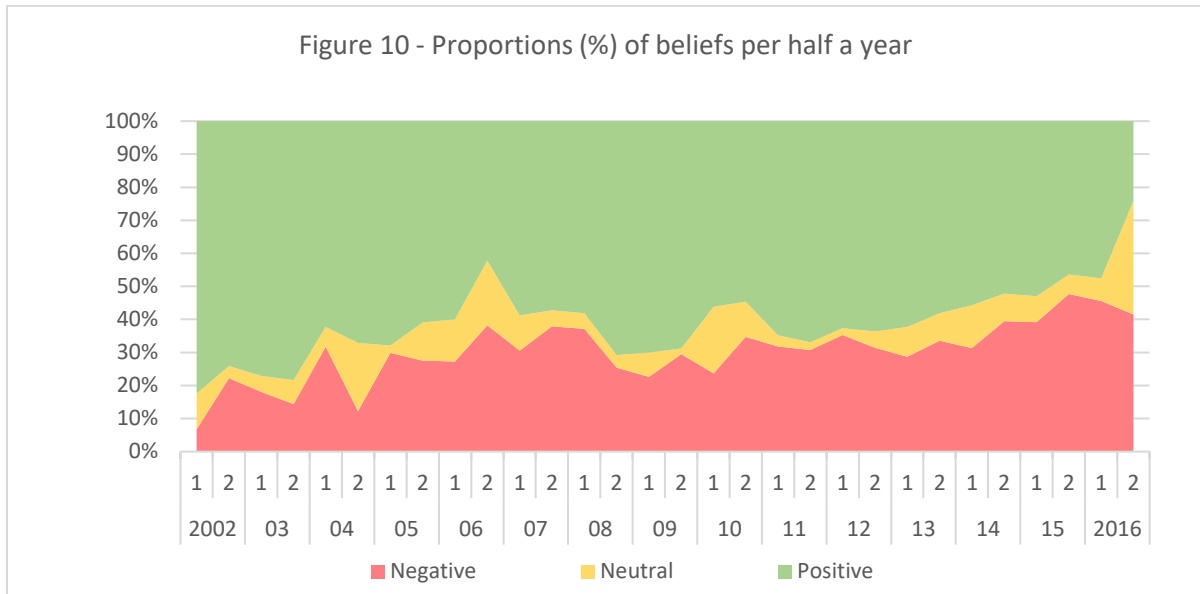
4.5.3 Embeddedness of actor groups in institutional orders over time

Figure 11 displays that over time the relevance of the community order relatively decreased compared to the profession order. This indicates that the profession order became more relevant in the embeddedness of actor groups. This can either mean that actor groups with a role in the profession order popped up more in the media, or that the embeddedness of actor groups changed. For example, a professional user in 2002 was making sense of AT in terms of being embedded in the community order, which as previously observed in Table 10 of section 4.3 could relate to a mythical grass speech acts. In 2014 a professional user was making sense of AT from being more embedded in the profession order, which as previously observed in Table 10 of section 4.3 could relate to the speech act concerning Dutch play quality. Therefore, the change of embeddedness of actor groups in the media may occur in two ways. The presence of the market order seemed to be relatively stable over time. This may indicate that a certain actor group that was embedded in this order was equally relevant over time.

Figure 11 - Proportions (%) of embeddedness in institutional orders per half a year
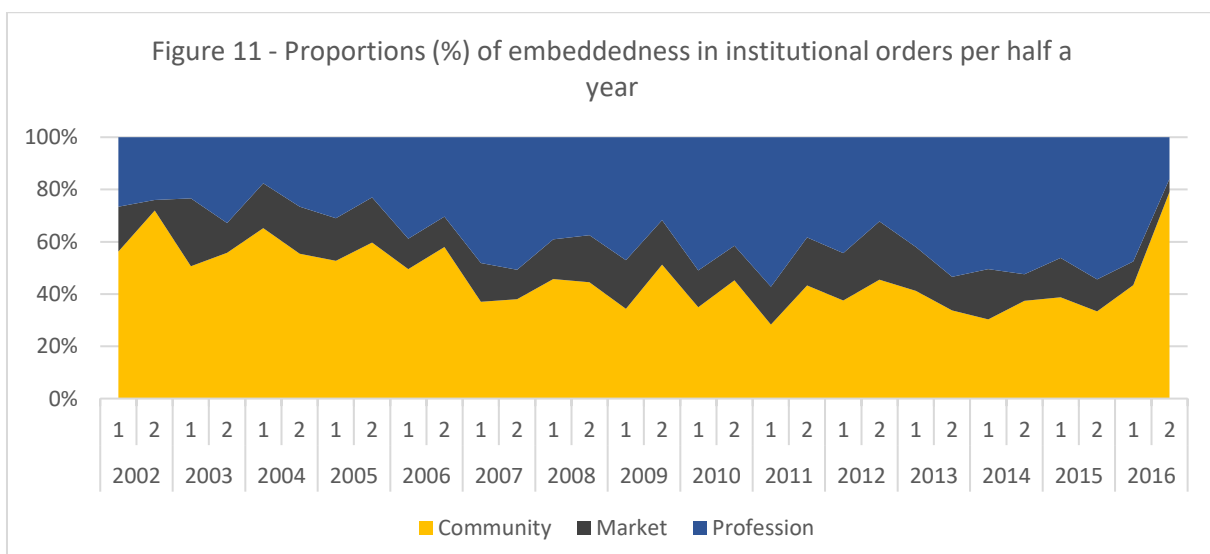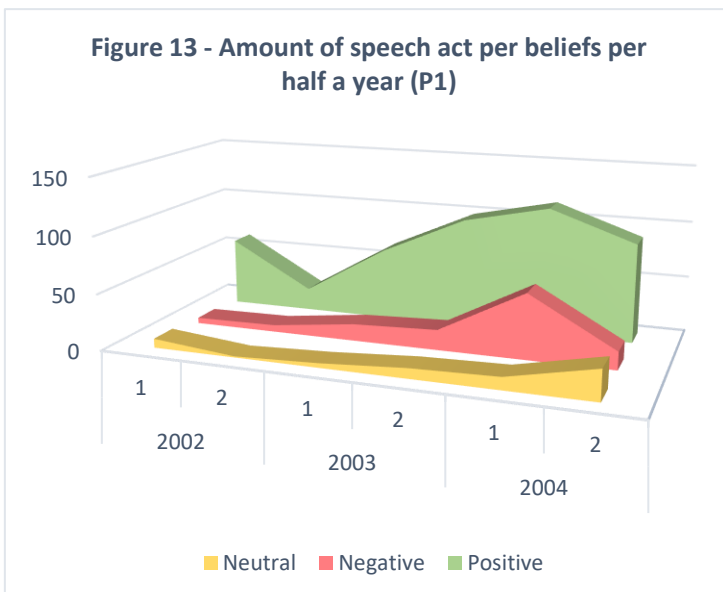
4.5.4   Evaluation categories over time

Figure 12 displays that the five evaluation categories always seemed to be present to some extent. Football culture and play experience seemed to have opposite development. Football culture seemed to be more relevant in the beginning, while play experience became relatively more relevant over time. A real deviation could be observed at the end when the evaluation category health effect became the most dominant evaluation category, which before that moment was a relatively decreasing category. Endurability seemed to be the most consistent evaluation category that was applied to AT in any moment in time and even showed a dominant presence. At last, the economic effects seemed to be a less prominent category over time that increased a little over time.

Figure 12 - Proportions (%) of evaluation categories per half a year
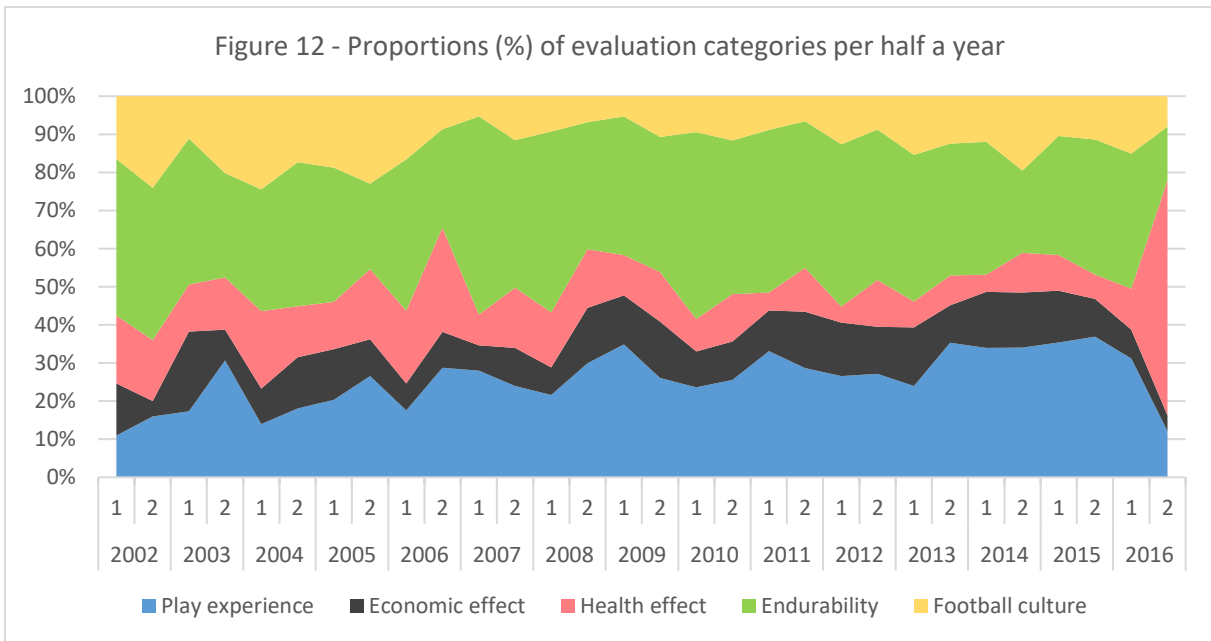
4.6   PERIOD 1 – 1/2002-2/2004 TECHNOLOGY BREAKTHROUGH AND REGULATORY SUPPORT

Figure 13 shows the amount of times speech acts were positive, negative or neutral. In this period,

Figure 13 - Amount of speech act per beliefs per half a year (P1)

actor groups were mostly positive about AT, while negative beliefs rose in the first half of 2014. This indicated that adoption of AT was perceived as positive by most actor groups.

Figure 14 was part of a larger graph in appendix V. This graph is altered to show a more detailed view of the relevant actor groups in this period. Within this period, five actor groups seemed to be active and participated in the discussion. This period can be characterized by the entrance of producers in the media in the first half of 2002. The user group seemed to enter the debate in the first half of 2003, when the media that was focusing on the professional level and institutional actors that were focusing on the amateur level became more relevant in the debate around 2004, when also the rise of negative beliefs was observed.

These actor groups seemed to be most relevant during the first identified period. Therefore, these groups were analyzed in terms of the speech acts they used in this period. These speech acts are displayed in Table 24. Not all speech acts were taken into account, such as speech acts that were only mentioned once or seemed relatively unimportant, because they had a low frequency (such as frequency three compared to eleven in the professional media actor group). This aided to focus on the main developments in this period.

Figure 14 - Amount of speech act per actor category per half a year (P1)

Table 24 shows that these actor groups. where the color green marks positive speech acts or actor groups, red marks negative speech acts or actor groups, and orange marks neutral speech acts or actor groups. Producers used two types of speech acts to show their positive beliefs. Producers used the sliding safety speech act, which displays a safety logic that connects to a positive belief using the evaluation sliding resistance, which refers back to previous generation of AT that had these issues. Furthermore, producers combined the mythical grass speech acts to positive beliefs by stating the feeling of grass was maintained. They even developed grains that smelled like grass to connect to this speech act.

Institutional actors focusing on the amateur level could be divided into two actor types. Associations used the weather cancelation speech acts to show their positive beliefs, which indicates that their role to manage amateur games seemed most relevant. Municipalities used the money-conscious speech act, which also connected to a positive belief about AT. This connected to their role of providing funds for amateur clubs. This also showed that actors groups can be positive about the technology, but for different reasons. However, not all actor types were only positive. The media was only negative and seemed to rely primarily on the mythical grass speech act that contradicted the beliefs of producers.
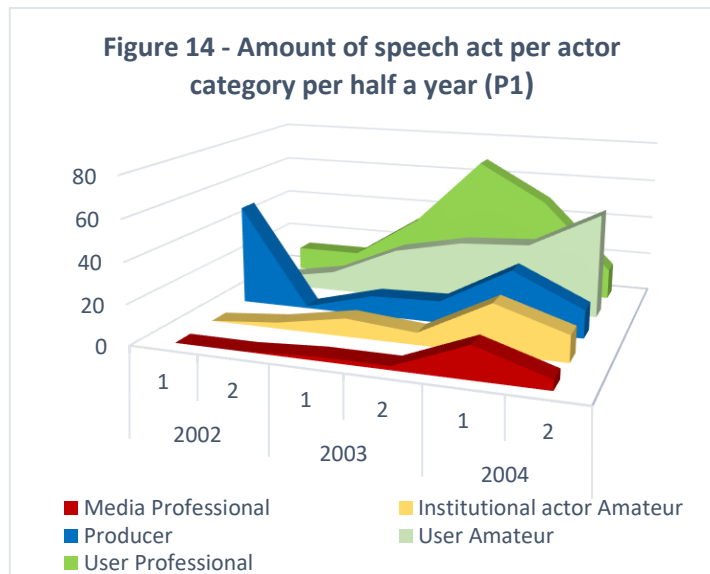
Actor category	Subcategory	Speech act	Beliefs	Frequency
Producer		Sliding safety	Positive	13
		Mythical grass	Positive	7
Institutional actor amateur	Association	Weather cancelation	Positive	4
	Municipality	Money-conscious	Positive	4
User Professional	All	Field quality	Positive	14
		Sliding safety	Positive	8
		Mythical grass	Negative	10
		Game quality	Positive	6
		Injury safety	Negative	6
	Player	Sliding Safety	Negative	4
	Club	Revenue model	Positive	4

User Amateur	Intensify leisure	Positive	9
	Sliding safety	Positive	8
	Field quality	Positive	8
	Weather cancelation	Positive	5
	Mythical grass	Negative	4
	Sliding safety	Negative	4
Media professional	Mythical grass	Negative	11

Table 24 - Speech acts relevant actor categories P1

The user actor groups seemed to be divided into positive and negative speech acts. Amateur users were also positive about weather cancelation. Furthermore, intensify leisure and field quality seemed to be positive speech acts that were dominant within this actor group. This may indicate their connection to their community idea of sports for the sake of sports. However, the user group seemed to be in conflict with their beliefs, because negative speech acts focused on the mythical grass speech act type. At last, actors in this group seemed to vary in terms of the sliding safety speech act, which was linked to positive and negative beliefs.

The users at the professional level were similar to the amateur level in terms of the field quality and mythical grass speech act. An interesting observation was that only players had negative beliefs when using the sliding safety speech act. Furthermore, the professional user category connected the game quality speech act to positive beliefs, which connected to the idea that professional users were more embedded within the profession order that aimed to excel in performance. The subcategory club had positive beliefs when they used the revenue model speech act, which may indicate that AT w seen as a way to generate more money.

In conclusion, in period 1 actors were mostly positive about AT and used eight speech acts, which displayed positive beliefs. These were articulated by producers, institutional actors focused on the amateur level, professional users and amateur users. Negative beliefs were connected to three types of speech acts. These were articulated by the two user groups, with a special focus of players on sliding safety, and the media. These insights are connected to the events displayed in Figure 15.

Figure 15 - Timeline events period 1

Heracles is chosen for trial UEFA (1)

SC Cambuur adopts AT independently from the trial (2)

AT is allowed in amateur level

Technology breakthrough 3rd generation

AT is allowed in amateur level

1-2002   2-2002   1-2003   2-2003   1-2004   2-2004

Trial UEFA

Producer and professional AT clubs strike sponsorship deals

The Amsterdam Arena has bad field conditions

Period 1 starts in 2002 when a technological breakthrough in the field of AT was announced in the media by producers that focused on the mythical grass and sliding safety speech act. This event

49

triggered other events, such as the UEFA who started a trial at the professional level with AT. The trial was determined to take 2 years and if this trial would be successful, AT would be legalized within the rules of the UEFA and FIFA. During this period Heracles was chosen to participate in the trial which legalized AT in the second league of the Netherlands in 2003. SC Cambuur decided to take advantage of these favorable conditions and also adopted AT. Similar to Heracles, SC Cambuur benefited from a favorable sponsorship deal with an AT producer, which may explain the revenue model speech acts of clubs. More clubs flirted with the thought of adopting AT, for example Ajax whose field in the Amsterdam Arena lacked quality because their big stadium harmed the natural conditions. This refers back to the field quality speech acts of professional users. This period ended when AT was legalized by International and Dutch associations for the professional level as well for the amateur level, who became also embedded in the discussion where the relevance of the speech acts intensify leisure, weather cancelation, and field quality seemed to dominate.

4.7 PERIOD 2 – 1/2005-2/2006 THE ROMANCE OF FOOTBALL AND GRASS

Figure 16 displays the amount of times speech acts were positive, negative or neutral. In this period, positive seemed to dominate but also negative beliefs seem to become more prominent than before.

Figure 16 - Amount of speech act per beliefs per half a year (P2)
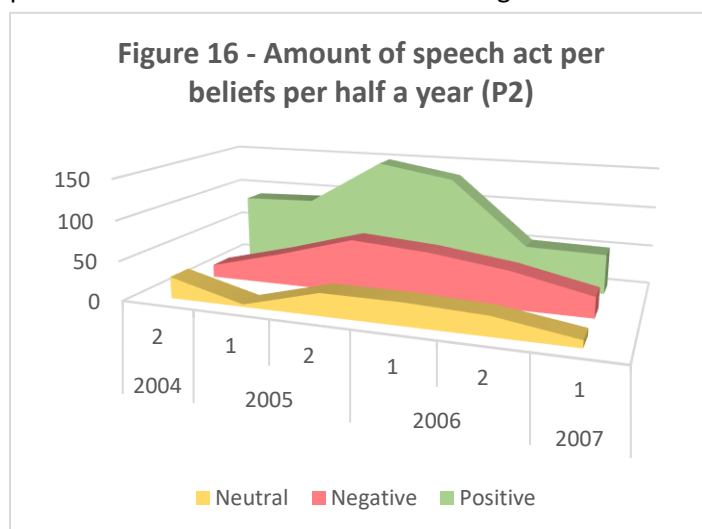
This indicated that adoption of AT was perceived by a majority as positive in the world of football, but the opposition also increased during this period. At the end of the second half of 2006, the presence of actor articulating positive beliefs even seemed to decrease substantially.

Figure 17 was again part of the larger graph in appendix V. This graph was altered to show a more detailed view of the relevant actor groups in this period. Within this period, four actor groups seemed to be relevant and participated in the discussion to understand the critical changes in this period. This period can be characterized by the rise of opposition from the professional user and media groups, where producers and experts were answering to this opposition.

These actor groups seemed to be most relevant during the second identified period and were, therefore, these groups are analyzed in terms of the speech acts they used in this period. These speech acts are displayed in Table 25. Again not all speech acts were taken into account for the same reasons.

The professional user group seemed to be focusing on two positive and two negative speech acts. The negative speech acts focused on injury safety, which indicated that professional users do not perceive the AT underground as safe enough to prevent

Figure 17 - Amount of speech act per actor category per half a year (P2)

injuries, and on mythical grass, which presented they believed that natural grass should be part of the culture in football. However, not all professional users agreed in terms of the safety speech acts and
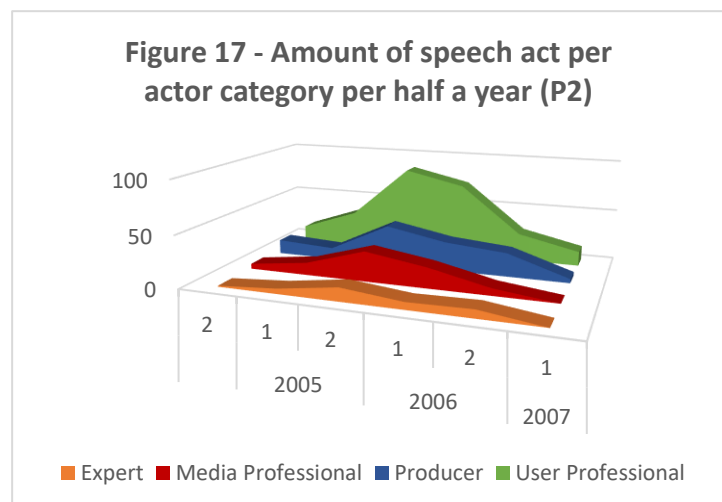
added that the field quality speech act should be valued as more important. However, the positive side seemed less prominent. Especially when media actors themselves started reinforcing the mythical grass speech acts and the natural grass producers stated negative field quality speech acts, because they argued that they can maintain natural grass fields of high quality and AT was therefore not needed.

These development were countered by the AT producers by stating against the mythical grass speech act, which they reinforced with technological developments as reflex grass that bended back just like natural grass. They also used the game blueprint speech act where ball play experiences were measured similar to natural grass. At last, they stated the financial gains of AT in the revenue model speech acts.

Actor	Speech act type	Beliefs	#
User Professional	Injury safety	Negative	15
	Mythical grass	Negative	9
	Injury safety	Positive	7
	Field quality	Positive	6
Producer AT	Health safety	Neutral	6
	Mythical grass	Positive	4
	Revenue model	Positive	4
	Game blueprint	Positive	4
Producer natural	Field quality	Negative	3
Expert	Health safety	Negative	5
	Health safety	Neutral	4
	Injury safety	Positive	3
	Injury safety	Neutral	2
Media professional	Mythical grass	Negative	8

Table 25 - Speech acts relevant actor categories P2

At last, the experts entered the debate around 2005. This was to mainly state that AT is not proven to cause more injuries and some experts even state that it should be considered beneficial in injury prevention. Furthermore, experts prevented a riot in the social system by stating AT does not cause cancer, which explains the health safety speech act. Despite multiple speech acts stated health safety was in danger, the Dutch government research institute stated that AT should not be unfavored in terms of health safety speech acts.

In conclusion, in period 2 actors groups at the professional level became less in favor of the adoption of AT. The discussion was among producers, professional users and media focusing on the professional level. Speech acts were articulated by producers, experts, institutional actors focused on the amateur level, professional users and amateur users. The negative beliefs in this period seemed to have more effect and injury safety and mythical grass seemed to cause a problem for AT producers who react by stating speech acts as game blueprint, revenue model and mythical grass. At last, opposition at the amateur level seemed to be prevented by a statement of the Dutch government research institute. These insights are connected to the events displayed in Figure 18.

Figure 18 - Timeline events period 2
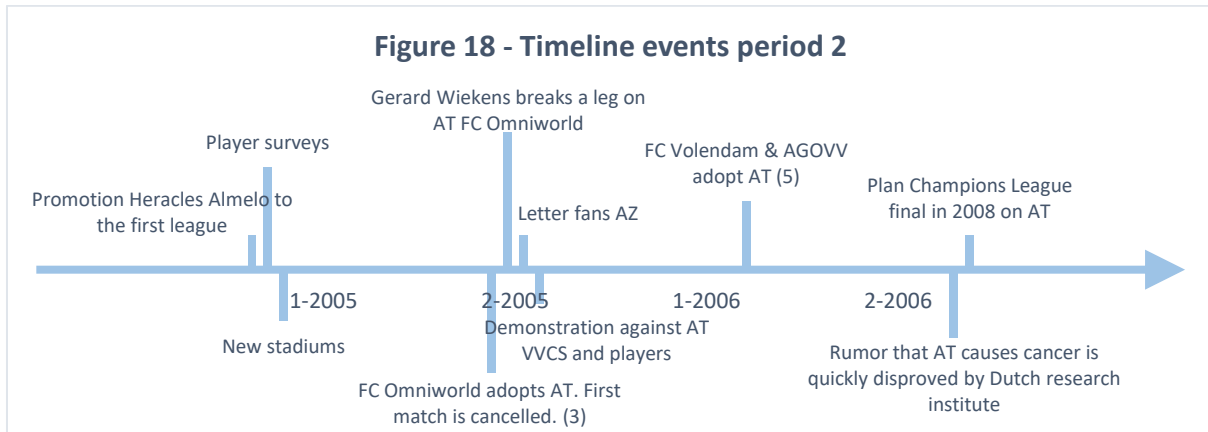
Period 2 starts after the legalization of AT in period 1. AT became also more relevant for multiple actor groups, because clubs started considering to adopt AT in their new stadiums. Additionally, the observability of AT increased because Heracles Almelo achieved promotion to the first league in the Netherlands. This meant that in the season of 2005/2006 for the first time matches would be played on AT in the first league of the Netherlands and player surveys were taken by player unions who did not believe the results from player surveys in the trial of the UEFA, which were in their opinion to positive. However, at the start of the season 2005/2006 a rise of speech acts could be identified. The adoption of FC Omniworld was influenced by exogenous events. The first match had to be canceled and in the redo a player, Gerard Wiekens, broke his splint bone and blamed the field. This may explain why the injury safety speech acts rose in this period and changed the focus of relevance in terms of embeddedness of professional users. This caused resistance from unions and player and they announced a lawsuit, which eventually was never filed.

In addition, the increased observability of AT led to opposition of supporters (professional user group) to stop professional clubs who considered to adopt AT in their new stadiums, which through social contestation developed a social endogenous event. This changed the embeddedness of clubs whose relevance to be part of a community increased. AZ was one of the first clubs to seriously consider adoption of AT in the first league but the opposition among the AZ supporters seemed too big. The letter the supporters wrote became a symbol (event) of maintaining natural grass in the first league. It seemed that this resistance scared most clubs to adopt AT in their new stadiums and only two second league clubs eventually deviated from this behavior before the season 2006/2007: FC Volendam and AGOVV Apeldoorn.

Period 2 ends with a limited adoption at the professional level by exogenous and endogenous events that changed the way actor groups considered their embeddedness. Further damage by a riot about cancer seemed to be prevented by the Dutch government. Despite this limited adoption, international organization still tried to establish a presence of AT at the professional level by reinforcing regulatory plans, such as the plan to play AT in the champions league match of 2008.

Additionally, the following example shows how producers or other actors in favor of AT did not seem to get a grasp on the romantic reasoning in this period. A clash between the romantics Johan Cruijff and Willem van Hanegem with realist Louis van Gaal was observed in the second half of 2006 and illustrated beautifully how mythical grass speech acts got more foothold than other kinds of speech acts. Mulder (2006) stated about this discussion that: "*Louis van Gaal carries the responsibility of one team, Van Hanegem and Cruijf carry the responsibility of football in its totality.*" Where van Hanegem (2006) in his column states: *I do not understand this plea for this fake thing. If you like good football, you love real grass. Grass is real, AT is fake. Do I need to say more?* The support of these more legitimate actors may have played a role as well in the developments in this period.

4.8 PERIOD 3 – 1/2007-1/2010 AMATEUR EMBRACEMENT, PROFESSIONAL TOLERANCE

For this period an additional insight is gathered to characterize the period. As can be observed from

Figure 19 - Estimate amount of AT fields over the years

AT fields Amateur — AT fields Professional
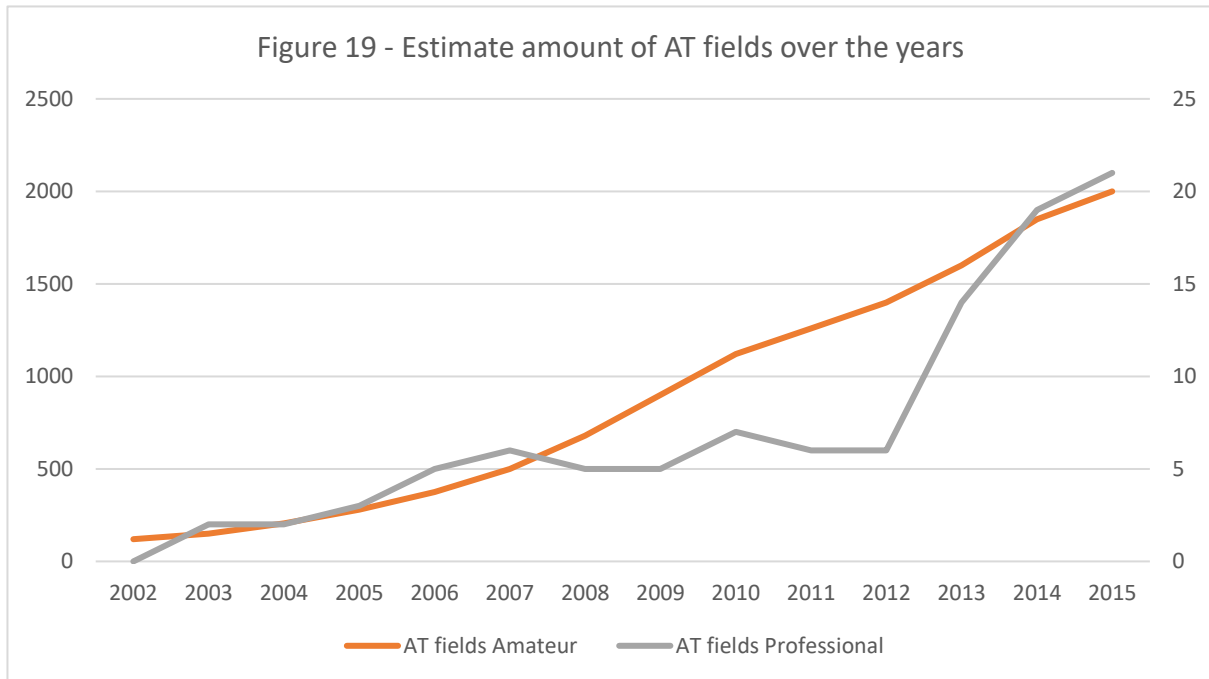
Figure 19, adoption in this period at the professional level seemed to be limited, while the amateur level increased over time. Taking this into account aided in understanding the following developments that are described next.

Figure 20 displays the amount of times a speech act was positive, negative or neutral. In this period, a rise in beliefs seemed to be equal for negative or positive at the start of this period, but at the end the positive beliefs seemed to dominate again. This change was most likely caused by relatively less professional actors present in the media among which only professional users remained a bit prominent.

Figure 20 - Amount of speech act per beliefs per half a year (P3)

Neutral Negative Positive

Figure 21 displays that five actor groups seemed to be relevant and participated in the discussion to understand the critical changes 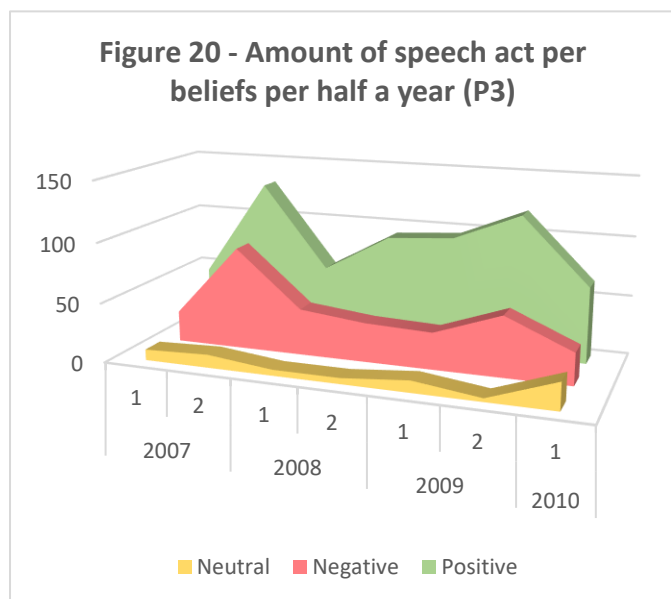in this period. This period can be characterized by the retreat from profession oriented speech acts and the positive speech acts on the amateur level. The actor groups that represented these developments were found to be producers, media amateur, institutional amateur, user amateur and user professional. These actor groups were analyzed in terms of the speech acts they used in this period. These speech acts are displayed in Table 26.

The first actor group that will be discussed is the professional user group. Remarkably, the dominant speech act of mythical grass disappeared and the speech act unfair advantage emerged. The current status quo where the diffusion of AT in the first league was prevented seemed to have changed the focus of the community order to the profession order. This was also illustrated by the opposing party that used the habit excellence speech act to counteract this unfairness. They reframed this unfairness as a smart trick that should be allowed within football and also still used the speech act field quality to glorify AT. This change in speech acts may indicate that actors were debating the status quo and adopted the myth of natural grass which was already maintained at the professional level.

Figure 21 - Amount of speech act per actor category per half a year (P3)
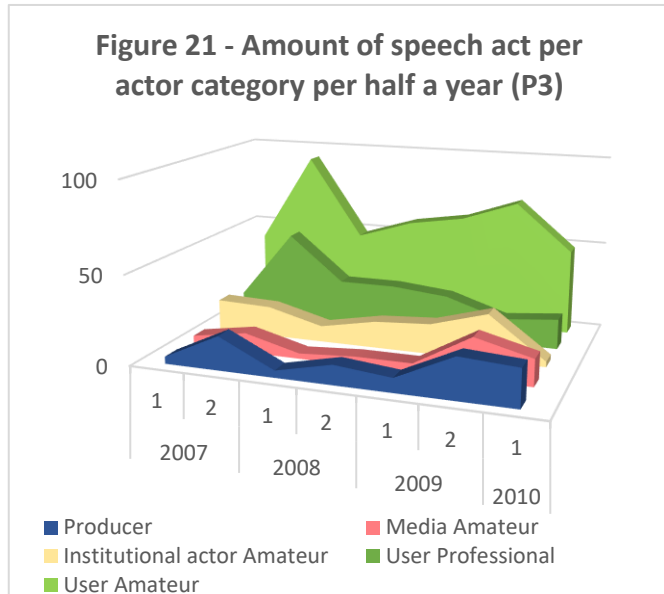
The second actor group that was most prominent in this time frame was the amateur user group. Amateur users used one negative speech act in Table 26, which focused on injury safety. The other speech acts were positive and related to the speech act types intensify use, training quality, field quality, weather cancelation, neat football, and technical excellence. Additionally, clubs seemed to be the only user category that articulated money-conscious speech acts, which showed their role as financial manager.

The third category also connected money-conscious speech acts to positive beliefs about AT. The institutional actors, who focused on the amateur level, expressed only positive about AT and their speech acts related to intensify leisure, manage space, multi member use, and funding. This indicated that the embeddedness within the community and the market order resulted in reinforcing speech acts instead of a competition of logics or technological frames.

The amateur media also seemed mostly positive as well. However, the media that focused on the amateur level seemed to have had a discussion in terms of the weather cancelation speech act and whether it should be considered a positive or negative aspect of AT.

At last, the producer group displays in Table 26 that natural grass producers used field quality speech acts which they connected to negative belief about AT. This was because they believed natural grass was sufficiently improved to prevent the need for AT. AT producers on the other hand used the game blueprint speech act to state AT was made similar to natural grass and therefore adoption should be desired.

User Professional		Injury safety	Negative	19
		Field quality	Positive	11
		Habit excellence	Positive	7
		Unfair advantage	Negative	6
User	All	Intensify leisure	Positive	42

Amateur		Training quality	Positive	28
		Field quality	Positive	26
		Injury safety	Negative	19
		Weather cancelation	Positive	20
		Neat football	Positive	15
		Technical excellence	Positive	12
	Club	Money-conscious	Positive	12
Inst. Actor Amateur		Intensify leisure	Positive	13
		Money-conscious	Positive	10
		Manage space	Positive	10
		Multi member use	Positive	10
		Funding	Positive	7
Media Amateur		Field quality	Positive	6
		Weather cancelation	Positive	5
		Weather cancelation	Negative	4
Producer	Natural producers	Field quality	Negative	7
	AT producers	Game blueprint	Positive	5

Table 26 Speech acts relevant actor categories P3

In conclusion, in period 3 the professional level seemed to have refocused the debate, which was less extreme because clubs did not adopt more AT fields anymore and the status quo seemed debated but tolerated. However, developments in this period could best be characterized by the amateur level where diffusion took off and actors groups seemed to be mainly positive about this diffusion. In total this period distinguished 12 positive speech act types compared to 4 negative speech act types. These speech acts seemed to be triggered by how actors were embedded within the social system rather than events triggering this framing. This may display that the amateur embeddedness differed from the professional one, where these speech acts were not articulated. These insights have been connected to the events displayed in Figure 22.

Figure 22 - Timeline events period 3

Report Dutch Football Association
'As green as grass'.
European Qualification
Rusland-England on AT

AT development:
Capillary tubes

Change rules amateur
level forces clubs to AT

WC 2010 has hybrid fields

KNVB reinforce rules field
heating or AT

FC Zwolle adopts AT (6)

SC Cambuur drops AT (5)

1-2007   2-2007   1-2008   2-2008   1-2009   2-2009   1-2010

Champions league final on AT is
modified to natural grass

RBC & Excelsior...

Ten Cate starts incorporating supply
chain in their own business

Volendam & Heracles win more
home than away matches

SOS natural grass

Extreme winter

AT weaving

Period 3 started with the Dutch association stating in a report about the acceptance of AT that AT was more accepted in amateur football than professional football and that the perception in professional football hampered the diffusion of AT at this level. This seemed to reduce the debate and limited further diffusion of AT at the professional level. This may explain why FC Zwolle was one of the last clubs that adopted AT for a while and Cambuur even decided to switch back to natural grass before the season of 2008/2009.

Meanwhile, AT and natural grass producers were making improvements in their production processes by making their supply chains more efficient and by product improvements, such as new seed mixes for natural grass or capillary tubes for AT, which explained the occurrence of the natural grass producers in the media. Association were not that prominent in the media but tried to establish more support for AT by getting internationally matches played on AT at the professional level. However, after global resistance after a European qualification match on AT, the champions league plans on the AT field were turned to a plan with natural grass. This could have been caused by a technological event where natural grass producer improved their technology significantly which reduced the need for AT.

Around the second half of 2008 the unfair advantage speech act seemed to be caused by a notion of the development around Heracles Almelo and FC Volendam who played in the first league. As journalist Hammink (2008) of journal De Gelderlander noticed about these clubs: "*Both clubs win more matches at home than outside their stadium. This is a common fact, but these clubs differ from the normal rates. Heracles gathered 17 points at home, while they only got 2 points away from home. For Volendam these ratios are 10 and 1. As reference: De Graafschap gathered 8 points at home and 4 in away matches.*"

That this reinforced the habit excellence speech act could be observed at the end of this period when Excelsior after a long period of time was the first club that adopted an AT field at the moment when it played in the first league (previous clubs adopted AT in the second league and after promotion increased the rate of AT fields at the professional level). They adopted not only an AT field as a smart trick to have an accepted competitive advantage but with the adoption of AT the field was minimalized to the smallest size possible within the rules of the Dutch football association to make the space to defend smaller, which increased their chance of having less goals scored against them. This showed that social contestation had resulted to the event of Excelsior adopting AT.

At last, a regulatory event of the Dutch football association, that stimulated the prevention of canceled matches, was that matches needed to be played at second fields of AT if the main field of natural grass was not playable due to weather conditions. However, the media observed that this led to matches in terrible weather conditions which nobody should desire, which explained their speech acts.

4.9 PERIOD 4 - 2/2010-1/2014 FINANCIAL CRISIS AND EXTREME WEATHER CONDITIONS

Figure 23 - Amount of speech act per beliefs per half a year (P4)

Figure 24 - Amount of speech act per actor category per half a year (P4)
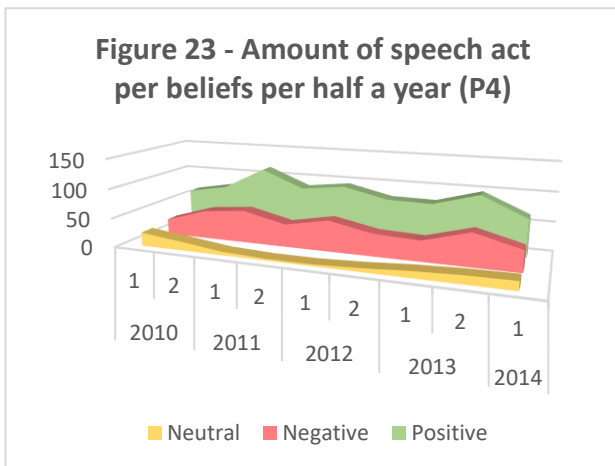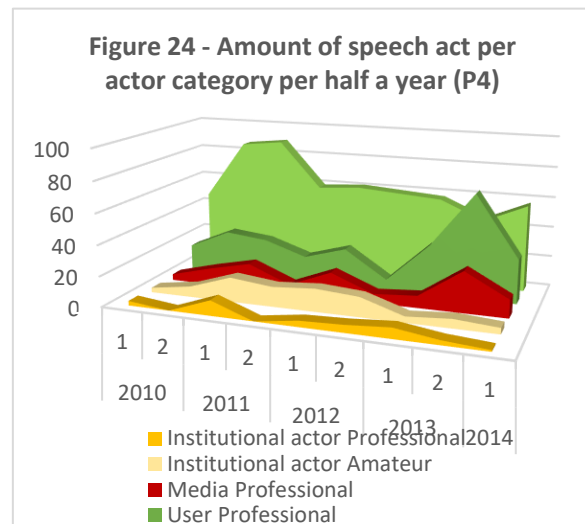

Figure 23 displays the amount of times a speech act was positive, negative or neutral. It shows that both positive and negative speech acts fluctuated simultaneously but positive speech acts seemed to increase more at the start of this period. This could indicate that a new status quo was reached that was debated during this period. Figure 24 displays that three actor groups seemed to be active and participated in the discussion. This period could be characterized by developments that caused the professional level to rise in prominence again in 2013. Furthermore, institutional actors focusing on the amateur level seemed to become more prominent as usual in the discussion and the amateur user level was most prominent.

First, the amateur level was analyzed in Table 27. At the amateur level not much had changed. Field quality, intensify leisure and training quality have remained the three most important speech acts, while injury safety remained the only negative speech act type at the amateur level. Other positive speech acts were weather cancelation, manage space, habit excellence, funding, and neat football. The framing of the amateur user category seemed to be maintained. This could not be said for the institutional actors that focused on the amateur level. Institutional actors at the amateur level were mostly townships who used the speech act types manage space, multi member use and weather cancelation to connect with positive beliefs. The funding speech act was connected in this period to a negative belief. This showed that a previous positive speech act for this actor group was changed to a negative speech act because they had less money to spend.

At the professional level, institutional actors seemed to be positive about AT. Townships bought stadiums of financially struggling professional clubs and supported this with a intensify stadium speech act, which stated that the stadium would be exploited for social functions to generate money by the implementation of AT. Associations connected AT with positive beliefs by articulating a weather cancelation speech act, which could indicate that the weather was influential in this period.

Actor		Institutional logic	Beliefs	Frequency
User Amateur		Field quality	Positive	41
		Intensify leisure	Positive	38
		Training quality	Positive	19
		Injury safety	Negative	18
		Weather cancelation	Positive	12
		Manage space	Positive	10

57

		Habit excellence	Positive	9
		Funding	Positive	9
		Neat football	Positive	8
Inst. Actor Amateur		Manage space	Positive	9
		Funding	Negative	8
		Multi member use	Positive	8
		Weather cancelation	Positive	7
Inst. Actor Professional	Municipality	Intensify stadium	Positive	4
	Associations	Weather cancelation	Positive	2
Media Professional		Preserve excellence	Negative	7
		System acceptance	Negative	5
		Mythical grass	Negative	5
User Professional		Injury safety	Negative	13
		Mythical grass	Negative	12
		Funding	Positive	10
		Field Quality	Positive	8
		Habit excellence	Positive	6
		Weather cancelation	Positive	6

Table 27 - Speech acts relevant actor categories P4

The media focusing on the professional level remained negative but seemed to slightly adapt their framing. Media opted for the system acceptance, preserve excellence, and the mythical grass speech acts, which displayed they were reconsidering their framing strategies by introducing new speech act types. Furthermore, the mythical grass speech act returned, which was negatively associated with AT in the professional user group. This group also still had negative beliefs based on the injury safety speech act. However, the professional user group seemed to be positive about AT in terms of funding, field quality and weather cancelation, which could indicate a change in their embeddedness because their relevance of speech acts changed. At last, habit excellence was also stated by professional users and connected to positive beliefs.

In conclusion, in period 4 the professional level seemed to be more open to adopt AT. The field quality and funding speech acts appeared to rise in terms of relevance. At the amateur level, an opposite trend could be identified. Amateur users remained positive in their framing of AT but townships used the funding speech act that was connected negatively to the adoption of AT, which indicated that something influenced their considerations in their role as financial provider. It may be also interesting to see the different perspectives of the townships that funded professional stadiums but stated there is a lack of funds for the amateur level. This presented that townships embeddedness in amateur level or professional level influenced how they framed their investments in AT. In total 9 positive speech acts could be identified compared to 5 negative speech acts. These insights were connected to the events displayed in Figure 25.

Figure 25 - Timeline events period 4

Heracles adopts 4rd generation of AT

Amateur league have skewed league tables

Bad fields at professional level

Group adoption 1: 7 clubs get AT (12)

Collective tender of AT by CED

WC Qatar related to AT

Effects financial crisis

Townships needs to economize

Extreme winter

Xtragrass has 10% AT

2-2010   1-2011   2-2011   1-2012   2-2012   1-2013   2-2013   1-2014

Shake-out AT producers

Financial crisis: AGOVV goes bankrupt (9)

Youth teams added to league (14)

England allows AT in FA Cup

RBC goes bankrupt (6)

This period started when the financial crisis influenced professional clubs who started struggling with their financial balances and were searching for solutions, which explained why some actor group roles were more embedded in a market order. The effects of the financial crisis took their toll on clubs who had also been running terrible financial managements. RBC and AGOVV went bankrupt during this period. Also, during this period the fields of clubs suffered from extreme winters, and with the change of regulations by the Dutch Football Association clubs, clubs needed field heating or AT. This change was applied because there were too many canceled matches or bad field conditions in the previous years. The drawback of AT, which was that it has high construction cost, became now its strength because field heating was a similar investment. This explains why the funding speech acts in professional football became more relevant in combination with the field quality speech act.

The funding and field quality speech acts led to a collective tender of clubs orchestrated by the Cooperation of the second league. This collective tender led to the adoption of seven clubs at once before the start of the football season 2013/2014. Events that aided this adoption was the development of a 4th generation of AT and the supply chain security Ten Cate implemented to guarantee the quality of fields. This period ended with the idea that AT seemed to finally diffuse widely at the professional level in the Netherlands and events also indicated that internationally a similar trend could be developed.

Where at the professional level the financial crisis seemed to have stimulated the consideration of the adoption of AT, the amateur level seemed to experience the opposite effect. Municipalities, who were a source for funding, had to economize their budgets and less funding was available for clubs to adopt AT. In short, exogenous events financial crisis and bad weather caused changes in how some actor groups were embedded in the field.

4.10 Period 5 – 2/2014-2/2016 Global trend professionals triggers resistance

Figure 26 - Amount of speech acts per beliefs per half a year (P5)
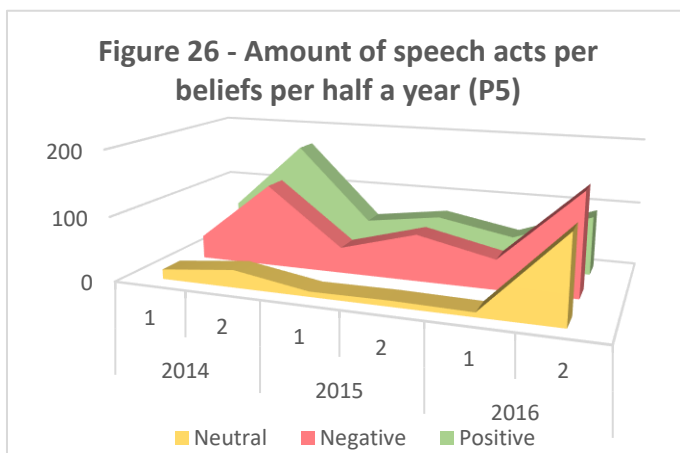
Neutral   Negative   Positive

Figure 26 displays that positive and negative beliefs had become more equal in absolute terms and pro and contra sides were in balance. This indicated that the dominance of positive beliefs seemed to be broken. Furthermore, at the end of 2016, a rise could be identified again in the beliefs about AT.

However, Figure 27 shows that this rise was not caused by the actors relevant to understand this period and indicates that something else was probably going on there, which is why period 6 is discussed.

This indicates that the debate on the professional and amateur level became alienated, because the actor groups seem to rise independently from each other. Figure 27 displays that the professional users group and the actor group media that focused on the professional level that seemed to rise considerably during the second half of 2014.

The professional media appeared to have designed new speech acts in Table 28 such as Dutch play quality, which was a slight adaptation from the preserve excellence speech act. They composed a framing that stated that excellence was preserved in the blueprints of natural grass. This meant that playing on AT turf asked for wrong qualities that had resulted in a competitive disadvantage for the Netherlands internationally. Additionally, the mythical grass speech act was often articulated as well. This had been effective before, which could explain this usage.
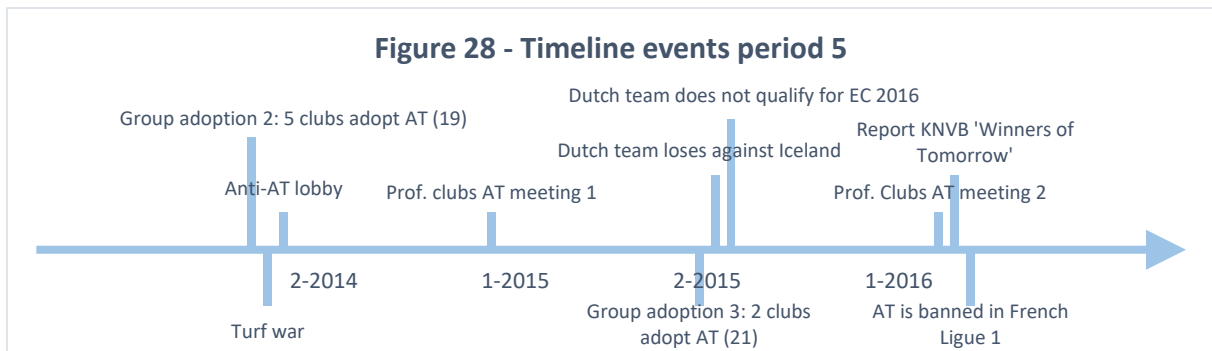

Figure 27 - Amount of speech act per actor category per half a year (P2)
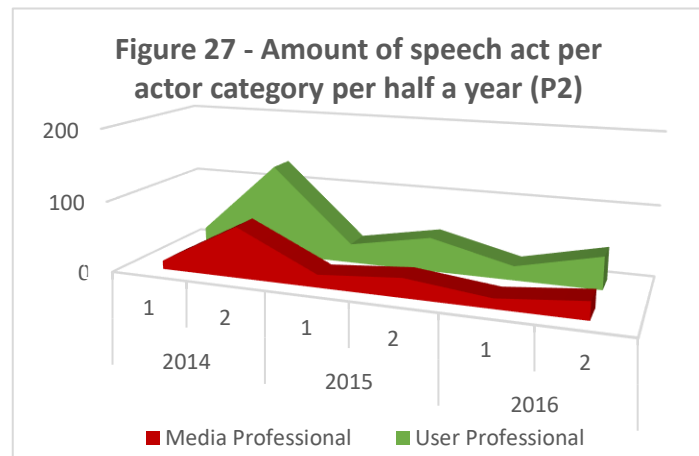
Actor		Institutional logics	Beliefs	Frequency
Media Professional		Mythical grass	Negative	20
		Dutch play quality	Negative	18
		Preserve excellence	Negative	11
User Professional	All	Injury safety	Negative	14
		Dutch play quality	Negative	14
		Dutch attractiveness	Negative	10
		Preserve excellence	Negative	9
		Field quality	Positive	8
	Club	Survival	Positive	7

Table 28 - Speech acts relevant actor categories P5

The professional user category seemed to follow this trend of the media and even added another speech act to the discussion with Dutch attractiveness that implied that no good players will ever come to the Netherlands because there are too much fields of AT no one wants to play on. Also the negative injury safety speech act was still present. Professional users that were in favor of adopting AT also redevelop their funding speech act into a survival speech act. They started arguing that without AT they could not financially survive and maintain proper fields of high quality, which was stated in their field quality speech acts.

In conclusion, five negative speech acts seemed to dominate this period with two positive speech act to oppose these speech acts. Period 5 may be characterized by events that triggered the opposition to rise and successful establish dominant frames about the presence of AT in the world of football.

Figure 28 - Timeline events period 5

Group adoption 2: 5 clubs adopt AT (19)

Dutch team does not qualify for EC 2016

Report KNVB 'Winners of Tomorrow'

Anti-AT lobby

Dutch team loses against Iceland

Prof. clubs AT meeting 1

Prof. Clubs AT meeting 2

2-2014   1-2015   2-2015   1-2016

Turf war

Group adoption 3: 2 clubs adopt AT (21)

AT is banned in French Ligue 1

This period started after the second big adoption wave in the Dutch national leagues that brought the total of clubs with AT on 19 clubs out of 40. This adoption and global trends seemed to have triggered an anti-AT lobby in the Netherlands that started redeveloping the framing of AT. At first, the Turf War could be identified. The Turf War was a metaphor for the law suit of female players against the FIFA because the FIFA had decided that the women world championship would be played on AT in the summer of 2015. This resistance seemed rather innocent at first but when Blatter stated that this would also be the future for world championships for men, people on a global level opposed to AT. This trend was adopted in the Netherlands. During this period this opposition tried to find a way to get rid of AT. Their framing strategy seemed to be successful in terms of gathering support for their framing, which was partly stimulated by the internationally bad results of Dutch clubs and the Dutch national team. Meetings were held to discuss the issue but there appeared to be a financial AT lock-in. The escape from this lock-in required a financial plan to compensate clubs with AT for their investments and lost opportunity cost. Unfortunately, the opposition did not find a way to make this financially possible and the impasse between AT clubs and non-AT clubs remained to exist.

This period showed how exogenous events of bad performance of Dutch clubs and the national team changed the relevance of focus of actor groups within the profession order that started to articulating negative beliefs, which through social contestation led to endogenous events, such as meetings about AT. This resulted eventually in a lock-in which showed that even when a technology was framed as negative, its adoption or presence could not be overcome.

4.11 PERIOD 6 – 2/2016 BROADCAST ZEMBLA WHIPS UP CANCER DISCUSSION

Figure 28 displays the amount of times a speech act was positive, negative or neutral. In this small period of time, a rise in negative beliefs could be perceived that became more dominant than the positive beliefs. This change was caused by the rise of actor groups focused on the amateur level because Figure 26 and 27 showed that the rise in this period of negative and neutral beliefs was not connected to actors embedded within the professional level. Therefore, this distinctively period within the amateur level displayed a tremendous switch in beliefs and a considerably rise in speech acts. Figure 29 displays that four actor groups seemed to be relevant and participated in the discussion to understand the critical changes in this period. These actor groups were analyzed in terms of the speech acts they used in this period. These speech acts are displayed in Table 29.

Figure 28 - Amount of speech act per actor group per half a year (P6)

Figure 29 - Amount of speech acts per beliefs per half a year (P6)
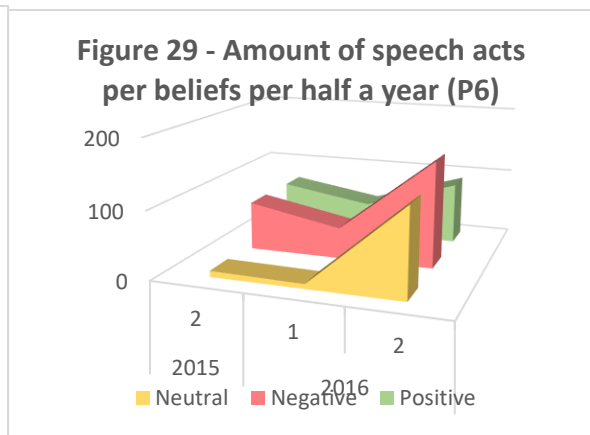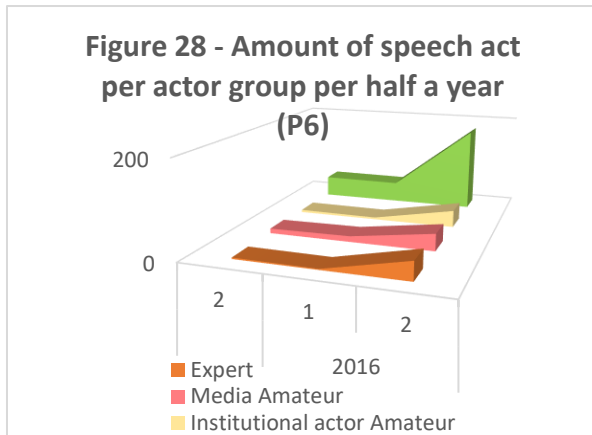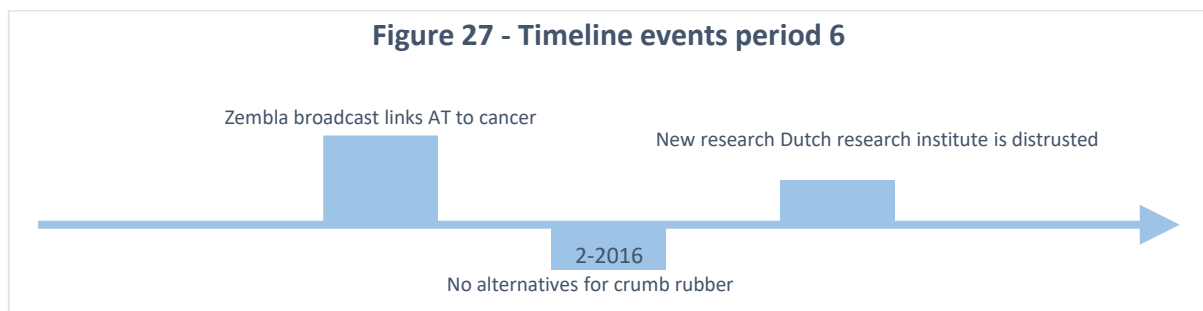
Table 29 displays that all relevant actor groups were mainly focused on the health safety speech acts. This was remarkable and displayed that the risk for cancer could take over a whole frame of a well-accepted technology at the amateur level. Also, the difference in reaction in this period compared to 2006 when AT was not widely adopted yet was remarkable. Because the product was not widely adopted in 2006, it seemed that less actors cared about this news about AT and cancer. In 2016, this was different because AT was integrated nationally and amateur actors were somehow related now to a role that was influenced by the notion of cancer. However, beliefs whether AT did cause cancer varied, which is interesting. This indicates that a clear consensus about the truth was lacking.

Actor	Institutional logics	Beliefs	Frequency
Expert	Health safety	Neutral	10
	Injury safety	Neutral	6
	Health safety	Negative	4
User	Health safety	Neutral	54
	Health safety	Negative	35
Inst. actor	Health safety	Neutral	15
	Health safety	Negative	5
Media	Health safety	Negative	7
	Health safety	Neutral	6

Table 29- Speech acts characterization actor categories P6

Figure 27 - Timeline events period 6

Zembla broadcast links AT to cancer

New research Dutch research institute is distrusted

2-2016

No alternatives for crumb rubber

This absence of truth could be best explained by looking at three events that start and end this period. Period 6 starts with the broadcast of Zembla that triggered speech acts in the amateur level to rise about health safety. The documentary of Zembla on national television caused a big discussion around

the chance that the crumb rubber grains of AT contained substances that caused cancer. The discussion seemed to end, because there was no good alternative for crumb rubber and actors at the amateur level also seemed to be lock-in in the usage of AT. The choice to stop with playing football seemed more drastic than taking the unknown risk of cancer, which meant the survival of AT fields in amateur football. This showed how beliefs of some experts caused a endogenous event of a television broadcast that changed the relevance of speech act at the amateur level and led to social contestation, which resulted into additional research on cancer.

5 DISCUSSION

The aim of this thesis was to explore how different actor groups made sense of a technology by connecting technological framing and institutional logics theory. This connection was explored by investigating how the embeddedness of actor groups in a social system influence the way they made sense of a technology in terms of the evaluation criteria and institutional logics they connect. This connection influenced whether the adoption of a technology should be valued as desirable in terms of actor groups having positive, negative or neutral beliefs. At last, the changes in the connection of different embedded actors over time were investigated by taking into account the occurrence of endogenous and exogenous events. The results of this research were used to develop a process model to explain technology sensemaking in social systems over time, which explains how the embeddedness of actor groups in a social system influence the connections they make between logics and evaluation criteria and how events change how actor groups connect these concepts over time. This model is presented in Model 1 and will now be discussed in relation to previous literature.
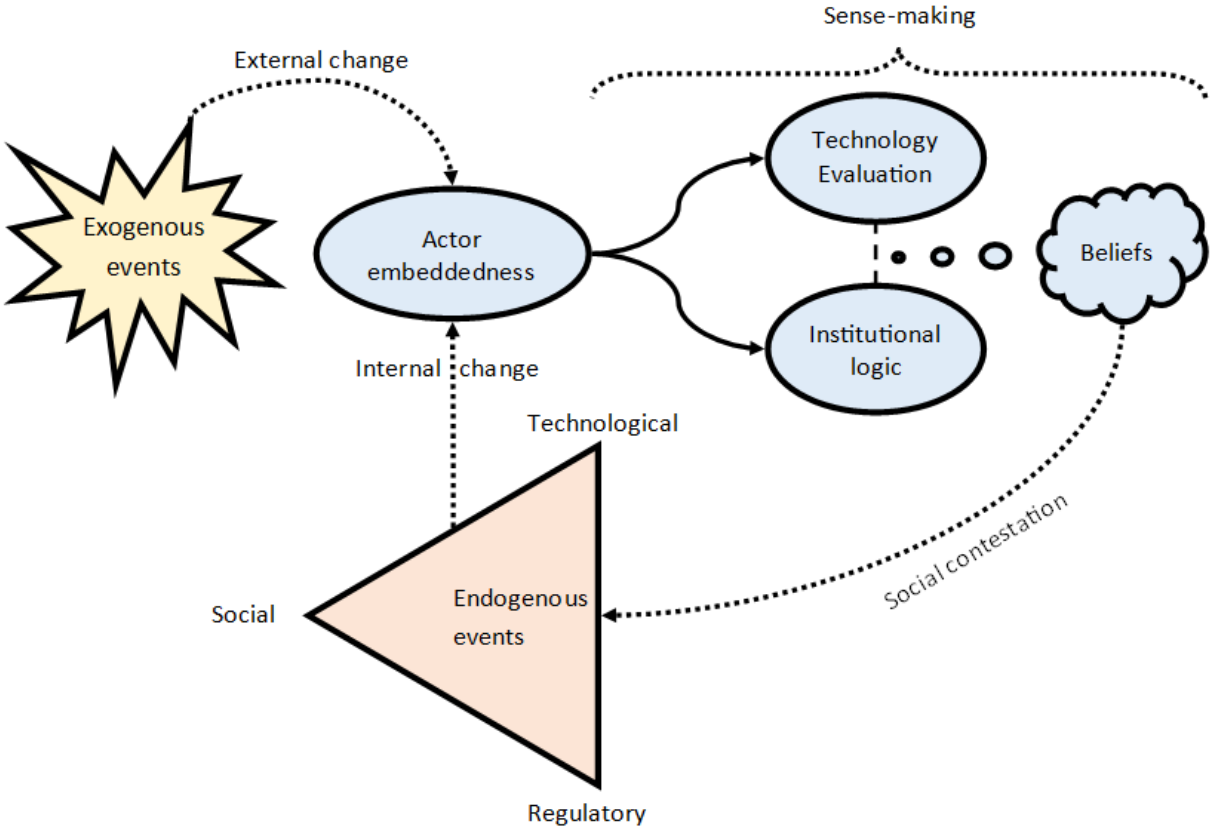
Model 2 - A process model of technology sense-making in social systems

5.1 SENSEMAKING PROCESS

First, this model suggests that the sensemaking of technologies differs between different embedded actor groups in a social system. From the results of this thesis could be derived that 28 connections

were identified in speech acts and that actor groups differed in which connections were used to determine their beliefs. Consequently, the beliefs of different actor groups can also be different. These observations are in line with Kaplan & Tripsas (2008) who stated that actor groups differ in their embeddedness in a social system and as such interpret technologies differently by making use of different evaluation criteria. Furthermore, this model is in line with Thornton et al. (2012) who state that the differences in embeddedness of actor groups influence the different use of institutional logics by these actor groups. The theoretical contribution of this model is that this model states that a connection between the two concepts of institutional logics and evaluation criteria influence the beliefs actor groups have about a technology.

Previous research has focused on the difference between technological frames of actor groups (Orlikowski & Gash, 1994) or within actor groups (Garud & Rappa, 1994). This model provides an alternative explanation for why these difference were obtained, e.g. some producers of cochlear implants may have focused on a safety logic in the community according to which a device was developed that was safer to use, where other producers adapted their product according to a high-quality logic present in their profession from which they developed cochlear implants that were more efficient in understanding speech (Garud & Rappa, 1994). Where the one does not have to exclude the other, the institutional logic perspective showed that actors may have a different interpretation of which goals they should opt for in a social system. This explains why actors differ in the way they make sense of a technology and eventually follow different technological trajectories (Garud & Rappa, 1994).

Furthermore, research has already focused on how actors maneuver between different logics (Smets et al., 2015; Wagner, 2018). These studies talked about community, market or profession logics as if they represent a single logic in the field. From the results of section 4.1, this thesis showed that the classification of logics should be seen as more complex than previous research has often stated. Community and the respective other orders should be seen as orders from which more specific logics arise. These logics can be further defined by the slight differences in situational settings which aim for different goals, e.g. the logic to create the opportunity to play can be aimed at increasing leisure opportunities through intensifying the use of facilities, but can also be aimed to prevent the cancelation of matches. This thesis showed that what was previously often referred to as just a community logic should be considered as a multi-layered concept, which this research has divided into the levels of order, logic, and goal. For evaluation criteria, a similar conclusion may be made where play experience is a category of smaller evaluation aspects of an underground e.g. ball play characteristics or technical game. Without using these different layers, the change from speech acts based on money-consciousness that aimed for long-term cost reductions, to speech acts based on survival, that aimed at financially stability and survival would be both identified as a market logic, while this change is critical in maintaining AT as part of football.

Another observation was that the producer group did articulate logics that were not related to the market order as the theory of Thornton et al. (2012) would argue. This theory stated that producers would be faceless and mainly related to a market logic to sell their products. This research found that producers could be better described as an actor with many faces. A producer identifies the common goals within a social system and tries to connect them in a speech act with positive evaluation criteria. In period 1, producers connected to the present goal to prevent open wounds from playing on AT because the sliding resistance of second generation fields was insufficient. This meant that producers were not faceless but adapted their reasoning to the goals that they identified in the social system. This explained why AT producers had speech acts based on community, profession and market logics over time in order to strengthen positive speech acts and counteract negative speech acts, or vice versa, when competing natural producers were speaking. Therefore, actor groups do not only perceive institutional logics relevant for their normative actions but can sympathize with logics of others.

5.2 PROCESS OF SOCIAL CONTESTATION AND INTERNAL CHANGE BY ENDOGENOUS EVENTS

Kaplan & Tripsas (2008) argued that actors groups can attempt to impose their technological frame on to others, which they described as a social contestation that aims at setting a technology frame that

predominates in the social system. This means that the establishment of actor groups with shared positive or negative beliefs may be critical to stimulate these actor groups to undertake certain decisions or actions that lead to certain significant events in time that influence the frames of others (Snow, Rochford, Worden, & Benford, 1986). This is a process of social contestation arising from actor groups with certain beliefs, which can be observed in Model 1.

Previous research in technological framing has addressed ways to establish dominant frames by social upheaval and collective action of actor groups to shape the technological frame of others (Benford & Snow, 2000). Furthermore, Garud & Rappa (1994) showed how the beliefs of producers can influence the technological trajectory and development of a technology, which they argued has a feedback loop that states that successful trajectories will reinforce positive beliefs or vice versa with negative beliefs. Furthermore, the framing of technologies may influence regulatory frameworks that can steer the way actors groups perceive the technology (Smismans & Stokes, 2017). This research has classified these types of events as endogenous events, which means these events cause a change that is influenced by the actions and decisions of actor groups whose actions arise from having a certain belief about a technology. This belief is built on a connection between institutional logics and evaluation criteria. These actions can be classified as technological, social, and regulatory. This classification was also used in understanding institutional change by previous literature (Greenwood et al., 2002).

These three types of events can influence the embeddedness of actor groups by changing the focus of attention of members or units in the social system. This means relevance of a certain embeddedness in the field could be revealed by certain events, which is in line with the rule of relevance of Dequech (2003). For example, in 2016 experts in the broadcast of Zembla shared their negative beliefs based on evaluating the technology in terms of risk for cancer and the aim that football should be safe to play. They started a social contestation in 2016, which eventually stimulated a social upheaval around the event of the Zembla broadcast. This caused an internal change where amateur users seemed to gain more legitimacy to articulate speech act and became more embedded in the media. Also, the amateur users adopted the safety logic and cancer evaluations introduced by experts. This reinforcement of a speech act by another group of actors did trigger additional social contestation and government representatives were considering to make the rules more strict in terms of polluting substances in the crumb rubber of AT, while producers started to suggest different technological solutions. This example illustrated how the beliefs of an actor group that participates in social contestation can create endogenous events that may trigger an internal change of how actors are embedded in the social system. This is in line with previous research that stated events could cause change if brought under attention by social contestation of actors (Munir, 2005). This changes the way they connect logics and evaluation criteria, which could change their beliefs and reinforce the loop.

5.3 EXTERNAL CHANGE BY EXOGENOUS EVENTS AND FURTHER RESEARCH MODEL

At last, model 1 suggests that change is not only stimulated from within the social system but could also be caused by exogenous events. This is in line with van Woerkum, Aarts, & Van Herzele (2011) who stated that some changes are unplanned tricks of nature or occur by chance. For example, the financial crisis or extreme winters in the fourth period in result section 4.3 changed the embeddedness of some actor groups who's speech act in the media became more prominent and they focused more on the logics arising from the market order while connecting these to evaluation criteria of economic effects. This was caused because their role as financial managers became more important, which connects to the notion of commodification of sports by Walsh & Giulianotti (2001). The recognition of endogenous events adds to describe the uncertainty around technologies stated by Garud & Rappa (1994) who mainly referred to this by linking it to actor's bounded rationality to oversee all possible options.

Additionally, the notion of exogenous events stimulated the idea that change in social systems with developed dominant technology frames and institutional logics can still occur. Kaplan & Tripsas (2008) statement of a dominant collective technological frame that is understood by every individual

the same is therefore hard to maintain. Endogenous events can be controlled within the social contestation, but exogenous events can still trigger differences among actors that eventually create variances in interpretations of evaluation criteria and logics within a social system. From the observations in the results of 4.3, period 5 was triggered by an exogenous event such as the bad performance of Dutch Football that changed how certain actors embedded themselves within the discussion by introducing a new connection of logic and evaluation criteria that caused negative beliefs and eventually led to an endogenous event of official meetings to discuss the presence of AT.

In conclusion, by bridging the gap on how institutional logics and evaluation criteria are linked in the context of a social system, a model is being made to observe the processes that could explain why the adoption and diffusion of technologies may take off or be hampered. This model can be applied to other technologies in sport and could maybe even be applied to any technology that is diffused in a social system where logics from institutional orders and evaluations of tech frames play a role. However, more additional research is needed to confirm these assumptions. Further research could focus on the validation of the proposed model in this thesis in three ways. Firstly, further research could investigate the sensemaking process. The effectiveness of strategies within the sensemaking process in terms of connecting institutional logics and evaluation criteria could be an interesting research objective. A focus within the sensemaking process could be on how to secure dominant connections between logics and evaluation criteria, or on contrary how actor groups can reconsider their embeddedness in a social system to trigger new kind of connections. This could provide new insights into the connection between normative and cognitive structures around technologies in a social system. Also, this research has mainly focused on the cognitive structure in terms of beliefs and evaluation criteria, while the artifacts could still maybe add something to our insights.

Secondly, the process of social contestation over time could be further investigated. How actors purposively or passively influence the emergence of endogenous events and how these change actor embeddedness, could be an interesting direction for further research. From this case study can be derived that social contestation in professional football evolved over time. Where in period 1, 2 and 3 the adoption and diffusion were hampered by social contestation focused on the mythical grass and injury safety speech acts, period 5 was dominated by the speech acts on Dutch play quality and Dutch attractiveness. The transition from focusing from the community to professional logics is an interesting development in how the social contestation changed and could be interesting to research further.

Thirdly, the model suggests that various kinds of events are related to chance. Research whether there are ways to deal with or decrease the probability of chance occurring events, such as tricks of nature, could be another starting point for research to further explore the connection between institutional logics and technological framing. At the moment endogenous events can be fitted within three variables. A similar conceptualization of exogenous events could aid in the understanding of the process of external change. This research, for example, confirmed the tricks of nature but also found economic external effects such as a financial crisis.

5.4 LIMITATIONS AND FURTHER RESEARCH

The first limitation of this thesis is that it is only based on newspaper articles. The collection of some different media sources, such as video material or professional magazines, could have aided to obtain triangulated insights. However, the wide and depth of the research articles were very detailed and represented a wide range of different perspectives from both the amateur and the professional level. Other media sources, such as professional magazines, e.g. Voetbal International, de Voetbaltrainer & Hardgras have been considered, but the data collection from LexisNexis was extensive enough to capture the discussion in the Netherlands. Additionally, LexisNexis contained press media that focused on the professional level as well as on the amateur level. It appeared that this focus enabled to reveal the considerable differences in the perception of AT among amateur and professional football. Media speech acts that focused on professional football were more often negative about AT compared to media speech acts that focused on the amateur level. This indicated that data sources that only

represented one level of football may be less informative and may be more likely to give a distorted picture. Another reason that made previously mentioned magazine media less suitable was that specialist publications are less accessible or available for the general public because specialist publications often require subscriptions and are therefore not easily obtained (Sherratt, 2011). LexisNexis with national and regional papers suffered least from selection bias and news items get more easily published, and therefore may contain varied speech acts and more different actors groups may be represented from the professional and amateur level.

Another limitation was related to the nature of this research. This research has a qualitative nature, but used quantitative methods to increase the external validity and objectivity of the results. This was possible due to the big amounts of data collected. Not including a second rater for the complete coding process may have influenced the results. An additional test was used to increase the objectivity further by measuring the kappa between researchers. For the collection of articles, this kappa was sufficient. However, qualitative content analysis has its limitations and always contains a certain researcher's bias for which this thesis has controlled as much as possible. Differences in coding were most likely caused by a different perception of what the coding entailed. This indicates that the use of the database can only be done after doing the qualitative analysis to get familiar with the more abstract codes. The method that this thesis used, however, seems to be a fruitful approach to do media content analysis to obtain rich insights, not only from the qualitative interpretation but also by applying quantitative analyses. This provided an additional confirmation of identified qualitative insights.

The last limitation is related to the concept of embeddedness of actor groups within a social system. This observed presence or change within the social relations of actor groups that cause them to connect certain logics and evaluation criteria is biased by the media, who do not only provide an overview of the developments but also determine whether someone's embeddedness matters to publish in the newspapers. For example, if the media wants to pick up the Zembla story, they would most likely purposely pick amateur clubs with soccer moms that are concerned about the health of their children to steer the public opinion. The lack of professional users giving an opinion was maybe not caused because it does not affect them but was steered by the media who preferred to frame the poor little children on AT fields that could get cancer instead of the professional players who one might not pity as much. However, another reason is that professional actors still used a lot of natural grass fields, which could be compared to the situation of the amateur level in 2006 when also not many actors were embedded in a situation that they used AT on a daily basis and the discussion did not take off as in 2016. This remark is maybe even more present within a sport where media provides an important connection to inform supporters or stakeholders in football about developments in football and mobilizing protest movement in media have been observed (Hill, Canniford, & Millward, 2018). This is an interesting remark since taken this into account could provide another interesting perspective to evaluate the developments described in this research and could be a starting point for further research on how the media frames the discussion around a technology.

5.5 PRACTICAL RELEVANCE AND FURTHER RESEARCH

What may be learned from our case study is that the embeddedness of actor groups was steered from within the system by social contestation that leads to certain endogenous events. This research did not focus on the effectiveness of establishing certain endogenous events, but it is fair to assume that the regulatory legalization of AT in professional football by associations did not lead to instant large-scale adoption and diffusion in the past. This shows that the effect of regulatory events and other events are maybe not always that influential as one sometimes may think. Approval to use something does not mean that a technology will be used, and the Dutch Football Association should maybe have reconsidered their strategy at that time since it is more important to focus how these endogenous events connect normative and cognitive frameworks in terms of the institutional logics and evaluation criteria that people connect. Looking at the diffusion rates at the amateur and professional level it could be assumed that these normative and cognitive structures were in place for the amateur level but have been poorly facilitated for the professional level that defined their utility differently.

Furthermore, the change of institutional logics or evaluation criteria is relevant even in later periods of the product lifecycle. In this case study, the presence of producers was most dominant at the beginning of the time frame. This could indicate that producers after initial adoption were also less aware of the role they could play in the framing of their technology in the media. This applies even more to the natural grass producers who were relatively absent in the discussion and maybe did not think that AT could ever become attractive for professional football. This connects to Christensen's (2013) notion that user groups differ in terms of the quality they need to adopt the technology in the early stages of the product life cycle but that through developments an inferior product can attract even the high-end markets as happened in period 4. After this adoption, a lock-in could be observed in terms of quasi-irreversibility (David, 1985) that was caused by the high cost that was perceived regarding switching back to natural grass. Despite that actor groups in period 5 reconsidered the connection between logics and evaluation criteria, it may have been too late to reverse the transition of 21 professional clubs from natural grass to artificial turf due to a financial lock-in. Therefore, both types of producers need to stay tuned in the discussion to guide the cognitive and normative structures because logics and evaluation criteria can change over time and some developments may be irreversible and support or resistance may come too late.

At last, this case study showed that latent speech acts could be triggered by certain endogenous events. The cancer discussion was started in 2006 but eventually took off in 2016 when AT was large-scale adopted and social contestation reintroduced the notion of this speech act. This indicates that some logics or evaluation criteria could become prominent in later moments in time. This analogy could be applied to other dimensions of logics and evaluation criteria such as the supply chain management of AT, which was currently debated because the disposal of AT seems to be badly managed and harms the environment (Zembla, 2018). This already caused some damage to the image of AT, but the discussion has not taken off that dramatically yet. Applying the previous analogy, AT producers should understand that if they do not deal with this threat forcefully and adequately, it may cause problems in the future. Therefore, new research potential is indicated how to incorporate the disposal of AT in the supply chain in a sustainable way and use environmentally safety speech acts in favor of AT. Especially, since AT supplier Ten Cate already have incorporated other components of the supply chain in their production process to secure the quality of AT. This indicates they have the capabilities to incorporate other parts of their supply chain to improve the production. With the notion of endogenous and exogenous events, it seems to be a matter of time before prominent speech acts in this area could start to rise. Also incorporating and improving the now inferior recycling methods of external companies could aid to connect to global sustainability goals, which connects to the importance of corporate social sustainability.

6   CONCLUSION

To conclude, the answer to the research question needs to be addressed. The answer to the question *"How does the embeddedness of actor groups influence the connection they make between institutional logics and technological and how events influence this connection over time",* is that different embedded actors have different roles within different levels that create a different embeddedness in a social system. This different embeddedness causes them to connect institutional logics and evaluation criteria differently. Important is the recognition that these concepts are multilayered and more complex than previous research has often shown. The connection of logics and evaluation criteria lead to actor groups having certain beliefs, which can cause them to participate in social contestation over time. Social contestations are actions and decisions actor groups make to end up with endogenous events that cause an internal change of how embedded actor group previously perceived the connection between a technology and the social system. This change can cause a reevaluation of the connection of institutional logics and evaluation criteria and a feedback-loop can be observed. At last, this change in the embeddedness of actor groups can not only occur from within the social system but can also be influenced by exogenous events. This means that dominant collective

frames in the system can still be adapted by developments that arise from outside the social system and cause embedded actors to connect institutional logics and evaluation criteria differently.

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Appendix I – Table media sources frequencies

Media name	Amount of speech acts	Cumulative amount in absolute numbers	Cumulative amount in percentages
De Gelderlander	466	466	10%
Dagblad Tubantia/Twentsche Courant	348	814	18%
Brabants Dagblad	275	1089	24%
De Volkskrant	274	1363	30%
BN/DeStem	262	1625	36%
AD/Rotterdams Dagblad	241	1866	41%
Dagblad van het Noorden	162	2028	44%
Dagblad De Limburger	147	2175	48%
Noordhollands Dagblad	142	2317	51%
De Telegraaf	134	2451	54%
Eindhovens Dagblad	131	2582	57%
AD/Amersfoortse Courant	190	2772	61%
AD/Rivierenland	129	2901	64%
Leeuwarder Courant	124	3025	66%
NRC Handelsblad	115	3140	69%
ANP	105	3245	71%
AD/Haagsche Courant	102	3347	74%
Het Parool	100	3447	76%
AD/Groene Hart	76	3523	77%
De Stentor/Apeldoornse Courant	68	3591	79%
De Stentor/ Deventer Dagblad	61	3652	80%
Provinciale Zeeuwse Courant	58	3710	82%
AD/Utrechts Nieuwsblad	55	3765	83%
De Gooi- en Eemlander	53	3818	84%
Leidsch Dagblad	53	3871	85%
De Stentor/ Zwolse Courant	51	3922	86%
Trouw	50	3972	87%
Haarlems Dagblad	48	4020	88%
AD/Algemeen Dagblad	47	4067	89%
De Stentor/Gelders Dagblad	45	4112	90%
De Stentor/Veluws Dagblad	45	4157	91%
De Stentor/ Dagblad Flevoland	37	4194	92%
Metro	37	4231	93%
Het Financieele Dagblad	35	4266	94%
De Stentor/Sallands Dagblad	33	4299	95%
De Stentor	31	4330	95%
AD/De Dordtenaar	29	4359	96%
De Stentor/Zutphens Dagblad	22	4381	96%
Nederlands Dagblad	18	4399	97%
NRC.Next	18	4417	97%
Spits	14	4431	97%
Elsevier Weekblad	13	4444	98%

Dagblad Flevoland	12	4456	98%
De Stentor/Nieuw Kamper Dagblad	8	4464	98%
Ijmuider Courant	7	4471	98%
Gorcumse Courant	6	4477	98%
Quote	6	4483	99%
Boerderij	5	4488	99%
De Peperbus	5	4493	99%
Beleggers Belangen	4	4497	99%
Almere Vandaag	3	4500	99%
De Havenloods Alexander	3	4503	99%
De Toren	3	4506	99%
FEM Business	3	4509	99%
Rijn en Gouwe	3	4512	99%
Trends	3	4515	99%
AFX-NL	2	4517	99%
De Botlek	2	4519	99%
De Molenkruier	2	4521	99%
De Nieuwsbode Bunnik	2	4523	99%
Vrij Nederland	2	4525	100%
Alphen.cc	1	4526	100%
BIZZ	1	4527	100%
Brielsche Courant/Hellevoetse Post	1	4528	100%
Cuijks Weekblad	1	4529	100%
De Gooi & Vechstreek	1	4530	100%
Het Kanton	1	4531	100%
Koerier Beuningen	1	4532	100%
Reformatorisch Dagblad	1	4533	100%

Appendix II – Analyses actor distribution

	Actor group	Number of speech acts	Percentage of speech acts		Amount of speech acts per actor per article	Number of articles
Producer		393	9%		1	2173
User	Amateur	1662	37%		2	459
	Professional	1095	24%		3	196
Institutional actor	Amateur	359	8%		4	66
	Professional	104	2%		5	48
Media	Amateur	310	7%		6	27
	Professional	424	9%		7	12
Expert		158	4%		8	3
	Total	4503	100%		9	2
					10	1
					11	1
					12	1

Table 1 – Speech acts in absolute/relative numbers of actors

Table 2 – Number of articles per number of speech acts per actor per article.

Appendix III – Analyses logic distribution

	Institutional logic	Institutional logic goals	#	%[4]	%[5]
Community **2051 (48%)**	*Internal values of community*	Football should maintain its charm and identity	233	30%	
		Football should maintain the sentiments of grass such as smell	193	25%	
		Football should be played on the conditions of a good natural grass field	170	22%	*38%*
		Football needs time to get used to changes and find acceptance	163	21%	
		Football should not be business oriented.	18	2%	
	Safety	Football should not cause injuries	326	48%	
		Football should not cause health issues	233	34%	*33%*
		Football should not cause open wounds	117	17%	
	Create play opportunity	Football should provide and stimulate sufficient leisure for members	248	58%	*21%*
		Football should reduce the chance of canceled matches	176	42%	
	Member sharing	Football should aim for efficient use of one space by multiple parties	84	100%	*4%*
	Rules	Football has certification for AT	29	34%	
		Football rules about the winter period should be reconsidered	15	26%	*3%*
		Football rules do (not) allow AT fields	14	24%	
		Football has guidelines for the use of AT	9	16%	
	Equality	Aim to have same facilities as others in football	32	100%	*2%*
Profession **1651 (38%)**	*Improve conditions to play*	Football conditions should be of high quality	424	52%	
		Football training conditions should be of high quality.	150	18%	
		Football conditions should increase sports quality.	144	18%	*50%*
		Football conditions should keep up with developments, such as new stadiums, and should not fall behind in evolution	89	11%	
		Football conditions should spare the natural grass of the main field.	12	1%	
	Qualification of excellence	Football excellence can be increased by achieving competitive advantages.	230	35%	
		Football excellence is incorporated in current game characteristics and therefore gameplay should stay the same.	114	18%	
		Football excellence is playing neat and technical football with combinations.	102	16%	*39%*
		Football excellence is mimicking the conditions of the top level.	94	14%	
		Football excellence is being prepared for undergrounds that mimic match conditions.	53	8%	
		Football excellence is performing on any undergrounds.	36	6%	

[4] Within logic
[5] Within institutional order

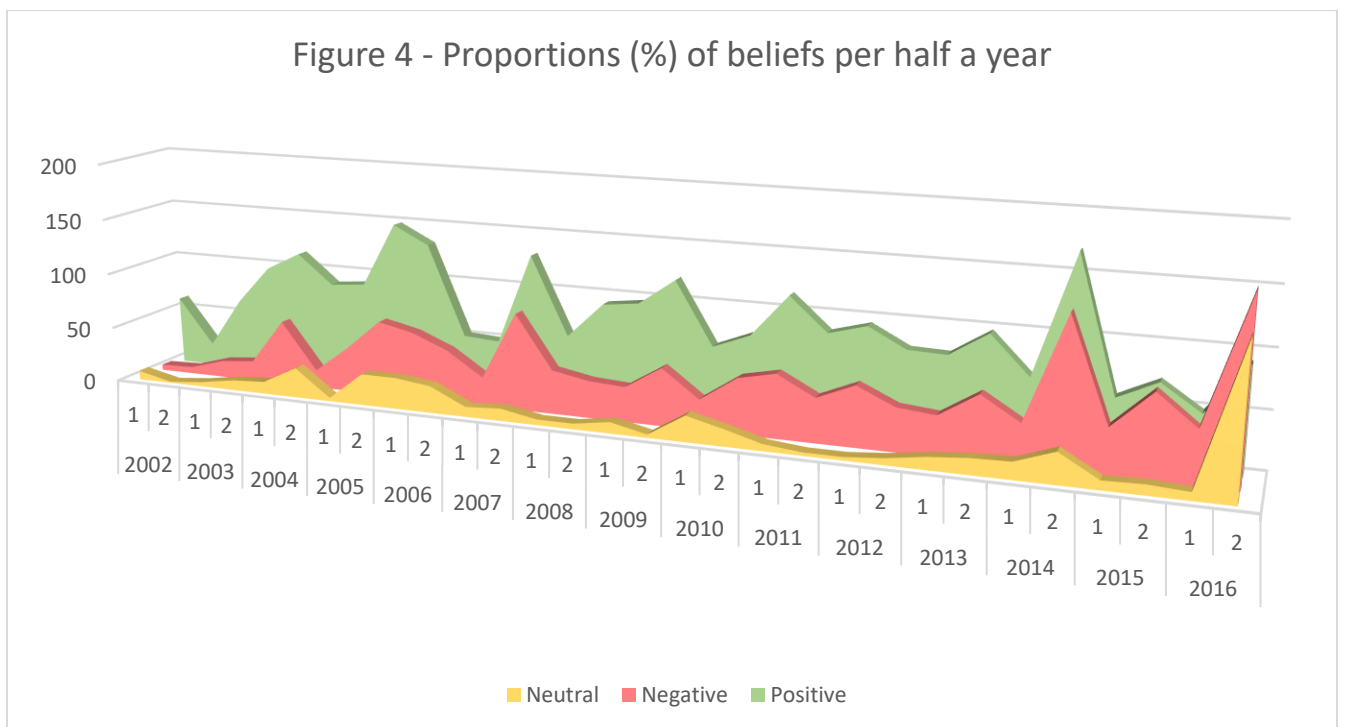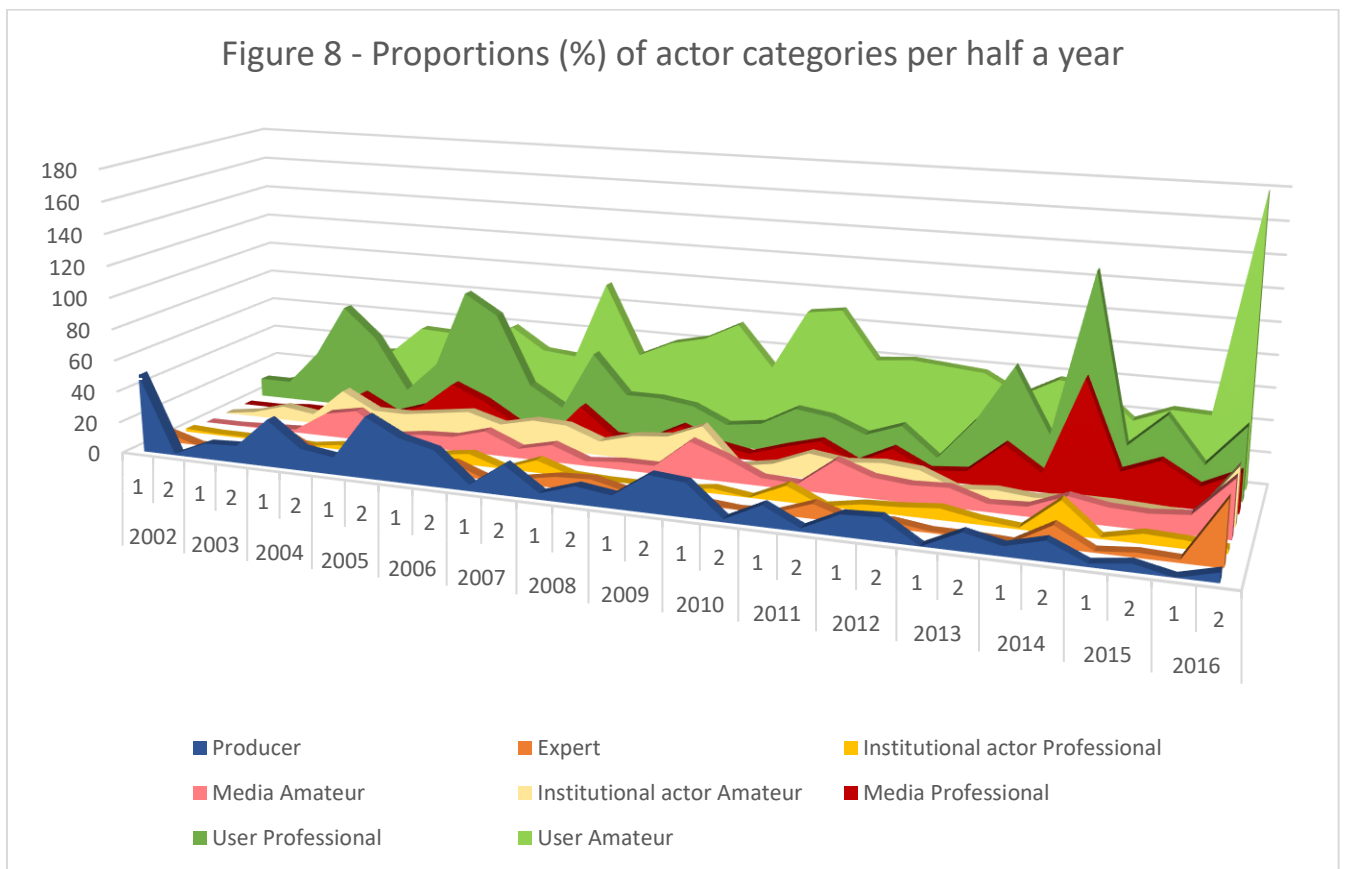|					
		Football excellence is being able to play a physical game.	20	3%	
	Fair play	Football teams should not have an unfair advantage in home games from their field that clouds the measurement which athlete is the best.	86	47%	*11%*
		Football teams should play on equal undergrounds.	64	35%	
		Football teams should have the same number of matches played.	33	18%	
Market **614(14%)**	*Cost Reduction*	The budget should be sufficient in the long run.	145	44%	*53%*
		The investments should be found in the short run.	128	39%	
		The financial stability should be enhanced.	33	10%	
		The pressure on volunteers to participate or pay should be acceptable.	21	6%	
	Reuse space	Football should intensify the usage of the current space for fields.	105	78%	*22%*
		Football should use their main field for training and matches.	30	22%	
	Commercial advantages	Generate profits by new rental opportunities with AT.	46	40%	*19%*
		Generate profits from the current interest in football.	22	19%	
		Generate profits from a rising market of AT.	20	17%	
		Generate profits from selling redundant land.	15	13%	
		Generate profits from more canteen revenue.	13	11%	
	Multifunctional stadiums	Football should have multifunctional stadiums to increase revenue streams.	36	100%	*6%*

Table 4 – Categorization logic categories per order and subcategories in absolute and relative amounts of speech acts.

APPENDIX IV – ANALYSES EVALUATION CRITERIA DISTRIBUTION

Evaluation category	Evaluation subcategory	#	%
Endurability	the field can be used more/less intensively,	461	32%
1420 (34%)	the field is (not) always playable	387	27%
	the field is more/less vulnerable,	270	19%
	the field is more/less even	80	6%
	the field is more/less weather (in)dependent	79	6%
	the field is more/less durable	77	5%
	the field conditions are more/less consistent	66	5%
Play experience	the field does perform more/less well in ball play characteristics	255	24%
1059 (25%)	the field does stimulate more/less high quality of football	238	22%
	the field is easy/hard getting used to play on	193	18%
	The fields' gameplay does (not) change the odds of winning	158	15%
	the field offers more/less cushioning, stability or grip	122	11%
	the field does stimulate more/less technical/physical/faster gameplay	115	11%
Health effect	the field causes more/ fewer injuries	300	42%
709 (17%)	the field does (not) cause cancer or other diseases	220	31%
	the field does cause more/less open wounds due to its sliding resistance.	189	27%
Football culture	the field has more/less traditional/nostalgic value	154	28%
557 (13%)	the field represents more/less the emotional connection with natural grass	115	21%
	the field smells more/less like natural grass	111	20%
	the field is more/less accepted by members	99	18%
	the field looks more/less like a natural grass	39	7%
	the field facilitates getting (not) dirty from mud	38	7%
Economic effect	the field has low/high construction cost	147	32%
461 (11%)	the field its annual costs are high/low	125	27%
	the field has more/less maintenance cost	108	23%
	the field has more/less commercial advantages	81	18%

Table 5 - Categorization evaluation categories and subcategories in absolute and relative amounts of speech acts.

Figure 8 - Proportions (%) of actor categories per half a year

Figure 4 - Proportions (%) of beliefs per half a year

Note:
Periods: 1/2002-2/2004, 1/2005-2/2006, 1/2007-1/2010,2/2010-1/2014, 2-2014-1/2016, and 2/2016