Implementation of International Strategy

in

Higher Education

– a system dynamics approach

Master Thesis in Counselling

Fall 2010

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Foreword

A thesis that has made the tour around the world and back, over and again, is full of memories that couldn't fit within these few pages. To acknowledge some of those who have made these memories, I would like to thank all friends and colleagues who have had their door open when I have come around with my notebook and questions. A special thanks to the Chineese University of Hong Kong, Stellenbosch University, Universidad de la Habana and last, but not the least, the host-institution for this study. Your kindness and hospitality have made everlasting impressions.

Not so often with me on my travels, but always very present and insightful in our discussions, my supervisors Dr. Jonathan Reams and Dr. Hans de Wit, deserve a heartily thanks for their support and constructive involvement in the thesis.

Content

1. Introduction

A pressing question in current higher education policy discourse is how to effectively incorporate the ever-increasing importance of the international context into higher education strategy and institutional practices. Although international aspects of higher education (HE) management have received increasing attention over the last decades with a considerable growth in research papers available on the topic (Kehm & Teichler, 2007) "little has been written about the implementation of internationalization plans" (Childress, 2010). This entails a lack of analytical tools for understanding the implementation process at higher education institutions (HEI).

> The high policy saliency of internationalisation is not yet matched by equal importance as a research field. Especially in terms of theory-driven research and the development of analytical frameworks the research field has not excelled. (Gornitzka et al., 2003: 12)

In the present thesis I aim at providing a terminology and frame of understanding related to the implementation process of international strategies at HEI through the analytical framework of system dynamics theory. Although the study is only a pilot study for a more thorough analysis to come in my PhD project, it gives a first indication of whether the theoretical concepts of system dynamics theory can be fruitfully applied to higher education management and international strategy implementation.

1.1 Personal motivation and choice of topic

After having been involved in international education for more than 17 years through studies in 10 different countries, work at an international office, attendance at several international education conferences and visits to over 40 international offices worldwide, I have taken a special academic interest in internationalisation issues in HE and how the process of internationalisation is managed.

The choice of strategy implementation as area of interest is based on a well-documented gap between "the rhetoric for and the implementation of internationalization" (Childress, 2010, p.4). Having observed this gap both from the professional and the academic side, I wanted to establish a theoretical structure that could enable academics and professionals to better understand the dynamics related to the implementation process of international strategies at HEI. This thesis is an

important first step in a longer search for a more constructive approach to the management of internationalisation at HEIs.

1.2 Research question and outline of the thesis

The research question proposed in this thesis is:

> *How can the application of systems dynamics theory lead to a better understanding*
> *of international strategy implementation at higher education institutions?*

The research question will be elaborated through 4 sub-questions presented in the methodology chapter and applied to a specific challenge at the studied HEI, namely the strategic goal of increasing outward student mobility. Through this strategic challenge the interdependence of different parts of the implementation process becomes visible.

The thesis consists of seven chapters. Following this introductory chapter the second chapter presents a literature review of research and trends in three areas related to the chosen topic; HE management, internationalisation of HE, and system dynamics theory. In the third chapter methodological issues are discussed in relation to the research design. The fourth chapter treats the preparatory steps of system dynamics modelling according to Sterman's (2000) suggestions for the modelling process. The model is presented step by step in chapter five and the findings discussed in chapter six. Finally, the conclusions chapter summarise the findings by answering the research questions, and proposing potential future research inquiries.

2. Theory and research

The literature review will first discuss the changing context of strategy implementation in HE, illustrated by the Dutch case. Thereafter, the term internationalisation of HE is defined and the thesis situated within current research in this field. Finally, the theoretical constructs of System Dynamics theory will be presented and related to the topic of internationalisation.

2.1 Strategy implementation at higher education institutions

2.1a Changing context for strategy implementation at HEIs

The HE environment has become increasingly complex over the last decades due to a number of major and interrelated changes. Teichler & Yagaci (2009, p.107) use the terms "massification", "knowledge economy", "competition" and "managerialism" to describe four central developments.

Massification of HE came with the rapid expansion of the HE system in the 1960-70's. The expansion has continued over the last three decades and caused a fivefold increase in tertiary education enrolments worldwide between 1970 and 2008, going from 32 millions to 159 million students (UNESCO, 2010). It has also led to an altered composition of the student body, which has become increasingly heterogeneous through the inclusion of more female students, students from new social strata and more internationally mobile students. In addition to entailing diversity in the student body, the expansion of HE has contributed to a "rather complex picture of higher education provision" (Knight, 2002, p.210). The variety of students gave rise to a variety in the demand for HEIs, and "New institution types emerged, educational offerings within institutions multiplied, private provision expanded, and new modes of delivery were introduced" (Santiago et al, 2008, p. 32). With the introduction of HE as a tradable service in the General Agreement on Trade Services (GATS) new cross-border HE providers also emerged and added to the diversity (Knight, 2002).

The second development, the establishment of a knowledge economy, postulates a society dependent on highly educated workers, where HEIs are supposed to contribute to the economic growth and well being of the society at large. As most stakeholders in society are affected by the performance of HEIs in a knowledge economy, the stakeholders in HE have proliferated. Ivar Bleiklie (2007) describes this shift as a movement from the university as a "republic of scholars" to the "stakeholder organization" (p.478).

With the stakeholders' increased focus on accountability and performance of HEIs, the third area of change, the competitive dimension of HE, has come to the forefront. Worldwide rankings like the

Shanghai Jiao Tong ranking and the Times Higher Education Supplement have received considerable attention over the last years, and contributed to a more outspoken competitive attitude at, and between, HEIs. The existence of a wide range of other measurement tools assures the presence of a competitive element also among the 17.000 HEIs that are not among the top 500 institutions (Kehm & Stensaker, 2009),

These developments with increased complexity, multiplication of students and stakeholders, and increased competition in HE, have also had consequences for the management of HE, the fourth and final development discussed here. The consequences were underscored with the introduction of New Public Management (NPM) in the 1980's and 1990's. Originally a British invention, and sometimes "called the New Right or Thatcherite reform strategy" (Ferlie et al, 2008, p.330), NPM has had a global impact over the last decades.

> The NPM relies on (1) markets (or quasi markets) rather than planning, (2) strong performance measurement, monitoring and management systems, with a growth of audit systems rather than tacit or self regulation and (3) empowered and entrepreneurial management rather than collegial public sector professionals and administrators (Andresani and Ferlie, 2006). The NPM seeks to produce a smaller, more efficient and more results orientated public sector. (Ferlie et al, 2008, p.335)

Henkel (2000) points to this trend as a "centralised decentralization" (p.57) in which the HEIs experience closer political and ideological scrutiny from the central authorities, but at the same time receive more autonomy in terms of how to achieve their goals. The outcome is a "movement from a state controlled model of higher education governance to a state supervisory model" (Meek et al, 2009, p.43). The relative autonomy of the HEIs has lead to a situation where "academic leaders are increasingly seen as managers, coalition-builders or entrepreneurs" (Santiago et al, 2008, p.4). This has been particularly notable in the case of the dean's role (de Boer et al, 2009), but also more generally in HE administration.

One of the most significant alternative approaches to NPM, Network governance (NG), has in some countries been a post-NPM, third way-strategy, and in some countries a reaction to NPM:

> (In Network Governance) there is a shift from vertical to lateral forms of management. There is devolution of power downwards from the centre of the nation-state to lower tiers and also upwards to higher including European tiers. In such systems, coordinating power is shared between social actors, possibly operating at multiple levels of analysis. Knowledge and 'best practice' spreads across the network, based in high trust, repeated interactions and a 'clannish' culture. There is dense interaction and inter dependency between network partners. The network develops self organizing and self steering capacity. The role of the state is distinctive only as a relationship facilitator: it brings actors together, builds trust, arbitrates and verifies interactions. (Ferlie et al, 2009, p. 337)

As illustrated below, it could be argued that Dutch HE has been oscillating between hybrid versions of these two forms of management over the last decades (Westerheijden et al, 2009).

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2.1b Changing context in Dutch HE

The Dutch HE system is a binary system with 14 universities (including one open university) and 47 universities of applied sciences[1]. The HEI studied in this thesis belongs to the latter type of institutions, which counts for approximately 2/3 of the total Dutch student body of around 600.000 students.

In the late 1970's, after a long period with strong academic self-regulation, the government introduced a "new era of neo-liberalism and neo-conservatism in the public sector, including higher education" (Westerheijden et al, 2009, p.108). It was also a transitional period where a set of changes and deregulations made way for devolving central decision-making powers to the institutions in the mid 1980's. After a five-year period characterised by close governmental scrutiny, the concept "steering from a distance" was introduced in a white paper in 1985, the so-called HOAK paper. In line with this concept the government's role was to be limited to setting the boundaries for HE activities as opposed to direct regulation. The interventionary state was to be replaced by a facilitory state (Neave & Van Vught, 1991, in Enders & de Boer, 2009, p.167). "The change to new instruments with less overt governmental interference in day to day affairs, yet strong steering on strategic issues, makes the HOAK policy turn fit into the NPM narrative" (Westerheijden et al, 2009, p.112). Although this turn in government steering was not as clear-cut as it can seem from the documents, it was an important shift when it comes to management styles of HEIs in the Netherlands. Over the next decade, universities "were expected to display more market-type behaviour" (de Boer et al, 2007, p.143) and the balance of power within the universities started slowly to move in the direction of the executives and away from academic self-governance. At the same time, the strengthening of the NPM-oriented steering also strengthened the NG orientation as more power was devolved to the institutions (Westerheijden et al, 2009). In 1997 the Act "Modernising University Governance" (MUB) was passed and it introduced a further reinforcement of the strategic importance of central management at HEIs. Some of the major changes were a transition from elected to appointed representatives and a possibility for "universities to change the organisational structure quite radically" (de Weert, 2000, p.79). Both aspects give a strengthened role for the dean in strategic decisions. Although the voice of the academics is all but lost in HEIs' decision-making (de Boer & Goedegebuure, 2001) and that the NPM version seen in Dutch HE is a soft one with many facets (westerheijden et al, 2009), the general trend towards a more professional management model seems prominent also in the Netherlands;

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[1] There are also a few private institutions with a modest number of students.

> Alternative models to the traditional form of the university as a collegial, bureaucratic and often semi-anarchical organization (…) have come to the fore, such as the corporate, the entrepreneurial, the enterprise, the service and the stakeholder model (…). In general, universities seem to be moving towards a managed professional public organization model. (de Boer & Goedegebuure, 2009, p.350)

From this short overview it can be concluded that the implementation of strategies in Dutch HEIs requires a professionalised management with both an understanding of the dynamics of complex organisations as well as a comprehension of the particularities of HEI management.

2.1c Particularities of HEI management

Although NPM reduces the gap between management of HEIs and management in the corporate sector, there are a number of particularities to be found in HEIs, especially related to how academics perceive their leaders. HEIs have a wide range of goals, which, due to the fragmentary structure of HEIs, often are contradictory. The tension created by conflicting or even competing rationales makes the outcome of strategic decisions less predictable (Baldridge, 1983). It is not only the institution that has a fragmentary structure; the staff is also highly fragmented. HE managers have to deal with a web of loyalties where the loyalty to the institution as a whole often loses out to loyalties to the discipline, the institute or the academic profession in general (Ibid.). "Teichler (2009) shows that academics' commitment to both the department and the university decreased in the period from 1992 to 2007" (de Boer & Goedegebuure, 2009, p.355)

A corporate manager could also expect the employees to carry out tasks imposed on them. The HE manager on the other hand will most likely encounter resistance from the academic staff who considers academic freedom and autonomy as one of the deeds of the profession (Baldridge,1983). There are also strong tensions between academic professional values in general and the bureaucratic expectations in an organisation. A lack of understanding of these tensions can easily escalate a conflict (Ibid.). De Boer and Goedegebuure (2009) conclude that the academics in the two countries that have gone through the "most profound changes in the operating environment of universities" (p. 355), i.e UK and Australia, are also the most "sceptical about university leadership and management" (p. 356). They further relate this to "the typical problems that academic managers face: blending the potential conflicting managerial and academic value systems" (p. 359). Part of this conflict can be traced to the unwillingness of academic staff to accept judgement from managerial staff, as peer evaluation is the gold standard in academic professions (Baldridge, 1983).

These particularities of HE management combined with the changing context of HE make the backdrop for the internationalisation efforts at HEIs .

2.2 Internationalisation of higher education

2.2a What is internationalisation of higher education?

The classical account of the university as an international organisation argues that "universities started as truly international institutions (…) in the 13th century (..)" (Altbach & Teichler, 2001). However, according to Scott (2000) since "internationalisation presupposes the existence of nation-states" (p, 4) the term cannot refer to universities before the consolidation of the nation-states in the early modern period. Knight (2007) would go even further and hold that although internationalisation "has been used for centuries in political science and governmental relations (…) its popularity in the education sector has really only soared since the early 1980s" (p.211). Before that other terms were used like international education or international cooperation. The relationship to neighbouring terms still creates frequent discussions and confusion. In the 1990's "comparative education, global education and multicultural education" (ibid.) were the most debated alternatives, and over the last decade globalisation has taken over as the main challenger. However, in spite of all the new terms, internationalisation has kept its place as the most preferred notion up till today.

In the early definitions of internationalisation it was regarded as a series of individual activities as can be seen in Arum's and Van der Water's definition referring to "the multiple activities, programs and services that fall within international studies, international educational exchange and technical cooperation" (1992, p.202 in Knight, 2007 p.213). Childress also refers to this type of definition laid out by NAFSA where internationalisation is explained as:

> A collection of international activities, including study abroad by US students, study in the US by international students, faculty exchanges, foreign language training, international development projects, corporate and university partnerships and campus community interactions. (Childress, 2010 p.9) [2]

A shift from an activity-focused to a process-related approach came with Knight's definition in 1994 where internationalisation is viewed as:

> …the process of integrating an international and intercultural dimension into the teaching, research and service functions of a higher education institution. (Knight, 1994, p.7)

Although widely referred to, this definition has been criticised for being too institution bound and for not referring to global processes. As mentioned, the relation between internationalisation and globalisation has been actively debated in the research literature over the last decade. One of the

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[2] This definition dates from 2003 and while it disturbs the chronological narrative of an evolutionary terminology it underscores the coexistence of different definitions of the same term.

stands holds "that not only are globalisation and internationalisation different; they are actually opposed" (Scott, 2000, p.4) "Globalisation ignores, transcends and is even actively hostile to nation states" (2001a, in Luijtenlub, 2007, p.26). According to Marginson (2000) the dialectic relationship between an inter-national and a global world order is not complete and the nation states play an increasing role in the process of globalisation. Van der Wende and Knight illustrate this by arguing that "internationalisation is both a response and a contributor to globalisation" (in Luijtenlub, 2007, p.29) and thereby link the two processes. Van der Wende's definition points to this relation:

> Internationalisation of higher education is: Any systematic, sustained effort aimed at making higher education (more) responsive to the requirements and challenges related to the globalisation of societies, economy, and labour markets. (1997, p.19)

This definition broadens the scope to overcome the limitations of Knight's institution-based definition. It also puts a focus on the dynamic relationship between globalisation and internationalisation and the systematic nature of the efforts.

A review of the rationales for internationalisation, which in the literature normally are categorised by economic, political, academic and socio-cultural rationales (de Wit, 2002, Knight, 2008, Childress, 2010), presents the opportunities created by internationalisation as the major drive for the internationalisation process. With the exception of the political rational, which to a large extent focuses on overcoming threats and security issues, the other rationales have a preponderance towards the opportunities to prosper economically, intellectually and as a social being. This does not seem to be reflected in any of the definitions of internationalisation reviewed here. Knight defends this on the grounds that "it is important to ensure that a definition does not specify the rationales, benefits, outcomes, actors, activities, and stakeholders of internationalization, as they vary enormously across nations and also from institution to institution" (2007, p. 212). A neutral definition should therefore be sought. Taking this into account Knight updated her working definition;

> Internationalization at the national/sector/institutional levels is defined as "the process of integrating an international, intercultural or global dimension into the purpose, functions or delivery of post-secondary education." (Knight, 2003, p.2)

This definition proves to be especially well suited in a study based on system dynamics theory as it regards internationalisation as a dynamic process and relates the international, intercultural and global aspects to the purpose of the system. The thesis will therefore rely its understanding of the term internationalisation on Knight's updated definition.

Although "substantial efforts have been made during this past decade to maintain the focus on the "internationalisation of education" and to avoid using the term "globalisation of education"" (Knight, 2007, p.208), the terms ""globalisation", "internationalisation", "regionalisation", and "denationalisation" are frequently used interchangeably" (Enders, 2004, p.367). For the current study this conclusion demands precaution when it comes to interpreting the terms. Although certain clarity on the terminology could be expected in recent research literature, the international strategy documents and other non-academic texts might not have the same precision in the use of the terms.

2.2b The thesis situated within current research on internationalisation of HE

Kehm and Teichler (2007) point out that the borders between what can be considered research on internationalisation in HE and other fields of HE research have been more blurred over the last ten years as internationalisation has obtained a more prevalent position in general research on HE. They still discern seven frequently recurring topics:

- Mobility of students and academic staff.
- Mutual influences of higher education systems on each other.
- Internationalisation of the substance of teaching, learning and research.
- Institutional strategies of internationalisation.
- Knowledge transfer.
- Cooperation and competition.
- National and supranational policies as regarding the international dimension of higher education (p.265)

The thesis will situate itself within the track of studies on "institutional strategies of internationalisation". The focus of the thesis is how HEIs respond to strategic demands and ensure strategy implementation. It will therefore contribute to the sub-theme "(strategic) management of internationalisation" (ibid). Kehm and Teichler note that the literature often has "a clear emphasis on persons rather than on institutions or policies" (p.268). This thesis will aim for an understanding of the HEI as a dynamic system where policies, institution and persons are interdependent.

The thesis will further contribute to one out of five shifts of leading themes in current research pointed out by Teichler (2004), namely a shift "from administration of mobility to strategic action and systems steering of internationalisation" (in Kehm and Teichler 2007, p.263). Although the starting point of the thesis will be a mobility issue, i.e. how to increase outward mobility, the choice has been made to highlight how this issue needs to be considered in relation to other parts of the internationalisation process to enable a constructive overall implementation, and hence a systems steering of internationalisation.

Some of the most central researchers framing the bigger picture of internationalisation in HE would be Jane Knight (1994, 2007, 2008), Hans de Wit (1995, 2002, 2008, 2009), Philip Altbach (1991, 1996, 2010), Frans van Vught (2002, 2009), Jeroen Huisman (2005a, 2005b), Ulrich Teichler (2001, 2002), Barbara Kehm (2007, 2009) and Marijk van der Wende (1997, 2009). Lisa Childress (2010), Anneke Luijtenlub (2007), and Minna Söderqvist (2007), though less known, have also been valuable for this thesis. In Norway, NIFU-STEP is the most profiled research centre for internationalisation studies. Nicoline Frølich (2005, 2006, 2008), Åse Gornitzka (2003, 2005, 2008), Bjørn Stensaker (2008, Kehm & Stensaker 2009, 2010), Peter Maassen (2004, 2007, 2008), Liv Langfeldt (Gornitzka & Langfeldt, 2008, 2009) and Jannecke Wiers-Jensen (2003, 2008) give central contributions to the Norwegian discussion on internationalisation of HE.

The internationalisation literature goes far in acknowledging the general complexity of HE management and the dynamic nature of HE strategy implementation. These features make the internationalisation process especially suited to be analysed through System Dynamics theory, a theory developed for understanding complex and dynamic organisational challenges.

2.3 Theoretical constructs of System Dynamics theory

Systems approaches is a common denominator for several theoretical frameworks that have complex systems as a starting point. Among these approaches we find Viable Systems Model, Strategic Options Development and Analysis, Critical Systems Heuristics, Soft Systems Methodology, and System Dynamics (SD) (Reynolds & Holwell, 2010). For this thesis System Dynamics theory has been the main approach.

Jay Forrester founded SD theory as an academic tradition in the 1950's. A central feature of the theory is explaining how complex systems, like universities in this thesis, respond to changes. The responses to change have a tendency to follow certain dynamic patterns that are crucial to identify and understand in order to avoid surprises and to seize opportunities. At the outset Forrester applied systems thinking to business development (Forrester, 1961), but later it has increasingly been applied to a wide range of topics like urban planning (Forrester, 1969) and the development of the human population (Forrester, 1971). Today SD is perceived as a meta-theory that can be applied to any field where systems occur. Some examples are the consequences of a 48 hours workweek limit for junior doctors in Britain (Morecroft, 2007) and the use of SD to understand and counter the spread of HIV/AIDS in Tanzania (Focus, 2008).

Meadows (2009) explains a system as having three defining factors: the elements, the interconnections and a function (non-human system) or purpose (human system). The elements would be tangible aspects like a university, a department or a professor, but can also be intangibles like the pride in being part of a university. The interconnections are the signals sent between the elements, often in form of information, that make the elements respond in certain ways. The function or purpose is the "raison d'être" for the system, like when many systems have the function of perpetuating themselves. When a less critical aspect of a system's activities conflicts with its main purpose it will easily get discarded or diluted. Internationalisation, although important to the main system, i.e. the HEI, is often perceived as less critical to many of the subsystems in an HEI.

SD theory uses a few building blocks to understand how the different elements, interconnections and the function/purpose of a system interact. The main building blocks are "stocks and flows" and "feedback loops" (Sterman, 2000, p.191). These building blocks are combined in different ways to aggregated models visualising how complex systems behave and the patterns they follow. In a system with a high number of interactions and competing functions/purposes, like a HEI, the model can explain "the counterintuitive behaviour of social systems" (Forrester, 1971b).

There are two strands of model building within the SD tradition. The first aims at producing comprehensive models to predict a plausible outcome of an initiative; the other is based on conceptual models to unlock thinking patterns and uncover system effects. This thesis is based on the latter approach to provide a tool for thinking and a learning process for HEI managers. There is a long list of system features that could inhibit or enhance organisational development; delays, bounded rationality, non-linearity, limits to growth, resilience, self-organisation, policy resistance, etc. They all explain certain aspects of how systems work and are expressed through the same building blocks as mentioned above. By applying these patterns to the internationalisation process of a HEI new knowledge can be acquired on how the HEI reacts to the implementation efforts.

In the area of organisational development Peter Senge (1990, 2006), Donella H. Meadows (1972, 1991, 2009), John Sterman (2000) and John Morecroft (2007) are among the most influential current system dynamics thinkers. In a Norwegian context SD research is centred around the System Dynamics Group at the University of Bergen with Prof. Erling Moxnes (2000, 2005), Prof. Pål I. Davidsen and Ass. Prof. David Wheat (2010).

3. Research design

3.1 Research questions and choice of SD as methodological approach

The choice of SD theory as methodological approach is based on two main considerations. First, SD theory seems particularly promising due to the highly complex nature of HEIs as discussed in the previous chapter. The second consideration is that although System Dynamics theory has been applied successfully to a very wide range of managerial challenges, it has not to my knowledge been applied to the field of internationalisation strategies at HEIs yet. The terminology offered by the theoretical framework could therefore provide a shift in thinking and give an opportunity to meet the challenges of internationalisation in a more structured way in contrast to the "best-practises"-approach that seems to characterise the internationalisation process at a majority of HEIs. To explore this issue I propose the following research question:

How can the application of systems dynamics theory lead to a better understanding of international strategy implementation at higher education institutions?

The main research question will be elaborated through four sub-questions:

1. What are the most influential elements and interconnections with relation to the implementation process of international strategy at the studied HEI?
2. How does the purpose of the HEI and its subunits interact in the implementation process?
3. What kind of dynamic features and patterns can be observed in the implementation process?
4. What can be learned with respect to an effective implementation of international strategies at HEIs?

3.2 Methodology

Methodologically the study has been carried out as an embedded micro ethnographic single case study of the internationalisation process at a HEI. In a micro ethnographic study the researcher takes part in the studied culture for a period of time long enough to understand the object studied from an emic perspective, i.e. the insiders point of view (Fetterman, 1998, p.20). Descriptions of the culture become more prevalent than explanations in an ethnographic study. In this study a deeper understanding of the interactions in the system is sought through descriptions rather than explanations. A case study methodology is especially appropriate in this respect since it implies tracing operational links over time with a focus on understanding contemporary events over which the researcher has no control (Yin, 2009). To clarify the relation between ethnography and case

study as approach, the latter is here considered the methodology and the first merely the form. Contrary to ethnography and "grounded theory" (Glaser and Strauss, 1967), case study as methodological approach has a clearer emphasis on developing theory prior to the empirical data collection (Yin, 2009, p.36). This study was from the outset based on a clear theoretical framework through SD theory. An ethnographic study would normally produce a "cultural portrait" through thick descriptions (Geertz, 1973, p.6), describing in great detail all the activities observed along with the researcher's interpretation of them. This thesis presents a cultural portrait, but not through thick descriptions. I have cut the descriptions down to the most crucial interactions in the system, simplifying an otherwise complex reality, to make the underlying structures visible. To be able to do this I have made preliminary detailed descriptions and then cut away all noise surrounding the core interactions. In some of the models quantitative modelling is used to illustrate the interactions.

The rational behind choosing a single case study follows the logic of the critical case and the revelatory case (Yin, 2009). The first is undertaken to open up for further investigations and the second aims to uncover prevalent phenomena previously inaccessible to scientists. The topic of this case has not been "inaccessible to scientists", but the shift in thinking explained in the discussions chapter could very well be revelatory to the practitioners in the field. There is also a time rational behind the choice of a single case study as the time and extent of a master thesis does not allow for several cases of this size. However, the case is designed as to become part of a multiple-case study to follow in my PhD. In addition to being a single case study it is an *embedded* single case study, i.e. the unit of analysis is a single institution, but one or more subunits are also studied to reflect observations at the institutional level (Yin, 2009, p.50).

Fetterman (1998) underscores that the researcher should approach the studied field with an open mind, but not with an empty head (p.1). Over the two years preceding this study I visited and interviewed 42 different international offices at HEIs in 14 different countries. I also attended three intensive courses on international office management and international strategy implementation offered by the European Association of International Education (EAIE) and worked at an international office for a shorter period. This background helped increase my theoretical sensitivity, i.e. perceptiveness to relevant observations (Glaser & Strauss, 1978), but it also made it more important to be aware of the danger of being too familiar with the studied object and thereby become less open to critical observations. It was also a challenge not to project previous experience on to the studied institution. Extensive readings in SD theory were also undertaken in order to become more perceptive to system's effects during the observation periods.

The study was divided into three periods of information gathering. First, an observation period of one month was carried out as a fully participant observer at the international relations office (IRO). Second, interviews were held with four key persons in the system, and finally an iterative modelling process was conducted with the feedback from some of the central participants in the system.

Over the first observation period I participated in the working environment of the IRO on a daily basis. Although the tasks I could be conferred were limited due to time restraints, the presence at the office gave rich input on how the administrative side of the internationalisation process was organised. This period was also used to get familiar with strategic documents and statistics concerning mobility at the HEI. The length of the observation period ensured enough contact to get a rough picture of the interactions at the institution, without running the risk of "going native" (Dalen, 2004, p.110) i.e. fully espouse the insider's view. In the search for parts of the implementation process that could inform my study on the variety of feedback loops active in the process I used aspects of theoretical sampling. Glaser and Strauss (1998) describe theoretical sampling as a method to obtain samples that would count for maximal variation within the studied field as opposed to the average behaviour (in Dalen, 2004). After the first observation period I had a hypothesis of two faculties that would show very different attitudes to internationalisation, the Faculty of Education (FE) and the Faculty of Economics and Management (FEM).

The second period of data collection was aimed at expanding the picture to the surrounding environment. I conducted two semi-structured interviews within the central administration, one with the author of the international strategy and one with the director of student services, who is also responsible for the IRO. Based on my hypothesis and the information from the first interviews, an additional two interviews were conducted within the FEM where one academic and one of the international coordinators where selected as informants. The restraints in time and extent of the thesis made me chose to interview only one of the two identified faculties, and use the interviews with the central administration to inform the study on feedback loops in the second faculty.

A third phase of the information gathering was conducted as a dialogue with some of the persons previously interviewed. A series of informal interviews were undertaken as an iterative process paralleling the modelling process to open up for new perspectives as my findings informed their view of the situation and vice versa. The final part of the modelling process was done at a physical distance to the studied HEI and what was originally planned as an action research approach, i.e.

intended "to alter the initial situation of the (…) organisation" through active participation (Greenwood & Levin, 1998, p.7), evolved into a more analytical approach.

Multiple data gathering strategies, quantitative and qualitative, have been used during the case study. A journal of my observations has made it possible to track changes in my own interpretations of the system. Unstructured interviews with staff and others have constantly informed the study and been documented in the journal. Document analysis of strategy documents, statistics and other relevant literature have also played an important role in the study. In addition to the information gathered at the institution, I have had contact with three external groups that have given valuable inputs from the outsiders' perspective. One is the co-supervisor of this thesis who also participates in an external evaluation group for the HEI's international strategy, the second is a Dutch research group with experience from several auditing exercises at the HEI, and finally I went to China and interviewed the IRO manager of one of the HEI's most active partner institutions. The different data gathering strategies and have given rich opportunities to triangulate information and draw on member checking with other participants in the system (Tashakkori & Teddlie, 2003, p.459).

Since the aim of the thesis is partly a methodological one, i.e. how SD methodology can be used on the topic of internationalisation of HE, I have chosen to defer several methodological issues concerning data collection, modelling, and analysis and to parts of the thesis where they are treated in direct relation with the case study. However, the interview process, the validation procedures and the ethical considerations are not discussed later and will therefore be treated here.

3.3 The interview process

The interview process has been inspired by a grounded theory approach[3]. Theoretical sampling has been mentioned in relation to the selection of informants and the analysis of interview data has to a certain extent followed a pattern of concept development used in grounded theory. In this study the interviews have been audio recorded, transcribed and coded from experience near descriptions to experience distant categories in order to the lift the material from a descriptive to an interpretive level (Dalen, 2004, p.65). The categories have then been used as base for further developing the interview guide and selecting the next informants to interview (Draucker et al, 2007, p.1138). The interview guide (appendix I) was originally adapted from a PhD study inquiring on internationalisation discourses in HE. As the PhD study aimed at presenting a "holistic

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[3] Corbin and Strauss (1990) warn that "researchers end up claiming to have used a grounded theory approach when they have used only some of its procedures or have used them incorrectly." (p.6) This thesis does not claim to strictly follow a grounded theory approach, but is inspired by some of its features.

management-systems thinking" to "further the development of a theoretical framework for planning internationalisation" (Söderquist, 2007, p.18), her research aligns with the aim of this thesis. As discourses "define the categories and phenomena that make our world" (Neumann, 2001, p.21), they also lead to the mental models at work in a system. The use of a similar interview guide could therefore prove constructive in the search for mental models and give opportunities to compare data with the findings of Söderquist's study (Ringdal, 2007, p.181).

3.4 Reliability and validation of the study

Patton (2002) presents five evaluation frameworks that would rely on different criteria to define reliability and validation in a qualitative study, namely the traditional scientific research frame, the social construction and constructivist frame, the artistic and evocative frame, the critical change frame and the evaluation standards and principles frame (p.542). This study is based on a mixed criteria approach with the evaluation standards and principles criteria as primary frame and the social construction and constructivist criteria as a secondary frame. The latter situates the study epistemologically and ontologically, while the first provides the main argument for its legitimacy.

Within a social construction and constructivist frame reliability and validity are contested terms due to their conceptual heritage from quantitative research traditions (Denzin & Lincoln, 2005, p.19, Seale, 2004, p.72). "Constructivists study the multiple realities constructed by people and the implications of those constructions for their lives and interactions with others" (Patton, 2002, p.96). A consequence of the multiple realities constructed, itself led out from the epistemological assumption of "transactional subjectivism" and ontological assumption of relativism (Lincoln & Guba, 1989, p.80), is that "validation and verification of models is impossible" (Sterman, 2000, p.846). It is still possible however, to increase the credibility of a study (Lincoln & Guba, 1986, in Patton, 2002), which is the intention when I here use the terms validity and reliability in lack of firmly established alternative terms for qualitative research evaluation (Thagaard, 2009, p.22).

The focal contribution of the evaluation and principles frame relates to the outcomes of social inquiry. Within the evaluation standards and principles frame validity and reliability would be a means to answer the question; "would I feel sufficiently secure about these findings to construct social policy or legislation based on them?" (Guba & Lincoln, 2005, p.205). I have chosen to underscore the outcome aspect since other criteria like accuracy, feasibility and propriety, although critical to a good study, would lack meaning "if there is no prospect of its being useful to some audience" (Stufflebeam, 1980, in Patton, 2002, p.550).

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3.4a Reliability

"Reliability usually refers to the degree to which the findings of a study are independent of accidental circumstances of their production" (Silverman, 2006, p.282). External reliability is related to replicability, the ability of a study to be accurately reproduced by others (Thagaard, 2009, p.198). Although external reliability is often discarded as less relevant in qualitative studies (Silverman, 2006, p.283), the quantitative parts of this study require explanations that make the methods used transparent. The detailed presentation of the models and the calculations behind the results are intended to make the simulation models replicable for other researchers. Due to limitations of space in the thesis an annex is attached with a more detailed explanation of the technical aspects of the models. The mental models found in the study have partly changed as a consequence of the inquiry and are therefore not reproducible. However, "search for reliability in qualitative observations revolves around detailing the relevant context of observation" (Kirk & Miller, 1986, in Silverman, 2006, p.284). The thorough documentation of the different parts of the study through a research journal, audio recordings of interviews and member checking of the results, ensure the quality and transparency of the proceedings also in these less quantifiable areas. The internal reliability, i.e. the correlation of findings between researchers working on the same topic (Thagaard, 2009, p.199), is also strengthened by the reference to patterns that are frequently found in other comparable situations and organisations. It must however be acknowledged that at some level a model will always depend on "a judgement of faith that either the procedure or its goals are acceptable without objective proof" (Forrester, 1961, in Sterman 2000, p.846). The transparency of the procedures aims to strengthen this judgement of faith.

3.4b Validity

Validity treats the consistency between the data gathered and the theoretical notion we want to say something about (Thagaard, 2009). Yin (2009) differs between three types of validity; construct validity, internal validity and external validity[4]. (For more on model validity, see appendix III)

Construct validity checks if the correct operational measures have been used in order to account for the studied concept. Narrowing the case study down to a specific challenge (see chapter 4), and clarifying the conceptual constructs related to it have been ways to ensure construct validity. Three kinds of triangulations have been performed that further strengthen the construct validity. First, triangulation of methods, i.e. "checking out the consistency of data by different data collection

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[4] In qualitative methodology literature the search for a terminology that can account for the specificities of validity in qualitative studies has resulted in a wide variety of validity terms. I have chosen to limit the discussion to the three types treated by Yin (2009) in relation to case studies.

methods" (Patton, 2002, p.556) has been conducted through a mixed methods approach combining quantitative and qualitative data gathering strategies. Second, triangulation of sources, i.e. "checking out the consistency of different data sources within the same method" (ibid.) has ensured consistency within the interview data as well as within the statistical data. In the last case official statistics were triangulated with databases both at central and faculty level as seen in chapter 4. Finally analyst triangulation, i.e. "using multiple analysts to review findings" was done through contact with external groups of analysts as mentioned earlier in this chapter. Extensive presence at the HEI, combined with in-depth experience from the field also contributes to the ecological validity of the study (Dalen, 2004, p.103), which again gives credibility to the construct validity.

Internal validity concerns whether causal relationships between elements in the study have been depicted correctly. Causality is highly controversial in qualitative research, but as Seale (2004) conclude "if you look closely at research reports they will always contain implied causal mechanisms" (p.76). In this study it makes sense to check whether the dynamic relationships depicted are found plausible. Yin (2009) proposes the use of logic models as a way to ensure internal validity combined with explanation building. The step-by-step presentation of the models in this study aims at making the chain of thoughts visible to the reader and thereby open up for alternative interpretations. In spite of the systematic data collection involving multiple sources it is still likely that a number of interactions have been overlooked. To enhance internal validity it is therefore important to expose assumptions behind the models and engage in "a systematic search for alternative themes, divergent patterns, and rival explanations" (Patton, 2002, p.553). Additional explanatory factors do not necessarily challenge the internal validity of the study. The critical point is whether the theory can accommodate them. A wide range of rival explanations had been explored before the factors presented were chosen as focal points. I was also confronted with additional factors in a post-study member check session, where key informants reviewed the consistency of the outcomes (Postholm, 2005, 138). As a test of validity each of the factors was either proven to fit easily within a more extensive model or irrelevant due to systemic limitations. With enthusiasm I realised how the models and the use of systemic thinking laid out in the discussions chapter, had triggered a very constructive and dynamic way of thinking at that point. At the end of the day, these "negative cases" (patton, 2002, p.554), contesting the findings, strengthened the internal validity of the study by providing examples of how SD theory could not only account for the factors presented in the model, but more importantly give a constructive framework to further develop the strategy thinking at the HEI. This was confirmed by the validating comment of one of the informants; "I totally see it now when you show it. I recognise everything" (C.1)

External validity relates to whether the findings in a study are generalisable beyond the specific case study itself (Yin, 2009, p.43). In case studies the nature of generalisation is a critical point; "Survey research relies on *statistical* generalization, whereas case studies (as with experiments) rely on *analytic* generalization. In analytical generalization, the investigator is striving to generalize a particular set of results to some broader theory" (ibid.)[5]. The "particular set of results" in this case study is related to results from a larger pool of case studies where SD theory has been applied to other complex organisations. Identifying patterns from such aggregated case study findings at the studied HEI strengthens the external validity. However, even if this makes it plausible that similar patterns would be found at other HEI, further studies are required in order to substantiate this claim. The research design of this thesis will be replicated and further developed in a PhD study, which could potentially reinforce the external validity retrospectively (ibid. p.44).

3.5 Ethical considerations

Throughout the study it has been a concern to ensure the informants' integrity (Thagaard, 2009, Postholm, 2005, Dalen, 2004). Although there is no requirement to report the study to any authorities in the Netherlands, efforts has been made to comply with Norwegian guidelines for similar cases (NESH, 2006) and general ethical guidelines for qualitative research. The first contact with the HEI in order to obtain informed consent included the thesis proposal and information about confidentiality. Information about the possibility for the HEI to request the final thesis to be held confidential was important since a study of an organisation's strategy implementation could be perceived as threatening for the institution's gatekeepers, i.e. those giving access to information (Dalen, 2004, p.35). The manager of the IRO conferred with her superior and they decided to welcome the study at the institution. Requests for access to other informants were later made through the IRO manager. Anonymity of the institution and the informants has been attempted throughout the thesis, but due to the central positions of the informants and the particularities of the HEI, it is difficult to assure this. However, offering the possibility of the thesis to be held confidential has been a way to guarantee anonymity in case the findings were perceived as too offensive to the institution or the informants. This has not been claimed by any of the informants.

Although the research design has been very constructive, carrying it out has also been very demanding. My future case studies will be highly indebted to this learning process.

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[5] Michell (1983) also points to this difference through the terms "theoretical generalization" as opposed to statistical methods' "empirical generalization" (in Seale, 2003, p.77)

4. Preliminary steps of the modelling process

John D. Sterman (2000) proposes a set of procedures for large-scale prediction-type modelling. Although some of the procedures are less relevant for conceptual modelling, the relevant parts provide an outline for the thesis. He divides the modelling into five steps; problem articulation, formulation of a dynamic hypothesis, formulation of a simulation model, testing, and policy design and evaluation. The first step contains four elements treated in this chapter; defining a challenge, defining key variables and creating a reference mode, which includes definition of a time horizon. At the end of the chapter the second step, formulation of a dynamic hypothesis, will be discussed.

4.1 Problem articulation

The scope of the research question is very wide, namely the entire implementation process of the international strategy at the studied HEI. To model the process as it unfolds in all the subunits of the institution would be a daunting task. The first challenge was therefore to focus the attention on one single problem that the institution had struggled with for a while and then to use this challenge as a platform for how SD theory could be applied to the entire process. This is in line with Sterman's (2000) recommendations; "Always model a problem, never model a system" (p.90). The problem articulation was done in dialogue with the manager of the IRO at the studied institution over the first observation period; "Usually the modeller develops the initial characterization of the problem through discussion with the client team, supplemented by archival research, data collection, interviews, and direct observation and participation" (ibid.). I had already discussed a highly optimistic strategic goal of 30% outward student mobility with the IRO manager at a professional development course in Italy two years earlier and we came to an understanding that outward mobility was still a major challenge for the HEI. The problem was therefore formulated as follows: "*What inhibits the increase of outward student mobility?*"

4.2. Key variables

Key variables in this study would be mobile students, housing availability, English taught courses, academics' willingness to teach in English, word of mouth, elective semester, free movers and policy resistance. Most of these variables are straightforward and will be defined as they are introduced in the modelling chapter. The term "mobile student" on the other hand has caused substantial confusion in internationalisation evaluations in HE and is therefore treated in detail here.

Student mobility has increased substantially over the last decades. The number of mobile students worldwide went from 1,75 millions in 1991 to 2,8 millions in 2007 (UNESCO, 2009). Although the

upward trend of mobility is undisputed, the statistics on student mobility have a number of methodological deficiencies. The many different definitions of what a mobile student is and the multiple ways of collecting these data in different countries make the aggregated numbers not much more than a qualified guess concerning trends (de Wit, 2008). The methodological difficulties are not only present at the aggregated level, but also within the HEIs providing the numbers, including the institution studied in this thesis. To understand institutional statistics on mobile students some categories can be useful to be familiar with. De Wit (2008) proposes four categories that would fall within the mobile student body and two categories of international students who would not be part of it. The two excluded categories of international students are:

1. "Students who study in an international classroom, i.e., with other foreign students and/or foreign faculty and who are taught an internationalized curriculum at their national university without moving at any time across borders" (de Wit, 2008, p.18)[6]
2. Students who go abroad for short term, study related visits: group study tours, summer programs, intensive language courses etc" (ibid.).

The four categories that are included are as follows:

1. "Students who go abroad for 3-12 months as part of their home study to earn credits for their home degree: exchange students, international internships, (inter)national scholarship program students (Fulbright, ERASMUS), etc (…)
2. Students who go abroad for an undergraduate or graduate degree, pursuing the degree program completely or mostly at the foreign host institution (…)
3. Students who follow completely or mostly undergraduate or graduate degree programs in their own country which are delivered by foreign providers virtually or otherwise. (…)
4. Students who follow completely or mostly undergraduate or graduate degree programs on the basis of a joint or double degree between a foreign and national provider" (de Wit, 2008, p.18).

The reliability of the statistics gathered in the case study has been a major concern. The first round of statistics presented gave 12 years of outgoing student numbers. The numbers before 2004/2005 were very inconsistent and a closer look at the methodology behind them revealed that a common definition of student mobility was lacking before 2005. By consequence each faculty sent in numbers more or less based on their own definitions. After 2005 an effort has been made to collect reliable and comparable statistics, but the routines for reporting mobility were still not consistent up till 2007. This makes the reported numbers difficult to use before this year. It also means that there were no reliable statistics at the time the current strategy was made. The numbers provided after 2005 still represent a qualified estimate and although care should be taken in detailed analysis, the statistics from the last five years provide a basis for general assumptions.

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[6] The term internationalisation at home is used for this type of internationalisation that doesn't involve any crossing of national borders. Internationalisation at home gives students who are non-mobile, i.e. the large majority of students, the opportunity to have an international experience through their studies at home.

A second concern related to student mobility at the HEI was how the institution accounted for incoming students. In the first statistics presented (figure 1) the ratio in- outgoing was highly unbalanced with apparently up to five times more incoming students than outgoing. The reason for this is, as Kelo et al (2006) explain, that "...available "mobility statistics" do not, in most cases, report on mobility at all. Instead, they report on foreign students, using foreign nationality of students as a measure of mobility" (p.4). The majority of the students in figure 1 were foreign nationals, to a large degree Moroccan and Turkish minorities, who had lived most of their lives in the Netherlands and not been mobile at all in a student context. I have labelled this figure "mental model in- outgoing" because it seemed to be part of the mindset in some parts of the management structure that there was a substantial imbalance between in- and outgoing students.

Fig.1

Mental model in-, outgoing
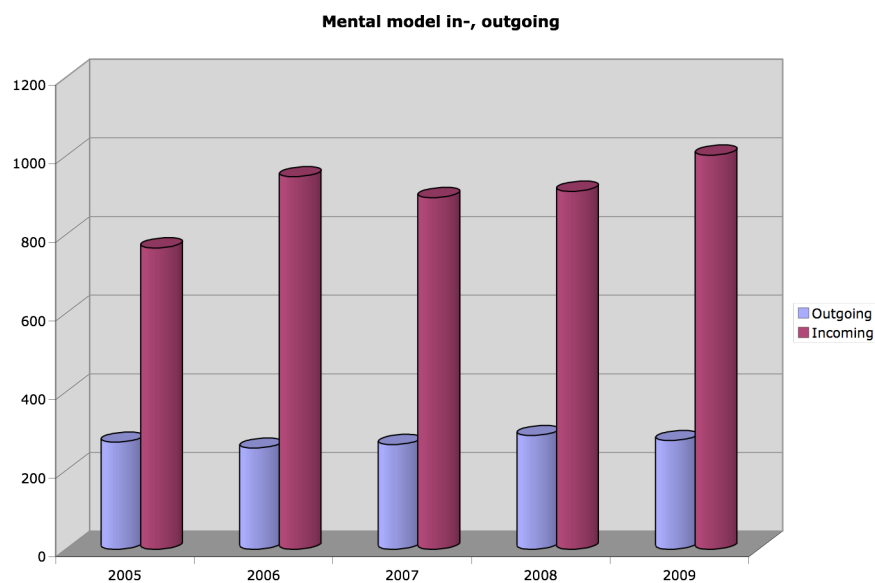
To compare in- and outgoing students properly the non-mobile foreign nationals had to be subtracted, but also the incoming full degree students had to be taken away (category 2 in de Wit's definition). The rational is that incoming full degree students couldn't be compared with any outgoing group at the institution. To do this we would need to know how many Dutch students who would otherwise have been at this institution, but decided to go abroad for a full degree instead. Such data is difficult to obtain[7], and not particularly relevant for this study. The picture changes quite drastically and it turns out that there has actually been more outgoing than incoming students in three out of the five last years. I also decided to recount the mobility based on academic years as opposed to the official use of calendar years to avoid double counting of students staying for one year, once in the fall semester and again for the next year during the spring semester.

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[7] It would be possible to make a qualified guess by finding the percentage of students going to this institution out of the total number of Dutch students and then take the percentage out of the total number of Dutch students on full degree abroad. It would also be necessary to look at the type of students going abroad and see how likely it would have been that they applied for this type of institution.

Fig.2
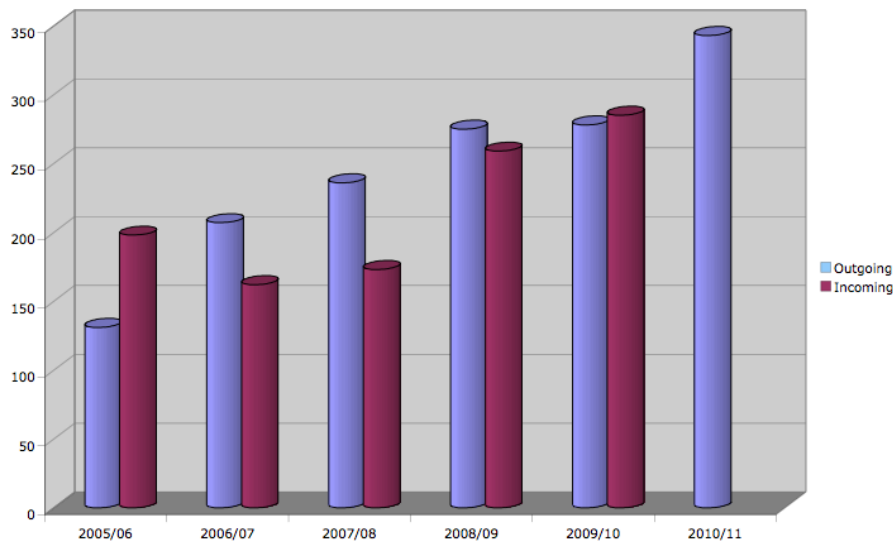
With reference to de Wit's categories of outward mobility, only category 1 students are found in the final statistics together with a few category 4 students, i.e. students participating in a joint or double degree programme. Having defined what a mobile student is and gathered statistics concerning the development of in- and outgoing students at the HEI, a reference mode could be made.
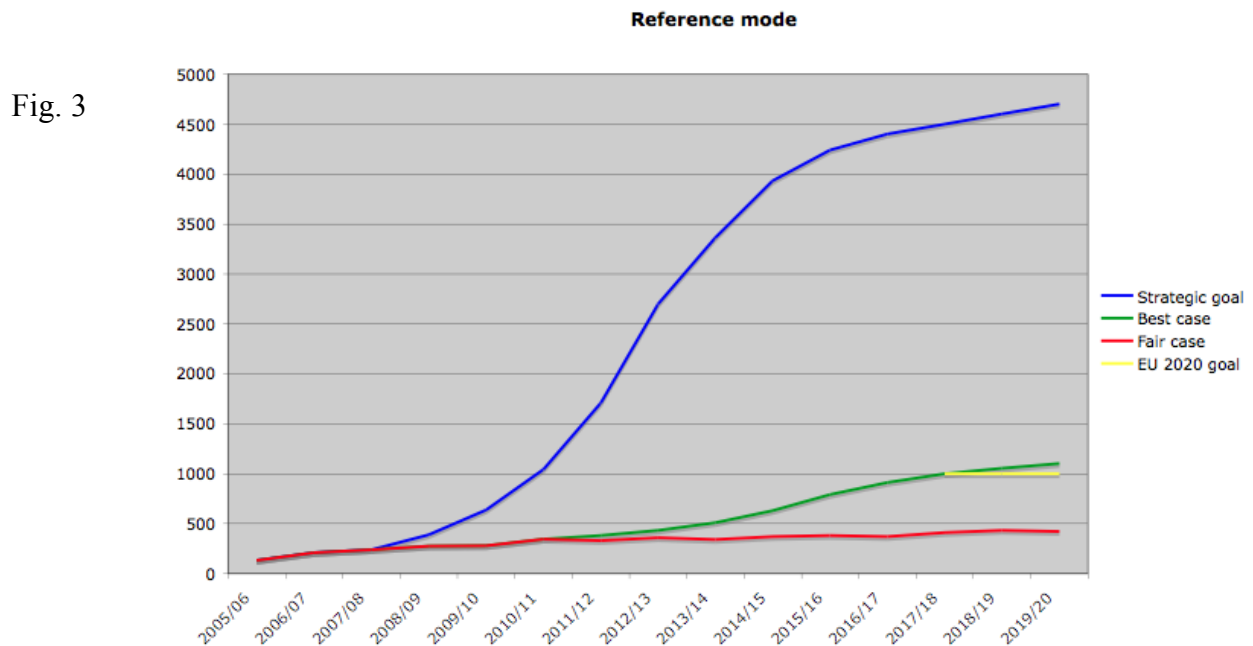
4.3 Reference mode

The reference mode shows the development of the problem over time, and is used as a reference point during the study to help the researcher and the others involved to "break out of the short-term event-oriented worldview" (Sterman, 2000, p.90). The first step is to find an adequate time horizon.

Time horizon: "The time horizon should extend far enough back in history to show how the problem emerged and describe its symptoms. It should extend far enough into the future to capture the delayed and indirect effects of potential policies" (ibid.). I have shown how the mobility statistics in the years prior to 2005 were lacking consistency. The years between 2005 and 2007 are also questionable, but still within what could be expected. To get a longer timeframe I have chosen to include the years from 2005 in the reference mode. When it comes to the endpoint of the reference mode I have chosen the year 2020. "A good rule of thumb is to set the time horizon several times as long as the longest time delays in the system and then some" (ibid.). The year 2020 is also a milestone for the European Union's mobility goals, but more importantly, it extends several times beyond the current international strategy plan of the studied institution.

Formulation of a best- and a fair case scenario: The current institution-wide internationalisation has a highly ambitious strategic goal for outgoing mobility. "The target in Course 2012 is that 30% of our students take part in an exchange programme, increasing to 50% in the years thereafter."

(International strategy, 2008-2012, p.7). The goal of 30% outward mobility is understood as the percentage of students who have had a study abroad experience at the time of their graduation. Although the mobility goal has been evaluated as fundamentally overstated at its mid-term review, it gives a good picture of the difficulties in seeing systemic effects in institutional strategies. In figure 3 the strategic goal has been translated into student numbers. The goal has been plotted in together with the actual development up till 2010, a predicted fair- and best-case scenario till 2020.

Fig. 3

Reference mode

The reference mode makes the discrepancy between the strategic goal and the actual development clearly visible. Due to the scale needed to count for the strategic goal, the best-case scenario seems easily within reach. Figure 4 shows the reference mode without the strategic goal.

Fig.4

Best and fair cases
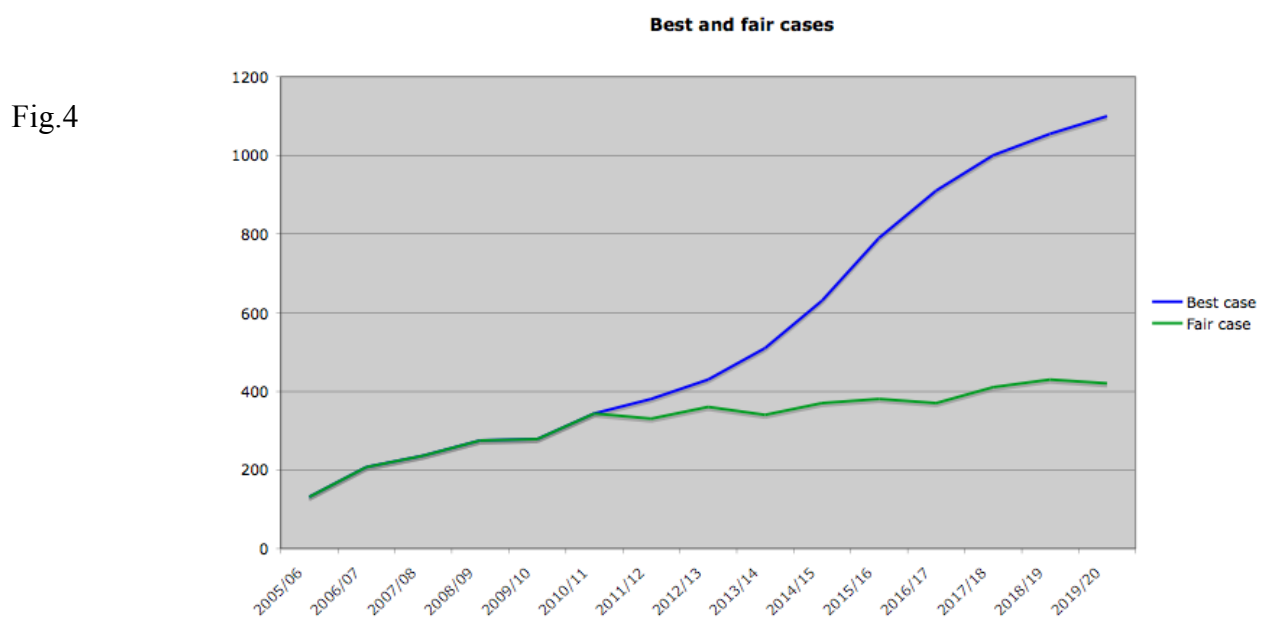
The change of scale shows that even the best-case scenario demands a drastic increase in outgoing mobility. The best-case scenario shows a rough estimate of what I considered to be the limits for increased outward mobility prior to modelling the case. The estimate was mainly based on the housing situation for incoming students as the most limiting factor as will be seen in chapter 5.

4.4 Formulation of a Dynamic Hypothesis

"A dynamic hypothesis is a working theory of how the problem arose" (Sterman, 2000, p.95). In the initial sketches of the models presented later I made a number of assumptions from the early data to use as a working theory of how the problem arose. Some of the assumptions were confirmed later, as the expected impact of the availability of housing, the willingness of academics to teach in English, the reciprocity in exchanges, the encouragement of free movers and policy resistance. Some of the assumptions were discarded later, like the expected positive impact of mandatory programmes, and the expected negative impact of time constraints among academics and the distribution of governmental funding. All these factors will be treated in relation to the modelling process with exception of the two last ones. Time constraints among academics might lead to less involvement in time consuming international activities, but this claim was not substantiated in the data gathered. It seemed more constructive to look at the lack of involvement in the light of policy resistance where time would not be granted as long as it wasn't perceived as contributing to the purpose of the teaching programme (see chapter 6). The funding issue was related to a new distribution model for governmental funding that had just been proposed at the starting point of the study. The new scheme would indirectly lead to severe cutbacks in the resources received by HEI for every of their students who didn't have a current address in the Netherlands. The proposal would have had serious implications for mobility, but due to this unintended consequence the proposition was revised before it took effect[8].

There are still a high number of factors that influence mobility that has not been treated here, like credit recognition, scholarship availability, financial costs for the HEI of guaranteeing housing and the pressure from national and European policy documents, etc. After having considered a high number of possible factors those chosen seemed to be the most critical to understanding why the original strategy goal was out of reach to studied institution.

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[8] A very similar disincentive for mobility is implemented in Norway where outgoing students infer a substantial loss of resources to the institute they study at.

5. Formulation of a simulation model

There are many influential factors that could be included in a model on student mobility at HEIs. The challenge both for model building and for strategy implementation is to simplify the situation as much as possible without missing crucial factors. To make the model easy to read, I have made one overarching model with two main elements, incoming and outgoing students. For each of the two elements a sub-model is made. The model building will be explained in three steps. First the overarching model will be presented, then the incoming sub-model and finally the outgoing sub-model. To summarise the chapter, a single conceptual model will be presented at the end.

5.1 Overarching model

From the analysis of strategic documents and interviews with the staff, two overarching principles were identified that seemed to provide the conditions for any initiative and thereby steer the implementation process. These would be the main interconnectors for the studied challenge:
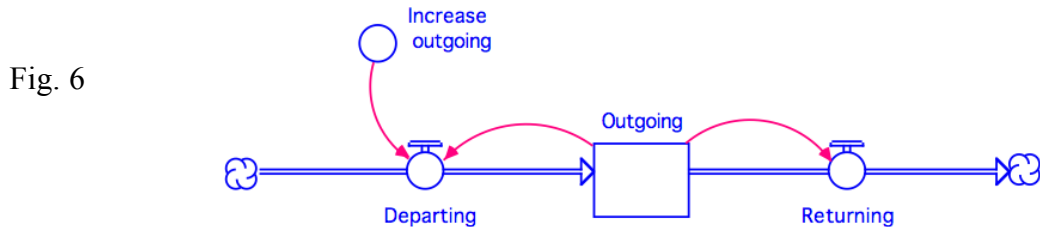
- **Partnership exclusivity:** All outgoing mobility should be done within exchange agreements. Mobility to non-partner institutions should be discouraged.

- **Reciprocity:** Exchange agreements should be based on one to one-reciprocity. Whenever the HEI sends a student to a partner institution it would also receive an incoming student from the same partner. Perfect reciprocity with every partner every year is not expected; the intention is to make the numbers equal in the long run.

It should be underscored that this is not a normative assumption, implying that partnership exclusivity and reciprocity are desirable outcomes, but a mere observation of their existence as guiding principles at the studied HEI. To incorporate these principles into a "stock and flow"-model as seen under, the first obvious stock would be the number of outgoing students. Added to the stock are the flows showing students going in and out of the stock. These flows represent the students as they go abroad and return back to the home institution.

Fig. 5
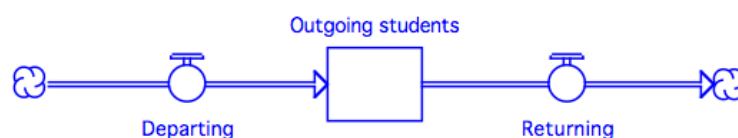
The clouds on each side represent factors that are exogenous to the model, i.e. outside the boundaries of the model. Where the students come from and where they go afterwards is outside of the model's concern. The valves are processing points where the flow of units is regulated. In figure 6, a change rate "increase outgoing" is added to indicate a change in the flows. The arrows between the parts are connectors that show a causal relationship. The "increase outgoing" influences the flow "Departing" and the amount of outgoing students influences the further inflow. This makes a self-reinforcing feedback loop, where the increase from the previous round is taken into account at the time of the next increase. Such a compounding template is often used in system dynamics modelling whenever a self-reinforcing growth process is modelled. The last connector, going to the returning students, makes sure that the number of students returning is the same as the number of the number of students who have been studying abroad.

Fig. 6

The first step is to model the principle of partnership exclusivity. According to this principle all mobility contributes to the balance between the HEI and its partners. To model this rule an additional stock and flow template for incoming students has been added, and coupled with a stock showing the balance between the two flows as seen in figure 7.

Fig. 7
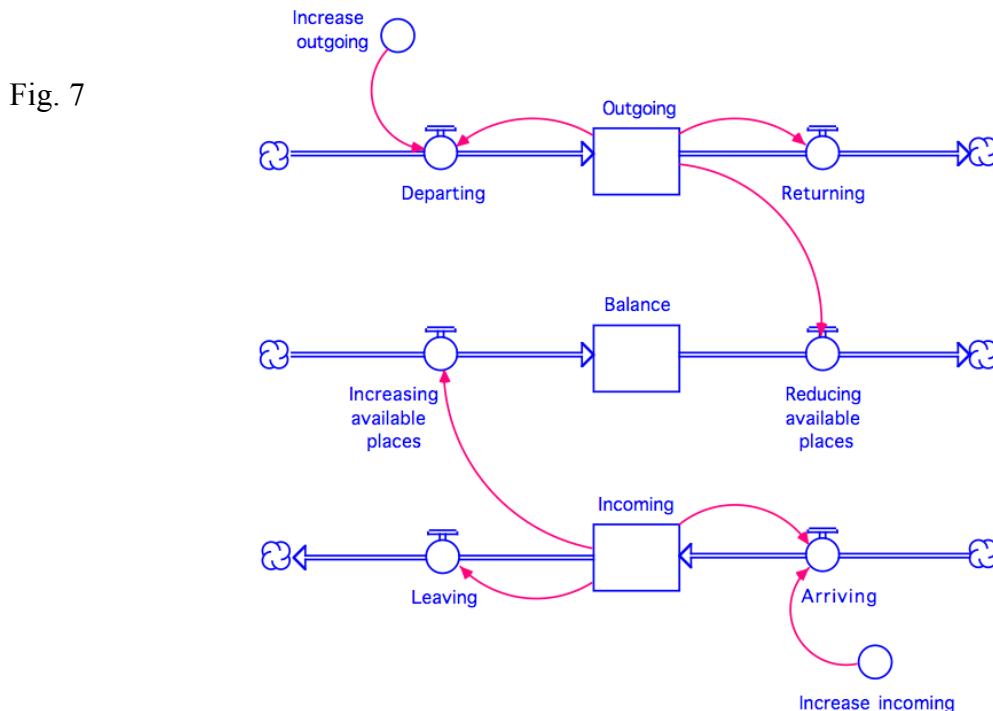
The second step is to model the principle of reciprocity. If the HEI wants to hold on to the idea of reciprocity it would need to counter any imbalance created between the number of incoming and outgoing students with actions that make the system return to balance. This reaction is added to the model in figure 8. To keep the model simple it represents only the reaction in the case of more outgoing than incoming students, which is the situation created by an ambitious strategic goal for outward mobility.

Fig. 8
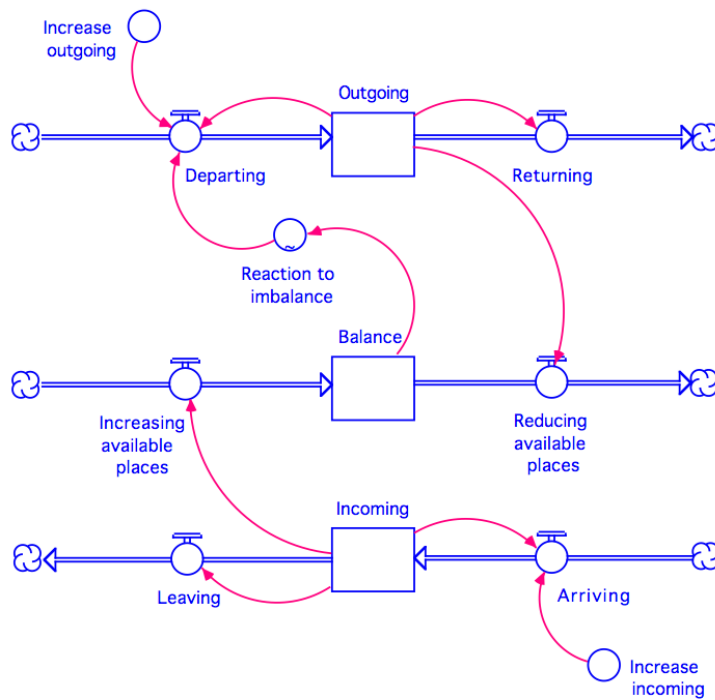
The "~" sign inside the converter indicates that it contains a graded reaction. The gradual change in reactions is seen in the graphical function 9 and explained on next page.

Fig. 9
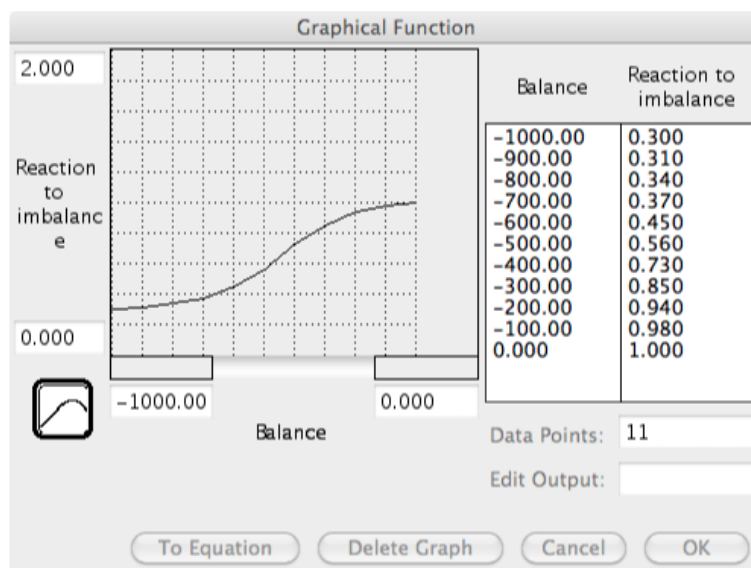
The graphical function shows the reaction to an imbalance going from -1000, i.e. 1000 more outgoing than incoming students, to 0. As long as the imbalance is less important than -200 the inflow of new outgoing students is multiplied with close to 1 every year, which means almost no reaction, and then the reaction gets gradually stronger with higher imbalance. If the imbalance gets to -1000 the outward mobility is multiplied by 0,3, i.e. cut by 70% every year. The graph has an S-shape which shows that as long as the imbalance is relatively small nobody takes notice of it, but when it gets bigger the reaction rapidly increases till it reaches the maximum reaction within their means, here set to approximately 70% cut in the numbers every year, then it flattens out.

With this simple model it is possible to fill in the mobility numbers from the starting date of the strategy and simulate possible outcomes. The simulation is not meant to give a prediction in exact numbers, but to show some of the dynamics related to the principles of partnership exclusivity and reciprocity, the guiding principles of strategy implementation at the HEI. The starting number of outgoing students is set to 236 and the incoming students to 173 according to the statistics from 2007-08. We can then play with different increase rates. The international strategy document does not state specific numerical targets for incoming students. However, since a large part of the incoming students come within the European mobility programme Erasmus it is possible to benchmark against the general increase of incoming Erasmus students to the Netherlands between the year 2000 and 2007. The average increase is approximately 4% per year. The strategy document expresses an intention of improving the institution's position as an international institution so the increase should aim for an improved market share. A yearly increase of 10% would represent 2,5 times the yearly increase experienced in the country as a whole over the last 7 years.

When it comes to the number of outgoing students the strategy document sets forward a goal of having 30% of outgoing students by the end of the strategy period in 2012, and further increase it to 50% thereafter. With close to 36000 students at the time of the strategy creation and duration of most study programmes being 4 years, the number of outgoing students would need to reach 2700 per year. With a starting point at 233 students it would need an annual increase of 63%. This could be possible, theoretically speaking. The group of potential outgoing students is easy to reach since they are all at the institution and obliged to follow the rules of the programmes they attend. Some of the programmes have a mandatory semester abroad something that could be implemented for more or all of the programmes at the institution. The tools at hand for the institution are quite powerful if student mobility was to be defined as a top priority. The limiting factor is that the institution does not have the same tools for increasing the rate of incoming students. If the model is fed with a rate

of 63% for outgoing students and the more modest increase of 10% for incoming students the result would be as illustrated in the following graph.

Fig. 10

We can see that after a couple of years with rapid increase the imbalance quickly becomes a heavy weight and causes the number of outgoing students to decrease over the next five years till the number of outgoing students passes under 100. It is not very likely that anybody would keep to the logic of reciprocity to this point, but if the strategy implementation is supposed to be based on the mentioned principles, the increase rate of incoming and outgoing students must be similar. If the intention is to obtain a higher outgoing than incoming mobility, the policy document needs to be revised to align the guiding principles with this goal, something that also involves a very different approach to how partnerships are established and how one-way mobility is encouraged. In figure 11 we can see that even a minor discrepancy of 20% increase in outgoing students against 10% incoming mobility would push the system out of balance.

Fig. 11
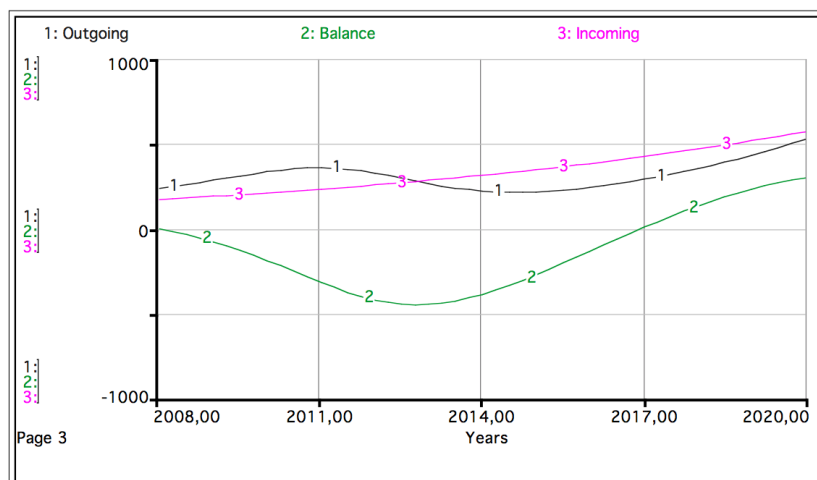
An important dynamic to notice is that although the number of outgoing students decreases after 2010/11 the imbalance continues to grow. It is common to ignore this dynamic and think the

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imbalance decreases as the outgoing number starts to decrease, but it is only when the two lines cross that the imbalance starts to improve. This explains why it takes six years from the number of outgoing students starts to decrease till the balance is reached again in this example.

There are two important conclusions to draw from this model:

1. If the institution wants to adhere to the two criteria of reciprocity and partnership exclusivity, the major limiting factor for an increase in the number of outgoing students is the number of incoming students. Hence, if the HEI wants to increase the number of outgoing students along the lines of the strategy document the main challenge would be to increase the number of incoming students accordingly.

2. If the HEI wants to increase the number of outgoing students at a higher rate than the number of incoming students the criteria mentioned above cannot be the basis for the strategy implementation.

So far, without predicting any outcomes of the institution's mobility initiatives, the application of a SD model uncovers that the assumptions behind the strategy document makes it very unlikely to succeed unless the number of incoming students is drastically increased or the guiding principles (interconnectors) are changed. Two sub-models will explore each of these possibilities.

5.2 Sub-model one: inward mobility

The first attitude adheres to both the criteria of reciprocity and partner exclusivity. It recognises increase in inward mobility as the most limiting factor to obtain more outward mobility. To make it easier to articulate plausible expectations related to the volume of incoming students, a sub-model concerning inward mobility is made as an extension to the overarching model. The capacity for attracting and welcoming new incoming students at the institution is made up of a complex range of factors involving both the teaching, research and services at the institution, how they are presented and how foreign candidates perceive these activities. To simulate the entire process would only add to the confusion. The model aims at presenting a few critical aspects as a tool for thinking when it comes to the limitations within the system. Four such factors will be explored; accommodation, English taught programmes, policy resistance within teaching staff and word of mouth. At the end the four loops will be included in a conceptual model of incoming mobility.

5.2a Accommodation for incoming students

Student accommodation is very scarce in the Netherlands and even Dutch students struggle with finding accommodation. It is therefore a prerequisite for the institution to be able to provide housing for incoming students. Short-term student housing (STSH) is more or less monopolised by a single private company in the town of the studied HEI and the accommodation challenges of the HEI has been outsourced entirely to this company. The company will be described as STSH.

To discuss how SD theory could have enhanced the current international strategy document, the model needs to respect the availability of information at the time of the strategy creation (Sterman, 2000). STSH's five-year strategy document running from 2008-2012 was published before the international strategy document and provides crucial information. The key points are:

- Their estimate for the increase of foreign students over the period 2008-2020 is 584 students, i.e. 45 additional students per year (p.9).
- The STSH will increase the number of furnished rooms for rent (the type of rooms needed for exchange students), going from 800 rooms in 2008 to 1600 rooms in 2012 (p.36). This will be done by furnishing existing rooms and not by the acquisition of new rooms (p.24).
- The total number of rooms will increase over the period, but so will the number of Dutch students. A long-term strategy for the STSH aims at reducing the average waiting time for Dutch students to get housing, which was 14 months in 2008 (19,5 months in 2004).

It is safe to conclude that this strategy does not open for the intended increase in the number of incoming students announced in the international strategy document, going from 173 to 2700 incoming students in five years. Even if we could expect some adjustments to be made in housing provision to respond to a sudden increase there are clearly limits. The question to ask is where these limits are and the first loop of the incoming model will give a partial answer to this question.

Fig. 12
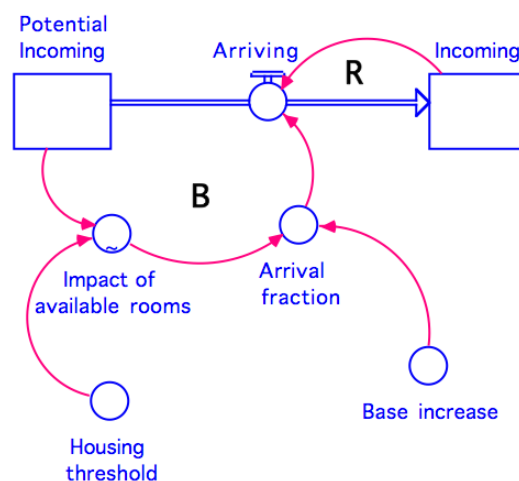
The model consists of two feedback loops. The first is a reinforcing loop shown as R, including incoming students and a base increase rate. The increase-rate makes the stock "incoming" grow for each year, like money in a bank account, since the rate applies to an accumulating stock. Because of this the stock could in theory increase exponentially forever. The second feedback loop is a balancing loop, marked as B, which limits the number of incoming students according to available housing. As the number of incoming students reaches the limit of housing the rate will drop according to a graphical function presented in figure 13.

Fig. 13
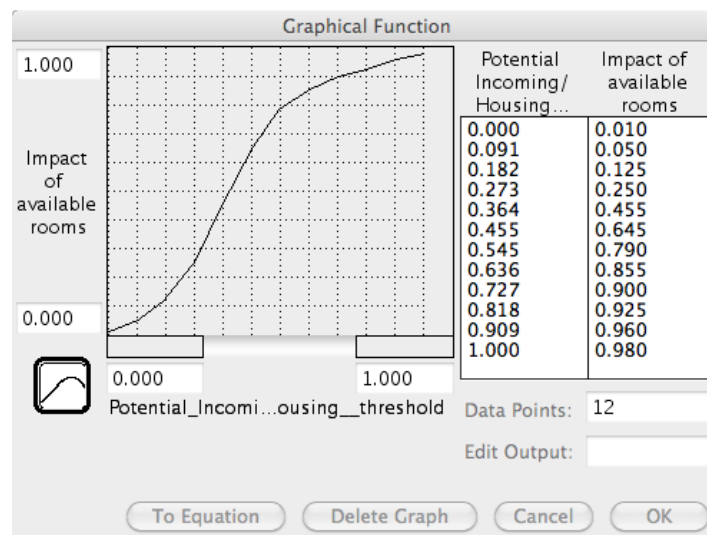
The converter (see graph) uses as input the potential incoming students divided by the available housing, and as output the impact this has on the arrival rate. Both numbers for potential incoming students and the housing threshold would be equal since the potential number of students can't be higher than available rooms. According to the strategy of the STSH there would be an additional 800 rooms over the period in question. However, the studied HEI is not the only institution in the city with an international ambition. A university in the same city offers over 100 programmes taught in English (compared to the 6 offered by the studied HEI) and is ranked among the top 50 HEIs in the world. It would therefore be prudent to expect the studied HEI not to get more than half of the new rooms. This assumption sets the housing threshold to 400. The equation potential students over housing threshold creates an indicator going from 1 when none of the potential students has arrived (400/400) and 0 when they all have become incoming students. The graph shows the impact this equation has on the arrival rate of new incoming students. When the indicator goes towards 0 (i.e. all available rooms have been filled) the increase rate goes towards 0. The S-shape of the graph shows that it gets more difficult to get additional rooms as the limit approaches.

In the model the converter "Arrival fraction" receives input from both the "base increase" and the "impact of available rooms". It has been set to use the lowest, and therefore most limiting, increase

rate out of the two. The base increase rate will therefore be used as long as it is the lowest of the two, but when nearly all rooms are occupied the "impact of available rooms" rate becomes lower than the "base rate" and the converter will shift to this rate. The following graph shows the results from nine different simulations with "base increase" rates going from 10% to 90% per year (1=10%, 2=20%, etc), and a tenth simulation with 25% increase. The simulation reveals that the difference between an increase rate of 25% and 90% is limited when it comes to the end result.

Fig. 14
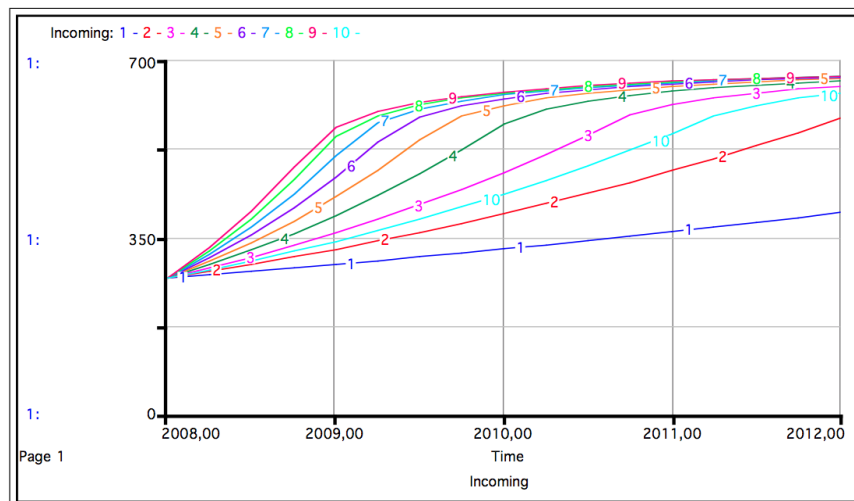
In figure 14, a 25% yearly increase seem to give the upper limit for a smooth S-shaped growth. This gives an estimate, not on how much the increase is likely to be, but what the upper limit would be if the STSH keeps to its strategic goals. Such an estimate makes it possible to foresee necessary adaptations in the environment. If the HEI managers see that the student increase overshoots the estimations of the housing provider, the STSH can be made aware in advance to make sure the company adjust their offer over the next years. Further it must be recognised that guaranteeing student housing for an increasing number of foreign students while national students face a serious lack of student rooms is a delicate issue, and the social responsibility of the STSH might inhibit a major increase in the number of available rooms for international students at the cost of the national students. The model presented here could therefore also be used as a positioning tool to understand where the limits to growth are.

5.2b English taught courses

The housing loop was a balancing feedback loop. The next feedback loop is a reinforcing loop and concerns the provision of English taught programmes at the institution. One of the basic criteria for attracting incoming students is that they are able to study at the HEI. This can be measured by the availability of courses that incoming students can attend, which in a Dutch context is largely
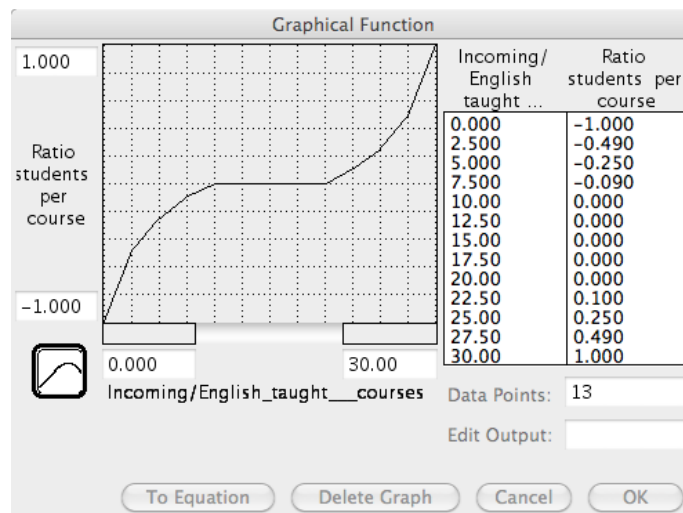
defined by the provision of English taught courses. However, it is not enough to establish new English taught courses to attract students since the presence of international students is what makes the courses viable. The more students at the HEI, the more programmes can be established which again attracts more students. If the courses fail to attract students the opposite will occur and courses get cancelled, which over time could reduce the influx of new students. This reinforcing loop is modelled below. Two compounding templates give the stock and flows of the loop. The relationship between the two stocks is articulated in the converter "Ratio students per course" seen in figure 15. To complete the self-reinforcing loop a link is made between the number of English taught courses and the arrival rate through a converter called "Attractiveness". It shows how the arrival of new students is influenced by the courses available to foreign students.

Fig. 15
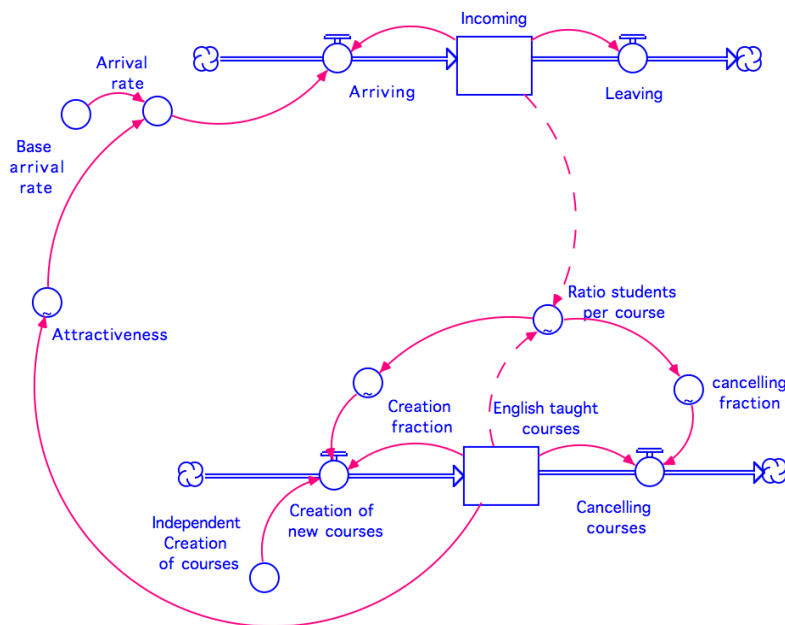
The dotted lines between the stocks and the converter represent information flows. The converter translates the number of students per course into an indicator going from -1 to 1.

Fig.16

| Incoming/ English taught ...	Ratio students per course
0.000	-1.000
2.500	-0.490
5.000	-0.250
7.500	-0.090
10.00	0.000
12.50	0.000
15.00	0.000
17.50	0.000
20.00	0.000
22.50	0.100
25.00	0.250
27.50	0.490
30.00	1.000

Data Points: 13

Edit Output:

When the ratio is less than 10 students per course the indicator goes negative and causes courses to be cancelled. When it exceeds 20 students per course the indicator goes positive and influences the creation of new courses. This self-reinforcing loop would very quickly have increased the number of incoming students and English taught programmes to an unreasonably high level since they mutually increase each other. However, there are restraining factors that need to be included.

5.2c Policy resistance within teaching staff

A counteracting or balancing feedback loop related to English taught courses is the policy resistance of teaching staff. Policy resistance is one of the arch types of SD theory and can be explained as "the tendency for interventions to be delayed, diluted or defeated by the response of the system to the intervention itself" (Meadows, 1982 in Sterman 2000, p.5). It can be expected that the demand for English taught courses at one point will outrun the availability of teaching staff comfortable with teaching in English and the remaining staff might oppose to do so or find other ways to dilute the English component of the course. The availability of teachers comfortable with teaching in English can be related to the hiring policy (figure 17). Due limitations of space in the thesis, simulations of this model will not be discussed. It still serves as a conceptual loop, and can spark a more concrete discussion of English-taught programme provision.


Fig. 17
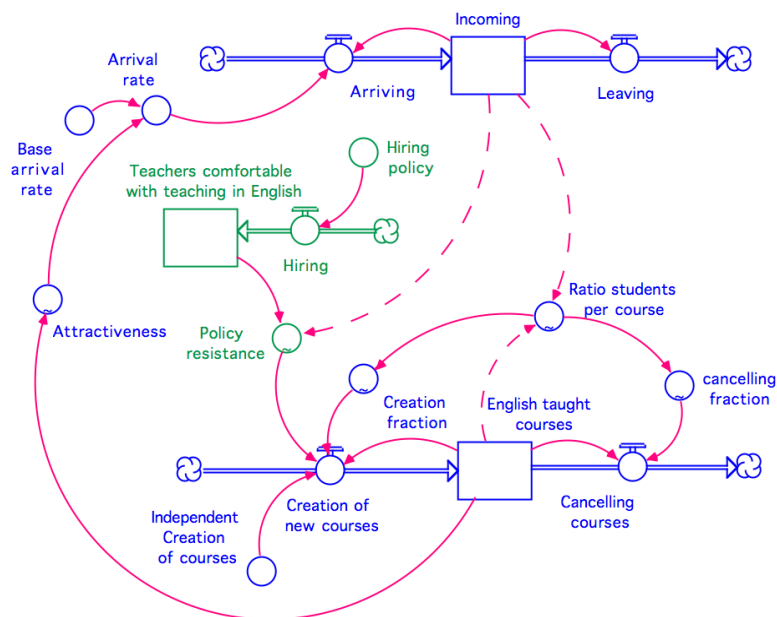
5.2d Word of mouth

The last loop included is named "word of mouth". This is a self-reinforcing feedback loop external to the institution and concerns how potential students get to know about the HEI and the impression they get of it. The more happy incoming students that return to their home institutions, the more students will hear about the HEI and more students will arrive next year. The opposite will happen in case of negative experience at the host institution. The word of mouth from returning students is

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coupled with the word of mouth created through marketing and other international activities. The word of mouth-loop represents another archetype in SD theory. It is only presented as a conceptual loop here and will not be analysed quantitatively.
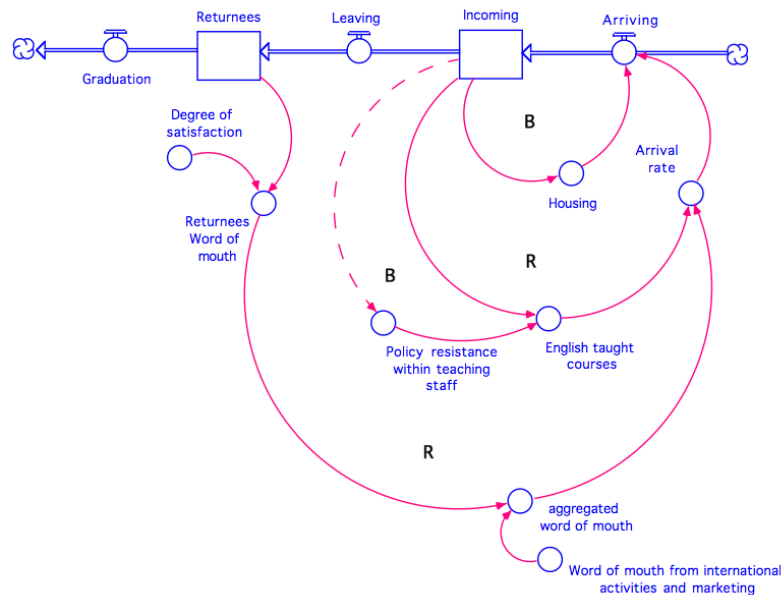
Fig. 18
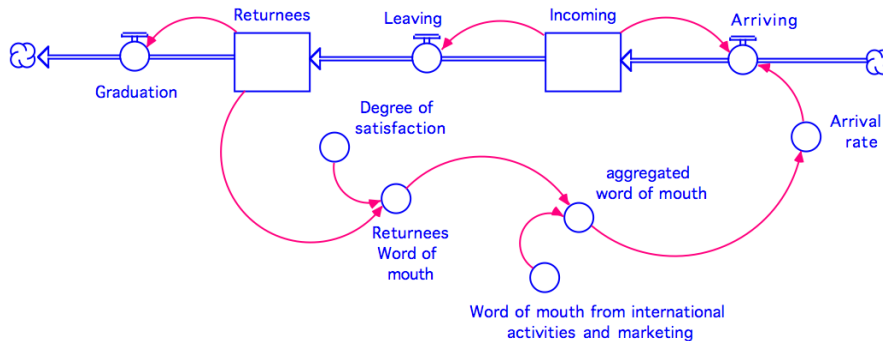
## 5.2e Conceptual model of inward mobility

The four loops concerning incoming mobility have been represented conceptually in figure 19.

Fig. 19

The balance of exchanges is counted through ECTS production or other equivalent measures of student workload. There are currently three main ways to provide programmes for foreign students; regular courses, summer school courses and short-term intensive courses. Having six students in short-term intensive courses where each receives 5 ECTSs equals one full semester workload. HEIs in English speaking countries are very popular among Dutch students, but these countries have less mobile students themselves. Students in English speaking countries are more likely to accept short-term mobility; hence, the short-term programmes are an effective way to reduce the imbalance with these institutions. I have therefore included summer school and international week as contributing to the creation of available places abroad. Along the same lines, convincing incoming students to stay for an additional semester would contribute to improving the balance as well.

Fig. 20
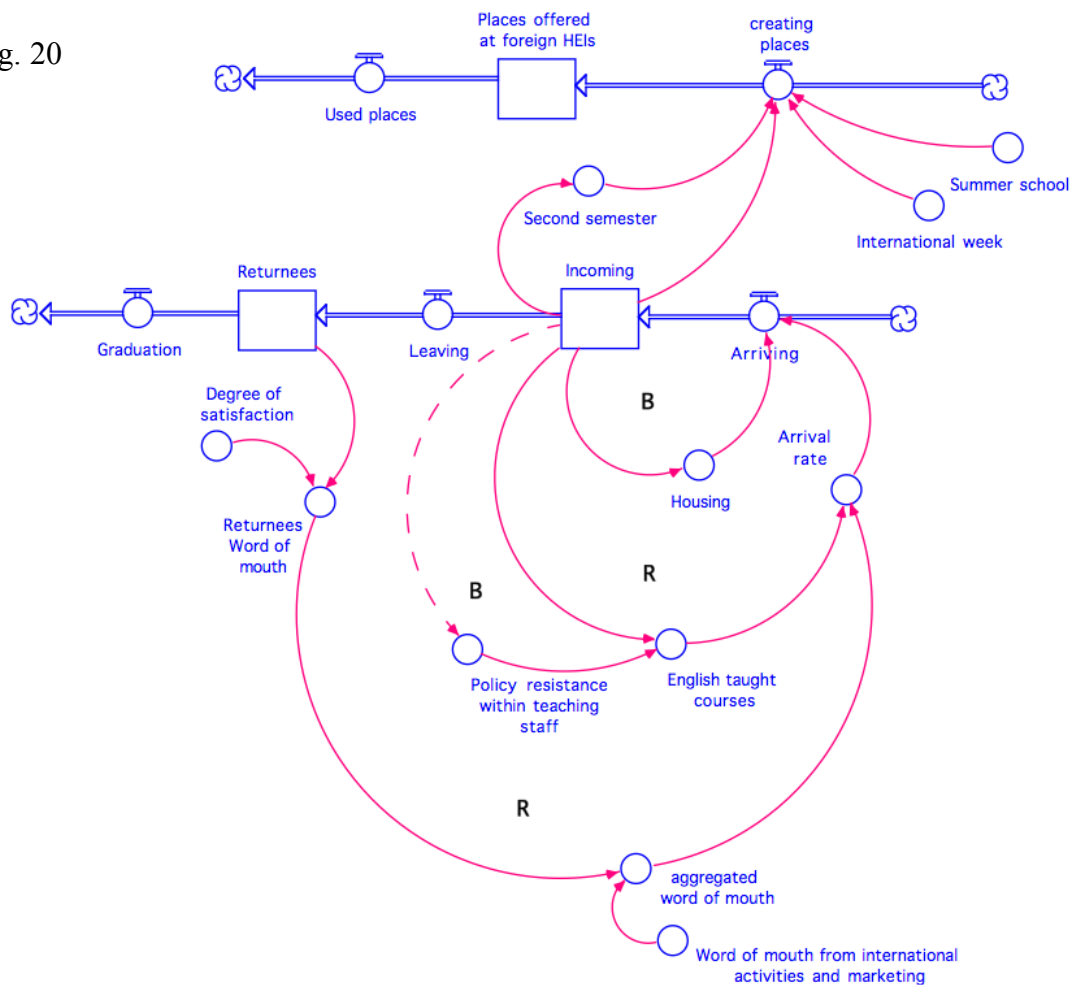
The aggregated sub-model is not meant to simulate behaviour, only to convey a simplified conceptual picture to induce a learning process. It makes visible the limitations of reciprocity and partner exclusiveness as guiding principles when it comes to increase the number of outgoing students substantially.

5.3 Sub-model two: Outward mobility

An advantage with outgoing mobility is that all potential outgoing students are present at the HEI. This gives HEI managers a number of tools on their hands in order to achieve mobility goals.

5.3a Mandatory study abroad period

Making mobility mandatory in certain programmes, where a minimum stay of three months abroad is a prerequisite to obtain a degree, has been one of the tools used at the HEI in order to increase outward mobility. If the requirement were strictly observed it would entail an outward mobility rate of 100% in these programmes. Intuitively it would seem like an effective measure in order to increase the outward mobility. However, limited by a fixed number of places available abroad, due to the reciprocity rule, mandatory programmes will counter-intuitively not increase the outward

mobility at all, but only create a shift in the composition of mobile students. In the figure 21 the fixed number of places abroad is illustrated through a lack of flows external to the figure, the only flow goes from one stock to the other in a 0-sum game. Adding to one means taking from the other.

Fig.21
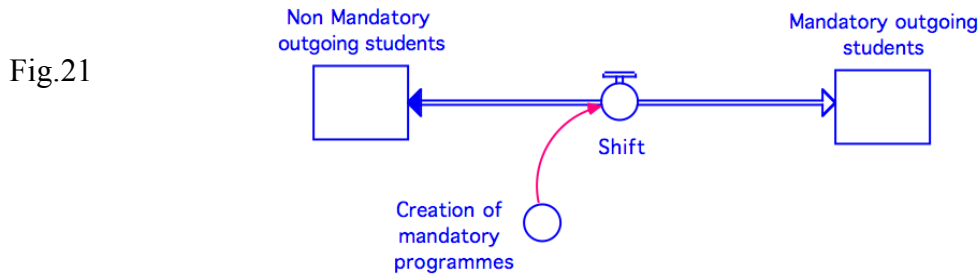
Another consequence of making outward mobility mandatory is that it also becomes a right for the students, since it can't be mandatory if it is not available. Hence, the institution needs to secure the availability of study abroad opportunities. The studied HEI has solved this by giving the students in programmes with mandatory study abroad period priority when it comes to choosing host institutions. Due to this choice the unintended consequences of mandatory programmes goes beyond a shift in composition of the outgoing student body. A reinforcing feedback loop that I have named "attractiveness of non mandatory study abroad", added in figure 22, shows the feedback generated when a higher number of students with priority of choice gives less interesting places left for students in non-mandatory programmes.

Fig.22
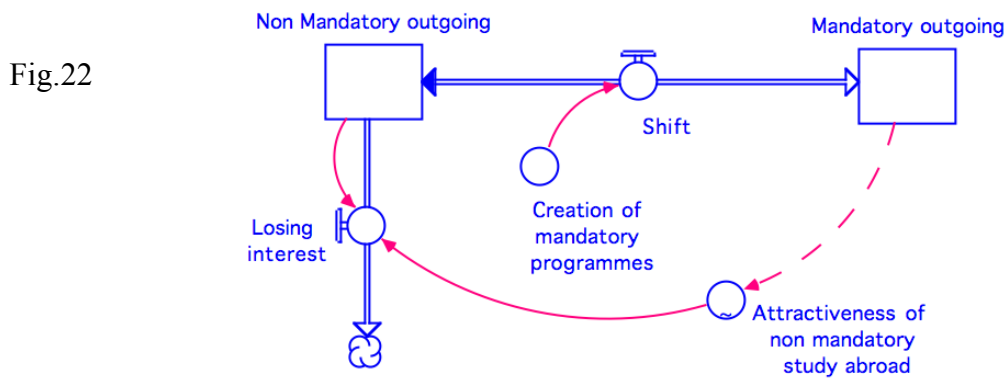
The graph 16 shows a simulation done with the assumption that as long as students with priority of choice represent less than 20% of the total number of outgoing students, there would still be enough interesting places for everybody to chose from, but as the percentage of students with priority of choice goes above 20%, the places left for other students start to be less interesting. In line 1 we can see that 5% of the total number of outgoing students are taken from non-mandatory to mandatory programmes every year. In the beginning, this only results in a 5% shift in the student body composition. After 20% however, the interest for non-mandatory study abroad decreases and before 60% of the original number of outgoing students are in mandatory programmes, there are virtually no other mobile students left. Hence, a 40% decrease in the total number of outgoing mobility.

Fig. 23
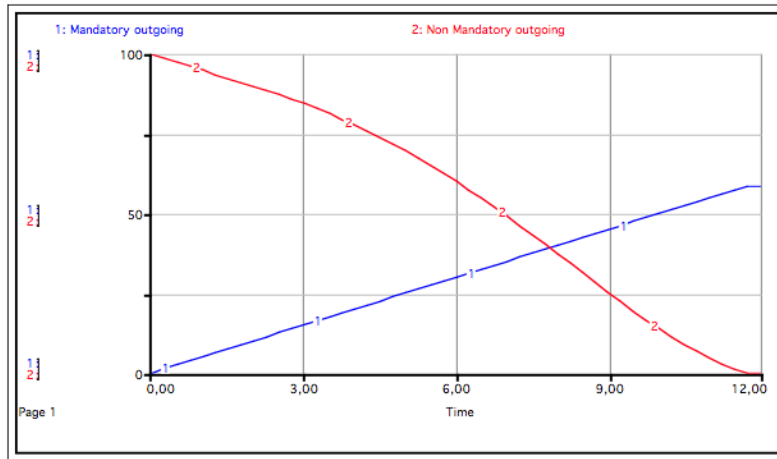
Although the choice of 20% as a tipping point can be discussed and the non-mandatory interest would never go completely to zero, the figure 23 conveys the conceptual idea of the negative impact it could have to give priority to some programmes within the frame of partnership exclusivity and reciprocity. The counterintuitive conclusion related to the use of mandatory programmes as a tool to increase outgoing mobility is thus that it does not lead to any increase, but on the contrary could lead to a decrease in outgoing students for the institution as a whole.

5.3b Elective semester

At the faculty of economics and management (FEM) at the studied HEI, the inclusion of an elective semester (30 ECTS) in the minor of bachelor programmes in 2004 has proved to be a successful measure to increase the interest in studying abroad. The semester can be filled with any type of courses as long as the relevance to the student's education can be established. This gives the students a wide range of options when it comes to the choice of courses abroad, along with a higher certainty of getting the courses validated by the home institution. The FEM seems to have tapped into an important barrier to mobility with the inclusion of the elective semester, and after a delay of 3-4 years needed for the first students to arrive to their elective semester in the third or fourth year, we can see a clear correlation between this semester and outward mobility as seen in figure 24.

Fig. 24

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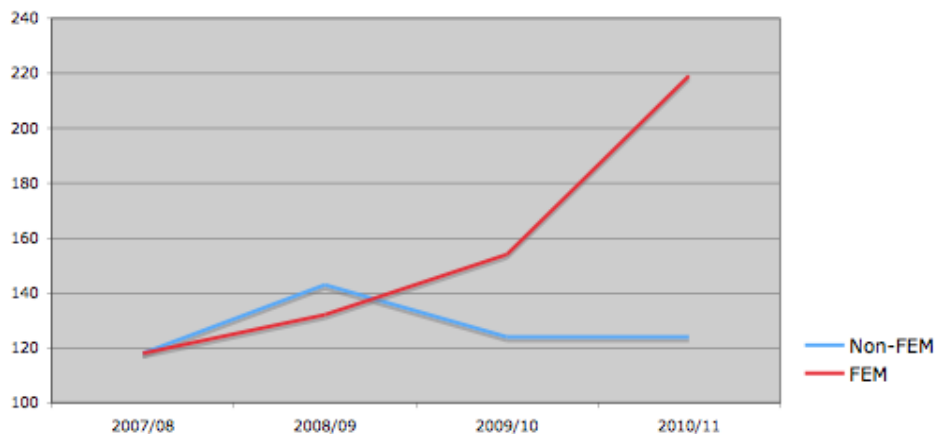
While the elective semester seems to be an efficient accelerator for outward mobility, the initiative does not affect the incoming mobility. Unless there is an increase in the number of incoming students making more places abroad available, this increase will soon be victim of its own success within the reciprocity frame. The elective semester creates a large pool of students willing to go abroad, but an increasing part of them will finally have to stay at home as seen in model 25:

Fig. 25
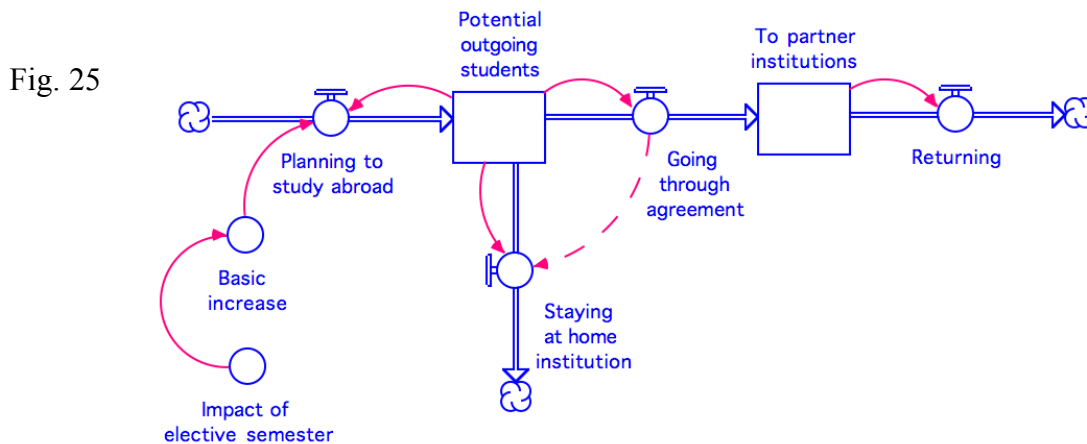
5.3c Free movers

One way to send out more students would be to relax the principles of reciprocity and partner exclusivity and encourage free movers, students going abroad without any institutional agreement. Accepting free movers would relieve the concerns of balance between in- and outward mobility.

Fig. 26
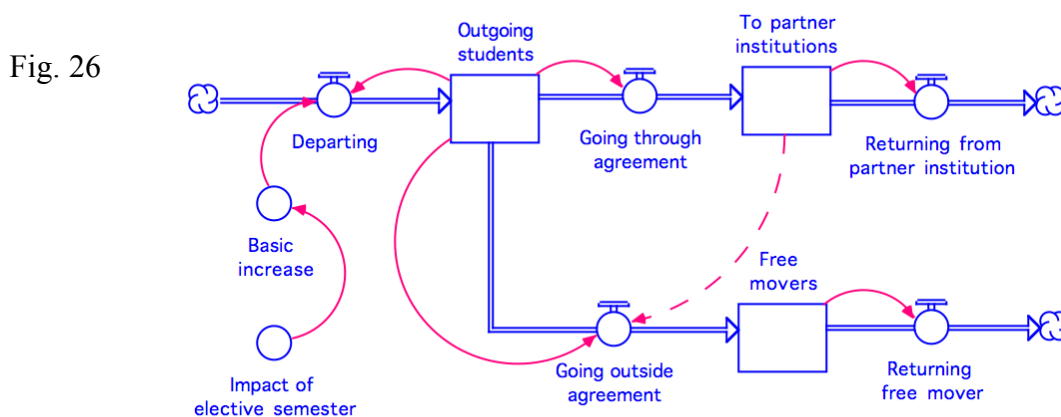
In a recent survey 61% of the participating students mentioned the "possibility to choose the university including the ones which do not have agreements with the home institution" as an important or very important factor in order to participate in the Erasmus programme. This would indicate that free movers constitute an untapped resource of outgoing mobility (Vossensteyn et al, 2010, p.91). If a 25% increase in incoming students is set as upper limit for how many students the HEI can accommodate (seen in 4.2.a.), and the increase in potential outgoing students due to the elective semester is set at 40%, encouraging free movers could give the following scenario:

Fig. 27
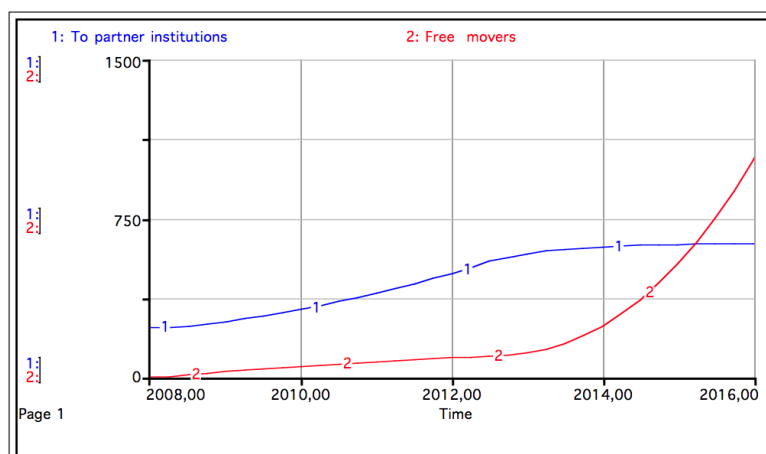
We can see that by including free movers the institution becomes able to continue sending out students although the limit to housing incoming students has been attained. Before the limit is reached the majority would still probably prefer to go to partner institutions due to the arrangements already in place, and in the European case, the availability of Erasmus grants.

I have so far discussed the upper limit for outgoing students and how the two overarching principles in the strategy implementation need to be relaxed in order to maintain the stated mobility goal. The focus has thus been how the SD methodology could help HEI managers align the mobility goal with the means to get there. However, two years into the implementation process, the institution is very far from its original goal even without reaching up to the first layer of limits presented so far, i.e. housing provision. The last part of this chapter will look at a lower layer of limits that could be the current most limiting factor, leading to an actual standstill in the mobility efforts for the entire institution with the exception of the faculty of economics and management (FEM).

5.3d Policy resistance outgoing

Figure 24 showed that the FEM had managed to increase its number of outgoing students quite substantially, but it also revealed how the rest of the HEI had experienced no increase in their outward mobility at all over the last 4 years in spite of considerable efforts. The barriers to mobility in this case seem not to be dictated by any of the limits to growth treated so far. The last loop of the outgoing model aims at a possible explanation of why the mobility numbers of most faculties have returned to the level they had prior to the strategy implementation.

> "Policy resistance arises because we often do not understand the full range of feedbacks operating in the system. As our actions alter the state of the system, other people react to restore the balance we have upset. Our actions may also trigger side effects" (Sterman, 2000, p.10).

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The balance that is upset is often linked to the purpose of the system, in this case the purpose of the teaching programmes, and more in general the purpose of the institutes and faculties. Through the interviews some of the resistance seemed to stem from a perception of mobility as positive for personal development, but not contributing to the purpose of the teaching programmes. The most direct example came from the faculty of education where a very positive stance towards internationalisation seemed to be diluted by a lack of perceived coherence with the future employment of the students. The staff repeatedly stated that they were educating students for the national workforce, who would work at a Dutch school and not abroad or in international companies. The faculty "tell me all the time that they (the students) have to go to the school next door and then they have to teach Dutch and they have to be good in that so the international experience is not the way" (C1). The mental model is illustrated below as two types of student activities competing for a limited time spent in the programme.

Fig. 28
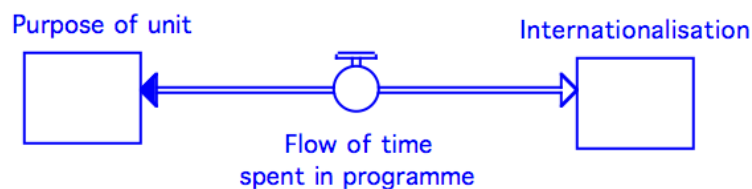
In this case demanding more student mobility would make the staff counterbalance the efforts even more to safeguard the purpose of the teaching, namely to provide teachers for local schools who have spent a maximum of time learning the required skills. This is a counterbalancing feedback structure put in place to "restore the balance we upset" (Sterman, 2000, p.10). As seen in the loop diagram under more internationalisation is perceived as leading to less time in the programme, which gives less time pursuing the purpose of the teaching, which again creates more policy resistance that counters new internationalisation initiatives[9].

Fig. 29

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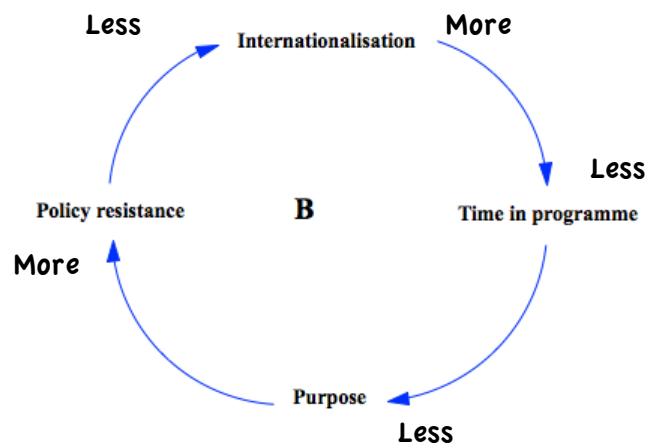
[9] In SD modelling the loop would be noted with + and – signs as opposed to "more" and "less". I have chosen to use the latter due to a possible confusion the first could create. This is explained in appendix II.

Once aware of this feedback structure managers can focus on creating a reinforcing structure around the purpose of the teaching instead of wasting their efforts on creating even more resistance. In the case of the faculty of education there are at least two links to be made between mobility and the purpose of the programmes. The first link is the increasingly international classrooms the future teachers will work in: "And then they are going into the classroom and there are lots of cultures and you have to manage all kinds of cultures" (C1). This goes for the composition of the student body, which will be very diverse, but even more so for the cooperation with parents, who often have less contact with the Dutch culture than their children. The other link is the demands on teachers to internationalise the content of the education and make the future generations interculturally aware. In order to prepare the students for their future career in teaching, an intercultural experience could give them a competitive advantage. The self-reinforcing feedback loop created by connecting the purpose of the teaching with international experience could prove constructive in order to overcome policy resistance. Furthermore, other links could be made on the more personal level of the academic staff where mobility issues were linked to research and teaching cooperation, or other areas where the purpose of the institutes and the mobility could be aligned. In the figure the change from "less" to "more" in the link between internationalisation and time in programme indicates this shift making the loop self-reinforcing (R).

Fig. 30
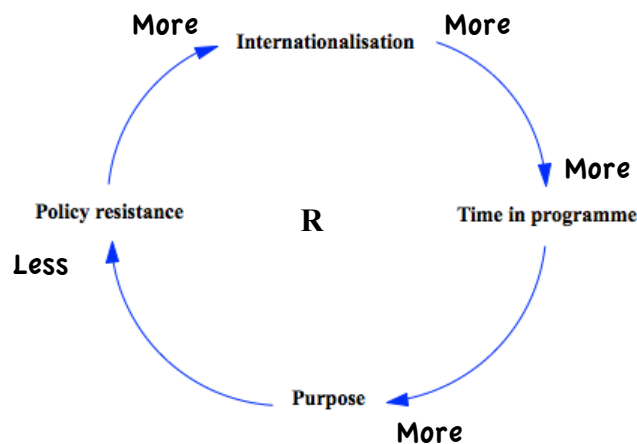
5.3e Conceptual model of outgoing mobility

To draw the threads together a conceptual model of outgoing mobility is shown in figure 31, where each of the factors discussed is illustrated as a loop contributing to the dynamics of outgoing mobility.

Fig. 31
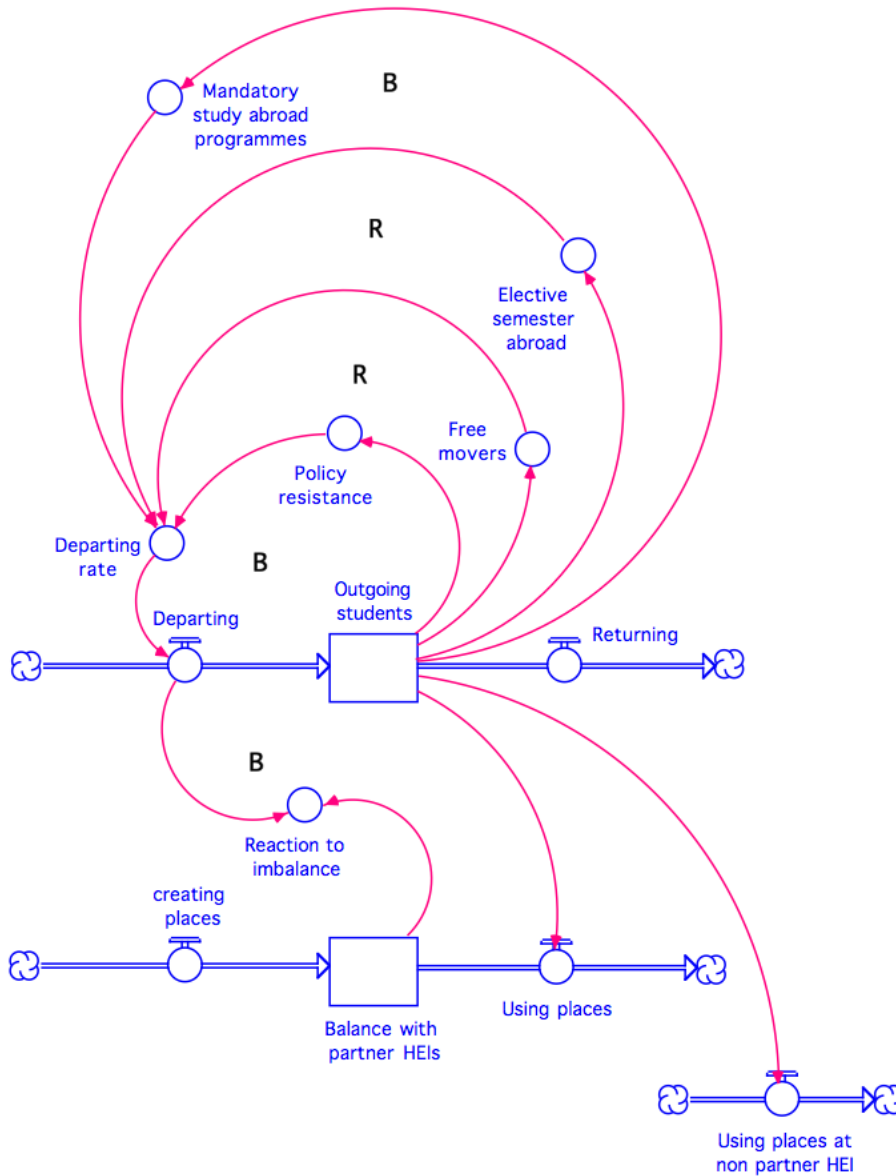
5.4 Full conceptual model

Finally, both the incoming and the outgoing conceptual models have been put together to show an aggregated picture of the dynamics discussed in this thesis. The overarching model can be recognised as the middle part of the model, the upper part being the outgoing sub-model and the lower part the incoming sub-model. For each of the sub-models an additional loop has been added to illustrate that the model is not meant to be exhaustive and that there are a number of additional loops that could be significant. This picture and the underlying dynamics will give the background to discuss system's features and patterns in the next chapter.

Fig. 32

6. Discussion of leverage points

Discussing leverage points like the use of elective semesters or mandatory study abroad periods to open for more outward mobility, or an English taught semester at the home institution to make it easier to attract more incoming students would be adhering to the best-practices tradition in internationalisation of HE. Although this tradition is not without merit I would like to take the discussion one level of abstraction higher and explore how the best practice sharing alone can lead to unsatisfying results. The argument follows what Kegan and Lahey (2009) define as technical solutions to adaptive challenges (p.29).

6.1 Technical versus adaptive challenges

Technical solutions are the implementation of best practices to improve a situation. This works in many cases when the challenge is technical, like how to discover fraudulent applications, but in the case of strategy implementation technical changes would as often generate new challenges. The administration would be fighting one fire after the other, not realising that many of them most likely were caused by the previous solution. In the case of student mobility the elective semester gives a rapid increase in outgoing students only to generate the challenge of imbalance with exchange partners. Adaptive changes involve a shift in thinking where a deeper understanding of how the system works and why it responds the way it does makes it easier to implement initiatives that take into account the responses generated. In the approximately 70 interviews that I have conducted at over 40 international offices over the last three years, a great many of the most pressured IRO managers said they were victims of their own success. I would argue that understanding how especially successful initiatives lead to the most acute challenges is one of the main leverage points in the implementation process of international strategies. I will therefore line out a few system features that has critical impact on the implementation process.

6.2 Impact of system features

Through the modelling we have seen several counterintuitive system effects. To see the models can be a sobering experience in itself and help recognise how the system reacts to our initiatives. However, learning about specific consequences of a system effect doesn't necessarily help us to see the consequences of the same effect in another setting. To do this we need to look at the mechanisms that inhibit us from anticipating these outcomes in the first place. One answer is that the complexity of the system makes it difficult to get a proper overview. This answer is not satisfying. Most of the models presented here do not contain more than a few components, but they still surprise us.

A more constructive approach could be to say that "everything we think we know about the world is a model. Our models do have strong congruence with the world", but "fall far short of representing the real world fully"[10] (Meadows, 2009, p.87). Although they give us important insights that help us manage a variety of activities, the mental models often fall short when it comes to understanding a whole range of feedback processes. I will here briefly discuss 5 different features in systems that make them able to surprise us over and over again. These are nonlinearity, boundaries, layers of limits, delays and bounded rationality.

Nonlinearity: We are inclined to understand the world around us through linear mental models. A linear response to the problem of a traffic jam would be to build another lane to ease the traffic. However, the responses of systems are in most cases nonlinear and the extra lane could easily attract more people settling in the area due to the swift road connections, adding to the traffic, and before long the traffic jam would be back with even more intensity. Reducing the road by one lane on the other hand could lead the traffic to alternative routes and thereby create a smoothly running traffic on the previously jam-ridden road (Sterman, 2000).

Due to nonlinearity the act of playing the game has a way of changing the rules (Meadows, 2009, p.91). There are elements of nonlinearity in all the models of student mobility presented in this thesis. In the case of mandatory study abroad programmes the only reaction to the initial 5% of students going over to mandatory study programmes was a 5% change in the composition of the student body. The linear expectation would be that 10% give a 10% shift, and 15% give 15%. This works fine up to a tipping point of 20-30% where suddenly an additional 5% increase produce a drastically different feedback, causing the number of non-mandatory students to collapse. The same goes for the way limited housing created a nonlinear increase in incoming students in figure X. Getting familiar with the nonlinearity of systems is therefore a practical way to enhance the planning capability in relation to implementation process of an international strategy.

Boundaries: While mental or formal models necessarily contain boundaries for what to include and what to exclude in the models, the real world has no clear-cut boundary limits. Incoming students do not come from a cloud like in the models presented in this thesis, but come from other universities, and from there the link could be followed more or less endlessly including an ever increasing number of factors.

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[10] This could be seen as a highly normative statement within a congnitivst approach.(fyll ut)

Obviously we can't include everything in the decision making process, but setting too narrow model boundaries is one of the most frequent causes for getting surprised by systems behaviour (Meadows, 2009). In the case study the model boundary behind the strategic decision on increased outward mobility in the strategy document, had been set without including incoming mobility as a limiting factor. Likewise, the principle of reciprocity seemed to have been adopted without linking it to the goal of a highly increased outward mobility. By extending these boundaries as done in the overarching model, it becomes apparent that the two assumptions mutually exclude each other within the time frame of the strategy.

The making and implementation of International strategies can suffer from our attachment "to boundaries our minds happen to be accustomed to" (Meadows, 2009, p.98). Organisational structures can easily create predetermined boundaries that we work within without realising it. Most international offices divide the workload either between incoming and outgoing students, or between geographical focus areas. These divides can easily inhibit thinking across the boundaries. "It's a challenge to stay creative enough to drop the boundaries that worked for the last problem and to find the most appropriate set of boundaries for the next question". (ibid, p.99). This is especially true at HEIs, which are "too often (…) living monuments to boundary rigidity"(ibid, p.98).

Layers of limits: The most important input to a system is the one that is the most limiting. No matter how many English thought programmes the institution offers, an increase in student inflow will not come as long as there is no more available housing for new students. More agreements with foreign institutions will not increase outbound mobility as long as the study programmes make it impossible for students to be away for a semester.

This is hardly surprising, but another dynamic issue adds to the complexity by making the most limiting factor a shifting entity in response to implementation initiatives. There are layers of limits and as soon as one limiting factor is overcome a new one will take its place. The challenge for managers is to see how their own activities create new limiting factors and thereby enable them to manoeuvre through the layers of limits. The case study shows that the most limiting factor for student mobility changes according to the level of increase in student numbers. As long as the increase of outward mobility is below a certain volume, policy resistance has been identified as be the most limiting factor, but as soon as policy resistance is dealt with and the number of students increase above a threshold, housing for incoming students takes over as the most limiting factor.

Every time a limiting factor is overcome growth occurs. It is thus the effective implementation efforts that alter the rules of the game the most. Understanding where the next limit to growth lays gives the managers the ability to give more direction to the growth process. Since growth cannot go on forever, it is necessary to decide on appropriate limits to live within. If the limits aren't self-imposed by the institution, they will be system-imposed. At the studied HEI, the growth seemed to be system imposed for the time being by policy resistance, far from the self-imposed limits of the strategy document.

Delays: Delays are omnipresent in systems and can cause instability and oscillations (Sterman, 2000). SD theory operates with two main types of delays, material delays and information delays. Material delays concern the time it takes from input to output in stocks. In mobility issues one of the delays would be the time between the creation of new programmes with mandatory stay abroad till the first students get to the semester where they go to a foreign institution. The consequences of decisions can therefore be invisible for years and have another delay before eventual corrective measures take effect. The same would be the case for the time between international recruitment efforts and the arrival of new incoming students from the target group.

Information delays are the time between something happens and the moment it is taken into consideration in the decision process. It involves the time it takes to collect information, but also the time we need to digest new information. After that we often need even more time to adjust emotionally to a new situation. It is due to information delays that we see the oscillations in the overarching model. Before managers have information about a high discrepancy between in and outgoing students the imbalance is already building momentum and by the time the managers get to know that balance is reached again, the imbalance has already gone to the opposite side. This repeats itself in the same way as when we turn on an unfamiliar shower and alternatively adjust the temperature too hot and too cold three, four times until we finally find a balance.

Understanding the delays in the system makes it easier for implementation managers to adjust the efforts more correctly from the outset, like when we turn a well known shower to the correct temperature the first time and wait till it gets there since we know how long the hot water delays are. The housing model showed that the upper limit of 25% increase per year would ensure a smooth growth towards the limit instead of adjusting on and off by overshooting the carrying

capacity of the housing market with a too steep increase of incoming students. "Overshoots, oscillations and collapses are always caused by delays" (Meadows, 2009, p.105)

Bounded rationality: "The term bounded rationality is used to designate rational choice that takes into account the cognitive limitations of the decision maker – limitations of both knowledge and computational capacity" (Simon, 1997, p.291). This means that we try to make rational choices with the imperfect information we have, but also that we process that information imperfectly, exaggerating the importance of the present time, giving selective attention to different inputs and even discarding certain information (Hogarth, 1987).

> "People use a variety of heuristics – rules of thumb – to form judgements and make decisions, and while these heuristics often work well in simple settings, they lead to persistent, systematic departures from rational behaviour in many realistic situations, including systems with even modest levels of dynamic complexity" (Sterman, 2000, p.597).

Through a wide range of role-plays made for this purpose it possible to observe how easily we adapt to the bounded rationality of different settings (Senge, 1990, Sterman, 2000, Meadows, 2009). A person put in the place of an investment banker with imperfect information about the market and other investors' purchases would overinvest through booms and underinvest through downturns even if it would be rational to do the opposite. It is therefore highly probable that changing the person in charge of the international strategy, like replacing the author of the international strategy at the studied HEI, wouldn't have changed much. The imperfect information due to lack of reliable statistics, delays in response to initiatives, misinterpreted reasons for policy resistance, and event focus as opposed to structure focus in the understanding of how HEIs react to an implementation process, would easily lead any implementation manager to make a series of suboptimal decisions. Being aware of the systems features like bounded rationality, and the ones discussed above, is likely to constitute a major leverage point towards a more targeted implementation process.

6.3 Aggregated system features: patterns

The system features mentioned above seldom appear in isolation. Aggregated system features create behaviour patterns that can be difficult to counter. However, a deeper understanding of the patterns helps to meet the challenges more constructively. Among the variety of patterns at work in systems, this thesis will look closer at three of them, namely policy resistance, path dependency and seeking

the wrong goal. These patterns constitute critical interconnectors in the system studied and would steer the "metabolic processes" (Meadows, 2009, p.13) of the strategy implementation, i.e. how the elements respond to initiatives.

Policy resistance: Policy resistance has been discussed several times in the thesis so here it will only be mentioned in relation to its origins. Policy resistance can come from a combination of several features like narrow boundary setting, bounded rationality, but also delays. The major value of intercultural competency for example is seen only after a considerable delay, probably after graduation. Nonlinearity is seen in policy resistance when the academic staff applauds the sending out of a few students, while sending out twice as many is seen as a threat. Understanding how policy resistance is a product of defence mechanisms, and often with good reasons (Kegan, 2009), can give leverage in how to approach it. Aligning the implementation efforts with the purpose of the unit would be one of the critical steps to counter this effect.

Path dependency: When previous experience reinforces the likeliness of repeating the same choices path dependency occurs. The classical analogy for this is to imagine picking at odds a blue or a red ball in a jar. The selected ball is put back in the jar with another ball of the same colour. When this is repeated again and again the probability of picking one colour increases each time. If the first ball is red, the next time there will be 2 to 1 chances for picking a red ball. If the blue ball is not picked immediately after that, the majority of red balls will increase, as will the likeliness of picking that colour next time. After 5-10 times the consequence of picking a blue ball diminishes since it will not catch up with the red ones at that point (Veggeland, 2007, p.103).

The same effect is seen when we get used to a certain way of setting boundaries, thinking linearly, the way bounded rationality makes us unaware of the layers of limits, and delays make us prefer the short term benefits to the long term consequences. A current path dependency in international strategy implementation is seen in the importance of university rankings. Although the methodology behind them is highly questionable (Kehm & Stensaker, 2007) most of the ranked universities put considerable resources into ameliorating their stand. This makes it too costly for any institution not to do the same (picking a different ball), and by consequence the indicators made up by newspapers steer much of the activities at highly regarded research universities. In this case study a path dependency pattern can be visible in the way mobility is organised around principles that might not be the best way to honour the purpose of the education, but that is widely adhered too

and strengthen through mobility programmes like Erasmus. I'm not saying these principles shouldn't be adhered to, but the dependency pattern makes us forget to look for alternatives.

Seeking the wrong goal: Systems have a tendency to produce what it is measured by. "If the goal is defined badly, if it doesn't measure what it's supposed to measure, if it doesn't reflect the welfare of the system, then the system can't possibly produce a desirable result.(...) Be careful what you ask them to produce" (Meadows, 2009, p.138). There is a tendency in mobility issues to give much more attention to the numbers than the purpose of mobility. "Institutions act rationally and strategically in effectively becoming what is being measured" (van der Wende and Westerheijden, 2009, p.77). The academic interviewed in this case study called for a more content-based cooperation, where a few institutions had closer cooperation in many fields. This will not turn out in big volume when it comes to mobility numbers, but could give high returns in form of cooperation in research and education, joint applications for research grants, joint degrees, etc. In order to align the purpose of teaching and research at the institution with the effects of mobility, a rethinking of how the implementation process is measured, along with the potential consequences of the indicators in use, could change the outcome.

6.4 Aligning strategy and purpose

The purpose is vital to any system and therefore also a powerful vehicle for change. Turning back to the definition of internationalisation as "the process of integrating an international, intercultural or global dimension into the purpose, functions or delivery of post-secondary education" (Knight, 2003, p.2), it is possible to link the two entities purpose and internationalisation. According to this definition, it can be argued that whether the international strategy implementation actually leads to internationalisation can be seen in the way the internationalisation process aligns with the purpose of the institution's units and activities. If this is not the case the institution could very well have many international displays like foreign students on campus or an international week, but as long as it isn't attached to the purpose of the institution it could still be hold that it hasn't been truly internationalised.

7. Conclusions

7.1 Summary of findings

The research question and its sub-questions have provided the guiding line for this thesis, and answering them will now summarise the findings. The first sub-question asked for the most influential elements and interconnections with relation to international strategy implementation at the studied HEI. In the modelling process a specific challenge was singled out to provide focus for the search, namely how to increase outward mobility. After having considered a wide range of influential factors, two overarching elements were identified, incoming and outgoing students, and their relationship guided by two interconnections (principles) named partnership exclusivity and reciprocity. For each of the overarching elements four sub-model elements were proposed as most influential. For the incoming sub-model these were accommodation, English taught programmes, policy resistance within teaching staff and word of mouth, and for the outgoing sub-model the elements were policy resistance, free movers, elective semester and programmes with mandatory study abroad period. The second sub-question asked how the purpose of the HEI and its subunits interact in the implementation process. Two stereotypical interactions of purposes were identified. One was channelled through policy resistance where the purpose of the international strategy and the faculty of education pulled in opposite directions paralysing the implementation efforts, and the other interaction was found in the faculty of economics and management where the two purposes were aligned and created a substantial increase in outgoing mobility.

A higher-level reply to the first and second sub-questions comes with answering the third sub-question on features and patterns observed in the implementation process. The five system features non-linearity, boundaries, layers of limits, delays and bounded rationality were discussed along with the three patterns policy resistance, path dependency and seeking the wrong goal. The system features and patterns were identified as higher-level interconnections governing the "metabolic processes" (Meadows, 2009, p.13) of the strategy implementation. These interconnections would also steer other parts of the implementation and we thereby lift the scope from the single challenge studied to a more general view of the process. The final sub-question pulls the strings together and asks what we can learn from a system dynamics approach to the international strategy implementation. The discussions chapter shows how most of the findings can be related to system features and patterns active in the process. Insights into how these features and patterns create the underlying structure of the strategy implementation could give a substantial contribution with

respect to a more effective implementation. The main leverage point discussed was the alignment of the internationalisation process and the purpose of teaching and research at the institution.

These four sub-questions bridge over to the main research question by partly answering how a better understanding of international strategy implementation at HEIs can be achieved through the application of SD theory. Identifying the main elements and interconnections makes it easier to get a better understanding of the interplay between the different factors. Adding the purpose immediately makes it clear why some initiatives would very likely fail, while other initiatives could use the purpose as a catalyst for the implementation. This becomes visible at the level of the individual factors, but even more so at the aggregated level through system features and patterns. The thesis argues thus that the application of SD theory would contribute to a deeper understanding of the internationalisation process and thus a more constructive strategy implementation.

7.2 Contribution to existing research and thoughts on future inquiries

The main contribution of this study is to take the first step in proposing a theoretical framework and terminology that could provide a more structured approach to understanding the implementation process of international strategies at HEIs. The application of SD theory is claimed to give a better appraisal of the dynamic nature of the internationalisation process. Through this case study the claim seems to be strengthen, but a master thesis has obvious limitations of extent and scope and there is a need for extensive additional research in order to assert the suitability of such a framework and terminology. The thesis has had its focus on applied aspects. Further studies would need to give more attention to the theoretical foundations of such a framework. Research on generic system archetypes has made an effort to provide a solid foundation as seen in Wolstenholme (2003, 2004), but there is still a gap to fill between the academic expectations and the applied field of evaluation practises (ibid). Once this is established it could be interesting to apply the framework in an action research inspired study where the researcher gets involved in the strategy implementation of the institutions studied. One of the pressing questions would then be whether there are other common interconnections, such as the two guiding principles of partnership exclusivity and reciprocity, which could lead to pervasive misinterpretations of systemic responses. Do these result in system features and patterns that are specific to international strategy implementation in HE, and if so, what could we learn from identifying them? Such studies have the potential of amending both the lack of "theory-driven research and the development of analytical frameworks" (Gornitzka et al., 2003: 12) and reducing the gap between "the rhetoric for and the implementation of internationalization" (Childress, 2010, p.4).

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Appendix I:

Interview guide:

1. What is your role related to internationalisation?

2. How did you get involved in internationalisation?

3. In your opinion, why should your department internationalise?

4. Who would you consider key persons at the HEI concerning internationalisation?

5. In your opinion, what should the role of the international office be?

6. What do you like/dislike with internationalisation efforts?

7. What do you think others in your department think about internationalisation?

Mobility:

1. Do you think the HEI is getting the most out of mobility? If not, what is missing?

2. There is currently a centrally set strategic goal for the number of outgoing students. What kind of signal do you think that sends?

3. Is the quantitative increase in outgoing students a priority for your department?

4. What has been done to increase the numbers of outgoing students?

5. Do your department have a balanced ratio of incoming and outgoing students?

6. If there were 10 times more of your students who went abroad to study, what consequences would that have for your department? And incoming?

7. What should be aimed at in the future?

8. (Anything you would like to add?)

Appendix II: Causal loop diagrams

The normal annotation for causal loop diagrams (CLD) in system dynamics is done by + and –
signs as seen under. When I have chosen to use "more" and "less" in its stead it is to avoid the
following confusion: + means more of the previous gives more of the next, - means more of the
previous gives less of the next. This is useful when we want to change the CLD below from a
balancing to a reinforcing loops by changing the Time in programme annotation from minus to
plus.
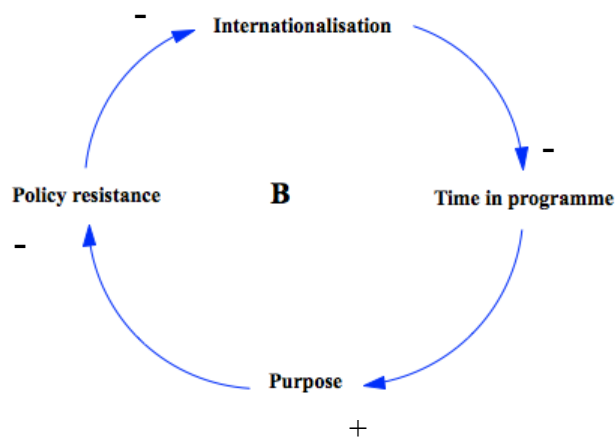
Although it is very logical, there is a pedagogical challenge in seeing that a "minus" in front of
internationalisation means that it gets more internationalisation since there is less of the previous
(policy resistance due to more purpose). Since the aim of the thesis has been to contribute to a
learning process, I have chosen to use the words "more" and "less" although the way they have
been changed from "more" to "less" in the case of internationalisation is not supported in SD
modelling.
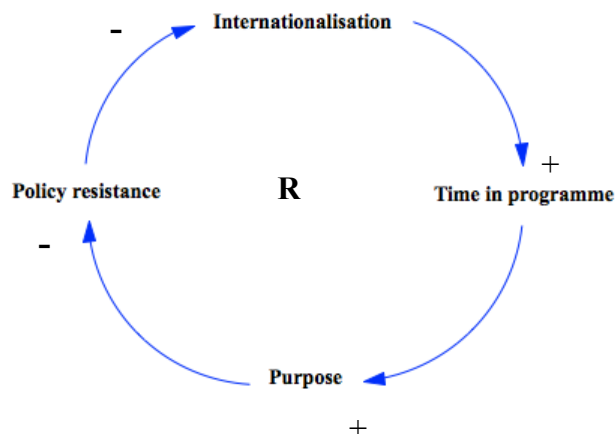
Appendix III: Validation tests.

(Due to a conditional offer for a PhD-position, the thesis had to be handed in before this appendix was finished. I have chosen to include it since it gives some additional information on validation procedures of System Dynamics models)

The models presented in this thesis have clear limitations. This appendix is aimed at making them visible to the users. Sterman (2000) provides 12 different tests to strengthen the confidence in models.

1. ***Boundary adequacy tests***

Deciding what should be seen as exogenous and endogenous factors sets the boundaries of a model, i.e. which factors to include and which to exclude from the model. The results provided by models might change if the boundaries are relaxed or restricted, and sometimes the choice of boundaries can be made to support preconceptions. It is therefore necessary to test if the boundaries are appropriate and in line with the intentions of the model.

In the overarching model the boundaries are set so the initial value of the two stocks incoming and outgoing students are exogenous, along with the two increase rates. The reaction pattern of the converter "reaction to imbalance" is also set exogenously. In the case of the stocks the chosen numbers are discussed and their relative uncertainty has been mentioned. From the discussion it can be concluded that the range of error in this case is not important enough to have any impact on the conceptual idea conveyed by the simulation. The increase rates are used to visualise this conceptual idea and the different possible outcomes of a discrepancy between the rates.

The reaction pattern on the other hand can be subject to discussion since the level of reaction is not necessarily correctly pictured. Again the idea of a reaction to a negative balance is all that matters to the simulation and the degree would only change the numerical outcome of the simulation without changing the conceptual limitations of reciprocity and partner exclusivity, the two concepts the model aims at visualise.

Having established the boundaries, the next challenge is to see if there are any feedbacks that are missing from the picture. One omitted feedback can be found in the lack of connectors between

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"reactions to imbalance" and "arriving" students. If there were more incoming than outgoing students the reaction would need to target the number of incoming students. Again, the purpose of the model is to show the dynamic between incoming and outgoing in the case of a steeper increase in outgoing students than incoming students, and thus the feedback is kept out to make the model as transparent as possible. By adding the two sub-models what is actually done is widening the boundaries to include the factors behind the two increase rates.

2. *Structure assessment tests*

"Structure assessment tests ask whether the model is consistent with knowledge of the real system relevant to the purpose" (Sterman, 2000, 863). Violation of physical laws would be a structure assessment issue, like if the number of people in a stock could become negative. In the overarching model the stocks "incoming" and "outgoing" could not become negative since the outflow is defined to be equal to the stock and any inflow can only increase the stock. The stock "balance" on the other hand can become negative, as seen through the +- sign in the stock. This stock accounts for the difference between incoming and outgoing and is therefore not violating any physical law by going negative.

Another structural assessment issue is the search for "free lunches" (ibid). Free lunches happen when something is modelled to occur by itself when real life occurrence would have required substantial resources. The overarching model allows the increase rate for incoming students to be set at any rate although the sub-models show limits to growth for the incoming stock. However, the model makes it possible to try out hypothetical situations and see what the logic ramifications would have been. It is therefore not a weakness of the model, but a question of its purpose.

3. *Dimensional consistency*

To check for consistency between the units of measure is a simple test in a model with as few elements as the overarching model where all the units are students or rates related to student flows. This test makes more sense in more complex models.

4. *Parameter assessment*

Parameter assessment relates to whether the parameter values correspond to descriptive and numerical knowledge of the system as well as to make sure they all have real world counterparts. In the building of the overarching model the parameters relation to real world numerical knowledge has been discussed and acknowledged.

5. *Extreme conditions tests*

The extreme conditions test check if the model is able to handle extremely high or low input values. The goal is to see if the model still adheres to real world principles like avoiding a negative number or sending out more students than there is at the HEI. When confronted to extreme values the overarching model still adheres to the real world physical principles and the stocks never go negative even with highly decreasing or increasing inflows. However, the extreme conditions test makes visible the limitations of the model when it comes to making sense of the two principles of reciprocity and partnership exclusivity. As already mentioned there is only a reaction to imbalance in the case of a surplus of outgoing students. The imbalance never gets corrected when the model is confronted with more incoming than outgoing students. This articulates the lower limit for outgoing influx rate, which can't be inferior to the rate of incoming students. The upper limit is dictated by the converter, which has a maximum reaction of cutting the number of outgoing students to 30% of the previous year (multiplying the stock by 0,3). When the outgoing influx rate goes above 2,33 (233%) it becomes superior to the maximum reaction and the reciprocity goal cannot be attained $((X + X * 2,33) * 0,3 = X * 3,33 * 0,3 = X)$. Both limits are well beyond what could be expected in the present system so it can be concluded that for the purpose of the model the values accepted are sufficient to run simulations of most likely scenarios.

6. *Integration error tests*

There are several methods available for how to calculate the equations on which the model is based. The most basic method is Euler's method, used whenever it is good enough for the purpose of the model. Runga-Kutta 2 is the next step in sophistication provided by the modelling software and Runga Kutta 4 the third option. For this model I have chosen the Runga-Kutta 2 level based on the need for frequent calculations to avoid ever increasing oscillations as a result of the time delays between calculations.

7. *Behaviour reproduction tests*

Behaviour reproduction tests would be used to compare the results from a simulation with observations of the actual system. In this case it does not make much sense to see whether the model output corresponds point-by-point to the actual development since the model is made to show the limitations to growth within a specific framework. The model is not intended to give precise predictions but to be a tool for thinking. However, the actual development should fit within the limits announced by the model. Recent statistics on mobility at the HEI show that the

development is well within the boundaries of the model with a total increase in outward mobility around 13% per year.

8. *Behaviour anomaly tests*

This test would try to identify important relationships in the model through a "loop knockout analysis" (880). In the model showed here the reaction converter is the most crucial point in the model and if it were to be taken away (knocked out) the model would show nothing but the exponential growth of the stocks.

9. *Family member tests*

The family member test looks at whether the model can generate the behaviour of other similar systems, and thereby give it more credibility. The conceptual form of the models in this case has been chosen to visualise commonly held assumptions. The principles of reciprocity and partnership exclusivity can be found in the strategies or mental models of many HEIs and with their managers. This argument is strengthened by the use of reciprocity in the Erasmus exchange programme. It would therefore be possible to apply the model to other institutions although the relative importance of the feedback loops in the sub-models would differ somewhat.

10. *Surprise behaviour tests*

"Discrepancies between model behaviour and expectation indicates that there are flaws in the formal model, the mental model, or both" (p.882). There are several surprise behaviours in this model. The counterintuitive effect of the reciprocity principle on long-term mobility is one, the lack of increase or even decrease in mobility as a result of mandatory study abroad programmes another. They will most probably show that the mental model of how these initiatives work has to be revised. "A main benefit of modelling is suggesting what to look for" (p.883).

11. *Sensitivity analysis*

Not performed.

12. *System improvement tests*

The fact that the studied HEI wanted to use the findings from this study in their ongoing revision of the international strategy makes it likely that the study will have some impact. The improvement of mental models related to the perceived imbalance between incoming and outgoing students has already been documented.