

In the picture

**policy considerations for
IT-supported recognition of
children with psychosocial problems**

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In the picture

policy considerations for IT-supported recognition of children with psychosocial problems

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In partial fulfilment of the requirements for the degree of
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Preface

This thesis report is the result of a graduation project, partially carried out at Capgemini Nederland in the practice Architecture Governance & secured Infrastructure, in the period from November 2007 to May 2008. The graduation committee consisted of four people (see Table 1), whom I would like to thank for their inspiring comments, the transfer of some of their research expertise and their general belief in a good outcome of an ambitious process. I also would like to thank my fellow interns for their critical thinking and good work climate, especially Kas Clark who was eager to read a pre-final version of this report entirely, and the support staff of Capgemini and TU Delft for their cooperation. Finally, the interviewees' willingness to share their thoughts with me made the project gain depth and credibility.

Table 1 Composition of the graduation committee.

Chair	Prof. dr. Jeroen van den Hoven, full professor in Ethics and Information Technology
First supervisor	Dr. Aad Correljé, associate professor, section Economics of Infrastructures
Second supervisor	Prof. dr. Jeroen van den Hoven
Third supervisor	Dr. ir. Jan van den Berg, associate professor, section Information and Communication Technology
Fourth and external supervisor	Drs. Marco Plas, principal consultant Capgemini

Next to this report, the paper "Value-sensitive design methodology for information systems" has been written. It is attached to this report and printed on yellow paper, but is an independent work, not a part of the report text. As such, it is not included in the Table of Contents.

Delft/Utrecht, 29 April 2008

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Samenvatting / Summary in Dutch

To guarantee the accessibility of the results of this master thesis project for those who do not master the English language, we included a short summary in Dutch, mainly focusing on the results of the research.

Om de toegankelijkheid van de resultaten van dit afstudeeronderzoek ook voor niet-Engelsvaardigen te waarborgen, is op de volgende pagina's een korte samenvatting in het Nederlands opgenomen, waarin vooral wordt gefocust op de resultaten van het onderzoek. Hierin worden onderstaande aanbevelingen uitgewerkt.

Aanbevelingen

1. Wissel niet meer informatie uit dan strikt noodzakelijk.
2. Houd rekening met de beschikbaarheid, effectiviteit en wenselijkheid van interventies voordat informatie wordt verzameld.
3. Beoordeel elk systeem op zijn eigen merites. Schenk in het bijzonder aandacht aan een verfijnde normatieve analyse. Er bestaat geen panacee.
4. Betrek meerdere domeinen bij een incidentgebaseerd systeem, maar houd de technologie simpel. Beslis over het type informatie dat wordt uitgewisseld (contactgegevens of beperkte inhoudelijke informatie) en het gebruik van risicofactoren.
5. Beperk de toegang tot levenscyclusgebaseerde data tot een enkele beroepsgroep, maar verzamel wel zoveel data dat een goede analyse mogelijk is. Beslis over de mogelijk diagnose-ondersteunende rol van technologie en het gebruik van risicofactoren.
6. Wissel geen medische informatie uit met niet-medici door middel van een informatiesysteem.
7. Stel het invoeren van een eventuele meldplicht voor vermoedens van kindermishandeling en andere ontwikkelingsbarrières uit tot meer bekend is over het effect van huidige en geplande beleidsmaatregelen.
8. De nationale overheid zou knopen moeten doorhakken over risicofactoren, een eventuele meldplicht en een taxonomie van meldcriteria.

Samenvatting

Naar schatting heeft ongeveer drieënhalve tot twaalf procent van de Nederlandse jongeren te kampen met psychosociale problemen van enige omvang: emotionele of gedragsproblemen die hun maatschappelijk functioneren hinderen. Een groot deel van deze jongeren is nu niet in beeld bij instanties als scholen, de jeugdzorg, de medische wereld of de welzijnssector. Van de jongeren die wel bekend zijn, is niet altijd zicht op alle problemen. Ook weten veel hulpverleners van elkaar niet dat zij met dezelfde jongeren bezig zijn, laat staan welke informatie er al beschikbaar is of welke interventies er zijn ondernomen.

In dit onderzoek is een verkenning uitgevoerd naar de belangrijkste beleidsoverwegingen rondom informatiesystemen die het herkennen van jongeren met psychosociale problemen ondersteunen. Daarbij gaat het er zowel om het aantal jongeren dat niet herkend wordt te verminderen, als een beter en vollediger beeld te krijgen van een jongere met problemen.

Wij erkennen en herkennen dat technologie en instituties niet waardenneutraal zijn, maar kunnen leiden tot positieve of negatieve discriminatie van groepen mensen en het versterken of schaden van belangen. Door al in het begin van een beleids- en ontwerpproces na te denken over fundamentele vraagstukken met betrekking tot de effectiviteit, haalbaarheid en neveneffecten van een systeem, kunnen verrassingen achteraf worden beperkt en kunnen waarden op een bewuste en gewenste wijze worden opgenomen in een systeem. Het blijkt dat de door ons bestudeerde systemen te complex zijn om voor elke ideologische familie, zoals liberalisme of communitarisme, een simpele positie te kunnen voorschrijven. Vaker nemen keuzes de vorm aan van dilemma's of moet een balans worden gevonden tussen conflicterende waarden.

De voornaamste overwegingen waarmee beleidsmakers, op elk denkbaar overheidsniveau, rekening moeten houden, blijken niet op het vlak van technologie te liggen. Het zijn veeleer instituties als wetgeving, de inrichting van organisaties en samenwerkingsverbanden, en de inzet van beïnvloedingsinstrumenten waarover keuzes gemaakt moeten worden.

Een eerste algemene overweging is dat het sowieso verstandig is om nooit meer informatie te verzamelen dan strikt noodzakelijk voor het beoogde doel (aanbeveling 1): baat het niet, dan kan vanwege de kans op stigmatisering en informatieverlies toch schaden. Het verzamelen, verwerken en uitwisselen van informatie kan niet los worden gezien van de interventies die beschikbaar zijn (aanbeveling 2). De effectiviteit van veel interventies in de jeugdhulpverlening staat ter discussie, en voor alle domeinen geldt dat niet voor elk probleem passende interventies voorhanden zijn. Zonder dat er kan worden ingegrepen ligt het niet voor de hand om informatie te verzamelen, het dient dan geen doel. De informatiebehoefte en de interventies moeten dus op elkaar worden afgestemd.

Verder dient elk systeem op zijn eigen merites te worden beoordeeld (aanbeveling 3). Keuzes kunnen pas worden gemaakt als de concrete situatie waarin het systeem moet gaan opereren duidelijk is. Er is geen panacee die in alle situaties werkt. Een goede analyse van de betrokken belangen en waarden mag niet worden vergeten, waarbij zo precies mogelijk wordt geformuleerd wat bijvoorbeeld privacy of de ontwikkeling van een kind betekent en hoe de afweging daartussen voor verschillende groepen uitpakt.

Dit rapport onderscheidt twee typen families van haalbare en intern consistente systemen. De eerste familie bestaat uit incidentgebaseerde systemen (uitgewerkt in aanbeveling 4). Hierin wordt pas informatie opgeslagen nadat er iets is voorgevallen, bijvoorbeeld een delict, een vermoeden van mishandeling of spijbelen. Verschillende instanties in verschillende domeinen, zoals de zorg, het onderwijs, de sociale dienst, politie en justitie en meldpunten voor kindermishandeling, werken samen om hun vermoedens te toetsen en te achterhalen welke andere hulpverleners meer weten over het kind. Incidentgebaseerde systemen maken gebruik van basale technologie: de interpretatie wordt gedaan door mensen. Twee fundamentele keuzes zijn gekoppeld aan incidentgebaseerde

systemen. Ten eerste moet bepaald worden welke informatie precies wordt uitgewisseld: wordt er behalve de contactgegevens van de melders ook inhoudelijke informatie opgeslagen? Daarnaast kan men ervoor kiezen risicofactoren te gebruiken: statistische verbanden tussen groepskenmerken en de kans op psychosociale problemen. Risicofactoren zijn een efficiënte manier om een schifting te maken tussen kinderen met een laag en hoog 'risicoprofiel'. Zij kunnen echter leiden tot stigmatisering van mensen die een risicokenmerk als allochtone afkomst, laag opleidingsniveau of tienerzwangerschap bezitten. Ook kan het leiden tot gemakzucht en blindheid, omdat niet alle gevallen te vatten zijn in een classificatiesysteem en de toepassing van de factoren met grote onzekerheden gepaard gaat.

De tweede familie bestaat uit systemen die het kind volgen gedurende zijn levenscyclus (uitgewerkt in aanbeveling 5). Een voorbeeld van een dergelijk systeem is het Elektronisch Kinddossier. Deze systemen kenmerken zich door het verzamelen van inhoudelijke informatie. Omdat diepgaande informatie vaak specialistisch van aard is, is het verstandig deze data alleen binnen dezelfde (medische) professie te gebruiken. Anders is de kans op miscommunicatie erg groot, bijvoorbeeld doordat begrippen in verschillende domeinen verschillende betekenissen hebben. Rondom de levenscyclusgebaseerde systemen zijn keuzes op twee assen mogelijk. Ook hier kan men ervoor kiezen wel of geen risicofactoren te gebruiken bij de (longitudinale) analyses. Een tweede keus betreft de intelligentie van het te gebruiken computersysteem. Men kan ervoor kiezen alle interpretatie van de data over te laten aan mensen, maar een systeem kan ook behulpzaam zijn bij het stellen van de diagnose, een second opinion geven of verbanden tussen gegevens opsporen.

Twee beleidsopties zijn niet meegenomen in de set van haalbare systemen. De eerste betreft het uitwisselen van medische informatie. Daarvoor is geen noodzaak gevonden, omdat zij niet of nauwelijks bijdragen aan het herkennen van psychosociale problemen en de kans op misinterpretatie groot is als niet-medici rechtstreeks toegang tot dergelijke gegevens krijgen (aanbeveling 6). Ten tweede ligt het niet voor de hand om een meldplicht in te voeren voor professionals die kindermishandeling of andere barrières in de ontwikkeling van een kind vermoeden (aanbeveling 7). De wetenschappelijke literatuur is niet eenduidig over het effect van een dergelijke plicht, en onze geïnterviewden geven aan dat het risico van overrapportage en schijnzekerheid aanwezig is. Het is aan te bevelen eerst de effecten van andere beleidsmaatregelen in de specifieke Nederlandse context af te wachten.

De fundamentele keuzes moeten zo vroeg mogelijk in het proces gemaakt worden, zodat er geen onnodige verrassingen achteraf ontstaan, wanneer ontwikkelingen moeilijk kunnen worden bijgestuurd. Op drie terreinen is het wenselijk dat door de nationale overheid al keuzes worden gemaakt, los van de ontwikkeling van specifieke systemen (aanbeveling 8). Ten eerste moet worden besloten of er wel of geen risicofactoren mogen worden gebruikt. Het gaat om een fundamentele en complexe afweging tussen verschillende waarden, die wellicht het beste nationaal kan worden gevoerd, met de transparantie en professionaliteit die daarbij hoort. Ten tweede moet een knoop worden doorgemaakt over een eventuele rapportageverplichting. De Rijksoverheid de enige die de wetgeving op dit punt kan veranderen. Ten derde is het wenselijk dat de Rijksoverheid het voortouw neemt in het ontwikkelen van een taxonomie van begrippen en meldingscriteria.

Guide to the reader

This report can be read in different ways. The only way to get all nuances is by reading the full report. However, if you are...

interested in the **results** and you don't have much time, focus on chapter 7;

interested in the **results** and you have a little more time, read chapter 1, paragraph 4.6 and chapters 6 and 7;

interested in the **empirical material**, focus on chapters 2 and 5;

interested in the **methodology**, read chapters 1 and 3, paragraph 4.6, chapter 6 and paragraph 7.2.

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1. Introduction

Problems with Dutch youth are a frequent subject of the news. Both the problems youth can encounter themselves, as well as problems regarding the organisation of youth care and protection are highlighted. In order to remedy and prevent barriers in the development of children, the services should be organised in an effective way. Several incidents from the past years have set the scene for a changed thinking on the importance of the psychosocial development and, ultimately, the protection of children. Social workers had not been able to prevent the murder of Gessica (Wanders, 2007) and Savanna (Kiene, 2007), although professionals were not found guilty of neglect. Although these are extremes, the common opinion is that youth services suffer from structural problems. The former national commissioner for youth considers a lack of coordination, decisiveness, responsibility assignments and information exchange as underlying problems (van Eijck, 2006). Organisations may not know of other professionals and organisations that are dealing with the same child and hence lose sight of some types of problems that they did not recognise or cover. Information is dispersed among different individuals and organisations and often incomplete. These information problems are a key part of the broader organisational problems of the sector and form or focus. Incomplete information affects children in two ways. When they have a problem, their problem analysis and interventions may not be coordinated. Secondly, children with problems may not be recognised at all. Based on that perspective, more attention is devoted to early signalling of problems. The more and the earlier children with psychosocial problems are discovered, desirably when they have a problem but preferably before they develop one, the less children will be affected by these problems. This also saves direct and indirect costs and relieves the care¹ sector, which is extremely complex and whose effectiveness is under scrutiny (Programmaministerie voor Jeugd en Gezin, 2007). One approach to do this is to seek for risk factors that may be indicators for problems at later ages (Brown, Cohen, Johnson, & Salzinger, 1998; Hermanns, 2007; ten Berge, 2005). If one is able to determine these risk factors and adequately respond to them in case of a 'red' signal, the preventive approach would be successful. The risk factors can be determined through risk assessments, for instance at the health centres for young children (*consultatiebureaus*). Another way of uncovering problems is the collection of signals from schools, medical professionals, police and welfare organisations, who may report when procedures or intuition tell them that something is wrong.

1.1. Research objective

This project aims at identifying the fundamental considerations for high-level decision-makers with regard to the design of an information system supporting the process of recognising psychosocial developmental problems with Dutch children in the age from zero to nineteen.

By focusing on psychosocial problems, we exclude purely somatic (body-related) problems without a psychological component. In literature, a somewhat fuzzy distinction is being made between psychosocial and psychiatric problems, whose most important differences lay in the origin – psychiatric problems can be related to characteristics of the

¹Frequently, a distinction between is made between *cure* and *care*. According to the Oxford English Dictionary, cure refers to the action or process of healing a wound, a disease or a sick person, whereas care involves serious or grave mental attention. As most psychosocial problems cannot be traced back to an unambiguously definable disease which can be taken away by a surgical, therapeutic or pharmaceutical intervention, we will consistently refer to youth *care*. The youth cure sector is mostly part of the general medical sector, which falls outside our scope. This means youth care has a broader meaning in our report than the narrow sector supplying youth care services out of the provincial budgets, often pointed to as “the youth care sector”.

1. Introduction

brain – and severity (interview with pedagogical researcher)². Psychiatric problems often lead to a disturbed perception of reality. These problems are very specific, severe, and hence somewhat easier to recognise. They are included in our research insofar as they lead to psychosocial problems, which is often the case. The term psychosocial problems is widely used when talking about improvements in the recognition of children with problems, among others by Zeijl et al. (2005). Obesity may involve a psychosocial risk, as it can be an indicator of a problematic parenting, but a disorder such as a kidney infection is clearly beyond the scope of our object of study. We confine ourselves to a possible *decrease* of the *number* of children with these problems or the *intensity* of the problems. A major source of psychosocial problems with children is child abuse. In itself, that phenomenon is not a psychosocial problem, but it very likely leads to one (Ammerman, Cassisi, Hersen, & Van Hasselt, 1986; Egeland, Sroufe, & Erickson, 1983), so we will include child abuse in our definition of psychosocial problems.

Once children are discovered as having problems and the type of problem has been established, a whole set of organisations, procedures and care options becomes available. The organisation of that sector has been widely critiqued (van Eijck, 2006), but is beyond this project. We only consider the *recognition* of children having present or likely future problems and determining the type of those problems. Recognition is both intended for children not yet identified as having a psychosocial problem, or children who are already in contact with an organisation, but whose problems are not fully recognised. We are only concerned with information needed to perform a diagnosis (by any profession), and not in coordinating all types of interventions. That is in the realm of case management and belongs to the follow-up of a diagnosis, after the problems have been fully identified. A final qualification we need to make is that we are looking for systems whose primary goal it is to recognise children with psychosocial problems. Several other systems may contain useful information in this respect, but those systems in themselves are not the focus of our research. The combination of information from these systems *is* part of it.

We will identify considerations at a generic level. If we devise a spectrum from general, abstract notions of justice, fairness, equality, privacy and the like on the one extreme, and a detailed system specification, ready to be coded into an artefact, at the other side (see Figure 1 on the next page), this study is closer to the generic level. It is a first translation of the general notions and dilemmas to the field of psychosocial problem recognition. With the results from this project in mind and the appropriate political choices made, system designers should be able to draw a technical and institutional architecture in concrete cases, which can be further detailed by software engineers, organisation specialists and the like. We will pay attention to the boundaries of technical feasibility by making use of knowledge about architectural principles and state-of-the-art technology insights, without choosing for a particular architecture or technological principle. If we make use of the word “design”, we refer to characteristics that can be influenced by a Dutch policymaker in the present. As they regard an information system, these choices are design choices because they direct and constrain lower-level architectures, specifications and artefacts.

With a ‘system’, we do not necessarily mean a single, concrete technical artefact. It can be read as either a type or token. When it is a type, system refers to an abstract notion of a political, managerial and technical solution where information technology supports certain tasks with regard to problem signalling. It may point to a full-coverage, nationally administered system as well as the enhancement of a local database with sensitive personal data. It can be aimed at inter- or intraorganisational and inter- or intrasectoral use. Of course, when having a particular context (a ‘token’) in mind, the dilemmas and ways to relieve them will be applicable to a concrete system. Therefore, the study is relevant for high-level decision-makers in different contexts. Decision-makers always point to problem owners, mostly politicians, who are accountable for the fundamental trade-offs attached to the

²If we refer to the content of an interview, this style is used: (interview with role of the interviewee). Chapter three will describe our use of interviews.

system's design. The results may also be relevant for researchers, system designers and even the electorate in thinking through the consequences of different design choices.

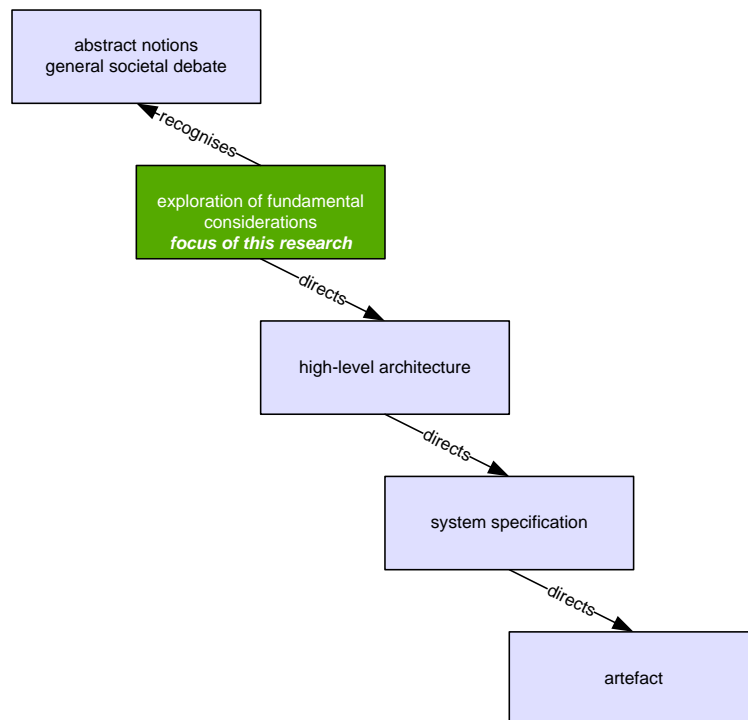


Figure 1 Levels of analysis.

1.2. Goals and relevance

This research tries to make both a practical as well as a theoretical contribution. The first is aimed at assisting policymakers in assessing various alternative systems by gaining insight into the relevant considerations (realising and facilitating ‘tokens’), the second in the construction of a typology (thinking about ‘types’).

Better insight into the empirical questions related to feasibility and effectiveness of design choices is a must-have for every decision-maker. Complex information systems regarding the exchange of sensitive data in the public domain, like the Electronic Patient File currently being implemented in The Netherlands, have suffered from delays and resistance (Parool, 2007). It might be that by thinking through the most relevant technological and non-technological aspects in a holistic manner, a more coherent and effective design could have existed from the beginning and one is less prone to unpleasant discoveries along the route. Much policy activity can be observed with regard to IT-supported problem recognition, most notably the Verwijsindex Risicjongeren and the Electronic Child File. However, they are not finished yet and many more decisions on (extension of) these systems have to be made in the coming years, especially at the local level.

It is very important to think through the consequences of major technical systems. Although it is hard to foresee all use contexts in the design phase (Albrechtslund, 2007; Bimber, 1994), especially at the early stages of a systems’ design, it is possible to keep at least some control of the effects on society. A duty rests on the designers involved to try to be as open as possible on the available choices (Hughes, 1994; Monasso, 2006). A clear overview of key considerations may be supportive in the process of early recognition of major design consequences and thinking through less trivial and direct results. Such attitude is aligned with a value sensitive design (VSD) approach, which

“(…) accounts for human values in a principled and comprehensive manner throughout the design process.” (Friedman, Kahn Jr., & Borning, 2001, p. 1)

1. Introduction

We do not actually design a system, but like to facilitate this approach by paying attention to normative aspects already in the design phase. We use a helicopter view and are not bound to a particular principal for our research perspective. Another reason why this research fits with the VSD field of knowledge is that it is interactional (Friedman & Freier, 2005): it recognises the mutual influences of humans and technology. We do not only look at the usage of technology, but also consider information systems and their design as sources of moral action and consequences. In that sense, our analytical part contains elements of disclosive computer ethics (Brey, 2000).

This research can also be used by the central government to extract an agenda of decisions it has to make to facilitate the realisation of systems by other parties, or to align those systems with their interests. Policymaking can take place at a systemic level or regarding concrete instances of systems. Both forms may profit from insight into policy considerations upfront.

Figure 2 shows an abstract representation of a policy process and helps to position our research. The system domain in our case is formed by the actors, procedures, perceptions, processes and resources that are involved in the recognition of children with psychosocial problems. This system is influenced by both external forces and policy changes, which always push for some kind of change in the system domain. Factors like the availability of new technology and the introduction of international treaties could be considered external. Policy changes are deliberate and self-controlled, from the viewpoint of the policymaker. Governments at any level can be decision-makers³. Multiple actors, the stakeholders, benefit from remedying psychosocial problems. In the first place, the welfare of the children themselves will increase. Secondly, their direct environment (parents, family, friends, classmates) may benefit. Thirdly, society can save costs when problems are dealt with early, productivity can be increased, delinquent behaviour diminished and costly interventions at a later age can be prevented. The effects are visible among a long time span. Children with problems frequently continue having problems during adulthood, especially when dealing with behavioural issues (Verhulst, 2001).

Policies are always aimed at improving or at least changing the current situation in the system domain, with regard to goals, objectives and preferences. Only when a problem is perceived, some intervention will be taken. Hoogerwerf defines a problem as:

“A problem could be described as a discrepancy between a yardstick (principle, norm) and a representation of an existing or expected situation.” (Hoogerwerf, 1987)

According to this widely recognised definition, problems are subjective, in that they are attached to a (normative) yardstick. The range of available policies can be described in a more objective way. We do not fix the goals of policymakers upfront, but like to explore fundamental design choices with regard to the policy. The way these choices are made will vary with the normative viewpoint and hence the set of goals, objectives and preferences that are represented by the policymaker. The range of possible policies is rather constant, if we are looking at currently available technologies and take institutional constraints, like international law, into account. Hence, this research tries to explore the solution space for information systems regarding problem recognition for children with psychosocial problems in general, and is not aimed at solving a *particular* problem.

³ Elsewhere, we will explain that only governments have enough means to force people and organisations to cooperate, hence, we only focus on public decision-makers.

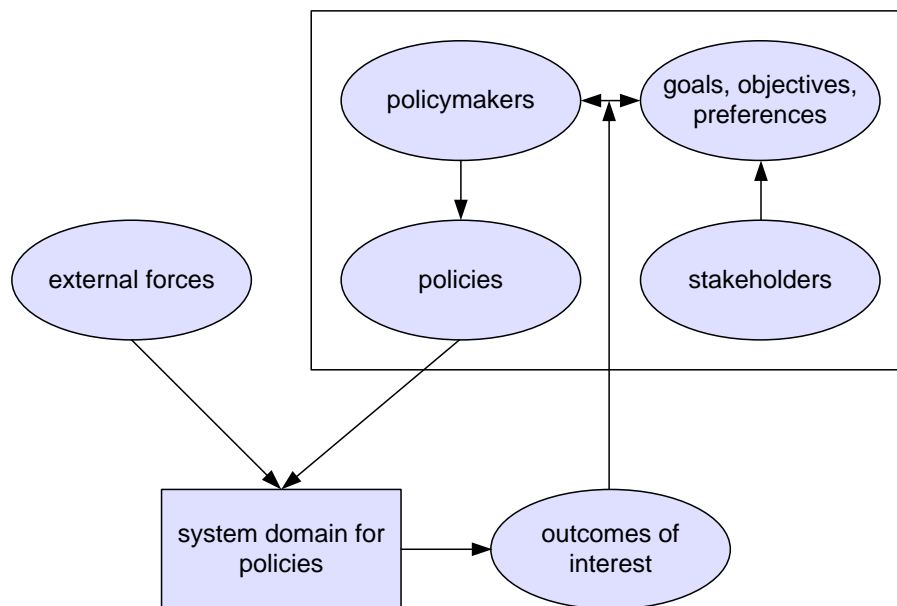


Figure 2 Policymaking process (Walker, 2000).

Apart from the practical contribution, the very same results may be of theoretical importance. Our structured exploration of the solution space leads to a typology of systems. This classification can be used as a conceptualisation of the possibilities and hence may be input for systematic research into characteristics and consequences of the type of systems under scrutiny.

1.3. Research framework and questions

The central research question follows directly from the research objective:

Which fundamental considerations can be identified for high-level decision-makers with regard to the design of an information system supporting the process of recognising psychosocial developmental problems with Dutch children in the age from zero to nineteen?

Before outlining the sub questions, it is useful to introduce the analytical framework to be used. Figure 3 shows Groenewegen's framework (2005), combining institutional and technical analysis. It is based upon the work of Oliver Williamson (1998) in the field of institutional economics. The framework points at building blocks and their relationships, relevant for the analysis of socio-technical systems. As such, it is very abstract and does not provide much guidance with regard to research matter, relevant theories or terminological rigour. Therefore, refining the model is essential.

Groenewegen's model is particularly helpful in our situation, as it recognises the need to integrate the technological with the institutional perspective. This has been recognised many times in the sociological and IT literature (among others by Bouwman, van Dijk, van de Wijngaert, & van den Hooff, 2005; F. Cohen, 1997; Hanseth & Monteiro, 1998; Koppenjan & Groenewegen, 2005; Orlikowski & Robey, 1991). Institutional economists frequently use the four institutional levels in Williamson's framework. His framework has been validated thoroughly. Groenewegen has added the element of technology and the interaction of this element with the institutional levels.

The model's lack of analytical rigour has a positive side. It makes it very flexible in incorporating different strands of analysis, theory and perspectives. For instance, we can incorporate behavioural psychology as well as ethical reflections. We are not bound to a single discipline for the supply of our insights, but can combine multiple notions. Recognising the iterative nature of this research, flexibility is a key advantage, as we are able to learn from

1. Introduction

new insights without risking throwing away our fundamental framework or theory. Although the framework is in its infant stage and has not yet gained much scientific recognition⁴, it seems useful for our purposes. The model will be extensively discussed in chapter three.

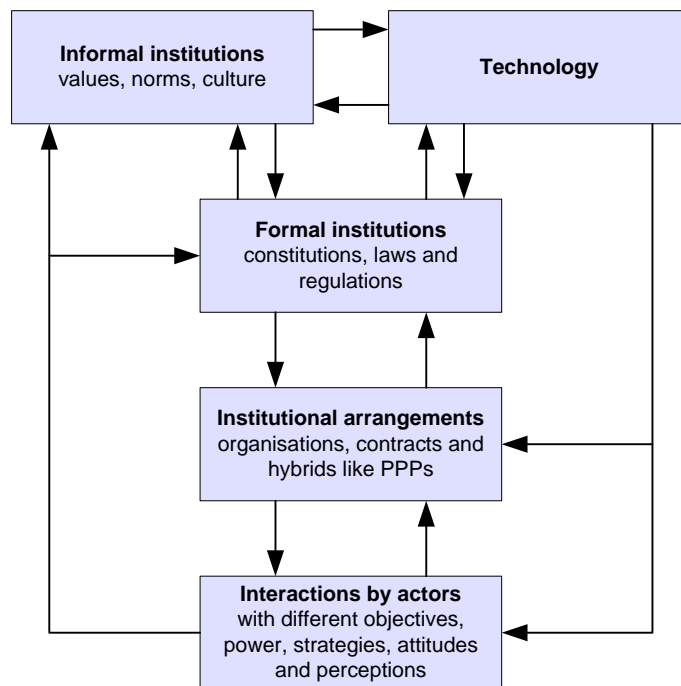


Figure 3 Analytical model (Groenewegen, 2005).

We can identify the following sub questions, to be worked out in the chapter on methodology:

1. Which factors can be identified in the five elements?
2. How can the status quo be analysed following the analytical framework?
3. Which considerations can be identified?

The conceptualisation has been an explorative and iterative process. Over time, and especially during the analysis of the impact of changes in the technological architecture, the insight in the completeness and relevance of the elements will increase. In this report, we will present the result of this process and omit the intermediate steps, as they do not carry much meaning in themselves.

1.4. Structure of the report

Chapter two will give a brief overview of our problem domain, by discussing the characteristics of psychosocial problems and detailing the information needs for a complete diagnosis. Chapter three will deal with the methodological aspects of the research, building upon the research questions identified above. In chapter four, we conceptualise Groenewegen's framework to make it suitable for our problem field. After that, we apply the framework to the status quo (chapter five). The sixth chapter provides our synthesis, by discussing the considerations, in response to our main research question. We will present two families of systems: incident and life-cycle-driven ones, each containing four feasible alternatives. To close with, the seventh chapter embodies the conclusion and reflection. Please see the guide to the reader on page 6 if you would rather read this report selectively.

⁴We will reflect on the framework at the end of the report, and hence contribute to validating the framework and suggesting improvements.

2. Domain exploration

In this chapter, we describe the characteristics of psychosocial problems and the generic way of discovering them. We do not analyse the status quo in terms of the information systems supporting these processes, as this chapter only provides background information about the context in which those systems may operate. The domain exploration serves as background information to our analysis. It does not contain new information, but is based upon literature study and interviews. We will, however, introduce the intervention cycle as a conceptual model where we will refer to later on.

2.1. Problems with Dutch youth

A first question to be asked when looking at developmental risks for youth is how big the problem is. Different perspectives lead to different answers. JGZ⁵ employees estimate the number of children, up to the age of twelve and having psychosocial problems, between 11 and 28% of youngsters, most of which are five or six years old. However, the JGZ also includes light cases in this number. If these are excluded, the estimate becomes 3.5 to 12%⁶, depending on the age of the child. Parents only reach 4 to 6%⁷. The number of children making use of some kind of dedicated youth care is around 60,000, although it is increasing (Centraal Bureau voor de Statistiek, 2007). Most of this care is voluntary, with the consent of the child and/or his⁸ parents. The cases where parents do not consent to an intervention are usually quite serious, as the parents can be part of the problem themselves (interview with pedagogical researcher). Research shows that the amount of children with problems is rather constant over time, but that the age at which problems start and, for a limited group of aggressive children, the intensity may have changed (interview with pedagogical researcher). The non-value-laden conclusion from these numbers is that probably over half of the youngsters with problems do not receive care that is designed for them. In absolute numbers, this translates to tens of thousands of youngsters. It is likely that problems are concentrated in urban areas, as for instance the municipality of Rotterdam reports relatively high numbers of problem children (Jeugd Onderwijs en Samenleving, 2007).

In Figure 4 we illustrate the relationship between several categories a child can belong to. The figure is not complete, but serves as a clarification of the interrelation of different concepts. The size of the areas is at best ordinally related, as the number of children within each category cannot always be determined. Children with unemployed parents and criminal children are examples of observable risk factors, a concept that will be explained in the next section. A subset of these groups are the children with psychosocial problems. These problems may also arise from psychiatric disorders or child abuse, which are ‘external’ factors. Within the group of children with psychosocial problems, not all children are recognised as having a problem. Even when some professional organisation does recognise them, it may be that not all problems are fully recognised – the so-called ‘multiproblem

⁵Abbreviations are listed in the back of this report (page 93). When it concerns organisations, Annex 1 can be consulted. JGZ means “Jeugdgezondheidszorg”, Youth Health Care.

⁶These numbers can be found in Zeijl et al. (2005). Different studies investigate the prevalence of psychosocial problems among adolescents. They are not completely comparable, however, as they use different definitions of psychosocial problems. Yet, among adolescents one also finds that about 10 to 15% percent of youngsters suffers from problems such as solitude, a negative self-image or violent behaviour (Junger, Mesman, & Meeus, 2003). Other problems have a smaller prevalence, but it is unclear whether they coincide with the 10-15% group, as different information sources are combined in the study.

⁷The discrepancy between the professional and parental estimate is attributed to the fact that JGZ professionals also take the family and other environmental factors into account, whereas parents only answered questions on the child’s behaviour (Zeijl et al., 2005). We use the JGZ estimate throughout this report, as it includes a broader range of problems and is likely to be more complete.

⁸We will use the masculine form for the purpose of readability throughout this report.

2. Domain exploration

children'⁹. One can distinguish between so-called single problem and multi problem children. A multi problem child may be recognised with respect to one problem, where the other problems may not yet have been adequately perceived. This research is focused on information systems that support minimising the number of children whose problems are not (fully) recognised. This Venn diagram shows that the distinction between problems and categories is often blurry, in that children belong to multiple categories, where different disciplines use different sometimes, with a slightly different meaning but often much overlap with those in other disciplines.

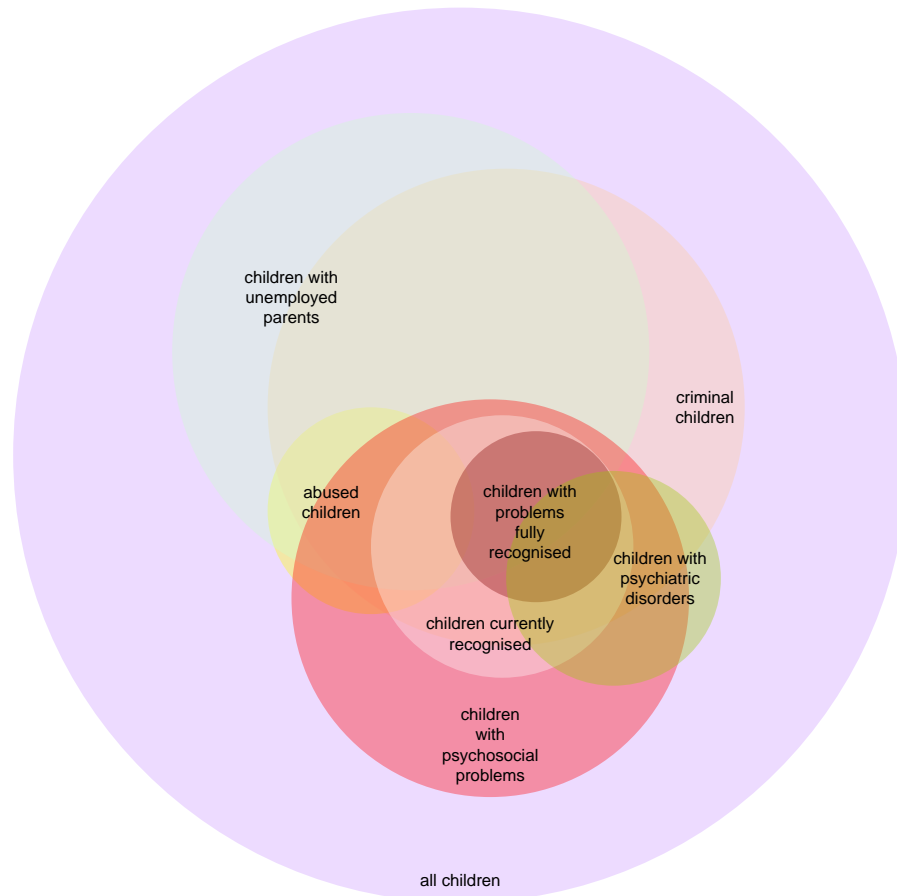


Figure 4 Illustrative Venn diagram of the relation of different categories children can (simultaneously) belong to. The size of the areas is not based on actual numbers.

The problem type that probably attracts most media and policy attention is child abuse. Annually, 20,000 investigations on possible child abuse are conducted, which is about a third of the number of reports from citizens and professionals (Centraal Bureau voor de Statistiek, 2007). The estimates on the prevalence of child abuse are even higher, around 102,200, as shown in Table 2. Compared to the count of 3.5 million Dutch youngsters, this broadly means that 3.5% of them suffer from child abuse, of 2% a report has been made and of 0.6% an investigation takes place.

⁹To limit the complexity of the figure, we have not distinguished between single- and multiproblem children in it.

Table 2 Estimates of the numbers of children abused in 2005. Slightly adapted from Van IJzendoorn et al. (2007). The numbers concern children being abused in 2005, not all children involved in child abuse in the past and the future.

	Harm		Relative
	Visible	Supposed	
Sexual abuse	1,658	3,176	4.7%
Physical abuse	14,148	5,667 ¹⁰	19.4%
Emotional abuse	6,214	5,518	11.5%
Physical neglect	10,841	22,668	32.8%
Educational/emotional neglect	8,078	20,371	27.8%
Other	719	3,158	3.8%
Total	102,216		100.0%
95% confidence interval	(97,305 – 107,628)		

However, considering the size of the problem big is not obvious¹¹. We defined a problem as a gap between a norm and a situation, which by definition involves normative aspects. It is clear, however, that the general attention from politics and the media has largely grown over the past years. The Operatie-Jong¹² (a special project team installed by the Dutch government to look for best practices in the sector), the Jeugdzorgbrigade (a Kafka-like team dedicated to getting rid of unnecessary administrative procedures), the Inventgroep¹³ (a group of experts arguing for more prevention), Raak (a civil initiative to reduce the numbers of child abuse), a sticky parliamentary demand for uniform reporting codes¹⁴ and the creation of a separate programme department for Youth and Family in 2007 are examples on the national level. At the local level, the initiative of the Gideonsgemeenten¹⁵ (a number of municipalities calling for more effective youth care including a focus on prevention) and ambitious municipal projects (among which is the start-up of Samen Starten in Breda and Venlo¹⁶ and a grand social debate in Rotterdam¹⁷) are all signs of a grown sensitivity for the problems of children. A number of incidents, like Savanna and Gessica who were murdered by their parents, have undoubtedly contributed to this.

It is hard to find out whether problems have actually increased, or that the increased awareness may have been a determinant for a growth of the youth care sector, as longitudinal surveys or statistical datasets amongst Dutch youngsters hardly exist. With regard to the autism spectrum, TNO concludes that statistics regarding the use and the causes of the rise of this use of youth services are unreliable. Despite that, they attribute the increase to a better recognition and improved diagnostics. Moreover, they state that definitions have been broadened so as to potentially include more youngsters (Besseling et al., 2007). An illustrative example is the amount of new youngsters that received youth care in 2005, which was 11% above the 2003 figure.

Without extensively discussing the subjective assessment of the severity or social desirability of the problems at hand, we think it is clear that reduction of these types of problems is beneficial for the child, his parents and society in general. We do not quantify the likelihood of reduction, but assume that, given the huge amount of critique on the functioning

¹⁰As physical abuse is most visible, this is the only category where the estimates about children with visible harm are higher than the numbers of supposed harm.

¹¹See for instance Weijers (2007).

¹²Van Eijck (2006).

¹³Hermanns, Öry & Schrijvers (2005).

¹⁴Novum (2007).

¹⁵Gideonsgemeenten (2006).

¹⁶Hofman et al. (2007).

¹⁷Gemeente Rotterdam (2007b).

2. Domain exploration

of the youth sector and the fact that some types of problems have only recently gained policy attention, some degree of reduction is possible.

2.2. Discovery and prevention

The recognition of children deals with two different ways of observing problem situations. We are in search of examining alternative means of *discovering* children who suffer from problems right now, and *preventing* these problems at a later age, that means, discovering children who might suffer from problems in the future. It is important to draw a distinction between these two goals, as they require different sets of information. Examples of indicators for problems in the present are frequent bruises on the thigh, which may point to sexual abuse. The procedure usually uses classification systems to assist the professional in assessing the risk. Moreover, a professional or citizen may use his intuitive judgement to indicate problems. This can be either a complement to structured approaches or a substitute, depending on how much discretionary room is given to the reporter. Again, people are triggered by some indicator, but the indicator does not follow a predefined scheme. When dealing with future problems, one is always assessing risks, as there is no hard evidence at all of the presence of a problem. We will call indicators for future problems *risk factors*: characteristic of a child or his environment that lead to a higher risk of the development of psychosocial problems. In the assessment, or taxation (these terms could be used interchangeably) of risks, the experience and tacit knowledge of a professional may be used as a way of allowing intuition to enter. Risk factors cannot be used for curative intervention. They only indicate likelihood. For a diagnosis preceding a curative intervention, symptoms or other specific information are needed. In the next section, we discuss preventive interventions.

An important difference between indicators and risk factors is that there generally is a high correlation between an indicator and a problem, but a low one on risk factors. Indicators are observed characteristics relating to an individual child, whereas risk factors comprise generic characteristics based on aggregated statistical values.

2.2.1. Risk factors

In the past decade, researchers have identified more and more factors of the child or its environment that increase the likelihood of future psychosocial problems (Brown et al., 1998; Hermanns, 2007; ten Berge, 2005; van IJzendoorn et al., 2007; Wientjes, Harbers, & de Kemp, 2006). Almost all surveys in this field are epidemiological, longitudinal studies and hence the relationships found are statistical ones. No causal relationship has been proved, but one can assume this to exist either directly or indirectly when correlation values are high. Especially the concurrence of multiple risk factors – generally at least three or four – seems to be a strong indicator of risk. With strong, one can think of ranges from 10 to 35% of children actually suffering in the presence of at least four risk factors, whereas the rate is only 3% in case no risk factors have been identified (Brown et al., 1998). This still means that one should be careful in assuming deterministic relations. The relations are of a probabilistic nature (ten Berge, 2005). Table 5 on page 22 shows an enumeration of risk factors for child maltreatment identified in a 17-year prospective study involving 644 families in New York. These factors are included with an illustrative purpose. For the Dutch situation, a more limited number of risk factors have been found in a different study, as shown in Table 3. However, risk factors are generally found by analysing retrospectively: only the characteristics of known cases of child abuse are monitored (interview with child abuse researcher). Several reporting biases may be present, so that the studies do not even indicate the statistical relationship with a good precision. One should note that risk factors could not be applied without assessing the conditions under which they have been found, like the age, the type of problems and possibly the cultural context. Most studies reveal only risk factors for a limited group, like those increasing the likelihood on delinquent behaviour for adolescents.

Next to the risk factors, one should also consider protective factors, to complete the analysis. As risk factors always indicate something that deviates from the average or the

'normal' in a negative sense, protective factors point to above-average conditions. In the scientific literature, the conceptual debate around protective factors has not yet been settled. Some view protective factors as the opposite end of the same dimension on which we find risk factors. Others state that protective factors only have meaning when a risk factor is already present and, hence, they are orthogonal to each other (Deković, 1999).

It is hard to make simple probability calculations and offset risk and protective factors, as many interaction effects are still unclear. Moreover, many problems observed at a very young age disappear after some years (Zeijl et al., 2005) and risk assessments are always snapshots. Therefore, longitudinal following is needed when one wants to make meaningful use of risk taxation instruments (interview with child abuse researcher).

Table 3 Relative risk factors, based on Van IJzendoorn et al. (2007). Relative risk equals the probability of the event given a characteristic, divided by the probability of the event for a control group.

Risk factor	Relative risk
Very low education	6.8
Jobless	5.2
Traditional immigrant	3.7
New immigrant	3.6
Single parent	3.5
Big family	1.8
Stepchildren	1.3

Instead of looking at risk factors of the children and their environment, one can also look at characteristics of offenders that increase the likelihood of abusing a child. Table 4 presents the results of Dutch study based on 2005 data. Note that these characteristics can be observed without revealing much sensitive data about the child or the parents involved. Supplementary to this, it is widely recognised that parents who have been victims of child abuse themselves are more likely to turn into an offender (interviews with paediatrician and child abuse researcher).

Table 4 Relative risk factors for child abuse offenders, based on Van IJzendoorn et al. (2007).

Risk factor	Relative risk
Very low education	7.0
Traditional immigrant	6.9
Jobless	5.4
New immigrant	4.1
Young mother (< 28 years)	2.2

2. Domain exploration

Table 5 Risk factors according to Brown et al. (1998).

Demographic risks	Parenting and parent-child
1. Low frequency church attendance	1. Maternal hostility to child
2. Young mother at child's birth	2. Power-assertive punishment
3. Mother not high school graduate	3. Low maternal warmth
4. Low family income	4. Low paternal warmth
5. AFDC support	5. Low maternal involvement
6. 3 or more children	6. Low paternal involvement
7. Mother divorced or never married	7. Unwanted pregnancy
8. Death of either parent	
9. Step-father	
10. Early separation from mother of three months or more	
Family characteristics	Child characteristics
1. Parental conflict	1. Low birth weight (under 5 pounds)
2. Maternal dissatisfaction with marriage	2. Pregnancy/birth problems
3. Maternal external locus of control	3. Low IQ
4. Poor maternal health	4. Early childhood illness
5. Poor paternal health	5. Early difficult temperament
6. Maternal alienation	6. Early immature behaviour
7. Maternal impulsivity	7. Early anxious withdrawn
8. Maternal low self-esteem	8. Handicapped (requiring special education)
9. Maternal anger	
10. Many negative life events	
11. Maternal dissatisfaction with neighbourhood	
12. Maternal sociopathy (drug, alcohol, or police involvement)	
13. Paternal sociopathy (drug, alcohol, or police involvement)	
14. Maternal trauma history (family history interview)	

2.2.2. Intervention cycle

The recognition of children with (possible) psychosocial problems is only one element of a chain of possible events. Any recognition is useless without a set of measures (interventions) available to change the problem situation. For instance, if long queues exist for intensive youth care, recognising more children that should use this is useless. In addition, the coordination of the care trajectory is extremely important. Therefore, choices on data collection and recognition are highly interwoven with the steps further down the chain: diagnosis and intervention. Figure 5 shows these phases from the perspective of the professional, within a single discipline, who has to decide on interventions. This intervention cycle can be considered as an abstract and generic version of many business processes in different organisations.

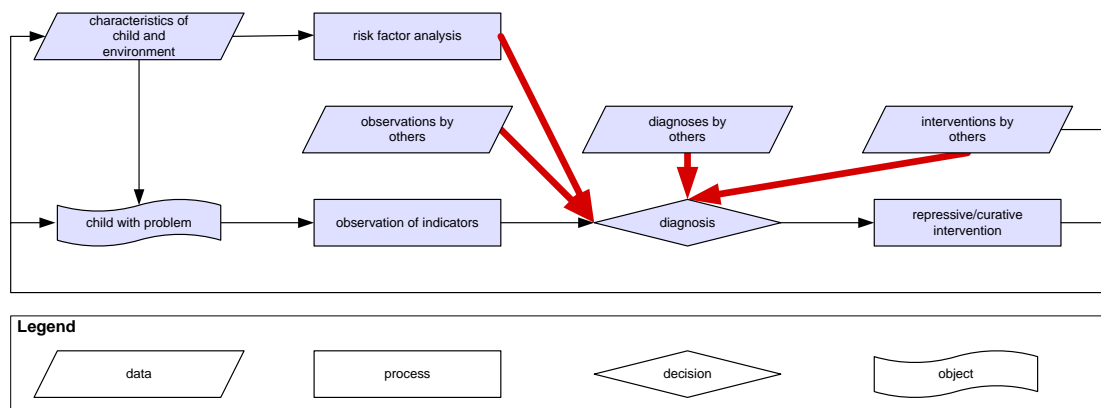


Figure 5 Intervention cycle. The bold lines indicate the focus of this research.

The child and his environment influence the occurrence of problems. The observance of problems through indicators is the most straightforward case of signalling. We do not look into the possibilities of genetic screening, as the research in this area is in its infancy and the related ethical questions are very specific.

Another possibility is the use of characteristics of the child and his environment to look for (the concurrence of) risk factors. If those are present, one may start with preventive intervention or use the information to increase awareness in the general professional process of signalling, diagnosis and intervention. This information stream is hardly developed. Moreover, this research does not reveal a demand for or belief in preventive intervention, as risk factors are considered too weak and complex a concept to decide on interventions directly without an appropriate diagnosis. Therefore, we do not include preventive interventions in our cycle, although they are types of interventions that might be taken when decided to do so.

This project focuses on the information streams that are indicated by the bold arrows. The information is used for a detailed diagnosis of the situation. We recognise beforehand that professionals within the appropriate discipline should carry out a specific diagnosis. Diagnosing is a process that starts with the formulation of hypotheses and follows with an attempt to find evidence for them (interview with paediatrician). For instance, a paediatrician can direct a child to a functional specialist when more specific expertise is needed. We consider the way in which diagnoses are carried out as a given, but want to look at the information needs and sources.

The systems under scrutiny comprise both the *collection* of data on problem indicators and risk factors as well as the *exchange* of this information, but do not deal with later phases, like a detailed diagnosis and care coordination.

There should be alignment between the interventions that are effective, the problems they solve and the ways these problems can be recognised. The effectiveness of many interventions has hardly been proved (Programmaministerie voor Jeugd en Gezin, 2007; ten Berge, 2005), which is an important limitation of the possibilities for meaningful data collection. Long waiting lists or difficult legal procedures may erect obstacles in the intervention phase. Interventions can take place in any domain. It could be a care trajectory, but also an (alternative) punishment, a placing in custody or divestment of parental responsibility.

2.3. Winding up

The central point of this chapter is the intervention cycle, which indicates a very generic diagnosis and intervention process and the associated information flows. It is important to distinguish between recognising present problems and predicting future ones. Either of them requires different sources of knowledge.

2. Domain exploration

We are (only) interested in four types of information: risk factor analyses, observations from others, diagnoses from others and interventions taken by others. Psychosocial problems are very diverse. Hence, we recognise that no one-size-fits-all model exists. Finally, the type of problems often require cooperation between multiple organisations and professions.

3. Methodology

This chapter deals with the way this research project has been set up. It discusses the type of research, our research activities and the choices made during the process. To start with, we define our key terms. The chapter can be omitted if one is only interested in the results of the study.

3.1. Definitions

All definitions in this paragraph are stipulative. That means that they are not derived from literature or lengthy debates about definitions, but are ‘working definitions’ aimed at clarifying core terms and concepts in this research design (Verschuren, 2007). The definitions are shown in Table 6.

Table 6 Stipulative definitions.

Term	Definition, reference and/or explanation
Analytical framework	See conceptual framework.
Choice	A factor within the conceptual framework that can be influenced. (Note the difference with (fundamental) design choice.)
Conceptual framework	Our tailoring of Groenewegen’s framework (constructed in chapter four).
Consideration	A thorough understanding of the fundamental design choices and the associated constraints, conditions and mutual (in)coherences.
Constraint	An environmental factor that can hardly be influenced.
Design choice	See fundamental design choice. (Note the difference with choice.)
Discovery	Discovering children with psychosocial problems in the present.
Element	One of the five elements (technology, informal institutions, formal institutions, institutional arrangements or interactions by actors) of the analytical framework.
Factor	An analytical element located within an element of the conceptual framework.
Fundamental design choice	A fundamental choice regarding the design of the IT-supported recognition system. We defined seven fundamental choices (in chapter four).
Indicator	An observable characteristic of the child or his environment, pointing at possible psychosocial problems in the present.
Information system	A system comprised of hardware, software, procedures, users, tasks, inter- and intra-organisational responsibilities and competences.
Policy option	A value for a fundamental design choice (policy alternative).
Prevention	Discovering children with a high risk of developing psychosocial problems in the future.
Psychosocial	Following the SCP (2005), this is a somewhat fuzzy term involving two kinds of problems: behavioural problems (externally directed) like aggression and delinquent behaviour, and emotional problems (internally directed), like anxiety and depression. It is a subset of all psychological problems, the complement being psychiatric disturbances (MOVISIE, NJi, & Vilans, 2007).
Risk factor	An observable characteristic of the child or his environment, pointing at the possible development of psychosocial problems in the future.

3.2. Explorative research

The research relies on input gathered from both selected literature as well as expert interviews. The study is qualitative, combines empirical (identifying problems in the status quo) and non-empirical (identifying fundamental decisions) elements. The research is explorative and interpretative in nature. We have adopted the realism paradigm (Sobh & Perry, 2006), which means we recognise that there is a single ‘reality’ but that discovering that reality is mediated by value-laden and perverted information channels. We will discuss the implications more extensively in the next section. The study combines description with a light form of prescription. We primarily give an overview of considerations, but assess their coherences and hence, favour some design choices over others.

A ‘scientific’ demand to this type of research is that it covers the most relevant factors without omitting important issues: the requirement of comprehensiveness. The methodology used should account for that. First, the interview pool is quite heterogeneous, leading to a multiplicity of perspectives and (subjective) opinions, which can be crosschecked or checked against the literature. Secondly, Groenewegen’s framework demands an examination of multiple elements and their relationships, so that the interconnection between institutional and technical issues is enhanced. For instance, if a choice on the level of the change of responsibilities assumes complex legal changes or even a change in culture, those changes should also be included in our analysis. Mutually exclusive tactics can be recognised as well, for instance centralisation and decentralisation at the same time. Thirdly, a broad orientation on the (recent) literature and the sector should lead to a good understanding of general issues perceived to be relevant in the scientific community or the youth sector. Nevertheless, it is hard to make a strict assessment of comprehensiveness and an infinite loop of iterations can occur, as it is always possible to add some new insights from interviewees of literature. In order to break that loop and structure our research, considering the amount of resources that is limited by definition, we phase our project. In the first two months, literature research and the conceptualisation of the framework was carried out. After that, the interviews with experts started. During that phase, no new literature was added except when triggered by the interviewees. The number of interviews has been limited and no new interviewees have been added once the benefit of each new interview diminished sharply. When insights from literature and interviewees are aligned and not much new information is gained from adding more literature or more interviewees, this is a process check on the comprehensiveness of the analysis. It is likely that most relevant considerations have been identified by then, following the Pareto postulate on efficiency based upon the concept of diminished marginal returns.

After the conceptualisation and the discussion of considerations, which are partially unstructured processes where some bias from the researcher may be involved, a simple validation of the conclusions is carried out. Apart from the validation of the considerations identified, we will explicitly ask the participants of this process to identify considerations omitted. That is a final process measure to increase comprehensiveness.

3.3. Detailed research approach

The research process, in which an answer to this question will be provided, is structured along the line of Figure 6. All elements in the figure represent research activities. The arrows link the activities together by means of input-output relations. Some elements are directly tied to a chapter of this report, or they ‘finish’ answering a sub question of our research. We will subsequently discuss the research activities. This explorative research has had a highly iterative character, but for the purpose of clear reporting and methodological discussion, we have not shown all iteration loops. This report is the result of the whole process, and not the collection of partial and intermediate results on the research questions.

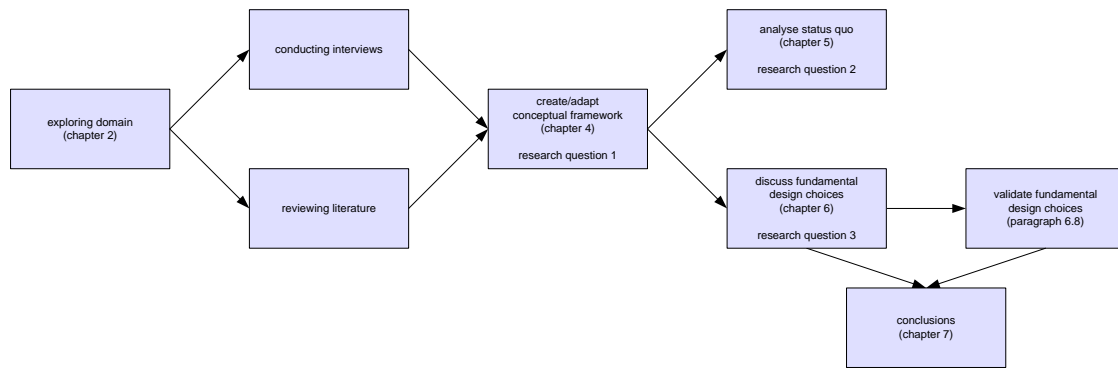


Figure 6 Research framework.

3.3.1. Exploring domain, conducting interviews and reviewing literature

Before entering our analysis, we explore the context within which a possible system has to operate. In chapter two, we did this by diving into the causes and symptoms of psychosocial problems, and outlining a very generic business process, the intervention cycle. In the next phase, we conduct interviews and use insights from literature, to be able to create a conceptual framework later on.

Literature searches have been instantiated by exploring most of the recent material on the policy domain and detailing the framework. The informal constraints are mainly based on a general notion of classical debates on ethics. The identification of formal constraints was relatively straightforward by examining the legal hierarchy in the appropriate domains. The technology part has been established with help of several experts at Capgemini, specialised in information security. The institutional arrangements follow from institutional economics and organisation theory, as this level is the one most theoretically elaborated and a quest for understanding it was the very reason Williamson's framework has been developed. Finally, on the level of interactions of actors, we departed from literature on the child protection sector. As this level is very concrete, the knowledge used here does apply generic notions to the lower level of the sector under discussion.

Thirteen interviews with experts have been conducted. Their roles are listed in Table 7. The interviewees stem from different disciplines and organisations. Among them were two professors, researchers, one person working concerned with UK child recognition systems, consultants, medical practitioners, civil servants and a software supplier. The right column will be referred to once we discuss the validation. We have not interviewed politicians, but focused on policymakers in the executive branch and professionals, as we are concerned with an exploration of the solution space more than of solving particular problems.

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Table 7 Roles of the interviewees.

Role	Participated in validation?
Administrator of risk signalling systems	x
Child abuse researcher	x
Consultant ICT and governance	x
Consultant UK youth sector	
Infant welfare centre practitioner	x
Information security consultant (two persons)	x (one person)
Paediatrician	x
Pedagogical researcher	x
Project leader (local/regional)	x
Project leader (national)	x
Public administration researcher	x
Technical project leader JCO Support	x
Education & youth consultant (no interview conducted)	x

The interviews contribute to an understanding of the organisations professionally involved with children and therewith the exploration of the problems, as well as the exploration of solutions and their consequences. The pool of interviewees is heterogeneous, so as to include different perspectives and make it easier to find the most relevant fundamental design choices and associated considerations within a limited period. The heterogeneity holds with respect to the organisational domains, but also regarding the position of interviewees in the management hierarchy. We interviewed people with operational responsibility as well as policymakers and managers.

On request of a number of interviewees, their names and exact functions are not available in the public version of this report. We will not directly refer to the interviews, but occasionally use their role (as listed in Table 7) to be able to give some context of certain opinions or knowledge. Some remarks in the interviews are not directly attached to the role of the interviewees, but one should be careful in viewing them as neutral. People are unconsciously shaped by their environment or may behave strategically. Therefore, in many interviews the same types of questions have been asked, to be able to crosscheck statements. Many questions have been asked to all interviewees, others were directly related to the interviewee's specific expertise. All interviews contained both explorative as well as specialist elements.

Almost all of the interviews have been transcribed to give the interviewees the possibility to authorise the text, to prevent reports from being distorted with the researcher's selective reporting during the interview and to make the information sources transparent for the supervisors. The question and answer pattern does not exactly resemble the original interview but is more structured, compact and sometimes paraphrased. The transcripts can be found in Annex 3, which is not included in the public version of this report.

The information from the interviews and the literature has been aggregated in a process of identifying the design choices that is unstructured and creative and somehow resembles a 'black box'. Detailing the framework and sharpening the analysis are iterative processes. In order to impose some structure on the research process, we have distinguished a literature and an interview phase. In the first two months of the research, most attention has been paid to literature, some first interviews and a detailed research proposal. In the third month, most of the interviews have been conducted. The last two months have been used mainly for the validation process, the analysis and writing of the report and paper. At the end of the literature phase, the framework has been 'fixed' until most of the interviews had been conducted. Only then, a new and relatively small iteration was made to sharpen the conceptualisation and add some new literature. The literature shaped the first interview

questions, and the literature combined with the first interviews guided the questions for the subsequent interviews. In this sense, literature and interviews have directed each other's exploration, but in a rather structured way.

Crosschecking insights from literature, insights from common sense and statements from interviewees is a form of triangulation. As our research is conducted in the realism paradigm (Sobh & Perry, 2006), we need to combine multiple sources to compensate for value-ladenness and perverted information. This can only be done for knowledge, not for subjective opinions. If an opinion is shared amongst multiple experts, we can use this to assess the design choices, as 'designing the future' can never be done with only high-certainty information. In our explorative research, facts and opinions regarding the future cannot be separated entirely. This provides another reason for the use of multiple data sources and triangulation.

No rigorous method of identifying the design choices could be applied, so a combination of common sense and frequency of occurrence in literature and interviewees formed the basis of including design choices. As some discretionary room is involved in the construction of the framework and the description of the relations, a validation phase is necessary.

3.3.2. *Creation of the conceptual framework*

Within each of the five elements of Groenewegen's model, several 'sensitizing concepts' are identified. These are factors that guide our collection of empirical material, they are the ones we are particularly sensitive to in gathering literature and conducting interviews. As such, they work as a filter on the massive amount of perspectives and data one can use.

The collection of the resulting choices is necessarily limited, and confined to what seems relevant from literature or interviews. Some elements contain more choices, others more constraints. Technology provides the means to execute policy. The set of available technologies is a constraint, within which choices may be made. Formal institutions are constraints if they cannot be influenced by Dutch policymakers. Otherwise, they are choices from the viewpoint of a policymaker. On the level of institutional arrangements, more choices can be made within our time scope. The interactions of actors merely host constraints, as we interpret this element as delivering psychological insights about decision-making. Finally, the informal institutions form a special element, in that it merely identifies values that are influenced by choices made elsewhere in the framework. Indirectly, a choice is present. For instance, one can 'choose' between the child and privacy, to present a very simplified example.

In the selection of choices and constraints, some discretionary room for the researcher exists. Parsimony, relevance and completeness are the criteria on which (and how) factors will be included. The parsimony criterion implies that the number of factors and design choices will be as low as possible, to keep the analysis (especially that of interactions) feasible. Although discretionary room is present, a combination of common sense and the continuous checking of the design choices with new interviewees should lead to a satisfying set of questions. From the literature and the interviews, a continuous process of adapting of a 'working' list of decision factors has been used. Design choices seen as irrelevant have been removed, and the others ones have been clustered where possible, so as to be able to reduce and structure the massive amount of information pieces to those that can be used in a meaningful analysis.

From our interviews, our literature study and common sense, we construct a set of *fundamental* design choices, which encompass the solution space. These should not be confused with choices located somewhere in the framework.

3.3.3. *Analysis of the status quo*

After the framework has been tailored (conceptualised), it can be used to analyse the status quo. This gives us the opportunity to verify the framework by examining the ability to use it for a description of the relevant dimensions of an existing situation. The status quo also serves

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a reference point for alterations. The conceptual framework has guided our selection of issues to look for. Borrowing the term from grounded theory (Strauss & Corbin, 1990) (which this research does not apply), one could speak of sensitizing concepts. The conceptual framework works as a filter on reality, in that we are more sensitive to certain facts and perceptions than to others.

3.3.4. Discussion of the fundamental design choices

The fundamental design choices are discussed in more detail, now that the status quo analysis has provided us with more information on their contents. After a subsequent discussion of these choices and the alternative values for each choice, we assess coherences between them, so that feasible combinations are possible and infeasible options are identified. The feasible combinations are grouped in two packages of rather different alternatives, which are both related to somewhat different information needs.

3.3.5. Validation

The considerations resulting from our analysis will be validated by a series of experts, mostly resembling the group of interviewees (see Table 7). As these interviewees have not been directly involved in the construction of the set of considerations, the risk for a tautological validation process seems to be small. The interviewees are used as they already showed their interest in this research project.

We presented our typology of systems, based on Figure 14 on page 72, in about five minutes, during a telephonic or face-to-face conversation, lasting about fifteen minutes in total. Then we asked the validators for their first responses. By not structuring the questions, we have tried to prevent too much direction from the side of the interviewer. The main function of the validation is a check on the comprehensiveness of the considerations and the reasonableness of their relationships. Besides, we sometimes asked some clarification on issues raised before by the interviewees. The average conversation lasted about fifteen minutes.

3.4. Choices made during the process

Developing the research design has been an iterative process, just like the core of the analysis. In the earliest version, we wanted to investigate several possible scenarios for a system's design. The problem of such an approach would be that the scenarios would have to be constructed early in the process, to be able to detail them meaningfully. It is questionable whether the construction of the design would not have affected the input from literature and interviewees too much, in that relevant choices and concerns would not be addressed. An improved version of the research plan intended to identify the dilemmas regarding the design of an IT-supported recognition system. After seminal analysis, it appeared that this abstracts far too much information. The number of dilemmas is not that big. Actually, only on the level of norms and values one could find real dilemmas. The other parts of the analytical framework may be incoherent, but that does not make them a fundamental dilemma. Finally, in our current design, we explored the most relevant considerations. We have been able to group them in two packages, but these are complementary alternatives and do not exclude each other. In that sense, they are different from the extreme scenarios we would have drawn in the first approach. This makes use of as much of the insights from interviewees and literature as possible.

A different choice concerns the role of the normative perspective. Whereas we intended to draw goals and constraints from different normative or ideological viewpoints, it turned out that the dilemmas are similar for many viewpoints. Only the, complex and unequivocal, way of finding a balance is different. However, that provides too little analytical rigour to give the normative differences a prominent place in our research framework. We still used normative insights and discussed the different perspectives possible, but only at an equal level with other elements of Groenewegen's framework.

We considered the use of prototypical cases to validate the outcomes of our study. We returned to this intention, as this research does not run through a complete policy cycle. If one uses cases to validate whether the proposed system categories may contribute to solving the problems underlying those cases, we are referring to concrete problems. By doing that, we would deviate too much from the goal of this project, which deals more with the exploration of the solution space than with the analysis of a (set of) particular policy problems.

A final major change concerns the role of technology. This research project has started around the notion of advanced privacy-enhancing technologies for the exchange of sensitive data. New information security paradigms, such as the Jericho framework and the notion of user-centred identity management, would be at the heart of the research. However, it turned out very soon that technology is not the main problem, and that focusing on these solutions would be neither relevant nor proportional. Further on in this report, we make additional comments on the role of technology, which does not seem to lead to difficult complexities in the formulation of policy.

4. Conceptualisation

This chapter deals with tailoring Groenewegen's model, which is very generic, to obtain more specific, analytical concepts we can look for in studying our case. The result of this exercise is visualised in Figure 7. The conceptualisation is our main analytical step and essential to understand the line of reasoning throughout the rest of the report. However, if one is merely interested in the synthesis parts of the research, one can move on to paragraph 4.6.

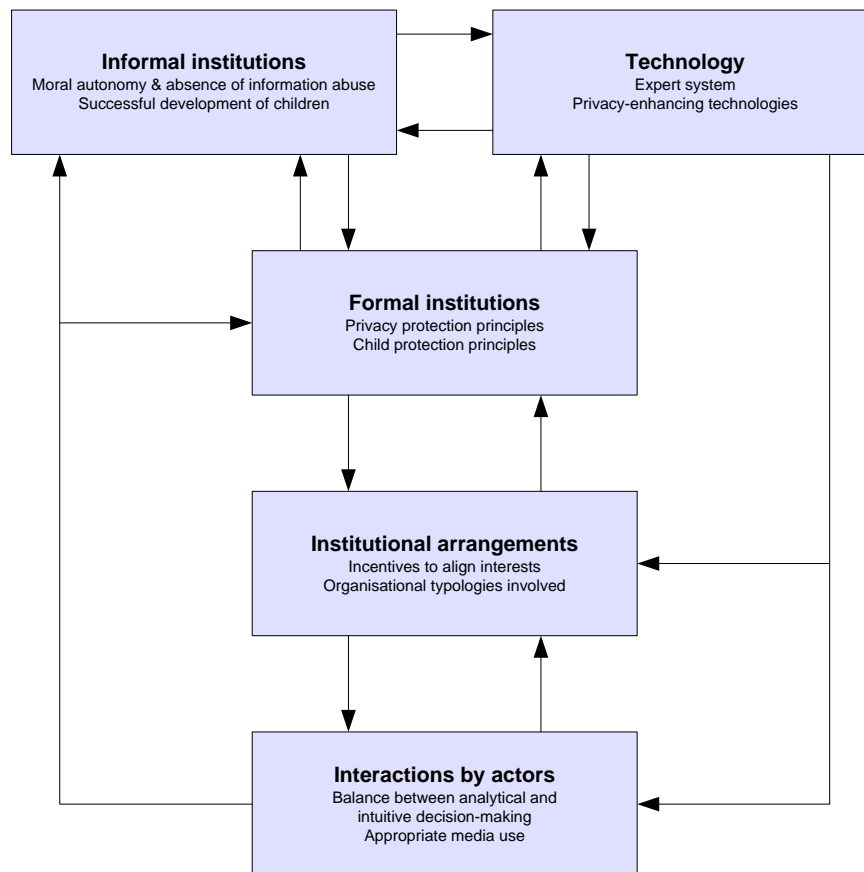


Figure 7 Conceptualised framework.

Groenewegen's model is based on the work of Oliver Williamson, as mentioned before. Williamson's model comprises the four institutional layers, similar to the framework of Groenewegen, but without the technology element. Williamson recognises that changes on the different levels come about in different orders of time, where informal institutions are hardest to change and interactions by actors the easiest. We do not agree with a static interpretation of this distinction. Whereas in general it may be true that some elements are easier to change than others, the order (with respect to the period it takes to change factors) of the elements in this respect is not always fixed. Think about the change in values (or more precisely, the shifted balance between competing values) after the WTC terrorist attacks. Informal institutions changed more rapid than formal institutions, which lagged behind. On the other hand, institutional arrangements may be very hard to change, as many conservative powers can be present. Again, this is an example of how elements can be both impeding and facilitating.

As North notes:

“The process of change is overwhelmingly incremental (...). The reason is that the economies of scope, the complementarities, and the network externalities that arise form a given institutional matrix of formal rules, informal constraints, and enforcement characteristics will typically bias costs and benefits in favor of choices consistent with the existing framework.” (North, 1994, p. 6)

Indeed, altering institutional arrangements like a reorganisation of intelligence services did sometimes take more time than changing the law, although the latter is an institution, too.

Our second and somewhat related critique on the model deals with Groenewegen’s positioning of the technology element. The place next to informal institutions suggests that technological change takes as much time as changing informal institutions, in the order of magnitude of a hundred years, if we follow Williamson. Technology can change much faster. Often, institutional change proceeds at a much slower pace than technological change does. Third, we do not agree with the selection of ‘arrows’, of relationships to investigate. For instance, no feedback loop between institutional arrangements and informal institutions exists. Nevertheless, one may well think of such feedback to occur. New public management and related ideas have changed institutional arrangements, which in turn lead to changing opinions on the role and responsibility of government. We recognise that feedback loops can be of multiple orders (indirect loops) and are often bidirectional. We use the five elements as inspiration for and structuring of our analysis, but do not strictly adhere to the pace-of-change properties and limiting of relationships.

We distinguish between constraints and choices so that those variables that cannot be changed in several years are considered a constraint. That means that this study merely looks into the present or close-to-present situation and presents no wide outlook. Predicting the future is very difficult. Even if one wants to explore it, a good understanding of the (already emerging) trends requires insight into the status quo.

For the remainder of this chapter, we have chosen to assign factors to only one element of the framework, where possible. Several insights are present at different levels, but for reasons of readability, we only discuss them once. That is possible since the framework is a tool and no rigorous instrument where the elements in themselves contain lots of meaning.

We will now turn to a subsequent discussion of the framework’s elements.

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4.1. Informal institutions

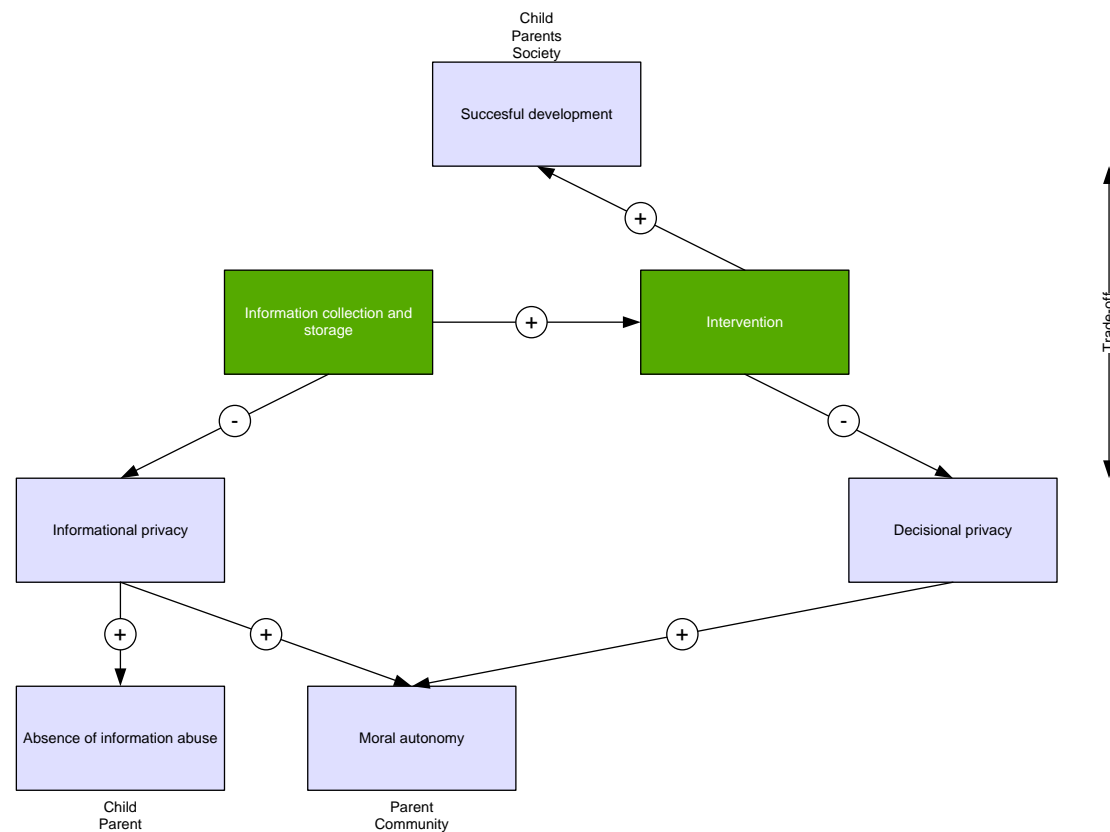


Figure 8 Simplified relationships between normative demands and intensity of information collection and storage and intervention.

Informal institutions refer to norms, values and culture. We will concentrate on the normative aspects of an IT system supporting problem child recognition. Figure 8 shows a conceptual framework used to discuss the three main values at stake and their mutual relations, mostly in the form of trade-offs. The dark blocks are two policy decisions at the core of our analysis. Which and whose information is collected and stored, and which and how many interventions will take place? We discussed before¹⁸ that the intervention part is no object of our study, but it is highly relevant in assessing the moral consequences of the decision on information collection. We can assume that increased information collection leads to more problem children being recognised, and in turn, more interventions will take place. Without detailing the nature and strength of those relations, this positive linkage can be established. In discriminating between informational and decisional privacy, we follow Rössler (2005). She defines privacy as:

“Something counts as private if one can oneself control the access to this something.”

Can should be read as a normative statement, in the meaning of allowed by convention. Access can be regarded in both the physical as well as the metaphorical sense. Decisional privacy is tied to a module of action or conduct, informational privacy to knowledge. Besides decisional and informational privacy, Rössler identifies local privacy, which is tied to the protection and (negatively the) intrusion of physical spaces. This type of privacy is not directly relevant for our study of an information system and will therefore be skipped.

¹⁸See the intervention cycle on page 21.

Beneath the two types of privacy, we recognise higher values at work – those of the absence of information abuse and moral autonomy. As these are more concrete, we will use them in our further discussion of the privacy-related values.

We recognise a successful development of the child as one value, the absence of information abuse for children and parents as another, and moral autonomy, for parents, community and society in general, as the final one. Any discussion of values, applied to an IT system, is useless without referring to the actors concerned about these, which is the reason why we differentiate between the child's, the parents', the community's and the society's interest. In the following paragraphs, we first discuss these three values. After that, we dive into the trade-offs between them and the ethical principles that could assist in those decisions.

Throughout this report, we assume that our type of IT system always requires state intervention or legitimacy. A voluntary system is doomed to fail, as it is very unlikely that this reaches many problem situations with, for instance, parents being incapable of child nurturing. The state has the monopoly to enforce collective systems and draw the case for interventions following from the recognition of problems. With state, we do not necessarily mean the national government. The Dutch state is unified and decentralised, with many governmental bodies on lower levels capable of taking binding decisions for their citizens. In the section on formal institutions we will further detail the legal constraints within which lower governments have to operate. The role of the state will be discussed in the reflection on moral autonomy.

4.1.1. *No information abuse*

One of the goals of safeguarding informational privacy is that one should prevent people from being harmed by others misusing their personal information (Jeroen van den Hoven, 1998). A classical example is the professional secret in the medical sector. General practitioners could seriously harm a girl living in a conservative family when telling her parents about a requested prescription for the contraceptive pill. For our case, one can think of a conservative candidate for the mayoralty who does not want information on possible hard drugs use by his son to become public knowledge. Communitarians and liberals, two strands of political thought considered classical opposites, generally agree on the need to prevent this type of harm. It is important to recognise that the determination of 'misuse' may be dependent on the political view. Communitarians may find the exchange of information about the sexual behaviour of children between medical staff and parents a good idea. However, if one agreed not to use the information for this purpose, misusing it with the result of harming people would be equally unacceptable for communitarians as it is for liberals. This simply is a matter of the 'rule of law' and general social norms on accepted behaviour.

The causal link between privacy protection and information misuse runs through the intermediating variable of risk. The more people have access to more information, the higher the risk of misusing it and causing harm. Mechanisms may be (put) in place to lower the risk of causing harm, such as criminal law penalising abusers and individual and group attitudes towards dignity. This, however, is no guarantee that abuse will not take place. In the case of penal law, there is no full certainty on catching offenders, offenders are not always rational and respond to incentives in the intended way, they may be ideologically motivated to break the law and errors may be made during law formulation or prosecution. Besides, normative statements such as the harm principle (also known as the restricted liberty principle) are directed towards individual behaviour and its regulation by the collective. As not everybody abides to these principles, risk of abuse will always be present in cases where information exists. The only way to eradicate this risk is not to store the data at all, which may be demanded by people attaching value to informational privacy. In many organisations, intrinsic motivation for information security is hardly present (Nickolson, 2008) and, especially in the health care sector where IT budgets are low, privacy may be a serious issue, as can be illustrated by some anecdotal evidence about a recent hack revealing medical data of eight percent of Dutch citizens (Spaink, 2005). Of course, this does not mean that protection cannot be enhanced, but the danger of information abuse seems to be real.

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Schoeman¹⁹ argues that different information is being used in different relationships. Data protection is needed to allow people to have multiple identities. Liberals will support this, because it gives people the freedom to experiment, whereas communitarians may acclaim the participation in multiple communities that is facilitated. Introna (1997) elaborates on the need for various degrees of social and intimate relationships and social roles. He argues that most social relationships can only function as long as they are simple, which means that only a limited information domain is involved. Introna mentions the example of the complex relationship of husbands, where an overflow of mutual knowledge about each other's behaviour exists, and concludes that most relationships in society can only function by means of simplicity in the information exchange.

The protection of room for experimentation and multiple identities seems to be not very relevant for the state-citizen relationship, as the social function will not be harmed by a single information leak. Yet, if information can be accessed centrally and a significant part of a database storing sensitive data is hacked, the social function will be seriously harmed. It is important to recognise that the sensitivity of data is not about the raw data stored and processed, but about the context in which it is used (J. van den Hoven, 2008). The combination of data and context provides meaning and may lead to privacy invasions of all types discussed here. Think about a simple record, providing only contact details in a database for high-risk youngsters. These data can also be found in a phonebook, but the fact that they are present within an environment connects these children to much more information, based on for instance the criteria used to select the child for inclusion in the system.

4.1.2. Moral autonomy

The concept of moral autonomy can be approached from several directions, but the common meaning of it is that people should be free to hold their own conception of the good life. This is mostly relevant for parents and, if applicable, the community (in the social and not the 'family' sense of the word) of the child and his parents. Moral autonomy may be threatened if the process of the recognition of problem children is biased towards certain citizen groups or certain ways of life. Think about teenage pregnancies, which are statistically correlated with the risk on child abuse (see page 21), but may have resulted from conscious and persistent conceptions of the parents.

Biases can be present by systematically advancing one conception of the good life (or a way of exercising this) over other ones. With regard to computer systems, this can be defined more precisely.

"We use the term bias to refer to computer systems that systematically and unfairly discriminate against certain individuals or groups of individuals in favor of others."
(Friedman & Nissenbaum, 1996, p. 332)

This does not have to be done in a conscious process, but for an assessment of the consequences, that does not make any difference. There are no methodologically rigid ways of determining biases and their impact²⁰. Therefore, we have not specified the bias concept any further, but will use this value (as part of moral autonomy) in analysing the consequences of fundamental design choices.

A first way of biases to occur is by the effect of using a uniform system that has certain values attached to it. By involving a certain group of citizens (problem children or maybe even all children) in a certain set of procedures, meanings and data, one may affect value-related choices in life. A counterargument could be that even the choice not to set up such a system of information collection and intervention is value-laden. That is not completely accurate, as such a passive stance does not preclude people from believing and acting very differently, whereas the decision to intervene takes away some discretionary room from citizens. Several authors have warned against the levelling effect of a state pursuing its moral values. One of

¹⁹Referred to in Nissenbaum (2004), not directly consulted.

²⁰In a paper (Monasso, 2008), written parallel to this thesis report, we propose a methodology for value sensitive design based on the approach used in this paper.

most famous thinkers in this respect was Isaiah Berlin, who feared that the advancement of positive liberty, the state intervening in order to allow every individual to make *substantial* choices, eroded the higher-valued negative liberty, the freedom of non-interference (Andrades, 2007). In the same tradition, we can place Alexis de Tocqueville and, more contemporary, Michel Foucault. The first analysed the equalising and possibly dictatorial effect of the concentration of power in a democratic state, where minorities' or some individuals' interests are not well protected (Tocqueville, 2004). The latter has explained the ability of the state to control behaviour of its citizens extremely easily and extremely invasive at the same time, by making it possible to observe their conduct completely, elaborating on the work of Jeremy Bentham. Even without actually intervening in the development of children, the mere collection of data may already have a grading effect on people's lives as it signals the state's 'opinion' on the normal and the deviant. Introna and Pouloudi (1999) build the argument that it is essential to allow people the freedom from judgement of others, because judgements are always entangled in interests and values. That means no neutral position exists from which actions and information can be judged. The availability of information can lead to the possibility of false judgements, since the other can never know our real interests and values when considering our actions and opinions. We would add that these misperceptions might lead to a certain conformance. The less diverging one behaves or thinks, the less likely it is that he will be misinterpreted.

One way of government scrutiny to be exercised is by the (unconscious) effects of categorisation, as described by Bowker & Star (1999). By pigeonholing certain problems and characteristics of people, implicit moral judgements may be given and consequently, people's possibilities or even behaviour may be changed. Think about a systematic way of looking for the prevalence of risk factors. If a high risk results in an intervention, then children attached to these risk factors may be helped more, or faster, than children without. Had the problem categorisation been different, then the distribution of intervention effects would have been different as well. Therefore, all classification systems have an ethical dimension.

A second way of biases to arise is on the individual level, for instance, when the attitudes of caretakers influence their behaviour. A Flemish private initiative recognises the danger of individual conceptions influencing the discretionary room of care takers and asks their volunteers to sign a declaration where they oblige themselves not to press their norms and values (Tirez, 2007). It is questionable whether it is possible to withdraw from this completely, as many decisions are intuitive and cannot be traced back to rational and transparent thoughts. Many individual biases will be averaged out on a big population, but systematic biases may still exist. Think about the fact that many caretakers are white and are likely to have an (unconscious) bias towards the modern western way of life.

Moral autonomy is not only visible at the individual level (the parents), but also on the level of the community. Local communities, religious communities or pedagogic communities (anthroposophist schools), for example, may have their own conceptions of the good life and consequently the nurturing of children. IT systems that are biased negatively towards the autonomy of a community may infringe upon complex equality, a notion introduced by the communitarian Walzer (1983)²¹.

Walzer recognises the existence of different social spheres. He argues that the dominance of one type of good in one sphere should not lead to dominance in other spheres. Goods can be things like money, knowledge, social position and information. Walzer does not see problems if one excels in the possession of a certain type of good and is dominant in one sphere, for the reason that people are simultaneously living in multiple spheres. Hence, no one will be able to dominate other people's lives if the 'Chinese walls' with regard to the spread of dominance between the social spheres are kept in place. With an invasive IT system supporting problem child recognition, the state can use monopolies from spheres like

²¹Different labels circulate in literature, which refer to a more or less similar concept. Nissenbaum (2004) uses the term contextual integrity, Van den Hoven information injustice (1998).

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education, health care and the police to enter the domain of private child raising – the way parents nurture their children.

Walzer's notion of complex equality catches both the need to prevent information harm, as discussed above, as well as the need to protect community's orderings. It is not so much because a universal principle of justice is harmed in the free flow of dominance between the spheres, as it is the need to allow communities to organise themselves according to their own, endogenous principles. That argument is culturally relativist (Kymlicka, 2001) and sounds attractive for communitarians. That touches upon the stone-old universalism-relativism debate. Basic negative human rights have a universal character, but the softer, the more ambiguous, the more positive a right is formulated, the more relativism is accepted in contemporary societies, who combine elements from both views.

Stated generally, liberals attach more value to the moral autonomy of the individual (as opposed to the state and the community), whereas communitarians value the moral autonomy of the community (in this case, as opposed to the state). Socialists and others wanting the state to prescribe the good life may not consider moral autonomy relevant at all. However, we do not take the families of political thought as our starting point, but the (possible contradicting) values that emerge from them. As decision-makers will usually need the consent of a heterogeneous group of people (be it voters), it is hardly likely that an extreme position can be taken.

4.1.3. *Successful development*

The third value is the one most likely to start considerations on more invasive IT support of problem child recognition. Safeguarding a successful development of children is a driver of much political action. Depending on how one defines successful, one may introduce value-ladenness from the very beginning. If success is derived from the conformance with a tight conception of the good life, the child probably is not been favoured. We assume that the intention of any system is to increase trivial factors like prevention of sexual and physical abuse and mental neglect. They do carry moral conceptions with them, but they are not very disputed.

A successful development is in the interest of the child and, more indirectly, of the society, that probably saves on the costs of criminality, health care and low job potential. The parents are also included, but their interests are not always aligned, as in many cases parents do not ask for help when conditions for their children are poor. Maybe their fundamental feelings for children are usually more intense than those of society in general, perceptions and behaviour may alter the real situation for children.

The attention to children's development can be ethically justified by referring to the harm principle. Children may not, consciously or unconsciously, be harmed by their parents. The harm principle does not say anything on the remedy in case of harm. The reciprocity principle is often used in combination with the harm principle, where the former says that the parents lose some rights or must compensate otherwise. In the case of psychosocial problems with children, this is not very likely to help, as often it is the combination of parents, children and their environment that causes the problem. The relationship of parents and the child, and the competence of the parents, may be at the heart of the problem. Therefore, some form of external intervention can be justified by the harm principle.

4.1.4. *Balancing*

The signs on the arrows in Figure 8 indicate the polarity of the correlation between the variables. Any increase in the intensity of information collection and storage and/or interventions is assumed to have a positive effect on the successful development of children. These relationships are simplified for the purpose of analysis. Of course, not all interventions will be successful, not all information collected is necessary to initiate effective interventions, and so on, but the polarity of the relationship is non-arbitrary. In contrast to the positive effect on the child's development, we find the privacy values: absence of information abuse and moral autonomy. This points at a trade-off between the two: child's development and privacy. The position on an imaginary spectrum between these two rights for decision-makers will, at

least partially, be fed by political ideology. Without placing ideologies in the focal point of our analysis, we briefly discuss the main strands of thinking to indicate existing positions on the continuum.

Liberals attach to the harm principle, explained before. Children ought not to be harmed by their parents, and in case it does happen, we have argued intervention is acceptable. Besides the harm principle, ideas on fairness and justice also play a role. In his account on liberal justice, Rawls (1999), who has greatly influenced contemporary liberal thinking, proposed a maximin-distribution. The normative conclusion is that society is designed in such way in that, if one could choose from different alternative distributions of utility, one should pick the one that guarantees the best position for the worst off in society. Children being abused – although only one category of children with psychosocial problems – can be envisaged to belong to this category. The fact that some parents may have to surrender some freedom without their children being helped, for instance in case of false positives, is not relevant as long as being in the position of an abused or neglected child is considered to be worse than being in the position of the parent whose rights are partially given up.

When looking at moral autonomy, it is hard to draw an equivocal line in the liberal sphere. Liberals do highly value an individual's autonomy, but when it regards the autonomy of parents, it is not the traditional right to choose one's *own* life that is at stake. Liberals generally assume parents do know better what is good for their children than government, but in case the parents fail, it is likely that the child's right on a good life – although it is not yet able to choose one, government can ensure that as many options as possible are kept open – is more important. As one cannot fully discriminate between cases of just and unjust interference, again, a difficult trade-off is involved. If the breach on most parents' autonomy will be relatively modest and a great number of children can be helped, modest liberals will not have many problems with that. More extreme liberals²² (libertarians, for instance) will have more problems in accepting any form of government intervention, including the collection of data.

Communitarians will have an interest in children's development as well, but are generally reluctant to accept government's interference as this may destroy community's orderings. One of their dilemmas is that communities do not have the same competences as the state to interfere. Whereas intervention in parents' decisions is not problematic, a community's own structure (for example, the church) has not enough powers to do so, so the state is involved. One way of relieving this dilemma is to allow communities to execute some interventions through their own structures, legitimated by the powers of the state. In almost all communities, child abuse, neglect and the like are seen as unacceptable behaviour of parents and a case to intervene can be built without much problems. Communitarians can be regarded to adhere to a multiplicative social welfare function, in which utility is measured at the level of the community instead of the individual. Some contemporary communitarian thinkers equal the community with the state. They are concerned with the common good, the functioning of a healthy society with enough social capital. They have opinions on how to create such a society, but should not be confused with socialists, who directly want to influence the life of individuals. Their unit of focus is different. These type of communitarian thinkers are willing to give up individual rights where effective and proportional, as they consider no right to be absolute (Etzioni, 1997). From our analysis, we can state that the common good is primarily served by successful developments of children, as society in general has no direct interest in safeguarding informational privacy.

Finally, we can distinguish two strands of thinking attached to an additive social welfare function. Classical utilitarians summate utility over all individuals in a society. Their position is only dependent on the utility values and the number of people affected for the three moral values. It is very hard to quantify the utilities and assess the utilitarians' outcome, especially as distributional issues are involved (some people should give up utility for the

²²We recognise that libertarians fall within the liberal family, but do not take part into disputes over whether the heart of their thinking is liberal or not.

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benefit of others). That observation is in line with fundamental critique on the utilitarian viewpoint, that interpersonal utilities are very hard to compare. A classical utilitarian position in the area of privacy and child protection is absent in mainstream politics.

Socialists *may* pursue a conception of the good life, which they consider superior. A paternalistic position may provide the basis of obliging citizens to adhere to a consciously constructed, value-laden system. In that case, moral autonomy is not of much interest to them. Socialists tend to protect the weaker groups in society. It is likely that they are willing to protect children without harming other significant values.

Throughout all approaches, information harm seems residual. Everybody attaches some value to this, but it is always weighed against other principles.

The concept of informed consent is regularly used in the ethical literature with regard to decisions that have consequences affecting others than the decision-maker. The principle of informed consent can be used for a great deal of cases, where parents do voluntarily cooperate. The application of the principle in those cases is not controversial and hence needs no discussion in this report. In the case of parents being part of the problem, like child abuse, or parents who do not have full control over their children, like derailed adolescents, it can be difficult or even counterproductive to ask for consent. If a tension between the parents' and the child's interest is present, asking consent places the child in an unfavourable position. Therefore, the application of informed consent for those cases is highly related to the general attitude towards the interests of different groups and can be subsumed into the discussions identified in the earlier parts of this section.

4.2. Formal institutions

Formal institutions refer to binding rules: laws and regulations. In this section, we discuss regulations that serve as a constraint on Dutch policy with regard to problem recognition. Merely Dutch judicial documents will be discussed in the next chapter on the status quo. Information security professionals fear that the only drivers for security at an organisational level are fear and regulation (Nickolson, 2008). Therefore, regulation seems to be a necessary instrument for at least some organisations.

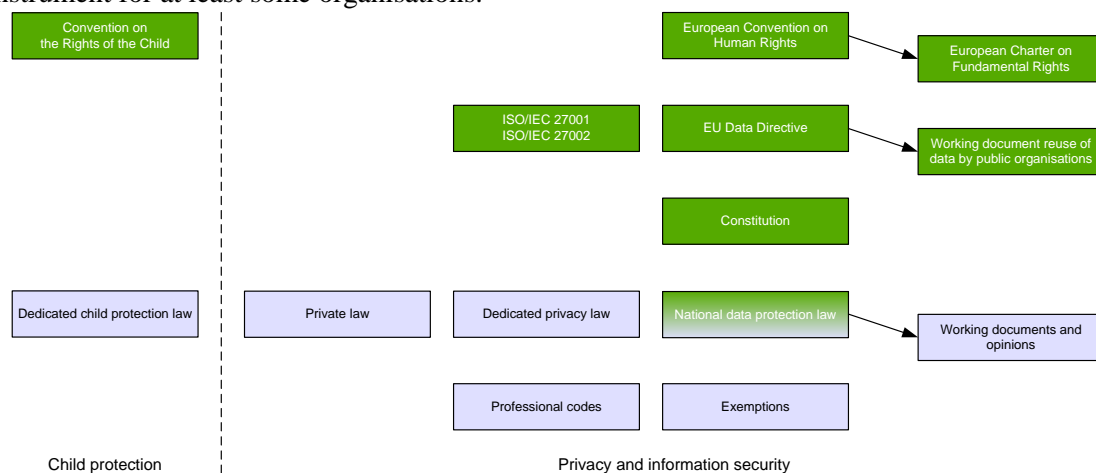


Figure 9 Hierarchy of applicable legal documents. The arrows indicate related works that merely serve as reference documents or further explain open norms. The dark blocks indicate regulations that are beyond the direct sphere of influence of The Netherlands or are considered very hard to change (in case of the constitution). Consequently, the light blocks fall within that sphere.

We identify relevant rules in two domains: the privacy and information security domain, and the realm of child protection. In Figure 9, the hierarchy of these rules is shown. We have distinguished rules that fall within the sphere of influence of The Netherlands and those that

do not. The ability to influence rules like the European Convention on Human Rights is very limited, as the voice of a single country is only small and the institutions to change them are designed consciously and unconsciously to make it hard to make fundamental alterations. In this paragraph, we only discuss the regulations that are hard to influence, as a discussion of the others is more appropriate in the analysis of the status quo in the next chapter.

On the highest level, we find the European Convention on Human Rights. This treaties' enforcement is protected by a dedicated court settled in Strasbourg. As for all other documents identified at the highest level, the Dutch constitution states that international law goes above national (article 94). That means that in case of a conflict, the treaty's explanation is applied. In the Convention, as well as the Charter on Fundamental Rights, which is derived from it for use by countries of the European Union, the rights are formulated very basic. Table 8 shows some relevant excerpts from these documents, including the Dutch constitution. Note that the content of the three documents is rather similar. Together, they prescribe that privacy protection is a duty of government and that infringements upon privacy should be proportional and have a dedicated legal basis. The constitution has no direct hierarchical working in the Dutch law system, in that it is superior to other laws, but the direct working of the European Convention makes that the intention of article 10 of the constitution can hardly be surpassed. For this reason, we regard the constitution, for our domain of analysis, as beyond direct influence.

Table 8 Key articles on the protection of personal data.

European Convention on Human Rights

Article 8 Right to respect for private and family life

1. Everyone has the right to respect for his private and family life, his home and his correspondence.
 2. There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.
-

European Charter on Fundamental Rights

Article 8 Protection of personal data

1. Everyone has the right to the protection of personal data concerning him or her.
 2. Such data must be processed fairly for specified purposes and on the basis of the consent of the person concerned or some other legitimate basis laid down by law. Everyone has the right of access to data which has been collected concerning him or her, and the right to have it rectified.
 3. Compliance with these rules shall be subject to control by an independent authority.
-

Constitution of the Kingdom of The Netherlands

Article 10

1. Everyone shall have the right to respect for his privacy, without prejudice to restrictions laid down by or pursuant to Act of Parliament.
2. Rules to protect privacy shall be laid down by Act of Parliament in connection with the recording and dissemination of personal data.
3. Rules concerning the rights of persons to be informed of data recorded concerning them and of the use that is made thereof, and to have such data corrected shall be laid down by Act of Parliament.

On the European level, we find the Data Directive as well. Directives have to be translated into national law, and if not, they may get direct working. In that sense, the contents of the directive are hard to deviate from. The Dutch *Wet Bescherming Persoonsgegevens* (WBP) is

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based on the Data Directive. The key articles of the WBP are shown in Table 9. Both the directive as well as the law may be detailed in working documents and opinions. They are more concrete but have a certain legal status. Note that article 2 confines the scope of the law to automated or systematic data sets. This means that the exchange of for instance sensitive data between professionals by phone is not regulated, albeit that more specific regulations may be applicable, such as the medical professional secret to be discussed in chapter four.

The Dutch constitution (article 1), the Convention (article 14) and the Charter (article 21) contain articles within which non-discrimination principles are explicated. The constitution provides the clearest and most easily accessible regulation in this respect. It reads:

“All persons in the Netherlands shall be treated equally in equal circumstances. Discrimination on the grounds of religion, belief, political opinion, race or sex or on any other grounds whatsoever shall not be permitted.”

Indirect discrimination is allowed, when there are objective reasons for this, although the jurisprudence in this field is complicated.

Table 9 Relevant articles from the WBP, in non-legal language.

Article	Description of content
2	This law is only applicable to (partially) automated processing of data, or non-automated systematic filing.
5	If the person concerned is younger than sixteen years, his lawful representative instead of the child takes over the right of consent.
7	Personal data will only be collected for explicit and legitimate goals.
8	Personal data will only be processed in a limited number of cases, among which are the explicit consent of the person concerned, to exercise a duty imposed by law or a vital interest of this person is at stake.
9	Personal data will not be processed in a way that is in contradiction with the goals it was collected for.
13	Appropriate technical and organisational protection measures will be taken, intended to prevent loss, illegitimate processing, unnecessary collection or processing. These measures are proportional to costs, the state of technology and the sensitivity of the data.
16	The processing of highly sensitive data (among which are health, sexual life, religion and race) is prohibited, unless specified otherwise by law.
24	An identification number obtained from law will only be used for goals described in that or other law.
31	An ex ante investigation is compulsory when one intends to exchange criminal data with third parties.
34	The person involved will be notified upon the collection of his data or the exchange with this data with a third party, unless the collection and/or processing are prescribed by law.

In the child protection domain, we also find an international treaty: the Convention on the Rights of the Child, agreed on in the general assembly of the United Nations. Here, too, article 94 of the Dutch constitution is applicable, but no dedicated court exists to enforce the Convention, although it may be referred to in national cases. Interpretations regarding the status of international stipulations regarding ‘social rights’. Forder (2008) argues that the Convention does impose real duties onto the Dutch government and makes a case for an electronic child file to comply with the treaty’s obligations.

The treaty demands from the state that it takes all appropriate measures to ensure that the child is protected against discrimination and ensure general protection and care (article 2 and 3). It should respect the rights and duties of parents to provide direction to the child

(article 14), where the state, at the same time, shall ensure to the maximum extent possible the survival and development of the child (article 6). The tension between state intervention and parental freedom is recognised implicitly throughout the treaty.

Special cases of regulations are technical norms set by industry bodies. ISO/IEC 27001 and 27002 are examples of this. They refer to the set up of an information security management system, respectively the practical elaboration of it. These norms may get legal status if they are referred to in laws or regulations. For our case, we have not identified norms that are mentioned in the international regulations mentioned, but they may be part of working documents to come, which is a reason why we did include the most relevant norm as likely to become applicable to our case. It should be noted that many norms referred to in the law have a rather generic character, which means that they provide structure and guarantee a certain level of completeness, but do not limit substantial choices.

4.3. Institutional arrangements

At the level of institutional arrangements, we find the analysis of inter- and intra-organisational structures. The accompanying theoretical streams we use are agency theory and organisation theory. The field of agency literature can be divided into two: principal-agent theory and a positive theory of the agency (Douma & Schreuder, 2002). The first is aimed at finding an appropriate reward structure to align the interests of the agent with those of the principal. The latter sees the firm as a nexus of contracts and intends to explain organisational forms. In our analysis, we will only use the first, as this one is most relevant with regard to the system itself: it gives an indication and qualification of policy instruments. The latter is more relevant in stages at a lower level of abstraction, when allocating responsibilities among organisations. That can be done in a rather technocratic way. It does not impose constraints for higher-level decisions.

With regard to organisation theory, we rely on the classical work of Mintzberg in determining a typology of organisations. We are interested in the relation between the organisation's characteristics and the appropriate mode of coordination and the effect of the introduction of technology on work processes.

4.3.1. *Principal-agent theory*

In situations where we can distinguish a principal, who has certain interests, and agents, who have to execute tasks but may have misaligned interests, principal-agent theory may be useful. As an IT system like the one we scrutinise demands the cooperation of many organisations, we can use insights from this theory to analyse whether key actors behave or can be made to behave in the desired way. To apply the theory successfully, the principal should be a single organisation, like a municipality or the Ministry of Youth and Family, which itself might represent interests that are more diffuse. The core problem is that the principal should design an appropriate incentive structure where a situation of asymmetric information exists. Not all behaviour can be fully observed and sanctioned, so some internalisation of values has to take place. That even holds true in hierarchical settings, like an owner-manager or employer-employee relationship. Principal-agent theory generally looks at contracts and plays with monetary reward structures. It is possible to consider other factors, like license structures and reputation.

The identification of actors, their interests and current incentive structures will be postponed to the analysis of the status quo in the next chapter.

4.3.2. *Organisation theory*

An organisation's culture and the way organisational processes are coordinated are highly interrelated (Mintzberg, 1983)²³. Relevant for our analysis is the question whether information systems aimed at cooperation between organisations, or even the internal use within a single organisation, are likely to be successful.

²³On which source we also base our descriptive parts of this section.

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Mintzberg distinguishes five types of organisations, from which we pick two that we perceive in the actor network we are dealing with. First, the professional bureaucracy, which is the dominant mode of organisation in the (health) care sector, and secondly, the machine bureaucracy, which is dominant in organisations tightly related to or integrated in government.

A professional bureaucracy is an organisational form where the professionals are relatively autonomous, even from their colleagues, which means they have considerable discretionary room in their decisions. Their work is standardised, not so much by the organisation, yet merely by professional training and professional organisations, which have been responsible for the high level of education. A process associated with professional bureaucracies is pigeonholing. As each professional is highly specialised, a problem and the specialism must be contingent. Pigeonholing is the process of finding the right match. This can be problematic, when a problem situation is multidimensional and requires multiple specialisms, or otherwise cannot be adequately assigned to an organisational 'hole'. The technical system, which supports the work and decisions of the professionals, is very basic, although the technology – the knowledge base of the professional – is generally well developed.

Top-down coordination is very cumbersome in a professional bureaucracy. Coordination mechanisms derived from the machine bureaucracy, like hierarchical coordination and detailed regulation, do not function well in this type of organisation. For a multitude of reasons, professionals do not like this 'invasion', among which are the fear that the relationship between the professional and the client is disturbed by external controls and the difficulty of objectively measuring the performance of a complex process. Nevertheless, the internal coordination within the profession does not guarantee uniformity either. Problems that extend a single specialism or cannot be pigeonholed adequately are in need of coordination outside of the profession. A characteristic of professional processes is their complexity, which leaves much discretionary room for an individual professional. This may lead to differences between practitioners.

The machine bureaucracy as described by Mintzberg more or less resembles the description of bureaucracy by Max Weber. He regards bureaucracies as being dehumanized and working without regard for persons. In this respect, he remarks:

"...the characteristic principle of bureaucracy: the abstract regularity of the execution of authority, which is a result of the demand of 'equality before the law' in the personal and functional sense – hence, of the horror of 'privilege,' and the principled rejection of doing business 'case by case.'" (Gerth, Wright Mills, & Turner, 1991, p. 224)

One of the values underlying bureaucratic authority is the desire to level economic and social differences. With regard to decision-making about problem situations regarding children, it is questionable whether the way of working of a (machine) bureaucracy fits with the complex decision situation. A professional bureaucracy seems more appropriate to handle these kinds of problems, but has the inherent disadvantage of being opaque to outsiders and, hence, equal treatment cannot be fully guaranteed.

We do not dive into the insights derived from process management literature, as this is concerned with the process of implementing a system or reaching consensus about the feasible goals. The reason why we do devote attention to organisation theory is that it may nuance the ability to direct developments in the first place.

4.4. Interactions by actors

On the level of the actual behaviour of actors, which is influenced by all other elements and may influence culture over time, we would like to zoom in on the way human beings make decisions regarding the recognition of children, as well as the appropriate mode of communication.

4.4.1. Analytical and intuitive decision-making

A tension between analytical and intuitive decision-making exists, as has been clearly identified by Munro (1999), who looked for decision-making errors that had disastrous consequences in the British child protection sector, with which she showed the relevance of this dimension. The associated literature originates from the field of behavioural psychology.

Analytical decision-making follows certain structures, uses validated literature, and should be rational, documented, impersonal and transparent. Intuitive decision-making is highly attached to an individual with a unique set of (tacit) knowledge, experiences and beliefs, who may 'feel' what the right decision is, but probably is not able to fully explain the sources of this feeling. That does not mean that the value of an intuitive process is by definition less than that of an analytical one, but its legitimacy may be more problematic, especially for government bodies that have to follow principles of non-discrimination and accountability. Both ways of deciding have their pros and cons.

The natural state of decision-making is the intuitive one. In the absence of (self-)imposed structures, whether it be legal procedures, aligned perceptions or IT systems, an individual will use his own body of knowledge, experiences and beliefs to assess a certain situation. In the absence of much validated and structured scientific knowledge, decisions still have to be made, and intuitive ones may turn out to be just. In addition, analytical procedures can never catch the full richness and context of a problem situation, as it necessarily aggregates and classifies information. In case the conditions for analytical decision-making are not fulfilled, intuitive decision-making is the only fallback option.

The intuitive way of deciding has several drawbacks, identified by the discipline of psychology. Munro (1999), Raiffa, Richardson & Metcalfe (2002) and Ten Berge (2005) enumerate many of them. Humans tend to simplify situations by reducing information. They use too little information and seek too narrow a range of evidence. People regard unreliable evidence (hearsay, testimonies, quantitative data) as reliable and reliable evidence (statistical samples) as unreliable. Probabilistic and human thinking often do not match, as uncertainties and dependencies are often ignored or misinterpreted and analogies are not discriminated from causal relations. The national rumour around the conviction of Lucia de B. (van Hintum, 2007), a case of penal law, illustrates how difficult the assessment of probabilities can be even for a group of higher-educated and experienced people. Judgements are hardly revised, as confirmation of already existing beliefs is sought and groupthink may arise. First impressions stick, remarkable and recent information outweighs a historical pattern. Sutherland remarks in this respect:

“First, people consistently avoid exposing themselves to evidence that might disprove their beliefs. Second, on receiving evidence against their beliefs, they often refuse to believe it. Third, the existence of a belief distorts people’s interpretations of new evidence in such a way as to make it consistent with the belief. Fourth, people selectively remember items that are in line with their beliefs.” (Sutherland, 1992, p. 151)²⁴

A recent dissertation which looked into the Dutch situation at the municipal health centres regarding preventive child care found statistically significant differences between individuals in the number of children they identified as having a psychosocial problem (Vogels, 2008). Another disadvantage of intuitive decision-making is that it is very hard to monitor the quality of the work of people who decide in this way. Only after-the-fact, assessments can be made, as the decision-making process itself is a black box.

The advantages of analytical decision-making are threefold. First, it is possible to make efficient use of available knowledge. Insights from massive scientific work can be presented in compact models to be used by less skilled workers. Secondly, it creates equality, which may be necessary for (legal) accountability and the guarantee of a certain minimum

²⁴Not directly consulted, but cited in Munro (1999).

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level of quality. Thirdly, it may be able to prevent the psychological decision traps identified above (Munro, 1999).

Analytical decision-making has its own disadvantages. It can alter the perceptions of actors, by creating a new reality. The child can be seen as a combination of scores on several factors, a problem situation is seen in terms of a risk class. This may lead to blindness (interviews with infant welfare centre practitioner, paediatrician, child abuse researcher). Children who are not associated with risk factors may be seen as healthy, which does not have to be the case. On the other hand, children in risk classes may get attention that is disproportional or does not fit on their situation. Optimising the ‘model’, that is, following the procedures as well as possible can become a goal that replaces optimal attention for the individual problem situations.

These influences are often unnoticed, but do occur. Structuration theory (I. J. Cohen, 1989) elegantly describes the so-called duality of structure. Human actions are constrained by structures, but at the same time, these structures are shaped by human action. Structures, therefore, may be self-reinforcing. Three modalities of structure are distinguished: interpretive schemes, resources and norms, all of which can be influenced by an IT system supporting decision-making (Orlikowski & Robey, 1991). Interpretive schemes are influenced as IT tends to formalise and encode stocks of knowledge. IT occupies organisational resources, and finally and perhaps most important, it alters norms. This can happen in three ways. First, technology is being seen as the appropriate means to execute the task. Secondly, it is prescribed as the approved way of working, and thirdly, it influences the priorities and criteria of tasks. In designing an IT system, these effects should be taken into account. Merely shaping structures might be desirable, but it may create unwanted equality and infringe upon moral autonomy in a way discussed in paragraph 4.1.

Experts recognise that the danger of stigmatisation already exists and can increase when risk factors usage becomes policy, although professionals seem to be aware of this effect and try to put it into perspective (interviews with pedagogical researcher, child abuse researcher).

In Table 10 we show a comparison of both ways of decision-making. As neither is superior on all factors, a smart combination of both seems best.

Table 10 Comparison of intuitive and analytical decision-making.

	Intuitive	Analytical
Positive	Contextuality Richness of ‘knowledge’ sources	Use of validated knowledge Efficiency Equality Transparency
Negative	Psychological traps Opacity	Equality

The dominant form of decision-making, intuitive or analytical, depends on the phase in the decision-making process and the associated task characteristics (interview with child abuse researcher). Hammond’s cognitive continuum is a widely used theory in this respect (Daniel, 2003). It places any decision somewhere on a continuum between pure intuition and pure analysis. Congruence between the characteristics of the judgement and the task environment results in better decisions. Figure 10 shows examples of the relevant characteristics. If we map the continuum on the intervention cycle as discussed in the first chapter, the observation of problem indicators tends to be a task environment that asks for intuition, as many cues are present and no generic analytic model is available to interpret the signals. The more specific the information collection becomes, the more it shifts towards the diagnosis, and the more analytical decision-making can be used. Practitioners recognise the shift from intuitive to analytical decision-making in an individual case as the process of information collection and diagnosis proceeds (interviews with paediatrician, infant welfare centre practitioner, child

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dependent on the time scale, however. Some fundamental design choices may be relevant over a long period, but to assess the impact of technological choices meaningfully, we must limit ourselves to feasible technologies in the (near) present. That means they are either commercially available, or the concepts are mature enough to guide the development of new artefacts. Since it is hard to predict the future, we do not pretend we explore it, but rather we give an overview of a limited number of developments that are being researched or developed right now and we consider being potentially relevant.

It is inevitable to run ahead of some of our considerations. Otherwise, we would discuss several technologies at length, which turn out to be irrelevant. Later on, we will argue that analytical decision-making is mostly relevant when only a single profession is involved, based upon structured data. There is no need to exchange unstructured data among several disciplines and very different information systems. The analytical power of computer systems is limited to supporting roles, based on relatively straightforward knowledge. Hence, we can do without artificial intelligence or advanced analytical tools in the sphere of business intelligence.

This leaves us with two questions regarding technology: How can analytical decision-making in a single domain be supported? And what can be expected of the security performance of privacy-enhancing technologies? We will not discuss the simple storage of structured data, nor matching based on identification numbers. We believe the technologies needed to accomplish that are so basic that they do not pose any difficult constraint.

4.5.1. Expert systems

The type of information system to be used for intradomain data analysis has some characteristics of a decision support system. The system does not make the decision itself, in which case it would be a decision system, but facilitates a decision process and should have some flexibility to adapt to the changing needs of decision-makers. Also, it is intended to support unstructured²⁵ but routine decision situations (Power, 2002). We will only occasionally refer to this term, as it is broad and does not provide us with much conceptual guidance. In addition, the recognition process does not always deal with decisions.

IT systems can fulfil the role of an expert system or knowledge-based decision support system (Power, 2002). These types of systems usually support a single professional, or a team of professionals in the same discipline. Expert systems are particularly helpful in the *analysis of data sets* and the application of a structured methodology. They may give a *second opinion*, based on the data entered by a professional as well as the data already in the system. They may also *assist in diagnosing* (Leong, 2003) by asking the right questions, based on a question-answer session, structured forms or the analysis of text. The knowledge needed for the analyses can be stored in the form of rules, a model or reference cases, for instance a database of well-diagnosed cases from the past which are dynamically enriched with new ones (Luger, 2002). With the latter functionality, the system may not only use generic knowledge for the introspection of individual cases, but may also learn from cases to ‘create’ new knowledge by means of statistical inference.

The exact choice of a technology should be left to a lower level of design abstraction. We recognise that systems fulfilling the three functionalities shown in italics are feasible: they can be developed with today’s knowledge.

4.5.2. Privacy-enhancing technologies

Technologies aimed at data protection or information security are conventionally called privacy-enhancing technologies (PETs). A wide variety of such technologies is available. The decision on the technologies to use can be postponed to the level of implementation. Several advanced technologies are currently available or still worked on, but the inherent characteristic of all technologies – present as well as future ones – is that they can never provide full protection. An accumulation of technologies, or using new technologies, may be so complex that humans do not fully understand the system and hence, it can still be unsafe

²⁵To be read as decision-making processes that are not completely deterministic.

(interview with information security consultant). The reverse is obviously true as well: simple systems often do not provide all security services to the desired extent. This paradox runs through every PET decision. The only way to be completely safe is not to store information at all. In general, information security is most difficult to realise when crossing the boundaries of an organisation's internal network, to exchange information with other partners. The heterogeneity of communication links and system structures leads to increased complexity and makes security more difficult to realise. At the same time, security threats from inside organisations are very hard to address by technical measures (Stuart Broderick, 2005), so not exchanging information with third parties can only increase, but never eliminate security leaks. Data protection is not only a technical endeavour, but also requires aligned institutions and an appropriate mindset of end users.

Central storage of data makes it more attractive to penetrate the database and such an attack can have far greater consequences than when a decentral topology is used. However, decentral storage is not always possible. In the case of referral index, some basic matching information will always need to be stored in one place. Although the sensitivity of the raw data may be low – providing identification numbers contact details at the very least – its occurrence in the referral system gives it meaning and makes it sensitive.

New technologies may lead to greater information security, but we do not think this fundamentally alters the trade-off with privacy. In some imaginary case where the likelihood of data leakage decreases from 1% to 0.5% - a factor two improvement – there still is a chance on leakage, and the privacy considerations have not changed. Therefore, we would like to introduce the principle of parsimony: only collect, store and exchange information when necessary, so try to design a system that provides the desired functionality with as little data as possible. In that case, the amount of information still depends on other choices made and the position in the privacy-development trade-off.

4.6. Fundamental design choices

In the preceding sections, we conceptualised the five elements of our analytical framework into choices and constraints, as shown in Figure 7 on page 32. To be able to give a structured assessment of the considerations involved in deciding about the system, we have to identify fundamental design choices. These form the body of any process or system, in that they prescribe the tasks, responsibilities and structures of reaching the intended goal of recognising children with psychosocial problems. From these design variables, we can analyse the relationships with the elements of our framework. Without identifying the decision choices, we would have no clear picture of a system's characteristics and cannot meaningfully use our framework, as we would not know where to start analysing the huge number of interactions between all the analytical units. By choosing a determinant (the fundamental design choices), we can discuss the relevant relationships in a more structured and meaningful way. We identify seven fundamental design choices. These factors are fundamental in that they cannot be reduced to more basic principles, and at least partly orthogonal in that they represent different decisions and do not fully correlate. This distinguishes fundamental design choices from elements in the framework. Various technological possibilities or legal stipulations, for example, are no decisions in themselves, but means to accomplish a more abstract goal, listed in Table 11. Figure 11 at the end of this section shows how the design choices and the elements of the framework are related. The factors from the framework are part of the analysis regarding the design choices, but that analysis can be broader as will also discuss coherences between the design choices.

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Table 11 Fundamental design choices and their values.

Design choice	Policy options
Triggers	Child's life cycle Indicators of current problems
Knowledge sources	Use risk factors Do not use risk factors
	Special case: information from relatives
Data collected	Contact details of persons concerned Substantial information (various degrees) Medical information
Organisations involved	Single profession
	Organisations from four domains
Centralisation	Central
	Decentral
Technological sophistication	Basic computer system
	Intelligent computer system
Reporting	Consent required
	Discretionary reporting
	Mandatory reporting

First, the triggers for information collection must be defined. Will information be collected at certain moments in every child's life? One can think of birth, health centre check-ups, certain major school events and the like. In this case, one can decide whether or not to store all data attached to these events, only certain parts of it or only collect data for problem recognition in case problem indicators or the presence of risk factors are observed. Another possibility to collect data is to be triggered only by problems, such as lower school attendance, police and justice encounters or behavioural problems signalled by doctors. Incidents are always attached to specific children. Incident-based systems therefore will not contain (almost) all children in a specific age range, as might be the case with life cycle systems. Of course, these possibilities can co-exist.

A second question is whether risk factors will be used. A special case is the use of information from relatives, like parents, brothers, sisters or cousins. This is different from generic background information because it requires others to give up some privacy by revealing data that are not directly observable.

Third, one should decide which data would be collected. Will only contact information be stored, or is a rich problem description with sensitive data included in a digital file? In case data about the child or its environment is stored, which goes beyond identification data, we will speak of substantial data. Medical information refers to information about diseases, and always is about an individual, not his environment.

Fourth, one should decide about which organisations to involve. Does the system only support a single organisation, organisations within a single (professional) domain, or does it facilitate interaction between multiple domains? Generally, four domains are discerned: police and justice, education, health care and welfare. One could add citizens' awareness as a fifth one. It would be advisable to use some form of professional judgement before using information from citizens, but this already is an information source. The so-called AMK's that are dedicated to this task are discussed in the next chapter. Fifth, the degree of centralisation of the system, in other words, the levels at which decisions are taken and degrees of freedom limited, should be included. This question is relevant at all governmental levels. Central government may consider how much room it gives to decentral parties, and local parties may demand cooperation with peers or ask the central government to intervene.

Sixth, the degree of computer intelligence is a fundamental choice. Does the computer system only store data, analogous to the old-fashioned paper way of working, or does it add intelligence by providing analytical support? Seventh, one should decide about the legal

regime underlying a professional's report. Does one require consent from the child or his parents, does the professional have a right regardless of consent, or is he even obliged to report if certain conditions are fulfilled?

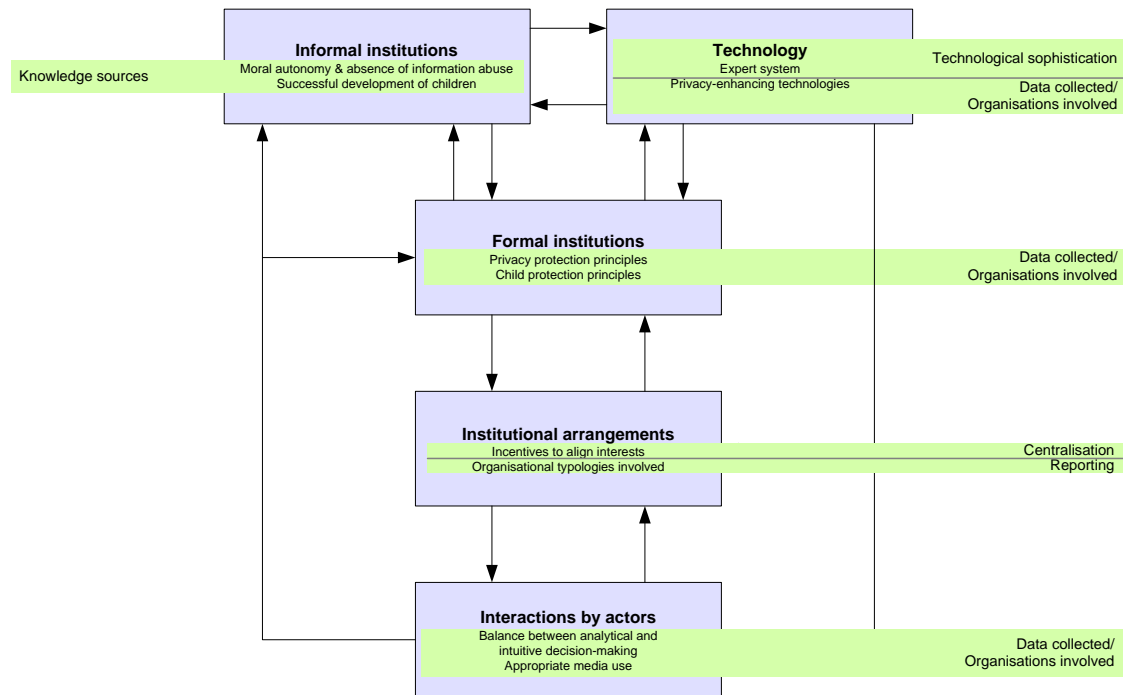


Figure 11 Relation of the conceptual framework and the fundamental design choices.

5. Status quo analysis

Now that the conceptualisation of our framework has been completed, we can systematically compare different decisions regarding an information collection system aimed at recognising children with psychosocial problems. To improve our understanding, we first analyse the status quo. This serves both as a reference point, as a test case for the refinement of our framework and as a serious policy option. This chapter is the one with the lowest level of detail, and may be omitted by readers who are merely interested in the results of the research. In that case, please note the summary at the end of the chapter.

The status quo is situated to be the situation as of April 2008. It will be worked out following the conceptualisation from the previous chapter. Its description is compact, as we tried to omit unnecessary details and focus on the relevant factors. First, we discuss the systems currently in place or under development. Then we will detail the elements of Groenewegen's framework.

5.1. Fundamental design choices

Several systems for the recognition of children are yet in place or are under development. We discuss two families of systems: those based on a child's life cycle and those based on incidents. In this section, we pay attention to the outcome of the fundamental design choices made with regard to these systems. We only discuss the most relevant systems. A comprehensive overview of inter- and intrasectoral initiatives to share information regarding children has been drawn up by HEC (2007). The VIR and the EKD are the systems most extensively discussed. Their characteristics, in terms of our fundamental design choices, are shown in Table 12.

Table 12 Status quo systems mapped onto the fundamental design choices.

Design choice	VIR	EKD
Triggers	Indicators of current problems	Child's life cycle
Knowledge sources	Unclear	Limited use of risk factors
	No information from relatives	No information from relatives
Data collected	Contact details of persons concerned	Substantial information
Organisations involved	Organisations from four domains	Single profession
Centralisation	Central/decentral	Central/decentral
Technological sophistication	Basic computer system	Basic computer system
Reporting	Discretionary reporting	n/a

5.1.1. Incident-driven systems

First, a national referral index (VIR) will come into force on 1 January 2009 (Rouvoet, 2007b). In the referral index, professionals from different domains (police and justice, work and income, youth care, medical youth care and education) may indicate that they are worried about a child's development, or that they are working on it. If at least two reports on the same individual are issued, a match occurs and the reporters are provided with each other's contact details. A report is also issued when a child has moved to another municipality. In this way, they can contact each other to discuss the follow-up outside of the referral system. No information other than the child's BSN, the expiration date, the date of reporting, the reporting organisation and contact information of the reporter are stored. A report expires after two years, although a historical archive can exist for ten years (Rouvoet, 2008a). Municipalities are responsible to organise the process of reporting and the follow-up

structure, and to make agreements with organisations that can deliver the reports. Monitoring of the follow-up of a match has to be organised by municipalities (Rouvoet, 2008a). No national effort has been undertaken to harmonise the definitions, although there is a local and professional demand for this (interview with consultant ICT and governance, interview with project leader). The referral index is inspired by several local initiatives, which will be discussed in a due moment. The index is implemented by means of a single artefact, which may be able to interconnect with existing systems. Youngsters are identified by means of their unique BSN and the system comprises citizens up to the age of 18, which may be extended to 23 if they received youth care or have been in contact with penal law (Rouvoet, 2008a). Movements between municipalities and the use of different contact details can no longer be a barrier in identifying the children. Ideally, a full picture of all professionals worried about or working on a child can be obtained. This information is only accessible for the reporters themselves. Management information is only available anonymously. The ministry estimates that ten to fifteen percent of all youngsters have problems that might be relevant for a report in the VIR (interview with project leader). This number is in line with the JGZ estimates on the number of children with moderate to intense psychosocial problems (see paragraph 2.1). Professionals can breach professional (legally enforced) secrets if a suspicion of a serious barrier in the development to adulthood exists, which is a rather vague norm. This gives them a right to report even without the consent of the child or his parents, although the report is communicated with them if no reason exists not to (Rouvoet, 2008a).

The municipality of Rotterdam was one of the first to start with a local referral index (SISA), intended to stimulate cooperation between different organisations professionally dealing with children (Gemeente Rotterdam, 2007a). Since 1998, the number of associated organisations has increased steadily. The number of signals lays around 25,000 a year, with some 1,000 matches. Interpreting these numbers is tricky. Multiple, repeating signals may be given if the user has set a short expiration period. In case more organisations are attached, more matches may be made without increasing the number of youngsters concerned. One estimates that about 80% of children are reached by the organisations working with the referral index. Each organisation works with specific risk profiles, which are included in a voluntary agreement (*convenant*), although the national model agreement does not provide criteria. The SISA system does not only signal youngsters, but also stores all follow-up decisions. This workflow is being monitored by a dedicated intervention and monitoring manager, who links organisations together (KPMG, 2007). Another regional system, *Zorg voor Jeugd* (Peelland region), stores information on interventions taken and attaches degrees of heaviness to a risk signal (*Zorg voor Jeugd*, 2008). Besides the Rotterdam and the *Zorg voor Jeugd* system, the SOS-project in the region Midden-Holland, ESAR (municipality of Almere), Vis2 (Enschede) and Zizeo (Leeuwarden) are examples of running systems, although sometimes the focus is more on cooperation along the chain than on problem recognition.

5.1.2. *Sources for incident-driven systems*

The incident-based systems may be fed by other IT systems, which are not primarily built for signalling children with psychosocial problems, but may contain valuable information. Think about the police register in this respect. People who are recorded in such a register in general have a higher chance of having psychosocial problems than people who are not. The system itself may contain much substantial information, which could assist in signalling problems. A judicial encounter may give rise to a risk signal, just like playing truant, which may be registered in its own dedicated system. We did not include this type of systems in the core of this research as signalling is not their main purpose, but they may be connected to other systems. These systems may be incident-driven, life-cycle-driven or hybrids.

ProKid is an example of a risk analysis system deriving new information from already existing data. ProKid is aimed at children under the age of twelve years who have been in contact with the police in the region Gelderland Midden, where the experiment has started. Based on the behaviour of the children, risk factor theory is used to classify the children. The

5. Status quo analysis

police and BJZ claim that sixty new children are receiving youth care due to the system. The minister of Internal Affairs announced that she wants the system to be implemented nationally (Hansen & Baak, 2008).

5.1.3. Life-cycle-driven systems

Parallel to the VIR, the Electronic Child File (EKD) is being developed. Originally, it was the intention of the national government to develop a national child file in which all kinds of medical information, collected at the municipal health service consultations, would be stored. This would deal with the problem of lost data when children were moved. Many misunderstandings have arisen about the intention and detailing of this child file. Due to an erroneous tender process, the government has not been able to develop a national file. Instead, it now focuses on stimulating local digitalisation processes and works on interconnecting these systems later on (Rouvoet, 2007a). Next to that, the central government is investigating possibilities for future information exchange with other partners in the health care sector and connections to the Electronic Patient File (Rouvoet, 2008b). As stated before, the CBP had major problems with the central storage of very sensitive medical data. Nevertheless, the data format or taxonomy that has been developed for the child file, the so-called Basisdataset 2.0 (BDS), will still be maintained and used (Rouvoet, 2008b).

Many people, including politicians, expected the EKD to be of assistance in recognising problem children. This may be true in the sense that historical information is more complete and accurate, and the file may have uniformed assessment processes with the introduction of common assessment frameworks, but the mere introduction of a software application does not tilt the working processes in that direction. The fact that the file merely contains medical data which cannot be shared with others, not even medical personnel that does not have a direct professional relationship with the child, makes its value as collaboration instrument very limited (Mom, 2007).

The national label for a range of local projects concerning early signalling of problems, targeting at children up to four years old, is called *Samen Starten* (Hofman et al., 2007), with the municipality of Breda as one of the starters. Although local implementation may differ and the project is still in its infancy, one makes use of (some) risk factors as we defined them (interview with infant welfare centre practitioner). The follow-up of the risk factor analysis is unclear yet. In addition, it is not yet clear if and how the data will be stored in an EKD and whether longitudinal analyses will be done.

5.1.4. Relationships between the systems

To structure the different types of systems and relations, we have drawn Figure 12. The three types of systems at the bottom operate within a particular sector. Through direct technical connections or via some way of human involvement, this information can be shared across sectors through a referral index. This is all incident-based, in that information exchange about a real problem in the present is facilitated. As the EKD is hardly operational, it is not clear how the relationship between EKD and referral indexes will develop. In the status quo, we do not know of information that is returned to the source IT systems after a match in the referral index. The standard follow-up after a match is the sending of an automated e-mail to the reporters.

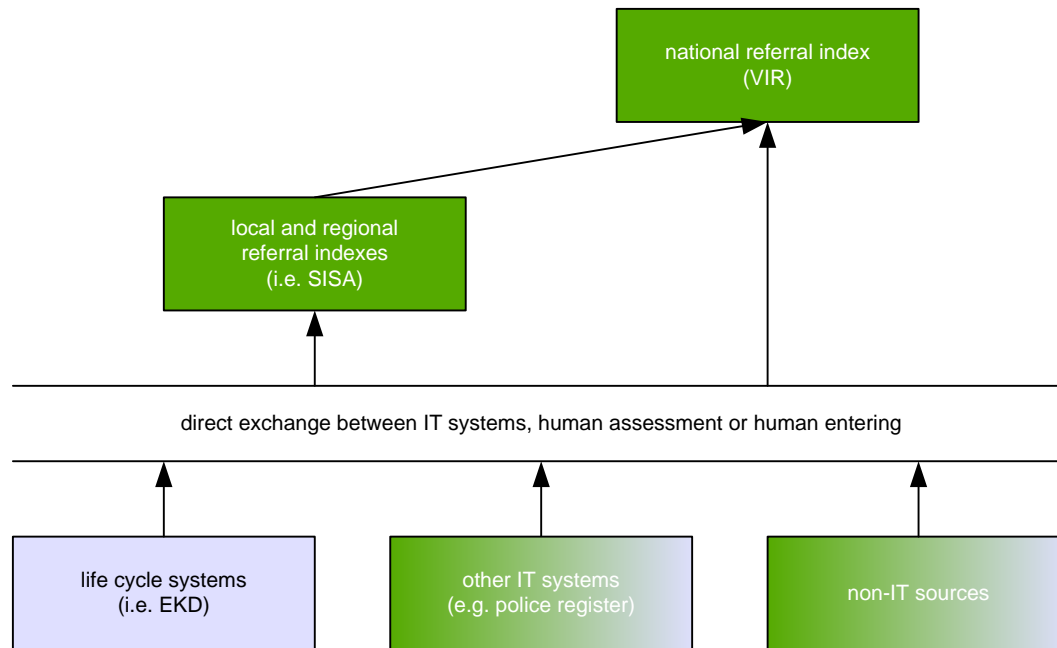


Figure 12 IT-supported information exchange in the status quo. Green (dark) blocks refer to incident-driven systems, blue (light) ones are life-cycle-driven.

5.2. Informal institutions

It is often argued that society has become less strict on privacy protection and more willing to advance the common good over the past years (Persson, 2007; Schildmeijer, Samson, & Koot, 2005). Several incidents, like the child murders mentioned before, may have initiated this process. The ease of information exchange through the internet may have contributed to a different attitude, especially amongst youngsters, who are less prudent on their private information (Lenhart & Madden, 2007). Maybe spill-over effects exist from the discussion on security versus privacy after the 9/11 attacks. In that realm, significant movements have been made toward security and intervention and departing from the privacy protection position (Nelson, 2002; Vedder, van der Wees, Koops, & de Hert, 2007).

The government policy has shifted into the direction of the child's protection. The minister responsible for youth writes in a letter to the parliament:

"In the proposal for changing the child protection laws, the child's interest (in stability and continuity of the upbringing) will determine the choice between a limitation of parental authority or ending this limitation." (Rouvoet, 2008c, p. 6) (original in Dutch)

A second example is the introduction of a legal prohibition on any kind of violence in child-raising (*Burgerlijk Wetboek*, book 1, article 247, paragraph 2) in April 2007.

Nevertheless, society cannot be characterised to have a single position on matters regarding ethical values. Different opinions co-exist in politics and society. Privacy protection is still seen as an important value, if one looks at the stringent formal institutions still in place. Also the fact that the EKD has won the Big Brother prize 2007 (Bits of Freedom, 2007) in the category proposals, illustrates the social sensitivity of developments in this field. It is hardly seen as an absolute right, however. As argued in the previous chapter, balancing the values of children's successful development and privacy protection is the real question, not the advancement of only one of the two.

It is questionable whether balancing the values is only done out of ideology or rational cost-benefit analyses. The number of murdered children is limited to a handful each year. On a total of 3.5 million, they could be considered incidents. Despite that, these incidents may trigger demands for radical system changes. We only recognise that decision-making can be

irrational, but do not analyse this point any further, as this report is intended to assist people willing to assess the different alternatives in an analytical way.

5.3. Formal institutions

In the previous chapter, we discussed only those formal institutions that were beyond the direct influence sphere of the Dutch state. In this status quo discussion, we complement this by more country-specific regulations. Figure 9 on page 40 shows the combined legal hierarchy. We discuss the regulations for the care sector (medical care, youth care and welfare) and privacy regulations in sequence.

5.3.1. Care

In the medical sector, the *Wet op de Geneeskundige Behandelovereenkomst*, part of the Civil Code (book 7) defines the contractual relations between medical professionals and their patients. Relevant stipulations are that people are only qualified to engage in a medical relation autonomously when they are aged at least sixteen. The general rule is that only with consent from the patient, a relation can be established (article 447). Between the ages of twelve and sixteen, the consent from both the child as the parents is needed. When parents withhold their consent but the treatment is considered to prevent serious disadvantages for the patient and the child explicitly indicates his willingness to undergo the treatment, it can still take place (article 450). Article 457 states that no medical information may be shared without the consent of the patient, unless law states otherwise. Two exceptions on these are regulated. When suspicions of child abuse exist, medical professionals may notify the AMK (article 53, *Wet op de Jeugdzorg*) without breaching their professional secret. In addition, when the functioning of the RvdK demands that secret information is exchanged, this is allowed (*Burgerlijk Wetboek*, book 1, article 240).

Professional organisations have issued several reporting codes that assist professionals in deciding what to do in case of suspected child abuse or other problems that may seriously hamper a child's development when no intervention takes place. The Dutch organisations of doctors (KNMG) and the association of physiotherapists (KNGF) have issued such codes (de Roode, Coebergh, & Pollmann, 2002; KNGF, 2007). Processes intended to harmonise these codes among several organisations and increase their scope are underway. The Dutch parliament has asked for adoption of the Rotterdam notification code as a national and compulsory guideline (Novum, 2007).

Different assessment frameworks could be used to draw up risk profiles, to be used by organisations to report youngsters with (presumed) psychosocial problems. For the Dutch situation, the DMO protocol seems to be leading. This is developed in the municipal health service of Amsterdam with assistance of the VU University and TNO to assess different factors concerning a child systematically. A longitudinal monitoring of the child is prescribed, but no simple scoring list is used. The framework is based on a bio-ecological model of development and concerns children up to the age of two. Parents are considered the most important risk factor. A different framework is CARE-NL (Child Abuse Risk Evaluation), based upon several developmental domains identified by Bronfenbrenner, who uses an onion model around the child (de Ruiter, 2006).

A comprehensive overview of reporting codes and assessment frameworks in use has been developed by the Dutch Youth Institute (Eijgenraam & Bartelink, 2007). The results of their search show that a huge variety of dimensions is taken into account, but almost no framework catches them all. Differences can be explained by the fact that different frameworks are used by different types of organisations. Equalising all frameworks, therefore, is not a process currently underway. Yet, some movements in the direction of alignment are present, as illustrated by the call for a national reporting code for child abuse. It is mentioned that the development of these type of frameworks is still in a rather infant stage and the currently available instruments are considered insufficient (WI CDA, 2005). None of the frameworks has direct legal status, but they may be referred to in policy documents and

agreements. Apart from frameworks or questionnaires aimed at professionals, numerous standards exist that can be used by parents or the children themselves (Vogels, 2008), although they are primarily used to ask parents about the behaviour of the child, not to investigate the parent-child relationship (interview with pedagogical researcher).

The law also prescribes some tasks and responsibilities of different across. Most relevant for our case is the *Wet Maatschappelijke Ondersteuning* (WMO), which holds municipalities responsible for five types of tasks regarding youth: information and advice, signalling, guidance to care, light pedagogical care and care coordination. The primary responsibility for signalling therefore can be found at the local level.

In the proposed law on public health (*Wetsvoorstel Publieke Gezondheidszorg*), the government included an article that gives leeway to the imposition of a generic software system. Later, they relaxed the explanation and indicated that they would only impose a standard (Rouvoet, 2008c).

5.3.2. Privacy regulations

Apart from the child protection and responsibility aspect, more specific privacy regulations exist for different Dutch sectors. As the data protection law states, data can only be collected for purposes that are either consented to or legitimated by law. Once data is gathered, it may not be used for other purposes, following the same exceptions. Next to the data protection law and the *Wet op de Geneeskundige Behandelovereenkomst* (WGBO) discussed before, there is a dedicated data law for the police, the so-called *Wet Politierregisters*. This law states in article 6 that data can only be exchanged insofar as this is helpful to exercising the police task. Exchange for the purposes of signalling psychosocial problems is not likely to fall within that definition.

The final law applicable to information exchange, which does not follow the general WBP, is the one concerning the municipal register (*gemeentelijke basisadministratie*, GBA) which stores general identification information of all citizens, among which is a unique identification number, the *Burgerservicenummer* (BSN). This *Wet op de gemeentelijke basisadministratie* demands that exchange of information from the register with external parties is only allowed with national ministerial permission. Article 24 of the WBP requires that identification numbers are not used for purposes other than those intended. The *Wet algemene bepalingen burgerservicenummer* is an example of a decree that allows some governmental organisations to use the BSN in digital communications with citizens.

The common element of all these laws is, as we saw in the EU Data Directive and WBP before, that new types of information exchange often demand an explicit judicial legitimacy. For most purposes, a full law making process should be gone through, in which both the parliament as well as the executive branch have to consent to changes.

The Dutch data protection law demands that the data protection authority (CBP) is notified upon new information processing tasks. When sensitive data is concerned, among which are identification numbers, a pre-investigation takes place before the processing can start. This may result in approval because the WBP has been completely followed, in an exemption on the general rules, or in a refusal of the request. Apart from this formal route, the CBP occasionally gives advices when asked for. The authority advised negatively on the intended design of the EKD, which will be discussed later on. In an early stage of the design process, a central storage of data was foreseen. The authority considered the risks to be too high:

“The necessity of the central storage of medical data of – in the long run – the whole population during several tens of years is, to the opinion of the CBP, not sufficiently grounded.” (Beuving, 2007) (original in Dutch)

This case concerned medical data, regarded to be in the class of most sensitive data. Moreover, use of the BSN as unique identification number was foreseen. Central storage would lead to easier hacking and the easy introduction of errors. The CBP referred to the

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Electronic Patient File that makes use of decentralised storage of data and an information broker in between (LSP, *Landelijk Schakelpunt*).

An example of an exemption to the general uses awarded because of the common interest is the referral index for high risk youngsters from Antillean origin (College Bescherming Persoonsgegevens, 2006). The exemption has only been granted for two years by way of experimentation. When this project is to be continued, an explicit legal basis should be formed.

One of the most influencing opinions of the CBP (van Blarkom & Borking, 2001) in which it translates the abstract legal notions to practical guidelines which compliance it will monitor defines four risk classes: public, basic, increased risk and high risk. Depending on the social relevance of the data, the organisational awareness and the ICT infrastructure the data are classified and accordingly a protection regime is prescribed.

A practical example of the WBP and its elaborations is that ZAT's (*Zorgadviesteams*) centred around schools can only discuss cases anonymously, as no structured exchange of information is possible without either consent or explicit legal legitimacy (Zorg in en om school, 2007).

With regard to the VIR, which will be discussed more extensively in the next paragraph, the CBP has imposed a number of strict regulations (College Bescherming Persoonsgegevens, 2007a). The most important conditions follow directly from the WBP, such as the obligation to get explicit consent from the child involved – an opt-in instead of an opt-out system where the child has to object –, a very clear delineation of the goals, the target group and responsibilities and a strict authentication, authorisation and logging procedure. Moreover, the CBP pointed to the prohibition of the use of identification numbers without a ruling ex art. 24 WBP. This means that the use of the BSN is a second reason why the VIR requires an explicit legal basis. A law is currently being prepared to account for these and related issues (Rouvoet, 2008a).

Several technical norms exist that have no direct legal status, but are often referred to by contractors. The NEN7510 norm regarding information security in the health care sector is the most important one, worked out in three NEN7511 norms describing verifiable requirements for organisations. The NEN7511/2 norm is devoted to cooperatives. Just like the ISO27001 and ISO27002 norms, only a set of requirements is given without detailed specifications. NEN-EN 12251 provides stipulations on the use of authentication by username and passwords, considered a weak form of authentication.

5.4. Institutional arrangements

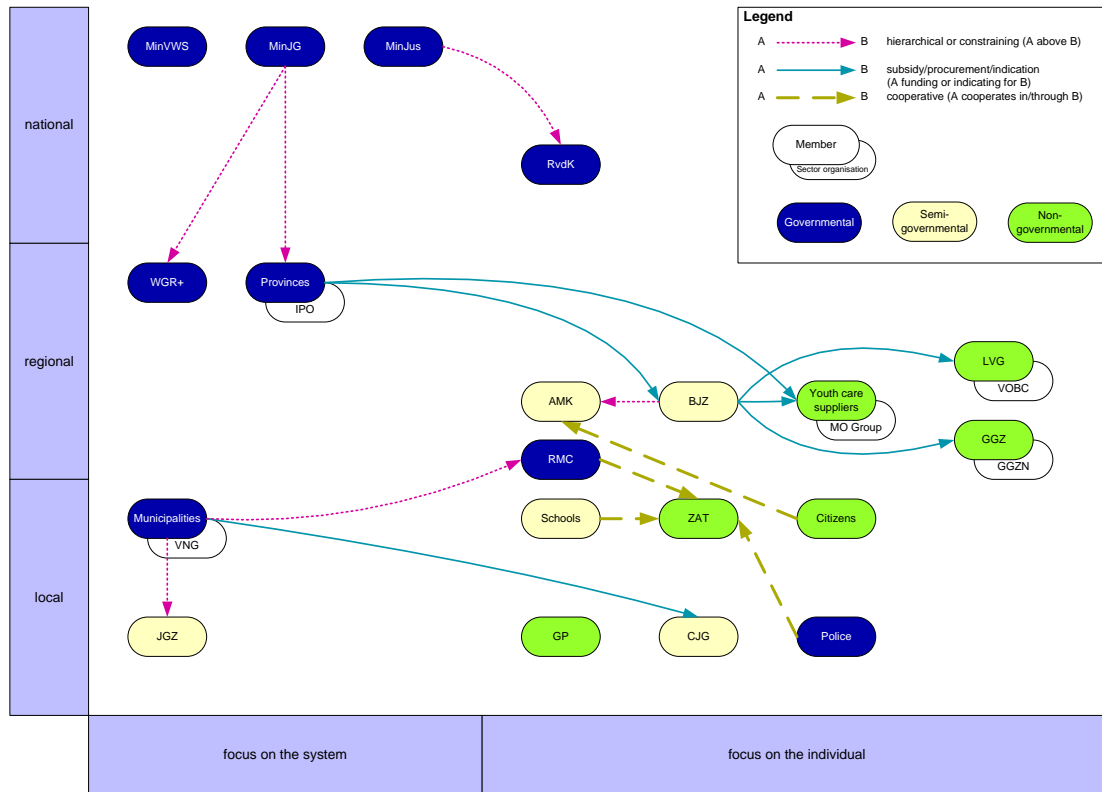


Figure 13 Actor and network analysis.

In Figure 13, a visual representation of the most relevant actors (professionally) involved with youth is given. In Annex 1, a detailed analysis can be found including full names and tasks of the organisations. Nevertheless, the analysis is not aimed at providing a complete picture, as the number of (small) organisations involved (in)directly is immense. A full overview can be found in a HEC study (Het Expertise Centrum, 2007). This analysis is aimed at identifying actors and relations for the purpose of analysing incentives. Other forms of analysis are possible, for example the identification of business processes, but they are too detailed for our purpose, which is more generic. We are not so much interested in a rich description of the field, but in identifying patterns.

5.4.1. Principal-agent theory

A general picture that arises from this analysis, many reports and interviews, is that the youth sector is very diffuse. This may make it difficult to coordinate actions and unify procedures. Different types of relations between the actors exist, varying from a hierarchy to voluntary cooperation. Many principal-agent relationships exist and consequently, different incentive structures are present. Often, actors with ‘system responsibility’ are dependent on a chain of principal-agent relationships to reach the worker dealing with the individual child. This makes the abilities to influence actions even more difficult. Organisations originate from different domains, which makes that no central authority or even department exists that can reach all of them. Whereas a programme department has been set up to coordinate all youth policy, organisations like the police and schools fall under different policy departments. Their information may be necessary for a meaningful exchange of information, but risk signalling is only a secondary business for them. Apart from the different functional origins, organisations work across various geographical levels. The national, provincial and local governments are all responsible for certain parts of the process and deal with a different set of organisations. A recent development, inspired by the Operatie-Jong, is the establishment of Centres for Youth and Family (CJG), which should provide a low barrier for youngsters and their parents

5. *Status quo analysis*

and facilitate cooperation among all partners in the youth care sector. The introduction of the CJG has received some criticism (Trip, 2007), as it adds another layer of organisational complexity to an already diffused sector. The CJG's are an example of the use of the principle of physical proximity. Creating a location where multiple organisations can have office is a way to facilitate cooperation by making organisation's actions more transparent and their data and people more accessible. Another relevant example are the Safety Houses (Veiligheidshuizen), implemented in some larger cities, where prosecutor's office and the police as well as 'soft' care organisations work together.

The municipality of Rotterdam recognises that, in order to be able to exchange information about children, organisations should be seduced to participate and every partner must be able to profit from the cooperation (interview with administrator of risk signalling systems). Yet, the same municipality is working on a compulsory notification for all organisations involved with children as of 2009 (Gemeente Rotterdam, 2007a), which makes the strategy a bit Janus-headed: one started with voluntariness but ends with compulsory participation. Making sure that organisations see 'what's in it for them' is a way of aligning interests and solving the tension between principal and agent. However, not everywhere is the same approach necessary. In Midden-Holland most of the participating organisations participated without any persuasion (interview with project leader).

Another measure often prescribed, next to alignment of interests, is the monitoring of performance of the agent. In this case, it is questionable whether that is possible. Individual appraisals of whether or not to report can be complex. Only with a detailed understanding of individual cases, it is possible to assess the behaviour *ex post*. One of the dilemmas an individual practitioner is faced with is that reporting too much information may lead to complaints about privacy, for instance by the child or his representatives. On the other hand, too little information exchange may cause problems to stay undiscovered. The rules are not always aligned with professional values. The law may prescribe that information exchange is anonymous in certain cases, or is not possible at all, where a person may find that the need of the child is a higher value that offsets these privacy considerations. When the unit of measurement is shifted from the individual to the organisation, some benchmarking may be possible. Different schools may be compared in the number of reports they issue, compared to the number of children corrected for their background characteristics. However, this introduces the possibility of strategic behaviour (de Bruijn, 2002), where reports may be issued simply to conform to performance expectations, instead of actually contributing to a child's development. The principal-agent problem seems to be difficult. Internalising values by voluntary cooperation, awareness campaigns and aids in applying rules and professional values seem to be more promising than cycles of measurement and control.

For a meaningful application of principal-agent theory, we must determine which interests of the principal are to be transposed to the agent. Goals could be that professionals issue reports if they are concerned about the development of a child and that they are willing to share substantial information.

In the Rotterdam project, the biggest operational system in the status quo, a sinusoidal movement in the number of signals is visible (interview with administrator of risk signalling systems). This wave is dependent upon media attention for child incidents respectively privacy. It may point to vagueness in the reporting instructions, which are based upon the two values simultaneously, but at least part of the fluctuation can be explained by the fact that professionals make their own, value-laden and externally triggered judgements. The agent does not act fully accordingly to the principal's interests.

5.4.2. *Mandatory reporting*

An interesting case where a principal-agent relationship can be envisaged is the choice whether to impose a professional obligation to report suspicions of child abuse. It is very questionable whether a legal obligation will alter an individual's behaviour in the intended way. Research on the United States situation where a mandated reporting regime is prevailing does reveal ambiguous results. It is clear that the number of reports has risen dramatically

since the introduction of the obligation (Drake & Jonson-Reid, 2007), but one may not have been able to isolate mediating variables like increased awareness. Many times underreporting has been found, in that mandated professionals across various disciplines did not report all cases they regarded reportable (Landau & Osmo, 1999; Vulliamy & Sullivan, 2000; Webster, O'Toole, O'Toole, & Lucal, 2005). Valliamy & Sullivan suggest a desire to avoid court proceedings, dissatisfaction with child protection services and the fear of loss of relationship with the child's parents as explanations. Others assert a massive overreporting resulted (Melton, 2005, interview with child abuse researcher), although this is empirically more controversial. One might suspect professionals to report to avoid legal liability, as might be indicated by the sinusoidal movement in the Rotterdam reports, but it is hard to draw conclusions. Carleton (2006) found no differences in reporting tendencies between professionals subjected to mandated reporting and those who were not. Brosig & Kalichman (1992) developed a model of factors influencing clinician's decision to report, which are grouped into three classes: legal factors, clinician characteristics and situational factors. In the first category, they identified knowledge of the law, statutory wording and legal requirements. This shows that the specific design of a legal obligation is relevant and no simple distinction between mandated and discretionary reporting can be made. It also points at a fundamental dilemma for practitioners, who try to balance the value of their (medical) relationship with a client against the interventions possible after a report. The finding that non-legal factors, like awareness and training, are also important, is confirmed by a study into the attitude of the Dutch BJZ in exchanging information (Bruning, 2006). Professionals often interpret the law in an overly restrictive way.

In any case, professionals seem to be willing to share information more easily within the same or similar discipline. Several institutionalised cooperation structures between paediatricians and infant welfare centre practitioners are present. Practitioners involved indicate that the existence of a shared language and background enables cooperation (interview with paediatrician, infant welfare centre practitioner). This in line with what could be expected from a professional bureaucracy, where employee's loyalty towards the discipline is higher than that towards organisation. It cannot be surprising that different professions prefer different reporting policies, as found by Delaronde et al. (2000).

5.5. Interactions by actors

No uniform picture of the balance between analytical and intuitive decision-making can be identified in the current situation. In different municipalities, different ways of working are being applied. In some cases, only prestructured lists with radio buttons are used, in other cases more room is available for free text. However, the introduction of risk assessment frameworks and the trend towards standardisation, of which the construction of a reference data set for the EKD is an example, may predict a growing accent on analytical decision-making. Especially since advanced technologies in the field of natural text processing are absent, these prestructured data sets are fed by preformatted inputs.

A difference can be recognised between sectors where the recognition of problem children is a primary task and those where it is not (interview with software developer). In the municipal health centres, structured assessments may be used as almost every child is seen on a frequent basis, information exchange takes place between professionals educated and working in the same sector. This is entirely different from reports of problem children from for instance schools, where risk signalling is only a minor task. Often, this information is provided in an unstructured way, as most teachers do not have much experience with the task and hence fall back on their intuitions

The decision on a reporting obligation can also be analysed on the level of the individual actors. Here, medical professionals often mention the fear that their trust relationship with the child or their parents can be threatened if confidentiality is broken by the law (interview with infant welfare centre practitioner, paediatrician). This consideration has the type of a dilemma. For one thing, the loss of an easily accessible service can have

5. Status quo analysis

negative consequences for children. For another, if a practitioner expects a child to be abused, the very same child's interest asks for action. One way to escape this dilemma is to move the discussion to the pragmatic level, as discussed in the previous section.

5.6. Technology

As the national aspects of the Electronic Child File are not yet fully developed, it is impossible to analyse the status quo situation in terms of the privacy enhancing technologies applied. This can be done, however, with the Verwijsindex, which will be in place across the whole of the Netherlands in 2009, but builds on existing predecessors at the local level.

Multisignaal is the biggest supplier of software for referral indexes. Their system is modular, where the base module concerns only the exchange of contact information in case several reports of users deal with the same child and a match occurs. Additional modules comprise functionalities like multidisciplinary cooperation and the establishment of a small file with substantial information. In January 2008, about eighty municipalities used modules of Multisignaal, which makes them the biggest supplier. The security characteristics of their system resemble the requirements in the national specification (Rouvoet, 2007b) quite well. We will discuss the security measures following the categorisation introduced in the previous chapter.

Data is stored centrally, which makes it quite vulnerable. In the case of the additional modules of Multisignaal, substantial information may be contained, but this does not concern medical data. Notifications on children, entered by users across several domains, expire after the period set by the user, bounded by a general limit. Nationally, this will be set to two years. At the application level, the technical design makes sure that users can only view information on children that are part of their own caseload. Simply looking up data on other children is not possible without issuing a so-called presignal, which is logged and for which the user is accountable. Full logging of all activities takes place, so that an audit trail may be conducted. The host is defended by the use of firewalls, intrusion detection and prevention systems, virus scanners and physical security of the computing room. The network connections are secured by the use of SSL encryption, based on server certificates from the PKI Overheid hierarchy. Authentication takes place by a combination of username and passwords, authorisation is based on Role Based Access Control, where users are grouped and access rights are assigned accordingly, to be administered by functional application administrators within the reporting organisations.

Both local Multisignaal implementations and the national Verwijsindex accept notifications from different interfaces. Users can directly access a web application stored at their servers, but semi-automated connections with other systems, for instance an Electronic Child File, may be possible as well. The NEN7510 norms are applicable. Following the CBP risk classes, the Verwijsindex is put in risk class two, which labels increased risk. This only holds as long as no substantive information is stored. If that is the case, it may be that risk class three, the highest, is applicable. All security measures identified in the specifications or the already existing Multisignaal systems are based upon commercially available products. No custom-made, dedicated, new technologies are used.

Several initiatives have been undertaken in recent years to facilitate the interconnection of different information systems from (semi-)governmental organisations. At the highest level, the NORA is adopted. Through various intermediate standards, this may result in domain standards like EBV, which is used in the justice sector, among others for the JCO Support system. In the health care sector, a different set of norms and services is being used, of which the Aorta infrastructure is most prominent. At the moment of writing, interoperability between NORA and Aorta is being explored (interview with consultant ICT and governance).

5.7. Winding up

Winding up: influencing actors is difficult, no case for mandatory reporting, consent required without explicit legal base, both bureaucratic as well as professional organizations in the field, shift towards more child protection, individual biases exist, technology: intelligent architectural choices

The most important observations from the status quo, which are relevant for our analysis of the design choices, are in the field of formal institutions and institutional arrangements. The privacy regulations at different governmental levels are quite consistent. They require either consent or an explicit legal base for collecting new information, or re-using information in a different way than the purposes for which consent was given or which were legally legitimated. Next, we encountered a large variety of organisations, without dominant, unidirectional and hierarchical links. We cannot simply think of national government as a monolithic body, able to direct all other organisations. An intelligent approach is needed, but some modesty in the expectations is sensible as well. This remark is strengthened by individuals taking their own interests and values into account.

Next to these observations, we have seen that the general trend in society is to stress child protection and development and be less concerned with privacy. Finally, it is hard to make a case for mandatory reporting, as research is inconclusive and other reporting policies are currently being implemented.

6. Considerations

In this chapter, we detail the different fundamental choices and assess the possibilities for meaningful and feasible combinations. It presents the results of our research. We do this by discussing the choices in the light of constraints and conditions, derived from the analytical framework. With fundamental design choices, we mean the choices depicted in Table 11.

It turns out that some choices are highly related and others can hardly be combined. The analytical framework is used to provide a comprehensive yet compact description of the impact of different alternatives. The relationship between the framework and the design choices has been depicted before, in Figure 11 on page 51.

6.1. General considerations

We would like to make three general remarks, which are not bound to a particular design choice. First, in chapter two, we discussed the intervention cycle and remarked that it is very important to create coherence between the information collected and processed and the range of interventions available and desirable. The effectiveness of interventions is under scrutiny, waiting lists may exist and it is questionable whether a satisfactory set of preventive interventions is available. These elements of the cycle are out of our scope, but without conscious treatment of those choices, it does not make much sense to enhance the signalling and assessment processes.

Secondly, before changing policies with regard to the recognition of problem children, the proposed alternative should be compared with the status quo in terms of added value. In this research, we have focused on identifying feasible alternatives, but did not assess the effectiveness of the alternatives. Although we will return to this question in our validation where we will ask interviewees briefly about effectiveness, this can only be accurately assessed when looking at a particular system in a particular context, to be compared with the same context at present. Generic assessments are very hard to make upfront, apart from a division into a 'nonsense' and a 'potential' category.

Note that the considerations should be re-evaluated by decision-makers for every new project. It is impossible to have a generic stance on the dimensions presented, as they are bound to the objectives and characteristics of a specific system comprised of actors, norms and values, resources and regulations. No one-size-fits-all solution exists, as can easily be derived from the Venn diagram shown on page 18, which shows that a multitude of problems exists, and, combined with diagnosis processes, this means that information requirements are different in each case. Nevertheless, this does not mean that no generic systems can be put in place that serve a broad range of problems and organisations. However, before developing these systems, one should think about the objectives, too, as generic systems may differ as well. Think about the simple difference of the exchange of contact details and substantial information and one can imagine that generic systems can have very different characteristics.

A more specific part of the analysis of every concrete system should be a normative assessment. One always has to take the actors involved and their interests into consideration, which should be determined for each specific case. The trade-offs between moral autonomy and the child's development cannot be made upfront, as we have seen. The question is always about how much one interest is harmed in favour of the other. Moreover, one has to be very precise in defining who is concerned. We have seen that psychosocial problems are concentrated in urban areas and risk factors point to a higher occurrence in low income and immigrant groups. Moral autonomy concerns all people included in a system in some way, which may be a far bigger group. On the other hand, specific systems for specific target groups, like the *Verwijsindex Antillianen* (Referral Index for people with an Antillean background), may be balanced differently as the group included in the system is very limited.

6.2. Design choices revisited

For each of the seven design choices, we discuss the alternative values in the light of relevant elements of our analytical framework. Moreover, we try to find correlations between the choices. By doing this, we create a rich but structured picture of considerations for decision-makers.

6.2.1. Triggers

Two alternatives can be distinguished. First, events in a child's life cycle can give rise to the collection of information. We point to generic events that hold for every child, to contrast with incidents. One may think about prenatal checks, the first and subsequent visits of an infant welfare centre and the attendance of primary school. In order to use the longitudinal set of data that is built up, it is best to keep its processing within a single profession. The frequent collection of data makes it possible to use analytical instruments. One can use validated knowledge sets and only has to work limited (because self-chosen) cues, and Hammond's continuum indicates analytical decision-making as feasible here. The medical discipline seems most appropriate to carry out regular monitoring tasks. They can distinguish between medical and non-medical problems and a whole JGZ structure is already in place. Of course, one has to decide which events to include and which problems to look for, but the fundamental characteristics of the decision are not altered when slightly limiting the scope of the system.

The legal basis does not need major adaptations, as the usage of information within a particular profession, for instance the medical or educational one, is already extensively regulated. We have seen that legal regimes put most constraints on the exchange of information between organisations or sectors, which hardly needs to take place here. The handover of medical or school files can be done when changing to a different practitioner or school. Although the parent's consent is required in the first case, this is hardly an issue, as the contact moments are relatively useless without any form of parent's cooperation²⁶. Note that generic screening based on life cycle events or contact moments is a way of assessing large numbers of situations in a rather uniform way.

The structured storage of (sensitive) data about children and possibly their parents increases the risk of information abuse. Therefore, a trade-off between privacy and the development of the child should be made here.

The second option is to collect information when an incident occurs. We distinguish three types of incidents. First, one may observe problem indicators and/or have made a diagnosis that should be shared with others. Second, the simple registration of the connection between an organisation or professional and a child might be useful, so professionals are aware of others dealing with the same child – without any reference to the problem situation. Third, domain-specific analyses on particular incidents may result in risk signals. Think about the ProKid example discussed before, where the police tried to apply risk factor analysis to young potential criminals, based on information within their own source systems. These domain systems do not classify as life cycle systems, as they only cover a preselected set of the population of youngsters, in this case those who have been into contact with the law. Possible risk analyses within the JGZ, based on data stored in the EKD, may also give rise to an incident signal.

The collection of incidents necessarily requires the cooperation of multiple organisations, from different domains. Otherwise, the system would only support regular work processes within a single organisation, which is out of the scope of our research. As the system supports the collection of many cues here, whose type can hardly be structured as many professions are involved and a big range of problems can underlie certain observable symptoms, intuitive decision-making is the appropriate mode. Some technology providing matching and pattern recognition is needed to combine signals from different reporters. This can range from a very basic functionality, like combining reports on the same child, to more

²⁶Refusal of cooperation *may* count as a risk signal for incident-based systems, however.

6. Considerations

advanced ones, where information from other sources and other persons may be collected. The exchange of personal information requires an explicit legal basis or consent from the parents or the child, if he has reached the age of sixteen. An aspect to pay attention to is the motivation of professionals and probably citizens to issue reports. The easier and less time-consuming the reporting process is, and the more it fits into professional expectations, the more likely it is to be successful. The preferred mode of coordination tends to be bureaucratic, as some central coordination is necessary to construct a taxonomy. Nevertheless, voluntary cooperation is also a feasible option, as the Rotterdam and Midden-Holland projects have shown, and it is not impossible for professionals from different discipline to reach agreement, as long as the information to exchange is simple.

6.2.2. Knowledge sources

The collection of information is useless without a way of processing it. That processing is dependent upon certain knowledge, either explicitly coded in procedures or code, or tacitly present in the mind of the individual person dealing with it. The most invasive question regarding the type of knowledge to be used we encountered are risk factors. General scientific knowledge and personal experiences are hardly controversial, and if they are, their usage can be discussed within the appropriate bodies. Moreover, such biases are less systematic than when using risk factors. Their usage is less obvious and probably needs to be considered at a political level, as it is highly normative.

We have seen that the risk factor is a complex concept and it cannot be used in daily practice without a thorough understanding of it. It indicates statistical probabilities at a generic level, no certainties for a particular case. Moreover, for the Dutch situation very little research has been conducted yet, so an additional uncertainty is created when relying on non-validated knowledge from abroad. Despite that, risk factors seem to be an attractive way to preselect cases with a high probability on problems. It could be used to allocate resources cost-effectively, but may lead to blindness. Also, classification biases may be introduced, which undermine the moral autonomy of individuals as the state indirectly 'signals' behaviour that is more or less wanted. Classification is inevitable if one uses risk factors. In fact, any form of prevention requires classification (van Gunsteren, 2008), as probabilities are involved. Children and their parents may be stigmatised and ethnic tensions may increase, as country of origin plays a major role. Stigmas can also arise around people with a low socio-economic status, which are concentrated in urban areas, stigmatising whole districts. The major problem of risk factors is that group characteristics are inferred to individuals. One can never speak of certainties, but only of probabilities. Birrer speaks about correlative inference in this matter (2005). In some cases, it can be difficult to distinguish between risk signals and risk factors. Think about a youngster who committed a crime. He may be in need of care right now, but his behaviour may also indicate future problems. We do not propagate the use of risk factors for such cases, as they do not deliver new information needed to perform a diagnosis: the child is already known, and data required to assess risk factors is quite readily available to the professionals involved.

If one decides to consider risk factors, it is very dangerous to shop selectively from the offerings of useful risk factors. Most studies identify multiple risk factors in one sample, which means that excluding a particular factor may lead to changed relations because the interaction variables have changed. The rules of thumb on the accumulation of risk factors (if three or more are present, the risk exponentially rises) no longer hold. Therefore, it is advisable to either choose for the usage of risk factors, and then only rely on scientific knowledge to determine them, or not to use them at all. Nevertheless, even in the scientific communities or within professional bodies emerging decisions will be value-laden, as one always deals with scope definitions and statistical uncertainty. Denying the use of risk factors at all is not completely feasible, as individual decision-makers can and surely will use this knowledge from time to time (interview with child abuse researcher), as we have seen that problem assessments involve intuitive and hence non-transparent decision-making.

Again, one should carefully consider the intervention cycle as a whole. If one makes use of risk factors, but has no interventions available if a high risk turns out to be present, or the interventions are seen as socially undesirable, then the application of risk factors is useless. Special attention should be paid to the anti-discrimination laws, notably the first article of the Dutch constitution. The categories in the constitution do not directly resemble the risk factors we found. However, the devil is in the “any other grounds whatsoever” clause. Especially when dealing with preventive analyses, one may argue that all people are in equal circumstances and no discrimination is allowed because no objective case can be made for it. For that to do, one has to argue that the cases are not similar because the circumstances for different groups are different. At this place, we cannot oversee the full legal complexity of this relation, it is hard to predict whether different interventions for different cases are permitted or infringe upon this fundamental article.

Instead of directly coupling the analysis of cases with the help of risk factors, one can also use risk factors to simply raise awareness. In this case, training on the appropriate use of the factors, and maintenance of the knowledge base by re-evaluating the risk factors in the light of new scientific insights, are essential. To get most acceptance and prevent a decrease of moral autonomy by political choices, it is safest to make professional organisations responsible for this process.

6.2.3. Knowledge sources: relatives

A special choice touches the use of background information that is not directly observable or readily available. Most risk factors can be derived from demographic information, but possible past experiences of child abuse by parents or indicators of problems at relatives like brothers, sisters and cousins may be more controversial. In that case, relatively sensitive information from others is used, and these others may not directly benefit from an increase in the child’s development. Kant’s second categorical imperative, that people should not be used as means for others, may be at risk. If the relatives consent to the use of their information, no problem exists, but when this is not the case, a moral dilemma emerges. In the illustrative case of a psychologist who treats parents to relieve their own negative experiences from child abuse, and who reports this in a system that registers it as a risk factor, the relationship with the parent may suffer from this, and hence the parent may be worse off.

6.2.4. Data collected

If information is exchanged between organisations, three possibilities exist about the content of the exchange. One may only give contact details of the child and the professionals involved, exchange substantial information or, as a special case of the latter, provide medical information.

Medical information is hardly seen as useful or relevant for the discovery of psychosocial problems (interviews with paediatrician, administrator of risk signalling systems, pedagogical researcher and infant welfare centre practitioner). Only within the medical profession, this information can be used in a meaningful manner. Therefore, including it in a system designed for the exchange of information is not very useful. In the case of an expert system, used within a single discipline, medical information is also relatively useless as risk factors can hardly be derived from it. Of course, IT may provide means to facilitate communication between professionals within the same discipline and often the same type of organisations, but that is not directly intended to recognise psychosocial problems and hence falls outside the scope of this report. The disconnection between medical information and the recognition of psychosocial problems seems counterintuitive. Nevertheless, it is not very surprising that information on diseases is not directly relevant for other professionals, as we are dealing with *psychosocial* problems and not psychiatric diseases. Note that a medical practitioner may possess other information than the medical one, which may be relevant for other professions or longitudinal storage. Think about bruises. If a practitioner observes them, it is not necessary to share all details, but a report on this encounter may be issued. Hence, medical information should be read in a narrow way: not as

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information from the medical profession, but as information that concerns the details of diseases.

If one would still be willing to include medical information in a system and share this with multiple professions, an explicit legal basis has to be formulated as currently the explicit consent is needed, even for usage by colleagues within the same discipline. One should also be prepared to face lots of resistance within the discipline, as many perceive the professional secret as sacred and not only a legal construction. Technologically, advanced PETs should be used. It is questionable whether the total of hardware, software, procedures and usage behaviour can guarantee a reasonable level of protection. On the other hand, one can look at the EPD developments and infrastructure at hand to take care of this. Nevertheless, the risk on information abuse by leaks and misinterpretations by unskilled people, seems to be high.

The most basic form of information exchange is the provision of contact details, so that professionals can contact each other to discuss the particular case, without further support of the IT system. Media richness theory prescribes that in complex cases, where equivocality is more important than the amount of information, richer media channels should be used. The telephone, e-mail and face-to-face contact are all richer media than a computer system built around standard messages. Therefore, if one likes to exchange information and facilitate cooperation it may, paradoxically, be wise to limit the role of IT and not to intervene too much in the rich communication processes.

If one chooses to provide substantial information through an IT system, a first thing to look at is the creation of an appropriate legal basis and (in case of cross-domain exchange) the usage of more advanced privacy-enhancing technologies. Substantial information is far more sensitive than contact details, although various degrees are possible. One can think about including information about the origin of the signal, such as its source is an individual assessment or a group-based selection. One can also indicate the seriousness and the need to get into contact.

6.2.5. Organisations involved

We touched upon the distinction between single and multiple professions several times. Nevertheless, it is a decision on its own, although not every option may be coherent with other dimensions. A strong advantage of confining a system to a single profession is that coordination may be relatively easy. Within a profession, a high degree of self-regulation is possible. If chosen for this type of coordination, politicians should accept that the results might be different than if they had decided themselves, but a lot of resistance has been circumvented. Nevertheless, the value-ladenness of individuals may still be a problem, although it is not specifically tied to this consideration.

If multiple professions are included, or domains as we call them, the professional mode of direction is not the only available one. Politicians may give room to different organisations to agree on cooperation bottom-up, but it may well be that different professions do not manage to agree, as they all have different backgrounds and speak a different language. In that case, and for the mere process part of the arrangements, bureaucratic coordination may be necessary. This may give rise to more resistance, which can also be explained intuitively: it is a variant on the 'not invented here' syndrome. Bureaucratic coordination has a tendency to level out differences and may lead to suboptimal outcomes. A best way seems to be the combination of different modes of coordination. The content should be left as much as possible to professionals, who may need third party facilitation, and the enforcement of basic agreements, the legal embodiment or forcing a minority of uncooperative organisations may be exercised by governmental machine bureaucrats. The decision on the organisations to include does not fundamentally alter the consideration at hand. The problems of cooperation and coordination are related to the type of organisations involved, not the specific ones connected to the system. Interorganisational cooperation requires a taxonomy, in order to avoid semantic problems. Such a taxonomy does not need to be aimed at software, but is primarily needed to align reporting procedures.

The question of which organisations to involve is highly related to that of the data collected. We already touched upon media richness theory and the concept of equivocality of information. Within a single discipline, it will be easier to reach equivocality, as the frame of reference between the communicating professionals is relatively similar. If one exchanges information across disciplines, this will be harder. However, standardisation can contribute to aligning the frames of references and hence increase equivocality.

Inspired by Hammond's continuum on the appropriate mode of decision-making contingent with a task environment on the two triggers, we would argue that analytical tools work best within a single discipline, as one can make use of domain-specific models. Also, if the data collected is structured (based on life cycle events), the number of cues and redundancy are low and analytical judgement is appropriate. When collecting incidents, the very idea of matching information is to look for redundancy and combining non-structured pieces of information. This clearly matches intuitive decision-making, which cannot be supported by computer systems that mimic the (analytical) role of an expert.

Furthermore, information security is a more difficult issue when crossing domains, than when staying within a single or adjacent profession(s). The exchange of information gives rise to security difficulties with possible consequences for informational privacy. Hence, parsimonious information exchange is to be recommended.

In the case of the EKD or other life cycle systems, one should note that the procedures and information systems may be designed for screening on many problems, including somatic ones. The recognition of psychosocial problems may be complemented with other purposes. The information security of this type of systems should be considered at the level of complete systems and not only for a single function of the system.

6.2.6. Centralisation

An information system may have central or decentral characteristics. With centralisation, we mean uniformity in decisions and design, imposed or monitored by the central government. The opposite is decentralisation, a model in which local parties have much room to take their own decisions. Many shades of grey are present, but for analytical purposes, we only discuss these extremes and their characteristics.

If systems are decided on and developed at a decentral level, this can lead to more innovation and risk-taking than when the central government would do everything. The example of the Rotterdam SISA project, which has started already in 1998, over ten years before a national obligation to use a similar system would come into force, shows that local governments may be more entrepreneurial. They are triggered by real problems and their political processes are less complex, as the number of organisations is limited and one can often build on a history of cooperation.

Central direction has the advantage of creating coherence with laws and other policies. As we have seen, information exchange without consent is hardly possible without an explicit national legal basis. Secondly, the uniformity created across organisations may facilitate cooperation and lower costs, as reinventing the wheel is prevented and economies of scale are introduced. Also, if one has to engage with professional organisations, the national level is a logical equivalent as professions are not bound to geographical borders.

With regard to semantics, the optimal level of centralisation is dependent upon the discipline involved. Professions like medicine can best be approached at a national level, but local or regional welfare organisations can have rather different reference frames across the country. Even in sectors like the JGZ or the BJZ huge differences between organisations exist (interview with administrator of risk signalling systems). A best of both worlds approach is possible, where some disciplines are catered for by the national government and professional organisations, and some are left to the municipal sphere of influence.

Centralisation does not necessarily mean that the information system itself and the data stored therein have a central topology. One can also think of setting technological standards with some discretionary room for local governments to decide on the implementation. This has the advantage of higher acceptance and lower resistance, as only

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those elements that need collective arrangements are imposed (interview with public administration researcher).

6.2.7. Technological sophistication

This research is focused on the contribution of IT to the recognition of psychosocial problems. Nevertheless, the IT does not have to be sophisticated. If only a basic computer system is used, one can think of the structured storage and accession of data and the matching of different reports. For this last thing to happen, a legal mandate to use identification numbers must be created.

With more advanced computer systems, we mean those that can mimic the role of an expert. They can perform analyses on the data, which are entered in a structured format. Techniques like natural language processing, discussed in chapter four, may play a role in the future, but likely not in the upcoming years. They can be considered extensions to a basic functionality of analysis in a time where even the basics are hardly realised. We mentioned three possible roles of expert systems: providing autonomous analysis, assisting in the diagnosis or, as a variant on the latter, providing a second opinion. Especially the first one is relevant for our case. Expert systems may try to find patterns in records, based on pre-entered knowledge about problem characteristics. They may be used to find risk factors and predict chances of problems to arise. When using information about relatives, expert systems may interpret the information from files of family members or others. In all cases, the system's results must be interpreted by human beings, as a computer system can never account for all details and is fed by humans who made certain choices regarding the analytical process.

Technologies are evolving rapidly. However, for our purpose, it is not very useful to discuss the various possibilities in-depth. Policy choices are not so much about the inner workings of the technology, like the question whether natural language processing should be used, as it is about the way technology is used in the overall process of recognition. Advanced analyses are, obviously, only possible when substantial information is being collected. The advanced systems can introduce classification biases, as they necessarily abstract details from reality.

6.2.8. Reporting

Does one need to ask consent of the parents or the child before exchanging information? At present, consent is always required by the law, except when child abuse is expected. In extreme cases, international child protection law may demand a protection of the child above other interests. The question can most easily be answered by looking at the interests of the various actors involved. Problems like criminal behaviour may ask for information exchange that is not approved of by the child or his parents, as they affect *society* in general. Society also has a general interest in the psychosocial health of its citizens, as this may be correlated with – at the narrowest interpretation – costs of health care and even productivity. Above the age of sixteen, when a *child* should give consent himself, reporting without consent would be a paternalistic act if the primary intention were to help the child's development. Psychosocial problems are seen as 'deviant' in that the general belief is that children suffer from them themselves, which would undermine the idea of a rational choice not to be helped. Below the age of sixteen, the *parent's* withhold of consent may directly oppose the child's interest.

In all these cases, a difficult and principal trade-off between different interests has to be made. It cannot be said upfront that liberals and communitarians disagree, as they both defend multiple interests at the same time and their ideology does not always indicate which one should prevail. One could argue that the specific interests at stake should be weighed, so that society has more options when its interests are harmed, but less when it acts out of paternalism. Another, more pragmatic viewpoint to this consideration is that asking consent may be time-consuming and hence, professionals are less likely to issue reports. Opposed to asking consent is giving the professionals a right to issue reports, depending on their own judgement. Even where that right already exists, it is not always used fully. Privacy regulations are often used as an 'excuse' not to share information, although the professional and organisational attitudes and customs, as well as compartmentalisation between

organisations are generally more restrictive than the law is (College Bescherming Persoonsgegevens, 2007b).

Another option is mandatory reporting. In section 5.4, we have already provided a detailed discussion of this matter. The results of research into this subject are not equivocal, which makes it hard to predict its effectiveness and its side effects when it would be introduced in The Netherlands. For the coming years, it seems wisest to await the results of the many developments already initiated. Awareness campaigns, the grown attention in society, training of practitioners, the Verwijsindex, Veiligheidshuizen and CJG's may well lead to an increase in reports. Illustratively is that the AMK's have long had waiting lists and still are reluctant in starting new investigations if professionals can handle the cases themselves. It may well be that a possible increase in reports cannot be handled by the current institutions.

6.2.9. Winding up

We observed several tight correlations between the design choices: policy options that naturally follow from each other. Three sets of intertwined choices can be distinguished. First, the triggers, data collected and organisations involved are related. In a life-cycle-driven system, substantial data can be collected and at best, only a single profession is involved. In an incident-driven system, the amount of data to collect should be limited, but a wide variety of organisations must be comprised. Secondly, the organisations involved and the degree of centralisation are correlated. A single profession is best be approached along the lines of a professional bureaucracy, a set of diverse organisations is in need of more top-down, machine bureaucratic direction. Thirdly, advanced analytical systems are best be used within a single discipline – a parallelism between technological sophistication and organisations involved. The issues of the knowledge sources and the reporting regime are relatively independent of the type of system under scrutiny and do not correlate with other choices.

6.3. First limiting of the choices

We have seen that many relations between the fundamental design choices exist. The web of relations is not as complex as it might seem, because some policy options naturally cluster. We will discuss the internally coherent combinations in the subsequent section, but to be able to do that, we need to reduce the number of combinations slightly. The criterion for limiting is based on the concept of strong dominance, defined by Colman:

“A dominant strategy is strongly dominant if it yields a strictly better payoff than any other alternative or strategy in every possible contingency...” (Colman, 2001)

It is hardly useful to include choices, which are dominated by better alternatives on all possible criteria. Possible means relevant in this respect. Of course, there may be small advantages to some alternatives, but if we do not include them, we do not consider them big enough to be relevant. A principle we can derive directly from the dominance principle is about parsimonious information exchange, introduced earlier. One should not exchange more information than necessary. This has no benefits, but can (and will) lead to disadvantages, albeit the consumption of scarce resources.

The usage of medical information is hardly useful, so we will remove this as a serious alternative for the scope of our search. Risk factors are almost never based on medical information and the interviewees do not consider exchanging this information useful. Again, note that this does not exclude the possibility of medical practitioners sharing other (substantial) information. The exclusion of medical information limits the alternatives regarding the type of information to be exchanged to substantial information and contact details.

The issue of mandatory reporting is too unclear, in our vision, to draw conclusions on. As a policy recommendation, we would advice to wait for the effect of many other measures to be clearer and to think through a possible measure carefully before introducing it, as it may be counterproductive. We also think that asking consent is no option for severe

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cases, where parents may be part of the problem. When using a system of discretionary reporting for severe cases and consent for all others, we think too much confusion arises on the boundaries of both categories. Moreover, if consent is only given selectively – think about parents who do not give consent to all organisations involved – the value of exchange may be marginal as professionals still cannot rely on the comprehensiveness of the information in the system. We think incident-based systems are only meaningful if they cover a wide range of organisations so that most relevant information can be obtained. A third reason against the option of consent is that an information system may be less useful in case consent is given. The professional could ask the parents which people they may contact to gather additional information, instead of the more roundabout question whether parents or the child consent in contributing to a system, which *could* lead to matches with other people. Fourthly, asking consent to use an incident-based system because others may be concerned about the child's development always has an element of distrust with regard to the child or the parents in it. It is not likely that asking consent will lead to much positive responses or it improves the credibility of the professional. For these reasons, we would like to exclude the option of asking consent from our choice set. Where possible, we would advise informing the child and the parents of having issued a report, when this does not harm the child's or professional interests. An open professional relationship often works best, because one does not have to hide its information sources (interview with paediatrician).

Concluding, we would like to exclude medical information from the set of feasible policy options and we recommend discretionary reporting for the time being, at least until more knowledge on the effect of compulsory reporting is available.

6.4. Relations between the fundamental design choices

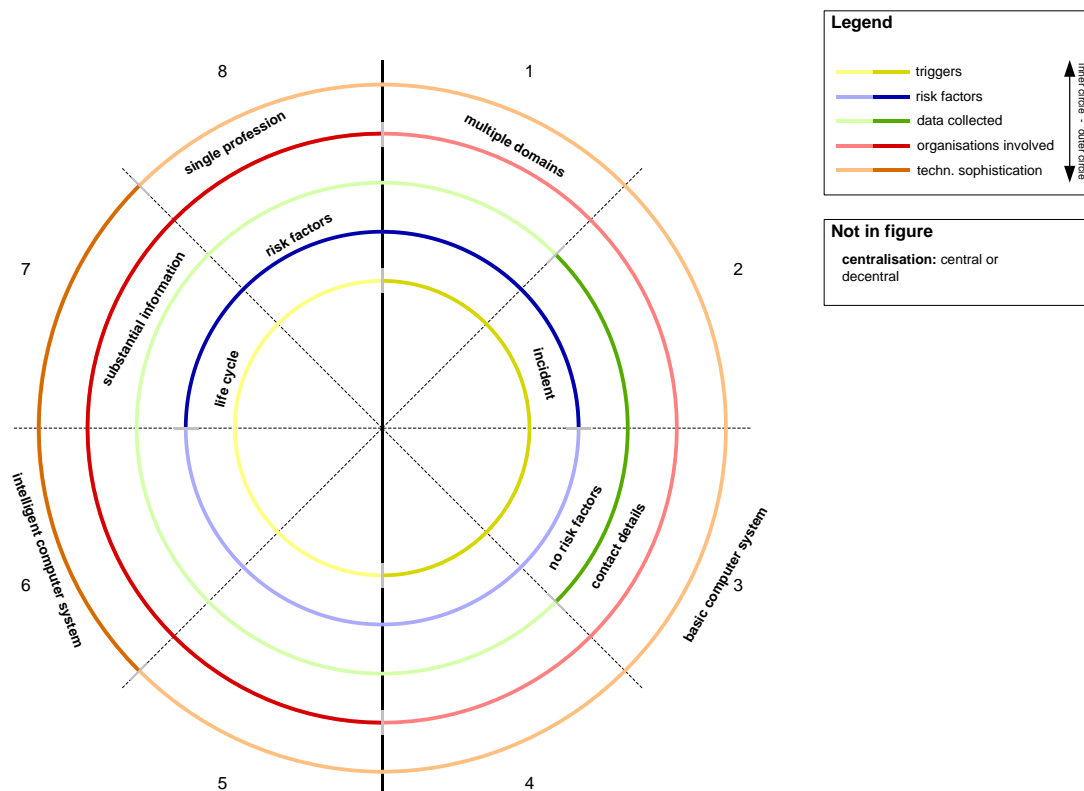


Figure 14 Choice circle, representing the eight feasible combinations of policy options.

With the exception of the two considerations (reporting and centralisation) and one policy option (medical information) discussed in the previous section, Figure 14 shows all options and their relationships. The circle shows eight combinations of policy options that are feasible, following the logic from section 6.2. Each circle represents a consideration, each colour an alternative (policy option) and each ‘pizza part’ a combination of policy options. The combinations on the left (five to eight) and right (one to four) side respectively are mutually exclusive. One should choose either for five, six, seven or eight, and one can only choose one, two, three or four. It is possible to combine combinations on the left and right side of the circle, as they are about a fundamentally different type of system.

Of course, the circle is an abstraction of reality – it has characteristics of a typology. Not all divisions are as strict as the figure suggests, but it provides a clear overview to the richer discussion in the previous sections. Table 13 shows the combinations in a different form. In the next section, we will discuss the alternatives, grouped in two families, in more detail.

Table 13 Feasible combinations.

Design choice	Alternative 1	Alternative 2	Alternative 3
<i>Triggers</i>	Incident	Incident	Incident
<i>Knowledge sources</i>	Risk factors	Risk factors	No risk factors
<i>Data collected</i>	Substantial information	Contact details	Contact details
<i>Organisations involved</i>	Multiple domains	Multiple domains	Multiple domains
<i>Technological sophistication</i>	Basic computer system	Basic computer system	Basic computer system
	Alternative 4	Alternative 5	Alternative 6
<i>Triggers</i>	Incident	Life cycle	Life cycle
<i>Knowledge sources</i>	No risk factors	No risk factors	No risk factors
<i>Data collected</i>	Substantial information	Substantial information	Substantial information
<i>Organisations involved</i>	Multiple domains	Single profession	Single profession
<i>Technological sophistication</i>	Basic computer system	Basic computer system	Intelligent computer system
	Alternative 7	Alternative 8	
<i>Triggers</i>	Life cycle	Life cycle	
<i>Knowledge sources</i>	Risk factors	Risk factors	
<i>Data collected</i>	Substantial information	Substantial information	
<i>Organisations involved</i>	Single profession	Single profession	
<i>Technological sophistication</i>	Intelligent computer system	Basic computer system	

6.5. First family: incident-driven systems

The first four alternatives are about the exchange of information between different organisations, resulting in a cooperation of multiple professions. We have chosen for a basic computer system, to satisfy the requirements of media richness theory and intuitive decision-making. The information may concern problem indicators, diagnoses, interventions carried

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out elsewhere and/or domain-specific risk analyses. If the outcome of a check-up at a certain moment in the life cycle gives rise to contact others, the system may apparently be used. The system always only contains a subset of all children, its information sources lead to preselection of children to be entered into this type of system.

Alternatives two and three reflect the combination of the VIR and regional initiatives best; they are primarily signalling systems. As only a few municipalities have already made agreements with local partners, it is hard to say whether risk factors as we defined them will be used in the VIR. The JGZ, in some regions, already makes use of risk factors, but it is not clear yet whether this can give rise to reports in the VIR (interview with infant welfare centre practitioner). If risk factors are to be used, then the factors should be confined to a single profession, as semantic noise may be too high when complex concepts are to be explicated across different mindsets. The results of an analysis with risk factors can be shared with the appropriate interpretation, of course. It is clear, however, that in the VIR only contact information will be used and the computer system is very basic as it provides no analysis except for a simple matching of reports based on the identification number of the child at hand. One can think of matching reports on more criteria, like the zip code and house number combination, or family name within a certain district. Although this is a major choice, it does not need very advanced technology. Local systems, at present, may contain more information, often related to follow-up actions and other interventions. This relates to the distinction we made when analysing the intervention cycle: for a diagnosis, one may need not only information about the problem and the diagnoses of others, but also about the interventions carried out in the past or present.

The first and fourth alternative are similar, except for the exchange of substantial information. This could entail some preliminary background on risk signals in the VIR, like the origin. Is the signal a default one or did some professional manually enter it? One can also send some background information on the child, varying from demographic data to a history of contacts. Note that this research is not only about national systems, but can entail any system with the purpose of recognising children with problems. Imagine the decision-situation to be local. Here, one can think of exchanging substantial information on the workflow of a child, aligned with procedural arrangements. In some municipalities, like Rotterdam, some of this data is already exchanged. Insights from media richness theory and cognitive biases could be translated into a recommendation so exchange as little information as possible through an information system. Substantial information always needs to be exchanged, in case diagnoses of professionals are to be improved. However, this communication requires relatively rich media channels, while an information system is a thin one. Moreover, presenting information that originates from a different semantic framework may be hard to interpret and misinterpretations may occur. We include the exchange of substantial information as a choice, but only the limited exchange is sensible, in our opinion. With limited, we mean information that is easy to interpret, such as intervention meta data and incident facts.

For all four alternatives within this package, the question on centralisation is relevant. No single recipe could be given, but the considerations discussed before can be taken into account.

A question one should always ask is about the benefit of the alternatives above a situation in which no system would exist, which is different from the status quo. We have seen that the number of organisations dealing with children is immense, and with it, the availability of interventions. However, the contact between different organisations is minimal, as no technological and legal means exist to facilitate that. Although the developments are in an infant stage and it is hard to draw *ex ante* conclusions on the effectiveness of a system, the enthusiasm of organisations already working with it, like the Rotterdam and Midden-Holland parties, indicates that there is a demand for information exchange. Many children with psychosocial problems have multidimensional problems, which cannot be tackled by a single profession, which explains this demand. The side effects of the systems in terms of overreporting, possibly overreacting and blindness can partially be controlled by good

training, monitoring of the functioning and modifications in the arrangements when necessary. The fact that multiple local and regional initiatives are slightly different provides researchers and policymakers with the opportunity to compare various alternative implementations over time.

Policymakers concerned with an implementation of the VIR, which usage becomes a legal obligation, can still consider the inclusion of risk factors and the exchange of substantial information. The latter will be more difficult in terms of compliance with privacy regulations and actually needs an explicit, national legal basis. It is not likely that it will be provided in the near future, as the ministry has chosen for contact details only. Therefore, at present, the degrees of freedom within this package are very limited. Over time, national and local parties may consider adaptations.

6.6. Second family: life-cycle-driven systems

Alternatives five to eight are fundamentally different and hence fall within a different family. The common denominators are the child's life cycle, a single profession and the exchange of substantial information. Hence, they have the characteristic of regular assessments for big groups of children, which are not preselected based on individual characteristics²⁷. The three commonalities are naturally linked to each other. If the life cycle is taken as a starting point, then longitudinal analyses are possible and hence substantial information must be stored. Exchange may be needed between infant welfare centre practitioners and school practitioners, or when a family has moved. Yet, most analysis is done within a single profession and most often even by the same professional. This is aligned with the recommendations from media richness theory. However, we should not consider the relationship between substantial information and single profession involvement as dichotomous. A correlation exists: the more detailed and sensitive information is shared, the more difficult equivocality will be and the higher the need for standardisation.

Analytical decision-making will be possible here. That gives rise to the option of intelligent computer systems (alternatives six and seven), although a basic system only storing information or providing procedural support is possible as well (alternatives five and eight). The usage of risk factors for the analysis is an important decision. Risk factors are a relatively easy and powerful analytical tool. Because of the usage within a single discipline, skilful and consistent application of the concept is possible. As professions tend to be organised at the national or even international level, the usage of risk factors by them can introduce strong systematic biases. In the absence of 'competition', one may be subjected to the profession's interpretation wherever one goes. Because of these consequences, the application of risk factors may require a broader discussion outside the limited world of professionals.

The EKD, currently under development, is one *instance* of alternative five. Longitudinal data are stored for use by the JGZ only, and no intelligent technology is foreseen. If other medical professions would be attached, like paediatricians and the youth care, this would be in line with this alternative. For the Dutch situations, we cannot think of other systems, besides the EKD, which might fulfil longitudinal screening, as this is a dedicated task of the JGZ. Student monitor systems and other sources from the field of educations do not classify as life cycle systems since they are not primarily intended to discover psychosocial problems.

²⁷Preselection on group characteristics is possible, but before a general assessment takes place, there is insufficient information on the individual child to meaningfully select cases. This may be done, however, later on in the assessment process. One can think of more tight longitudinal following of high risk children.

6.7. Hybrids

As both packages are triggered by different events, co-existence is possible. In fact, the systems can even mutually amplify the effect by creating links between them. Results from the assessment can give rise to concerns that lead to the exchange of contact details or substantial information across multiple domains. The background may or may not be given in this case. The other way around, one can think of a history of exchanged information or reports as part of an electronic child file or as input for regular assessment. In case information is exchanged between the two systems, the security value may be that of the weakest link. Therefore, this demands additional care for privacy-enhancing technologies and procedures. Also, formal regulations may need to be adapted, especially when information from assessments is being shared. The structure of Figure 12 on page 55 is a good example of combining various systems.

6.8. Validation

In chapter three, we discussed the methodology to be used for the validation. We asked our interviewees for a brief, first response to a short presentation of the two system families we found. Short minutes of the conversations are included in the confidential annexes (Annex 4).

All interviews recognised the distinction between the two packages as useful and comprehensive. The considerations underlying the typology have been discussed, with which most interviewees agreed. Based on the responses, we have made some adaptations to our story. Minor changes left alone, we made two changes. First, the way the distinction between contact details and substantial information is formulated has been nuanced. We no longer make a straight distinction, but recognise the dimension as a scale with shades of grey. Secondly, we improved our description of the usage of risk factors in the status quo.

The responses strengthen our belief that technologies and institutions should be analysed and designed together. Most of the interview time was spent on institutional issues around the technology, and not the technology itself.

6.9. Winding up

The distinction between incident and life-cycle-driven has resemblances with that between discovery and prevention, which we made in chapter two. Life cycle systems contain many, sometimes almost all, children who fit certain criteria. These systems support the prediction of latent or possible future problems, albeit that in the specific domain where they are used they also support the recognition of problems in the present²⁸. Life cycle systems are not likely to be built for the sole purpose of predicting future psychosocial problems. In the JGZ, they will be combined with other forms of screening, including somatic problems in the present and the future. However, screening is the main purpose of the JGZ work process and the associated life cycle system, so it does fall within our scope. Combining several screenings, as each problem type will only be applicable to a small subset of youngsters (between 3.5 and 12%²⁹ regarding psychosocial problems). The incident-driven systems deal with current problems and are aimed at discovering problems that are already manifest in some way. They are much more targeted, and discovering children with problems by improving diagnoses and interventions is their primary purpose.

²⁸Such a functionality is not part of our scope, as it concerns an intradomain work process.

²⁹See chapter two.

7. Conclusion and reflection

This chapter will return to our research question and consider the implications of our results. Next to that, we will reflect on our and future research.

Policy recommendations are highlighted, for the purposes of readability. However, the text of this chapter can be read without them.

7.1. Conclusions

This research was aimed at unveiling the fundamental considerations for high-level decision-makers, at different levels of (semi)government, regarding the design of an information system supporting the recognition of Dutch children with psychosocial problems. We used a framework that enabled us to identify five elements comprising relevant factors to consider, both from the technological as well as the institutional realm. We have constructed seven fundamental design choices, which have been checked against the analytical framework, and analysed their relationships. This has resulted in a typology of possible information systems. Before discussing the typology, we would like to make some general remarks.

Regardless of the system at hand, one should pay attention to three policy considerations. First, one should adhere to the principle of parsimonious information exchange: do not exchange more information than needed. This seems a bit trivial, but must be made explicit as a design consideration.

1. Exchange as little information as needed.

Secondly, it is very important to consider the whole intervention cycle when designing a system. Without appropriate attention to the interventions available, it is hardly useful to collect and exchange information. It is only intervention that counts in helping children with psychosocial problems, not a virtual world of facts and figures.

2. Consider the availability, effectiveness and desirability of interventions before collecting information.

Thirdly, for every type of system, one must assess the improvement *and* the disadvantages vis-à-vis the status quo. We have not made any case for the implementation of a particular information system, but only provided an exploration of the solution space and identified design choices that have to be made *if* one chooses to implement a system or before one evaluates its effectiveness *ex ante*. The four classic questions from the world of debating could be asked before developing a real system: Do we have a problem? Does the proposed solution solve the problem? Is the proposed solution feasible? And do the benefits outweigh the disadvantages? This research has particularly contributed to elements of answering the second and third question and provided an overview to assist in the fourth. The normative assessments should be carried out with respect for the concrete situation, by carefully defining who benefits and who loses from which choices. No generic trade-offs can be made, and we have seen that ideologies like liberalism and communitarianism do not provide a simple answer.

3. Assess each system in its own right. Pay particular attention to a detailed normative analysis. No one size-fits-all solution exists.

The typology can be used to support these assessments. We distinguished between two families of complementary systems, which may co-exist without any problem and even be intertwined to some degree. Table 14 lists the incident-driven and life-cycle-driven systems. Incident-driven systems can use three sources of information, which one has to decide upon. Life-cycle-driven systems are bound to a 'business' process of longitudinal screening. In the Netherlands, this is tied to the youth health care services.

7. Conclusion and reflection

For each system, some decisions are fixed, because they are inherent to the family, and some decisions are still to be made. Incident-driven systems are best be used across multiple domains and use a basic computer system. One still has to decide on the type of information to exchange. This can be either contact information or substantial information, where it is wisest not to exchange information that can be easily misinterpreted. One also can vary in the degree of centralisation in the design, implementation and enforcement of the system. The life-cycle-driven systems form the second package. The key characteristic of this type of system is that substantial information is being stored, but only for usage within a single discipline or domain. The main variation is in the technological sophistication, the intelligence of the systems used to store and analyse data sets. For both packages, which means, regardless of the type of system under scrutiny, one has to decide on the use of risk factors and the use of relatives' information.

4. When considering incident-driven systems, involve multiple professions and use a basic computer system. Decide on the type of information to exchange (contact details or limited substantial information) and the usage of risk factors.
5. When considering life-cycle-driven systems, limit the access to data to a single profession and collect substantial information. Decide on the use of expert systems and the usage of risk factors.

We encountered that there is no need to exchange medical information across multiple domains. Medical information does not provide relevant information with regard to the recognition of psychosocial problems by others than people within the medical profession itself. The privacy consequences of leakage of medical files can be large.

6. Do not exchange medical information with non-medical professions with the use of an information system.

With regard to reporting, we have found compelling arguments for discretionary reporting. Asking consent before information can be stored or exchanged is problematic, mainly because parents (and sometimes) the child does not always act according to the child's or society's interest. The issue of mandated reporting is still seriously debated in the scientific field. We have not found persuasive evidence to implement a mandated reporting regime.

7. Do not impose a compulsory reporting scheme for suspected child abuse or other developmental barriers, before the effect of other policy measures is clear.

Table 14 All design choices, grouped together in two families.

Family	Incident-driven	Life-cycle-driven
Scope	Problem indicators and diagnoses from others and/or intervention registration and/or domain-specific risk analyses	n/a
Compelling choice	Discretionary reporting	
Inherent properties	Multiple domains Basic computer system	Single profession Substantial information
Family-specific choices	Contact information or (limited) substantial information Centralised or decentralised	Basic or intelligent computer system
P.M.	No risk factors, Risk factors Related: Information from relatives	

7.2. Implications

The considerations identified are relevant for decision-makers dealing with any instance of an information system for the discovery and prevention of psychosocial problems. Whereas each system has its own characteristics, this set of considerations can be used as input for the decision-making. Not all considerations will be equally relevant in all cases. Depending on the hierarchical level of government and the ambitions surrounding the system, some decisions may already be fixed upfront. Think about a municipality wishing to extend its current risk signalling system, which cannot decide on the legal base for cross-domain information exchange because this belongs to the competence of the central government. Some issues may become less relevant if one adopts an incremental approach. For instance, if the GGD in a particular region prepares the introduction of the EKD, it may not yet think about the organisations involved. Nevertheless, it is to recommend that one already thinks about possible future uses of the system and makes it robust with respect to the underlying values chosen. The policy developments quite convincingly show that the opinions and policy actions on this type of system can alter in the course of some years. The typical development cycle for a complex information system lasts a few years, which means that the artefact created may already be outdated when released. This could be partially prevented by carefully thinking through the consequences of the system intended and the future developments, by paying attention to at least all relevant considerations identified in this report.

This research should be given a position in a more elaborate policy process, if one is considering a specific system. A structured way of rational thinking about policy processes, which fits into mainstream thinking in the field of public analysis, is provided by Walker (2000). He identifies a partially iterative sequence of steps in any policy analysis study. One has to start with the identification of the problem and the specification of the objectives and the criteria. These steps depend on the normative viewpoint taken. Although we found that dilemmas exist regardless of the ideological point of view chosen, one may weigh different goals, like privacy and the protection of the child's development, in a different ratio. The next set of steps deals with the selection, analysis and comparison of analysis, respectively. This is where the results of this study come in. We provided an overview of system classes and analysed them. Depending on this information, specific details about the problem situation and the proposed solutions, as well as lower-level requirements, one can compare the alternatives. It is important to recognise that our analysis provided a typology of systems, not a rigid decision scheme. Most considerations represent a dimension, a scale of decisions, from which we merely discussed the extreme situations. Reality is much fuzzier than any structured analysis can capture. One always has to look at the specific context and cannot rely on a one-size-fits-all solution. In that sense, this study does not replace any step in decision-making, it only supports it. The final policy analysis steps comprise the implementation, monitoring and evaluation of the alternatives.

Adopting the considerations from this research is helpful for decision-makers in a second way. Often, the translation of political values and decisions to the technical realm is problematic. Our considerations provide a translation of general abstract notions to decisions that can serve as input for system architects. Our analysis has been backward and forward tracing: from possible values to technology, and from technology back to possible values. This means we have come up with alternatives that are feasible and coherent from an executive point of view, and can also be mapped with the key discussions on the normative level.

Thirdly, central government can derive an agenda of generic decisions that may need to be taken without reference to any specific system. Several considerations are politically sensitive, in that they have a highly normative component and belong to central jurisdiction. Decisions on the desirability of the usage of risk factors and the reporting and consent regime may be fixed on a central level. The complexity of the matter asks for professionalism and transparency that may better be guaranteed at a higher level of government. This means that these considerations are even relevant for central government bodies who are not directly involved in the development of a particular system. On these issues, certain constraints may

7. Conclusion and reflection

need to be set and enabling conditions created. With regard to taxonomy, there is a demand from lower-level governments to provide clarity in definitions and facilitate exchange between information systems and disciplines. This is a role that can be played almost uniquely by central bodies, be it governments or, when applicable, professional organisations. Thus, this research can be used to set the agenda for several decisions that may need to be taken upfront, before reality overtakes the policy process.

8. Central government should take a stance on the desirability of risk factors, the reporting regime and a taxonomy of reporting codes.

A fourth usage of this research report is in the analytical material provided. As far as we know, it is the first comprehensive study of the Dutch status quo and developments foreseen by means of a structured analysis. It provides a way to think about information systems within a complex institutional setting, as well as a reference to much factual information. In analysing the popular literature, we encountered much speculations and opinions presented as facts. Hopefully, this report can contribute to a more fact-based discussion on the complicated and sensitive matters at hand.

At the theoretical level, the eight feasible alternatives may be seen as a topology. Leaving the general policy considerations aside and focusing on the two families of systems, their inherent properties and variants, a structured way of analysing and critiquing systems is possible. Contributions like ours may serve as a starting point for discussion in the scientific community and further research and hence, a credible theory may be developed in the future.

7.3. Reflection

We would like to reflect on our research, apart from answering our research questions. We will consequently discuss the methodology, the role of technology in the considerations, some interesting observations encountered along the route and suggest directions for further research.

7.3.1. On methodology

In our introduction, we remarked that the concept of Value Sensitive Design is attractive, but does not yet provide much theoretical or methodological guidance. Our approach, the use of Groenewegen's framework from the discipline of institutional economics, is new for the field of VSD. We consider the framework as very useful in identifying relevant aspects of analysis. Nevertheless, inserting technology as a separate element in a well-validated framework (Williamson's) is a quick fix where a more thorough theoretical exercise is needed. The analysis of the interaction of technology and institutions at different levels of abstraction and different paces of change is more complex than suggested. In chapter four, we already expressed our critique on the placing of technology at the same level of informal institutions and the selection of relevant relationships.

Creating a robust and even more helpful framework requires much more theoretical debate. This applied study is not the appropriate place to do that. We suggest more research on the development of a framework intertwining the technological and institutional realm, and recommend using Williamson's model as a starting point as it has proven to be useful for our case, and probably, similar cases as well.

This study is an example of explorative, interpretative research. Earlier in the report, we remarked that results are not completely reproducible as the analysis stage is a black box in some respects. The delineation of our topic is not only in the construction of the research questions, but is also formed in the analysis and synthesis. This is inevitable for this type of research. By means of triangulation and the use of theoretical insights from different disciplines, we have tried to make this process as unbiased as possible, but it can never be fully transparent. Nevertheless, the validity has been tested by the interviewees. Different categorisations had been possible, but we are convinced of having presented useful results that are comprehensive at a high level.

7.3.2. On technology

At the heart of our analysis, we used a framework that intertwined technology and institutions. When thinking about information systems, the intuitive focus is on technology. We adapted a more balanced approach, but the results show that technology is only of minor importance. Of course, information systems are technological artefacts and its realisation usually requires a lot of effort on the side of technical specialists, but technology did not prove to be a strong constrainer, nor an enabler for a real demand not yet satisfied. Information security is a very important aspect of any information system dealing with much information from many citizens, which is the case in all our systems. Even simple reports containing contact information only are sensitive, in that they may reveal identification numbers and may indicate that a child has been into contact with for instance the police or a clinic for alcohol and drug abuse.

7.3.3. On incrementalism and manipulability

We have seen that the large amount of different organisations leads to a complex environment for policymakers. It can be very hard to change perceptions, procedures and institutions of many actors residing in different disciplines. Moreover, much policy activity is imposed upon the sector. The consequences of measures already initiated, but not yet fully implemented, are unclear. It seems sensible to carefully think through changes in the sector and use an evolutionary approach. Policymakers can already think about ‘the future’, the desired end state of the system insofar as that is not fundamentally impossible by the complexity of the domain, but still move with small steps, evaluating them before the next one is unrolled. If we map the choice circle on an evolutionary path, Figure 15 on the next page shows which routes are possible. In the incident based row, the most basic alternative starts with contact information and the absence of risk factors. From there on, one may directly or gradually move to more substantial information and the inclusion of risk factors. With regard to life cycle systems, one can advance in the technological sophistication and, again, the inclusion of risk factors. Note that these are only logically sequential ‘jumps’ – whether they are desired partially depends upon the normative viewpoint.

The problems identified by many researchers and policymakers today (referred to in the introduction) sometimes exactly match those identified and worked on long before. This is not very surprising, if we consider that many trade-offs are involved and organising youth policy is no simple optimisation problem. The following remark is exemplary, although it concerns the organisation of the youth care in a narrow sense:

“The goal of Coordination in Youth Care [a policy program, TM] is not new. Critique on the ‘scattered policy’ of various ministries and the lack of coherence can be heard already since 1971.” (Willems, 1999) (original in Dutch)

Probably, it is not the size of the changes that does matter, but the force with which they are continued and policymakers believe in it. Much policy has been fired towards the sector, but many problems still have not been solved. This all the more reminds us of the importance of thinking through the consequences of policy choices as early as possible; this research provides tools to accomplish just that.

Another reason to be modest on the effect of policy changes, is the level of technological maturity in the youth sector. Many practitioners still work with paper files and were never in need to use a computer for their primary work processes. Moving towards an EKD and the VIR can be quite a leap for some. Introducing advanced technologies before making the big step towards digitisation in its most basic form, is not likely to be successful. In the end, almost all diagnoses and judgements are too complex to hand over to a system, so a human being is always responsible for his analysis. If professionals have no confidence in technology, the likelihood of them using it is very low. Hierarchical directions do rarely work in professional organisations, so gaining confidence of the end users is a necessary step in implementing even the most basic systems.

7. Conclusion and reflection

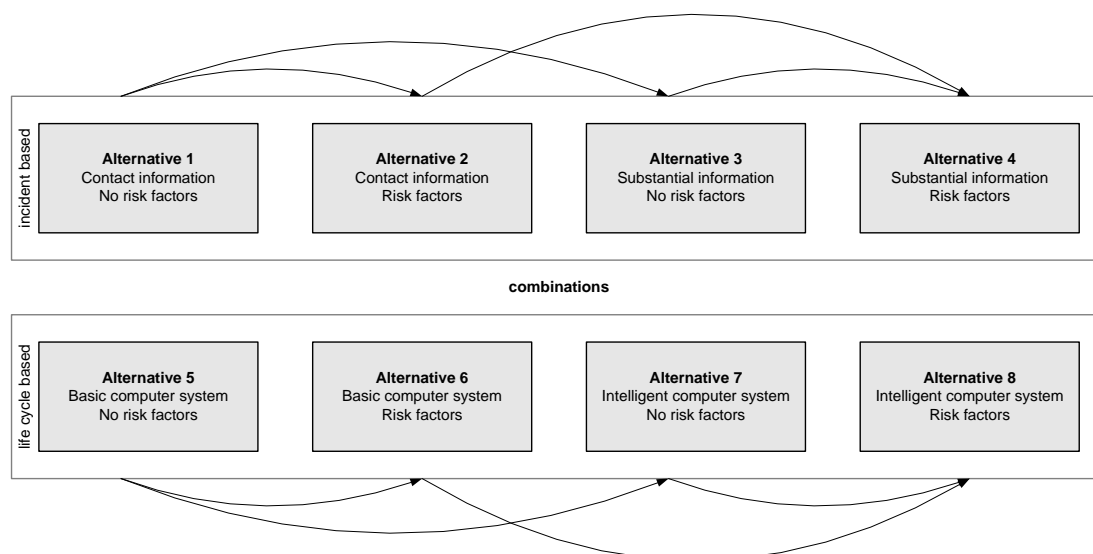


Figure 15 Evolutionary development paths.

7.3.4. On interviews

During our interviews, we observed that interviewees associated our questions quite readily with generic opinions presented in the popular media and vague images of possible scenarios. Responses have not always been rational in the sense that private ideological opinions of the interviewees could be completely separated from their factual or professional statements. We think it is fundamentally impossible to separate the two, as people are formed by their experiences, knowledge and opinions, even in unconscious ways. Questions and images of reality are associated with a web of notions, whose source may not always be in the professional domain. Moreover, many of our choices have a normative aspect. Even responses based on professional conformance often refer to subjective values.

A second observation during interviews is that participants find it difficult to think about future, more abstract scenarios. They often refer to their daily work practice in assessing the properties of a sometimes 'revolutionary new' alternative. Often, practitioners are not even aware of policy developments already decided upon. This reminds us of the fact that assessing the future is very difficult, which places a time limit on the validity of some aspects of this study. Nevertheless, we think the fundamental considerations also show that advanced technologies always have to justify themselves in terms of their contribution to a real information need and must be coherent with the other decisions identified. In the future, systems may get different properties and the role of technology may change, probably become more dominant, but we think our typology still holds as it accounts for all feasible variations on the considerations identified.

7.3.5. On generalisation

This research has delivered several intermediate and final results that might have general value, applicable to a broader set of cases than the scope we investigated. As we have not researched other domains, we can only reflect on the possibilities to induce the results and not make any claims.

Three sets of results may have general value. First, the factors in our conceptual framework. Although they have all been worked out for our specific case, the 'labels' of the factors are likely to be relevant in more situations. See Figure 7 on page 32 for an overview of the factors used. This is partially because the factors have been labelled quite general, without direct reference to the case at hand. Nevertheless, not all factors will be equally relevant in other cases, and new ones may need to be added. Most of the factors originate from generic and not domain-specific literature.

Secondly, the fundamental design choices may be relevant for other cases. Here, we think the generic value is less than with the framework, as we introduced very specific choices, most notably the trigger (life cycle or incident?) and reporting regime. These choices are the result of exploratory and validation interviews with experts and as such are more tightly bound to the domain. Our seven choices can serve as inspiration for others, but we would not recommend using them as a starting point.

Thirdly, the considerations, more specifically, the coherences between the design choices, may again have generic value, as the most pregnant ‘correlations’ were visible between the most generic design choices. Especially the notions derived from media richness theory and cognitive psychology are not limited to our case. Information systems are not always the appropriate way to convey rich information, where equivocality is needed, and their analytical capabilities are only relevant when congruence with the task environment exists. These insights could be used in other systems where the exchange of (sensitive) information is central. They put the role of technology in perspective, which may be counterintuitive when thinking about new solutions built around information systems. In general, the more the factors and the design choices fit with other cases, the more likely it becomes that the considerations are relevant in that particular case as well.

Next to the results, the methodology used is not inherently limited to this domain. It is related to sociotechnical systems where both technology and institutions are relevant, and the inclusion of ‘higher’ institutional levels suggests that public actors are involved, as it is unlikely that a single or set of private actor(s) have the capabilities to induce a change in informal and formal institutions. Our structured approach, where Groenewegen’s framework is used to support layered thinking and completeness, leading to a set of choices and ultimately, a set of alternatives – where considerations have entered along the path – is a very generic one, which may even be used with other frameworks than Groenewegen’s.

7.3.6. Further research

One could initiate relevant research on a number of analytical lines. First, the considerations themselves may be reviewed by a panel of participants in a workshop format. We have not had the opportunity to let professionals interact with each other. The interviewer has always been the mediating chain in transferring statements and knowledge between interviewees and the literature. An interaction may yield new insights as assumptions will be more readily unveiled and semantic differences uncovered. Secondly, one may set up a more applied study where real information demands are identified, based on back tracing from the palette of interventions available for particular problem situations. We only used a generic intervention cycle, which can be detailed for specific situations. Such a study would be more applied in nature and would primarily have practical relevance.

Thirdly, one can move back and forth with regard to levels of abstraction. The translation of our typology of systems into lower-level technical requirements for an architecture, down to the level of (prototypical) artefacts may deliver new insights on the feasibility of systems and present more compelling evidence on the effectiveness of systems. Fourthly, the insights from this study may be compared with studies in different sectors to look for generic insights on cooperation between organisations, the use of advanced technology, the trade-off between privacy and other values and so on. It may serve as input for a case study aimed at developing a more generic framework for decision-making on information systems facilitating cooperation between (public) organisations across a ‘chain’.

Fifthly, when the current and foreseen systems like the EKD, VIR and regional initiatives are in place for a while, a good evaluation of these systems, possibly in terms of the considerations from this study, can serve as a new iteration cycle and improve our insight. Sixthly, we encountered that there is no clarity on the effectiveness of a mandatory reporting regime. More research, where special attention is paid to the Dutch context, as most studies are from abroad and take a very different institutional context as starting point, may be needed before deciding on this issue.

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Glossary

An overview of stipulative definitions is given in Table 6 on page 25.

List of abbreviations

The abbreviations of organisations can be found in Annex 1.

Abbreviation	Native name	English translation (if applicable)
BDS	Basisdataset	Reference Data Set
BSN	Burgerservicenummer	Citizen Identification Number
CAF	Common Assessment Framework	
EKD	Elektronisch Kinddossier	Electronic Child File
GBA	Gemeentelijke Basisadministratie	Municipal Register
ISO	International Organization for Standardization	
NEN	n/a	Netherlands Normalisation Institute
NORA	Nederlandse Overheids Referentie Architectuur	Dutch Government Reference Architecture
SISA	Stedelijk Instrument Sluitende Aanpak	Municipal Instrument for a Comprehensive Strategy
VIR	Verwijsindex Risicjongeren	Referral Index Problem Youngsters
WBP	Wet Bescherming Persoonsgegevens	Data Protection Act

Annex 1. Actor analysis

As part of the conceptualisation of the framework with regard to the institutional arrangements, Table 15 shows the most relevant actors and their tasks and responsibilities. A visual representation of most of these organisations and their relationships is provided on page 59.

Table 15 Actors, their tasks and responsibilities.

Abbreviation	Full name (<i>English</i>)	Tasks and responsibilities
AMK	Advies- en Meldpunt Kindermishandeling (<i>Child Abuse Disclosure Office and Advice Centre</i>)	Advising and investigating on reports of supposed child abuse.
AMW/BMW	Algemeen Maatschappelijk Werk/Bijzonder Maatschappelijk werk (<i>Generic/Special Welfare Work</i>)	Many kinds of support to people with psychosocial and other problems.
BJZ	Bureau Jeugdzorg (<i>Bureau for Youth Care</i>)	Deciding on indications for intense care. Execution of guardianship for children.
n/a	<i>Citizens</i>	May report presumed cases of child abuse to the AMK.
CJG	Centrum voor Jeugd en Gezin (<i>Centre for Youth and the Family</i>)	Centre for accessible consultatoin services and facilitating cooperation between other organisations. To be established.
GGZ	Geestelijke Gezondheidszorg (<i>Mental Health Care</i>)	Supplying mental health care.
GGZN	GGZ Nederland (<i>GGZ The Netherlands</i>)	Sector organisation of GGZ suppliers.
GP	<i>General practitioner</i>	Signalling problems, early (medical) remediation.
IBG	Informatie Beheer Groep	Collecting information about premature termination of education.
IPO	Interprovinciaal Overleg (<i>Cross-provincial Roundtable</i>)	Sector organisation of provinces.
JGZ	Jeugdgezondheidszorg (<i>Youth Health Care</i>)	Prevention, vaccination and pedagogical support.
LVG	instellingen voor Licht Verstandelijk Gehandicapten (<i>institutes for Mentally Handicapped Persons</i>)	Suppliers of care for 'light' mentally handicapped persons.
MinJG	Programmaministerie van Jeugd en Gezin (<i>Programme Ministry for Youth and the Family</i>)	Drawing policies and legislation regarding youth, primarily in dealing with problems.
MinJus	Ministerie van Justitie (<i>Ministry of Justice</i>)	Drawing policies and legislation regarding (penal) law and legal protection of children.
MinVWS	Ministerie van Volksgezondheid, Welzijn en Sport (<i>Ministry of Health, Welfare and Sport</i>)	Drawing policies and legislation regarding health care (prevention, health care/cure sector).
MO Groep	MO Group	Sector organisation of BJZ's and

		Youth care suppliers.
n/a	<i>Provinces</i>	Are responsible for the supply of youth care, manage the budget and procure care.
n/a	<i>Municipality</i>	Coordination of all activities around an individual child.
n/a	<i>Schools</i>	Signalling problems, early (pedagogical) remediation.
n/a	<i>Police</i>	Signalling problems.
n/a	<i>Youth care suppliers</i>	Supplying the actual care, mostly paid for by the provinces.
RvdK	Raad voor de Kinderbescherming (<i>Council for the protection of the child</i>)	Representing the child's interest at the judicial level.
RMC	Regionaal Meld- en Coördinatiecentrum (<i>Regional Reporting and Coordination Centre</i>)	Collecting reports and interventions regarding truants. Involves municipal truant servants, not separately included in the analysis.
VNG	Vereniging Nederlandse Gemeenten (<i>Association of Dutch municipalities</i>)	Sector organisation of Dutch municipalities.
VOBC	Vereniging Orthopedagogische Behandelcentra (<i>Association of Orthopedagogic Care Centres</i>)	Sector organization of LVG suppliers.
WGR+	Wet Gemeenschappelijke Regelingen+-regio's / Grootstedelijke regio's (<i>Agglomerations</i>)	Three agglomerations have responsibilities similar to those of the provinces.
ZAT	Zorgadviesteam (<i>Care advisory teams</i>)	'Meeting' where representatives from relevant organisations discuss individual child problems.

Paper

Value-sensitive design methodology for information systems

A framework for identifying and designing for values

Note: The author guidelines of the Ethics and IT journal have been followed. The paper can be improved by organising a colloquium or submitting it as a conference paper, before targeting a scientific journal. Next to Ethics and IT, one can think of for instance *Science, Technology & Human Values*, *Science & Engineering Ethics* and the *Journal of Technology, Policy & Management*. However, each of these journals has a specific scope and ask for specific contributions. When the paper is more mature, a journal can be selected and the paper should be written with the journal requirements in mind.

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Abstract

Value-sensitive design is promising, but it does not provide much methodological guidance yet. In this paper, we present a framework for identifying and designing for values in information systems aimed at the exchange of sensitive personal information in the public domain. This framework is derived from the field of institutional economics, and was developed for socio-technical systems. We adapt the framework for our purpose, apply it to a case study case and reflect on its application. The conceptual framework is helpful in identifying biases and other value-laden consequences, as well as design opportunities. Nevertheless, it can be improved and should be investigated in more case studies to assess its generic value.

Keywords: value-sensitive design, social informatics, socio-technical system, institutional economics, bias

Introduction

Value-sensitive design is a growing discipline, but methodologically, tools to identify values and design for them are hardly available:

“The practical challenge conscientious designers face integrating values into diverse design projects, is due, in large part, to the sparseness of methodologies and, relatedly, the newness of the endeavor.” (Flanagan, Howe, & Nissenbaum, 2005)

Before designers can work with the notions of value-sensitive design (VSD), and include normative aspects already in the early phases of a product or system life cycle, an extension of the methodological tools to analyse and design for values is needed.

This paper tries to contribute to the methodology of designing for values with regard to socio-technical systems around an information system by presenting a conceptual framework. VSD is often associated with information systems, although it is not necessarily confined to that strand of technology. More specifically, we focus on the translation of values (intentions) into

consequences (of choices) for systems that support information exchange in the public domain.

At the heart of our research, we conducted an extensive literature study aimed at thoroughly analysing our case, complemented with thirteen expert interviews. The group of experts was heterogeneous and primarily consisted of people fulfilling an executive responsibility, either as project leader, policymaker or practitioner. We did exclude politicians, as we think not the values as such, but their translations to and from technical and institutional choices is the greatest challenge. The framework we have chosen is an existing one from the field of institutional economics. We do not argue that this is the best framework, but we have experienced it to be useful. As such, it can serve as a starting point for developing a more elaborate VSD methodology than has been done up until now.

Developing a framework has both theoretical and practical relevance. ‘Design’ is on crossroads: a design process leads to the creation of artefacts, but it can be inspired by and based upon theory. We regard VSD theory to be aimed at prescription, as design is creational by definition.

Another way of positioning our research is by devising a spectrum between abstract ethical notions on the one extreme, and a concrete artefact on the other. With artefact, we mean the set of technologies and institutions associated with it. Figure 1 on the next page depicts the different levels of abstraction. We are concerned with bridging the general normative discussions and the world of technology and institutions, indicated by the light box in the figure. At this level, information technology first comes in – general discussions such as those on privacy can be conducted without referring to technology. Except for the upper level, all levels can be interpreted as either types or tokens. It is possible to envisage fundamental considerations, high-level architectures, system specifications and artefacts as analytical levels for a general set of systems, or to consider them specific instances for a specific system. Think about the difference of discussing policies for protecting privacy when exchanging information in the public domain versus the creation of an information system in a small municipality in the east of the country, aimed at cooperation between exactly ten organisations following a prescribed data format. For our framework, it is irrelevant which approach is taken, although in the case of a token interpretation, one should take the specific context into account. We will do that in presenting our example, but our framework is aimed at a broader set of systems than only the instance of our case study.

We have chosen to limit the applicability of our framework, initially, to the exchange of personal information in the public domain, as our framework is inspired by a case study aligned with this definition. Also, we think that this strand of systems have a special need to consider the institutional aspects beyond the technical, as many actors are involved and multiple, often contradictory values should be taken into account. At the core of our analysis, we use a framework that is explicitly developed for socio-technical systems, characterised by unruly technology, the involvement of multiple parties, both public and private, the existence of market forces and government regulation (Koppenjan & Groenewegen, 2005). The market forces are not that relevant in our case, but the other characteristics match the definition of the exchange of sensitive information in the public domain.

We consider it inevitable to analyse the ways in which values manifest themselves, before we can suggest deliberate design considerations. Therefore, we will discuss the exploratory/descriptive and prescriptive part separately. To conclude, we will reflect upon the pros and cons of the methodology presented.

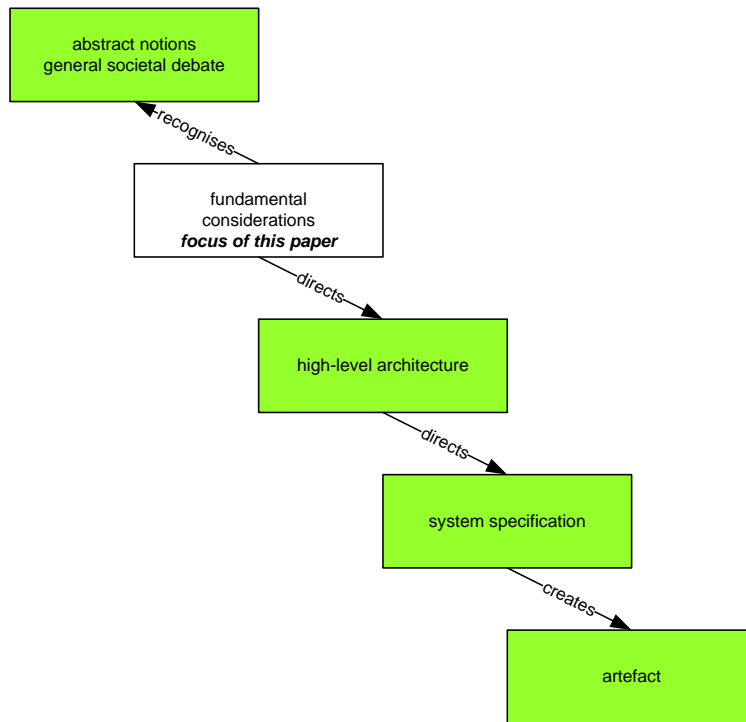


Figure 1 Levels of abstraction.

Literature

VSD recognises that technology and institutions are interrelated. This insight runs parallel with thinking in other disciplines (e.g. Bouwman, van Dijk, van de Wijngaert, & van den Hooff, 2005; Cohen, 1997; Hanseth & Monteiro, 1998; Koppenjan & Groenewegen, 2005; Orlikowski & Robey, 1991). Technology and institutions are both value-laden (Friedman & Kahn Jr., 2002). Compelling examples are biases in computer systems (Friedman & Nissenbaum, 1996)

and classification biases (Bowker & Star, 1999). The former authors define bias in the context of computer systems:

“We use the term bias to refer to computer systems that systematically and unfairly discriminate against certain individuals or groups of individuals in favor of others.”

Before one can take up this notion in any design process, one must establish the possibility to deliberately influence the way in which values are inscribed into technology and institutions. The value-ladenness of institutions is covered by the field of political science, institutional economics and public administration and is much more classical and obvious than the thinking about the relationship between values and technology. Consistent with VSD, we take an interactional position (Friedman & Freier, 2005) with regard to technological determinism. We neither assume technology goes its own way (the exogenous position, Friedman & Kahn Jr., 2002), regardless of human interference, but we also do not tilt to the fully embodied position, where all value effects of technology can be traced back to deliberate design choices. The interactional position is supported by three concepts or theories. Structuration theory, built around the notion of the duality of structure (structures are both shaping and shaped by themselves), pointing at the existence of positive feedback cycles. Orlikowski & Robey adapted Giddens’ structuration theory to the field of information systems (1991). A competing theoretical strand is actor-network theory (ANT), which describes the inscription of desired behaviour into artefacts and the translation of values in the interaction between actors within a network in a very abstract way. ANT does not a priori distinguish between technology and human actors. It recognises resistance against change, framed as irreversibility (Hanseth & Monteiro, 1998). Finally, Hughes (1994) coined the term

technological momentum. He argues that technology becomes more autonomous over time. The reverse also holds: the human influence with regard to the consequences of technology is largest in the early phases of the life cycle.

Now that the designers' influence has been explored, it is still unclear whether a designer can adequately influence the future. Albrechtslund (2007) talks about the positivist problem in this respect. He remarks that a design can never foresee all use contexts. Bimber (1994) calls it unintended consequences, and elsewhere, we have discussed the problems of information overload, bounded rationality and non-linear behaviour of complex systems (Monasso, 2006). Nevertheless, complexity, uncertainty and fuzziness do not provide an excuse to be aware of and design for values where possible.

Value-sensitive design holds a rather optimistic and promising view on the relation between values and technology. It embodies a third phase in ethics, after analytical and applied ethics (van den Hoven, 2007). It is a way of thinking that can be described as:

“(...) principled in that it maintains that such values have moral epistemic standing independent of whether a particular person or group upholds such values. At the same time, Value-Sensitive Design maintain that how such values play out in a particular culture at a particular point in time can vary, sometimes considerably.”
(Friedman & Kahn Jr., 2002)

We do not fully agree with the assumption of epistemic independence. It may be that most values are generic, but when designing systems, one has to make trade-offs between values. It is in this process that ideologies or other ways through which moral stance is expressed may support the process of decision-making. If one only formulates values such as fairness and justice, one has escaped these difficulties by fleeing to a higher level of abstraction. We think that explicating these trade-offs is essential. Next, moral theory may come in to take a stance in these dilemmas, a process that is not directly part of a VSD methodology or at least is not unique for design of technology. After the moral stance has been taken, VSD insights may be used to incorporate the value in the design.

Our analysis of values is a form of disclosive computer ethics, which can be distinguished from mainstream computer ethics (Brey, 2000). We try to uncover moral issues beyond the actual usage of technology by humans and instead focus on the design phase. Brey states that such an analysis can remain largely pretheoretical, using only loose definitions of moral values, if one is not willing to depend of a particular moral theory. Indeed, we will not choose a moral viewpoint, but try to identify values in general. Nevertheless, this still does not encompass a full value-sensitive design cycle, as one has to decide on trade-offs. Disclosive computer ethics therefore comprises only the first step and the descriptive part of this paper.

VSD is promising, but its methodology is not mature yet. Several contributions, from different fields, have been made, among which are values in design (Flanagan et al., 2005) – which draws upon the triad discovery, translation and verification – and critical technical practice, a methodology aimed at bridging the world of cultural reflection and design, which may also be applied to values in technology (Boehner, David, Kaye, & Sengers, 2005). Some people consider value-sensitive design as a specific methodology, next to values in design, critical technical practice and others, because Friedman and others – who coined the term value-sensitive design – have also made methodological contributions (e.g. Friedman, Kahn Jr. & Borning (2001), where they distinguish conceptual, technical and empirical investigations). Nevertheless, we observe that value-sensitive design is conventionally referred to not as a methodology, but merely as a generic approach, a goal. Hence, we use value-sensitive design as a generic term and distinguish several methodological contributions in it¹. Earlier contributions in the field are useful, but have not systematically combined institutions and technology in their analysis. Moreover, they generally lack rigour and, as such, can structure an analysis, but do not provide much guidance on its contents. We would

¹Manders-Huits & Zimmer (2008) use the term “value-conscious design” to refer to the overall approach, and regard value-sensitive design as a specific one.

like to add a methodology aimed at providing this guidance. As research proceeds, we expect the VSD field to be able to validate, compare, recombine and improve different methodologies. At this moment in time, the number of case studies and degree of detail of the methodologies does not allow for systematic comparison.

Identification of values

Our analytical framework is borrowed from Groenewegen (2005), who extended Williamson's framework from the field of institutional economics (1998) with a technology element. The visual representation is given in Figure 2. Four elements deal with institutions and are based upon Williamson's framework. Each of them operates at a different level of analysis. The upper level comprises informal institutions and is hardest to change, the lowest one deals with the interactions between actors and can be changed more easily. Depending on the time scale and the resources of actors, elements could be considered either as constraints or as instruments for a particular actor.

All relationships between the original four elements are bidirectional. Informal institutions shape formal institutions, as formal institutions shape institutional arrangements and so on. The other way around, behaviour can also induce a change in institutional arrangements, the arrangements may lead to new or modified formal institutions etcetera. Next to these elements, Groenewegen introduced technology.

The model is in its infancy. We do not agree with the positioning of the technology, its aggregation level, nor with the way the relationships are depicted. By placing technology next to informal institutions, it seems that technology is very hard to change. We think technology resides at different levels of abstraction and fluidity. It should be placed on a more equal analytical footing with institutions, which have been split up into four elements. Technology can be thought of as concrete instances interacting (at the lowest level), as creating networks of functionality (comparable to institutional arrangements), to constrain behaviour by technical standards and architectural choices, and finally, by the availability of fundamental scientific knowledge (at the level of informal institutions). If placed on these levels, it is interacting with all elements of institutions, as well as with other technological levels. Moreover, we would not limit the relevant relationships beforehand, as we think for every combination of analytical elements, one can envisage a more or less direct relation. Although we comment on the model, we consider it more useful to apply it to our case and explore whether its fundamentals contribute to VSD methodology, than to carry out a theoretical exercise in adapting it without investigating its fit with our purpose. We use the framework to assist in identifying relevant aspects and facilitate layered thinking.

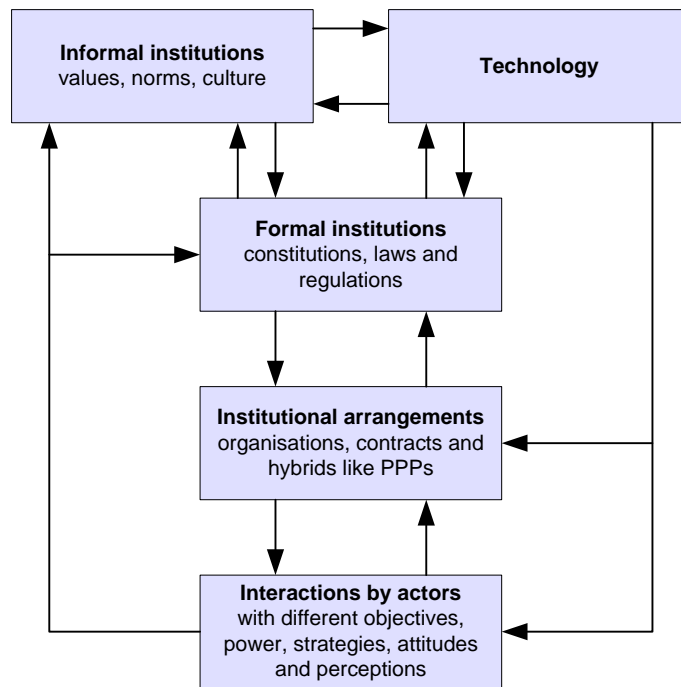


Figure 2 Groenewegen's framework (2005).

The variety in elements allows for the embodiment of and discrimination between different types of biases, following the classification of Friedman & Nissenbaum (1996). Pre-existing biases are mostly of an institutional nature, technical ones can be located in the technology element, and emergent biases will mostly be present in the interactions between actors or the technology. The way in which the elements can be used to explore value-laden consequences of design choices will be shown in our discussion of the case study.

Case study

We will apply Groenewegen's framework to a single case study: the Dutch national risk signalling system for children with psychosocial problems. We will first discuss the problem domain, and then consequently apply the five elements of the framework to identify biases and other value consequences. Many themes can be located in more than one element of the framework. For reasons of simplicity, we only discuss them once.

An estimated 3.5 to 12% percent of Dutch youngsters has a multitude of psychosocial problems, which are either directed internally (emotional problems) or externally (behavioural problems) (Zeijl, Crone, Wiefferink, Keuzenkamp, & Reijneveld, 2005). These problems have reached a level where they impair their social functioning and may even cause harm to others. The recognition of children with these problems can be difficult. Many of these youngsters are known by some organisation, such as schools, police, youth care or sports clubs as having a problem. However, the dispersed information often is never combined, so that the informational puzzle around a child is incomplete. Not every professional action requires that all information available elsewhere is aggregated, but combining data pieces may contribute to a better diagnosis or a better intervention. Sometimes, the combination of different concerns leads to an intervention that would not have been taken in the absence of complete information. Alleged child abuse is a good example of such a case. It is often very hard to conclude that a child is being abused, and professionals are reluctant in diagnosing this, because the consequences can be large. More certainty by exchanging of information across organisations and individuals, hence sharpening the picture of the situation and starting or aligning interventions with the diagnosis, may ultimately contribute to the child's psychosocial health. On the other hand, this very same exchange of information can be

problematic because of factors such as informational privacy risks, semantic errors and biases in decision-making.

The Dutch risk signalling system currently under development is a centralised version of several municipal systems. The so-called *Verwijsindex Risicjongeren* (VIR) collects risk signals from a multitude of disciplines. If a professional is concerned about a child, where the concern fits reporting criteria agreed on beforehand, he can issue a report in the system. The report only contains the unique citizen identification number of the youngster, the organisation and individual who issued the signal and the retention period, with a maximum of two years. No substantial information of any kind is provided. When the system receives multiple reports of a single youngster, a match occurs and the involved professionals are informed. By providing mutual contact details, the original report issuers can contact each other and discuss the case and child at hand. At the local level, arrangements have been made which often include a compulsory follow-up. At this level, the municipality also takes the initiative to select organisations that will be connected to the VIR, which can reside in four domains: police and justice, education, health and employment services. Currently, regulation is prepared that enables professionals to report without the consent of the child or the parents. A typical example of the usage of the system is the child who molests a bus shelter, which can lead to a report by a police officer. If the child also skips school and a report already existed in the VIR, a match occurs, and the police officer and school should sit together to discuss the child. The system only facilitates already existing processes of diagnosis and intervention. In that sense, it is a decision support system and only embodies a very basic technology. Nevertheless, the system has real value consequences.

We will start our analysis from the top down, as it is easier to discuss the elements with the most constraining effect at the beginning. Our conceptualisation of Groenewegen's framework is shown in Figure 3. With conceptualisation, we mean an overview of the relevant notions we encountered during our exploration. It is the result and not the starting point of our analysis.

We start with the informal institutions section. This element is the one where the relevant values have to be explicated. After that, we discuss the other elements subsequently. The analysis is a narrow selection of a more in-depth study into information systems that support the recognition of children with psychosocial problems (Monasso, 2008). We selected some exemplary factors to illustrate the possibilities of our framework. The case study as presented here has no independent value.

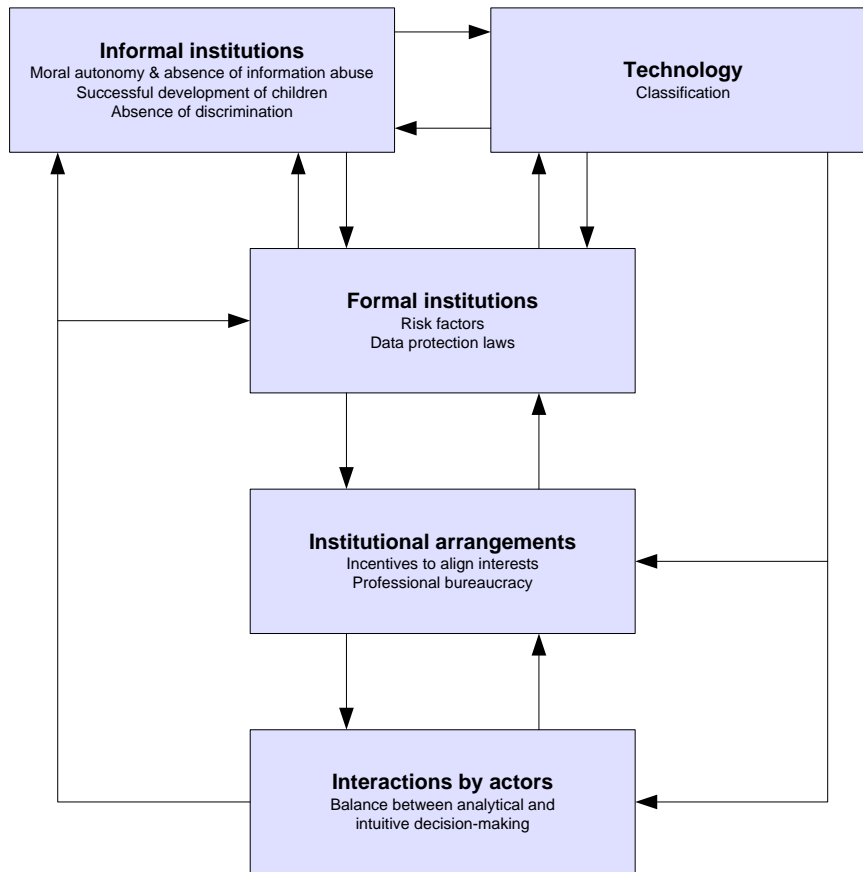


Figure 3 Simplified conceptual framework.

Informal institutions

Three values play a central role in this system. Firstly, the informational privacy, which serves the goals of moral autonomy and the absence of information abuse, respectively. Secondly, the successful development of children, which can be read as the absence or mediation of psychosocial problems. Thirdly, we included the absence of discrimination, to be read as biases towards a group.

Formal institutions

Formal institutions have a bidirectional relationship with values. Laws and regulations can contain biases or they can codify certain interests, such as the protection of the child. Often, formal institutions are the result of moral discussions on the desirability of (types of) intervention. A striking example in our case is the usage of risk factors.

Biases may be introduced in a conscious and systematic way if one decides to use risk factors to discover children with a high likelihood on present or future psychosocial problems. Risk factors are group characteristics such as low family income, low parental education, but also teenage pregnancy or foreign origin (Brown, Cohen, Johnson, & Salzinger, 1998; Deković, 1999; van IJzendoorn et al., 2007). In all cases, the factors have been derived from statistical correlations and not all results can be generalised to other contexts. In no way, they point to individual causal relationships. This type of relationship has been framed as correlative inferences (Birrner, 2005) or nondistributive generalisations (Vedder, 1999). Risk factor research has indicated a long list of factors that may point to, for instance, child abuse or criminal behaviour during adolescence. Often, the concurrence of at least three of four risk factors points to increased likelihood on problems, sometimes even with a factor seven compared to a situation in which no risk factors are present. Risk factors may be codified in the reporting protocols, but they also exist implicitly in the heads of professionals. They often

have to make intuitive decisions where their own impressions and experience plays a role. These individual decisions can have characteristics of a (moral) black box.

Relevant laws and treaties are mainly in the sphere of data protection. Without an explicit legal basis or the consent of the child or his parents, the European and Dutch privacy data protection regulations do not allow the storage, let alone the exchange, of sensitive data such as those stored in the VIR. The data as such are not sensitive, but the context in which they exist, provides additional meaning.

Institutional arrangements

At the level of institutional arrangements, one is concerned with the set of organisations and the allocation of tasks and responsibilities among them. Two theoretical strands are highly relevant here. First, principal-agent theory gives a perspective to analyse whether the interests (aligned with values) are carried out by agents, which we consider to be human actors, or whether the enactment of these values is perverted by disturbing influences. We found that, in those municipalities where a VIR-like system already exists, the amount of reports issued in a particular period heavily depended on the dominant media attitude in that period. When child abuse numbers flushed the newspapers, the number of reports expanded, but when government data leakage was front-page news, the number fell sharply. This means that the reporting criteria alone do not fully guide the reporting process, but that factors such as personal moral stance and the fear for liability also play a role. If organisations are perceived as agents, bureau politics is likely to come into force.

Organisational theory is a second strand of knowledge. Most of the organisations connected to the VIR are a form of professional bureaucracy (Mintzberg, 1983). This kind of organisation leaves much room for individual discretion and is hardly accessible to outsiders. In many professional domains, of which the medical discipline probably is the most notable example, professional values strongly influence behaviour. Think about a psychologist who treats adults who have been victim of child abuse themselves. Their own experiences increase the chance that their children are also abused. They may even confirm this during therapeutic sessions. However, the psychologist has a professional and secret relationship with the parents, and not with the children associated. Often, they do not issue a report, because their professional value is the treatment of the individual patient in a sphere of confidentiality and not the health of 'outsiders'. Even when these values are not directly codified, or the law explicitly creates exemptions, professional values may dominate others.

Interactions by actors

From the field of behavioural psychology, we can learn about the difference between analytical and intuitive decision-making. Both forms carry their benefits and disadvantages. Hammond's continuum aligns the task environment with judgement characteristics (Daniel, 2003). He prescribes that in a situation where much information is available, with multiple cues and a high time pressure, intuitive is better suited than analytical decision-making. When a narrower decision has to be made, the number of cues can be reduced and appropriate models are available, analytical decision-making is the preferred form. An advantage of analytical decision-making is that it partially corrects for fundamental human cognitive biases. Several biases exist in human judgement (Munro, 1999; Raiffa, Richardson, & Metcalfe, 2002). We may overrate the value of new evidence, of first impressions, we try to fit new material into our already existing perception instead of revising our thoughts, we have problems in correctly translating statistical correlations to real world situations and trade-offs, and so on. With these biases in mind, one can design a system that either does not reinforce them, or even better, tries to compensate for it. The VIR does not exchange substantial information, which may result from thinking about biases. Consider the (selective) exchange of information attached to a report. The first impression can be very sticky, whereas the problem situation may be very complex and the issuer of the report is not a skilled writer, but only typed a short memo. This impacts upon the perception of the other professional and harms a good diagnosis.

Analytical models compensate for these biases, but they also introduce new ones. Especially since models are often used across the full range of a discipline, small errors often have large consequences, compared to the large error in an individual case. We would say that analytical models have a high risk of introducing systematic errors and hence create bias as defined in the beginning of this paper.

Technology

The exchange of data by means of information technology requires some form of structure. Fully unstructured data exchange is not much more than the transmission of a box of unsorted papers from one place to the other. Only when some structure is provided, meaningful exchange and analysis may take place. In structuring information, one often makes use of classifications. The design of classes and the way residual categories are handled affect our values (Bowker & Star, 1999). For instance, if a capable and well-resourced mother who gave birth to her child at the age of 23 is labelled as teenager, she and her child may fall in the high-risk category teenage pregnancy, together with a 15-year old mother who originated from a problem family herself. The categories have independent meaning over the individual cases they contain. Again, the danger of nondistributive generalisations exists.

Design for values

Now that we have identified several elements of an institutional and technical design that impact upon our values, we can use this as a starting point to design with values in mind. We distinguish three ways to do this. First, one can remove or compensate identified and unwanted biases. Second, one can introduce (positive) discrimination where desired. Third and final, one can adapt formal institutions, technology and institutional arrangements to favour certain interests over others. We will give an example of these three possibilities, all adaptations to the currently envisaged VIR.

A bias one may wish to remove in the VIR is the overreporting regarding children from immigrant parents, if one locally decides to use risk factors, which is not explicitly prohibited at the national level. Either directly or indirectly, by means of a higher chance on teenage pregnancy, low income or low education, this group has a high likelihood of being *systematically* overreported. Depending on how risk factors are chosen, a significant share of immigrant parents may be reported. The concurrence of risk factors often does not indicate a risk higher than 25 percent that some undesired consequence may be(come) present. If consequently applied to a large group, it may be that four times as many people are labelled as high-risk cases, than there are cases where something is actually wrong. Stigmatisation of whole groups along the lines of ethnic origin may be the emergent result of a well-intended use of risk factors to care for children's psychosocial development. One may legally prohibit the use of risk factors, but then one also loses its contribution to better recognition. Another way is to facilitate training and awareness, so that risk factors are used in an appropriate way. Next, reports which have been issued based on the criteria of the concurrence of risk factors may be labelled differently, so that the receivers of a matched report are aware of its origin and can be more critical in assessing its value. Finally, one may use management information to check how risk factors are applied, to check whether the concept as such has benefit in the context of a VIR.

Systematic discrimination can also be desirable and seen as fair. We will no longer use the term bias for this, as it conflicts with the definition provided earlier on. It is systematic, but not unfair. Positive discrimination of certain groups may be desirable. In drawing up reporting criteria, one selects from the range of all possible problems and assigns priority to some of them. This makes it possible to direct the type of problems on which information should be exchanged and hence the likelihood of intervention increases. If society wants to tackle the problem of youth crime, it may demand professionals to report earlier if they encounter risk factors of youth crime or they suspect criminal behaviour. The procedures may systematically discriminate against criminal offenders by increasing their likelihood of being caught in the system.

One can also protect interests in a more direct way, by consolidating a position in difficult trade-offs. The balance between informational privacy and the child's psychosocial development may be difficult. For the latter, information exchange may be necessary, with the risk of infringing upon the moral autonomy and creating possibilities for information abuse for parents. Often, these trade-offs take the form of balancing interests from different actors. Once a political decision has been made, it may be coded into law, institutional arrangements or even technology. An example of the first are the reporting criteria, an example of the second is the creation of dedicated organisations who defend the interests of the child, and the last could be filled in by designing the system with easy exchange in mind, and not restricting this for the sake of privacy enhancement.

Discussion

We conceptualised Groenewegen's framework to distinguish several elements of an institutional and technical design and look for design choices that impact upon our values. After the application of the framework to our case study, several remarks can be made. First, the framework does seem to be helpful in structuring the identification of value-laden choices. It especially helps to consider different analytical levels and to think in a multidisciplinary way, as it is not tight to a particular discipline. However, its use does not go beyond the identification of five categories and the layered thinking with regard to institutions. This makes the framework both thin and lean. Thin, because it does not provide much analytical direction. It does not direct analysis in a rigid way, but is only a tool in design explorations. Lean, because it can easily be adapted to fit different situations.

The suggested framework can be a starting point for thinking about an improvement of VSD design methodology, but it is by no means a final product. Groenewegen's framework can be adapted to better serve our purposes and increase analytical rigour. As discussed before, we would like to split technology into multiple layers and reconsider the selection of relevant relationships between the elements. Moreover, the framework might be fed with some theoretical branches, which are generally relevant to consider the value-ladenness of IT systems. Principal-agent theory, organisation theory, structuration theory and the cognitive continuum may be candidates. Only a broader study, with multiple cases and an iterative improvement of the framework, may lead to a theoretical grounding of a methodologically sound design framework.

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We would like to thank Jeroen van den Hoven, Aad Correljé and Noëmi Manders-Huits for their inspiring comments to earlier versions of this paper.

Abbreviations

ANT	Actor-Network Theory
VIR	Verwijsindex Risicjongeren (English: Referral Index Problem Youngsters)
VSD	Value-Sensitive Design

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