

Chain-computerisation for interorganisational public policy implementation¹

A new approach to developing non-intrusive information infrastructures that improve public policy implementation

by Jan Grijpink¹

In two articles² the author presents some key elements from his recently completed thesis about functional, non-intrusive information infrastructures for interorganisational public policy implementation. The development of these information infrastructures requires a new approach, chain-computerisation, based on new concepts and practices. This methodology is vital for public administration, if the problems associated with interorganisational policy implementation are to be overcome. Chain-computerisation recognises the impossibility in many interorganisational settings of implementing government policy, because no single organisational actor has authority over the system. Thus, for example, a Dutch requirement that prisoners serving longer prison sentences must notify the Benefits system so that benefit paid can be adjusted, cannot be enforced because this multi-agency setting is too complex to allow adequate co-ordinated control. What is needed is an informational solution which automatically signals to the Imprisonment system that a prisoner is receiving benefits. Such highly automated communication systems can also protect privacy, in this particular example by signalling that a note must be sent by the prisoner to his benefit agency rather than by triggering enforcement by the Imprisonment system without the prisoner concerned knowing it.

This methodology can be seen as emerged from 'lessons learned' during the period that the author was responsible for the development of information policies at the Dutch Ministry of Justice.

Chain-computerisation is explained here by means of examples taken from the penal and social welfare systems, but it should be emphasized that the methodology of chain-computerisation can be applied to many other situations where public policy is to be implemented by close co-operation of many autonomous public and private organisations.

1. Value chains

Governments can be regarded as large networks of organisations with contiguous tasks for which an enormous amount of information has to be exchanged. This exchange of information *between* public organisations is much more problematic than the exchange of information *within* a public organisation. This is partly explained by the fact that within a public organisation there is a clear authority through which information flows can normally be arranged in such a way that they proceed smoothly and efficiently. However, this applies to a lesser extent where information flows between public organisations are concerned: there is a kind of 'no-man's land' between organisations. There are in fact many forms of consultation and ways of exerting influence, but there is no clear, all-encompassing authority. One organisation cannot impose its will on another. It is mainly for this reason that collective automation - even within the government - is rare.

Within large organisational networks we can distinguish value chains within which the production of collective goods and services takes place and within which governmental policies are brought about. In those value chains public, semi-public and private bodies may work together, locally, nationally and, to an increasing extent, internationally. Examples of these value chains include the enforcement of criminal law (see figure 1), youth protection, immigration and naturalisation, social security and education. These value chains primarily involve tackling problems that can

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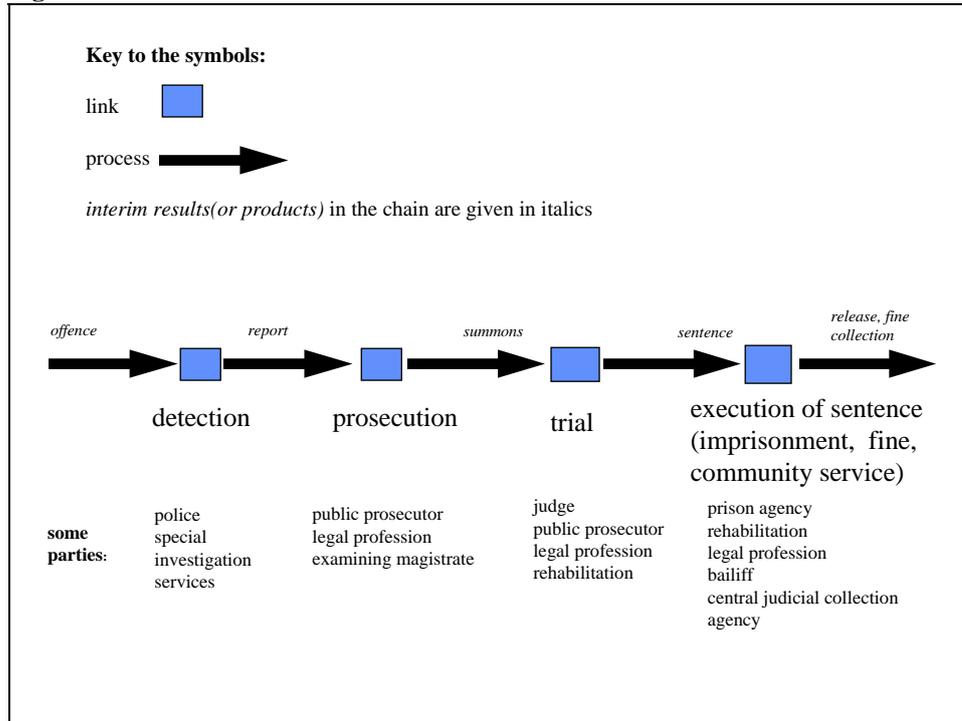
only be resolved by all of the participants collectively. An example of such a dominant problem in the value chain of immigration and naturalisation is the prevention of multiple Dutch identities when admitting aliens. This prevention can only succeed if all of the private and public bodies concerned co-operate well in concrete cases.

In spite of the good intentions, things often go wrong in a value chain. At chain level, there is often a lack of suitable administrative conditions and a suitable information infrastructure. An additional problem is that many organisations participate in more than one value chain and therefore constantly have to reallocate their scarce resources, or have to make concessions to quality. The judge, for example, contributes to the criminal law enforcement chain, the immigration and naturalisation chain and the youth protection chain. This presents the internal automation process within an organisation with dilemmas, because each value chain requires its own information infrastructure, thus imposing different, sometimes contradictory external requirements upon the same organisation. This is generally not sufficiently recognised from the usual perspective of internal automation.

It is not yet customary to regard operational problems in public administration from the external 'value chain' perspective. In many public organisations internal problems overshadow the concern for good external relationships with other organisations. After years of cut-backs, contracting out, and specialisation on their core business, organisations in a value chain are increasingly confronted with the growing mutual dependence caused by these measures.

A value chain is an exceptional administrative realm. All sorts of things happen that are not intended. 'Backlog' problems arise, for example, if one organisation has completed its task, but the next link in the chain has not yet had the opportunity to continue the work. Each link in the value chain attempts to solve the waiting problem by adjusting its own selection thresholds and priority rules. Work stocks are of course useful as a buffer between the links in the chain. They avoid a problem within a *link* immediately turning into a *chain* problem. However, work stocks also obscure the next link, so that bottlenecks can no longer be recognised in time. This sometimes takes on dramatic forms, causing a blockage in the chain. And at that point something else remarkable occurs: such blockages in the chain are usually tackled by the last link in a value chain, because that is where the problems stack up. But because the causes are usually found in the preceding links, this leads from the viewpoint of the chain as a whole to combating the symptoms. To illustrate this point: the recurrent capacity problems in the criminal law enforcement chain invariably surface in the last link of the chain, the prison system; additional prison capacity does not bring about any sustainable change.

Figure 1 The criminal law enforcement chain



Many well-intentioned efforts in a chain of operations therefore fail because of the complexity and limited manageability of organisational border-transgressing work processes. The organisation of a chain such as the criminal law enforcement chain, in which more than a thousand organisations participate, has become too big and too complex. Organisational measures alone are no longer sufficient to solve the problems. Neither does the internal automation of the participating organisations offer a guarantee for the correct functioning of the value chain. Information technology must therefore also be applied at chain level: chain-computerisation.

2. Chain-computerisation, a new approach³

Unlike traditional automation which starts out from the data one wishes to record, chain-computerisation takes as its point of departure the required communication with other organisations. How can the right details from different organisations be brought together at the right time to make the right decision? This question focuses attention on the collective information infrastructure needed to channel and steer this communication. Every value chain requires a different information infrastructure, depending mainly on the mission of the chain and on its process structure. The one chain (such as the criminal law enforcement chain), requires as information infrastructure a number system and a reference index for persons. The other chain (such as the value chain for immigration and naturalisation), has a greater need for biometric verification of a person's identity and for a collective deadline monitoring system.

This article introduces this new information infrastructural approach to communication between independent organisations. Chain-computerisation has two major objectives: effective communication between independent organisations and protection of the privacy of the persons about whom these organisations communicate. In this article, we examine how chain-computerisation improves communication. In a subsequent article, scheduled for the 1999-2 issue, we explore its value for privacy protection. I shall argue, that with appropriate information infrastructures for

public administration, more information can be effectively exchanged while improving the privacy of the people concerned.

This article is structured as follows. In section 1 we looked at the concept of value chains, an administrative realm of growing importance. Certain collective information problems at chain level cannot be solved by our traditional automation practice. We examine an example of such an information problem in section 3. Next, we explore the concept of information infrastructures in section 4. How can such difficult information problems at chain level be solved using information infrastructure? This is illustrated with an example in section 5. In section 6 we take a closer look at a chain information system and how it can be used for all types of information problems at chain level. Is chain-computerisation a useful approach under all circumstances? Chains are a capricious administrative realm, full of pitfalls for information systems. Successful chain information systems are still rare. In section 7 four rigorous tests are described to safeguard against wasting time and money on chain information systems. One of them is explained in greater detail. Finally, I draw some conclusions in section 8.

3. An example of a chain information problem

A chain information problem is an information problem in a value chain that can only be solved by all participants together. The following example is about benefit fraud by prisoners. Benefit fraud by prisoners takes place within a government institution and - sad but true - is made possible by a public authority.

Dutch benefit regulations require that if a person is given a longer prison sentence his benefits must be reduced or withdrawn. In practice, a prisoner receiving a benefit does not notify his benefit agency, either because he is insufficiently aware of the rules or because he plays the innocent in the expectation that the intended offence will go unnoticed. Regulations and circulars oblige the public prosecutor, the prison director *and* the social services department to ensure that people serving longer prison sentences do not receive more benefits than they are entitled to. These instructions, however, are not sufficient to guarantee enforcement of the benefit regulations. The approximately eighty prisons in The Netherlands are practically unable to find out which of their thousands of prisoners are receiving benefits. Notifying the more than 550 benefit agencies all over the country of every imprisonment is an impossible task, and the vast majority of the inquiries would involve serious breaches of privacy: a prison sentence is given illegitimate publicity if the wrong benefit agency is notified or if the person concerned is not receiving any benefit payments. In their turn, benefit agencies cannot know which of their clients are being imprisoned at a given moment in time without large-scale breach of privacy if the wrong prison organisation is questioned or when the person concerned is not serving a prison sentence at all. In these cases illegitimate publicity is given to the fact that a person is receiving benefits.

Benefit agencies face a lot more difficulties in complying with their legal obligations than prison organisations. This is because although many prisoners receive benefits at any given time, there are only very few prisoners among those entitled to benefits. And when should a benefit agency carry out its check? After all, any person with entitlement to benefit can be imprisoned or released at any moment. Benefit agencies would have to check continuously, with virtually nothing other than no-hits and breaches of privacy as a result!

We may therefore conclude that none of the authorities involved is in fact able to obtain the required data in a lawful and expedient manner. This explains why, despite the good intentions of the public authorities involved, benefit fraud by prisoners is only discovered by chance. That is to say, without chain-computerisation, because this new approach can offer an elegant solution preventing benefit fraud by prisoners. This solution is elaborated in more detail in section 5 below in order to clarify what chain-computerisation has to offer. But before presenting this elaboration,

the information infrastructural character of this new approach must be explained.

4. The concept and significance of information infrastructures

For communication between organisations, Prof. Dr. T.M.A. Bemelmans (Technical University of Eindhoven, The Netherlands) suggests making a distinction between information infrastructures on the one hand, and specific applications within organisations which can be built on them, on the other.⁴ Just as people often keep their own register of known telephone numbers separately from the telephone directory. We are sometimes barely aware of information infrastructures in our day-to-day lives. The telephone directory has gained wide acceptance in a few decades. Book catalogues have also become part of everyday life. What has grown gradually throughout the course of many years for books, voice telephony and road traffic, has largely yet to come about for electronically registered data.

By information infrastructures I mean general, permanently available basic facilities for the processing, storage and transportation of data that are used collectively between organisations in a value chain:

- collective technical facilities and standard software (computers, networks and database management systems);
- collective data and knowledge (data with rules about the connection between those data);
- collective administrative organisations, procedures and standards.

These facilities can be used by many parties for a variety of different purposes. In practice, information infrastructures can be recognised by joint, collective management, which is independent of the management of the specific applications that use them. Information infrastructures can also be recognised by the type of information systems collectively used, for example reference indexes and number systems.

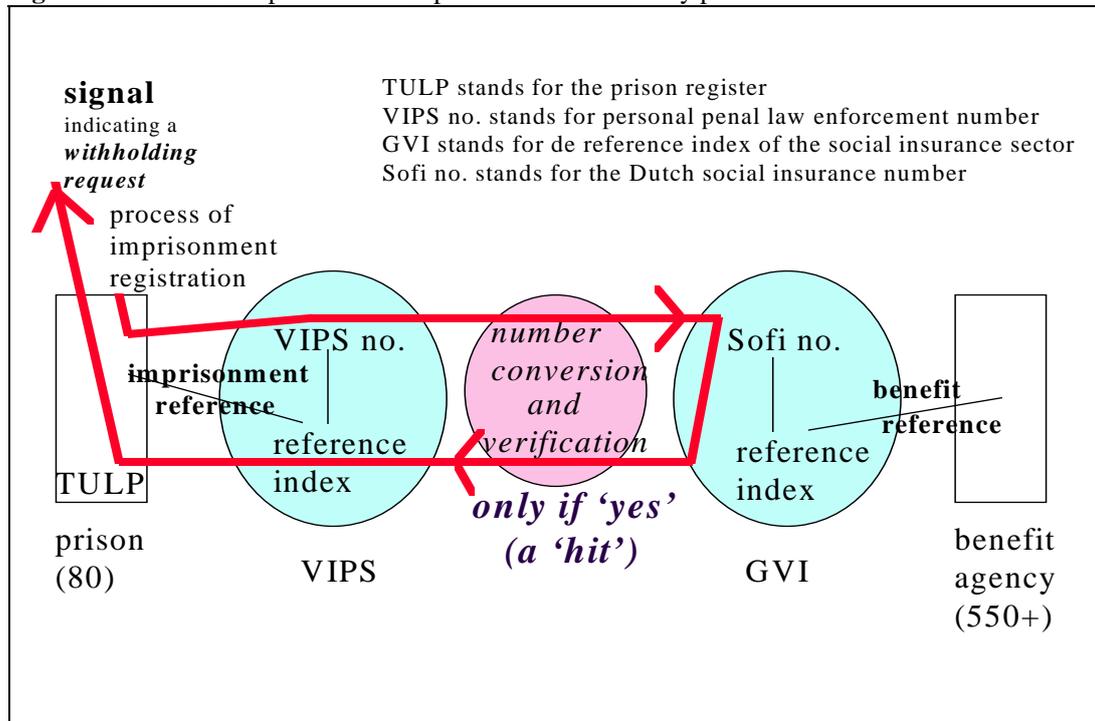
A comparison with the roads network can serve to clarify still further the concept of infrastructures. A gravel path to a house cannot be part of an infrastructure, but the public roads network and the ANWB (Dutch motoring organisation) signposts are. Infrastructures are typified by the fact that they can be used for a variety of different purposes. An ANWB sign could serve as a meeting point for the one road user, and fulfil its function as a signpost for the other. An infrastructure is also typified by implicit knowledge. This is why a small change to an infrastructure (e.g. a new traffic sign or a new road number) can cause so much confusion. You don't normally realise what you have to know to understand a traffic sign properly. Transparency and simplicity are therefore important features of infrastructures. Successful examples include the plug socket and the letterbox.

To bring into being an information infrastructure is no easy task. The space for collective information systems is very limited in the no-man's land between organisations. Organisations cherish their own data, which means that a collective databank beyond the borders of organisations is seldom possible. Even if this does succeed, there is often a lot of bickering about the ownership of the data, authority and management tasks. The most important factor is the lack of formal and unequivocal authority in organisational networks and value chains. Chain-computerisation takes precisely that lack of a formal hierarchy as its starting point. Large databanks containing substantive data used collectively between organisations call for more authority and willingness to co-operate and pool resources than are usually present in value chains. Chain-computerisation therefore aims more at 'overview' and less at 'content'. A 'bare' reference index or a simple signalling process is often the maximum result that can be attained. Within an organisation, separate facilities such as these would be regarded as laborious or superfluous.

5. An example of a chain-computerisation solution

The application of chain-computerisation makes it possible to master information problems at chain level which up to now were practically impossible to solve with organisational measures and traditional automation solutions. To illustrate this point, I continue the example of the prevention of benefit fraud by prisoners. As we have seen, it is in actual practice virtually impossible to detect benefit fraud committed by prisoners. Chain-computerisation does however offer an elegant solution by making use of an information infrastructure consisting of several chain information systems, such as number systems and reference indexes. A prerequisite for this is that both the criminal law enforcement chain and the social security sector have their own sectoral reference index and their own number system. This will shortly be the case.

Figure 2 Chain-computerisation to prevent benefit fraud by prisoners



The essence of this chain-computerisation solution to this fraud problem is that the concurrence of a new imprisonment reference in the criminal law enforcement reference index with an existing benefit reference in the social reference index is used to signal a (probable) benefit fraud by this prisoner (see figure 2).

A chain-computerisation solution requires that enquiries form part of the routine of the work process and run without human intervention. In this example the process of imprisonment triggers the communication. The signalling function must therefore not require any extra actions within the administrative process of imprisoning a new prisoner. The registration in the TULP information system at the registration desk of a person being imprisoned becomes at the same moment visible in the reference index VIPS by means of a reference to the prison concerned. No further human intervention is involved. VIPS can convert the VIPS number into the Social Insurance number required for the social index. VIPS can now use this Social Insurance number to automatically access the benefit reference index. This requires a verification system that responds

purely with a 'yes' if the social reference index shows a benefit reference for that specific Social Insurance number. This 'hit'-signal becomes visible on the screen of the TULP information system at the registration desk. If the person concerned has no benefit reference in the social insurance index, this automatic consultation remains invisible.

If this signal informs the desk assistant which standard letter has to be sent by the prisoner to which benefit agency, he can then present this letter to the prisoner ready for his signature. If the notification duty of the prisoner is brought to his attention *at this point* in the imprisonment process, the person concerned will be unlikely to refuse. No offence has been committed yet, while a refusal would cause one. This prevention-oriented method stays within the limits of the law and should - from the viewpoint of privacy protection - be preferred to an official notification of the relevant benefit agency by the prison organisation without the person concerned knowing it. Nevertheless, official notification could take place in the event of a refusal. In this case the prisoner is well informed.

This example illustrates how a chain-computerisation solution can elegantly solve a complex information problem whilst enhancing privacy at the same time. The trigger for accessing the social insurance index is found in the *operational process of imprisonment registration*. It does not involve a comparison of two files at a particular moment (all prisoners versus all benefit receivers), but a consultation concerning one person in the course of his imprisonment. The presence of this person makes it possible to detect and rectify on the spot any misses in a signal or data.

In the chain-computerisation solution outlined above the initiative for the communication rests with the prison, not with the benefit agency. Given the quantitative ratio between those entitled to benefits and prison sentences, it makes sense to carry out this automated enquiry from the criminal law enforcement reference index VIPS. However, if the quantitative ratio were different, it would of course be better to access the criminal law enforcement reference index VIPS from the social insurance index, unless this cannot be embedded in a suitable operational process.

The chain-computerisation solution outlined above supports only the required direct availability of the necessary information at the very moment of the decision or action. The reference indicates where additional information can be obtained. In this example additional information will generally not be needed unless the prisoner claims that a mistake has been made and wants it sorted out.

In the traditional approach one would also ask how the necessary information can be registered and kept up-to-date. Chain-computerisation does not support this question: the prison should not systematically collect and record this information, because it does not need it on a continuous basis and once recorded, the prison will not be able to keep it up-to-date either.

Using an information infrastructure consisting of a few chain information systems such as reference indexes, number systems, and software components for number conversion and verification, it is possible to set up effective communication between a large number of organisations. With this communication one can solve chain information problems that could not be solved up to now, such as benefit fraud by prisoners.

6. An example of a chain information system: a reference index

Having discussed a typical example of a chain information problem and a chain-computerisation solution, in the next section we shall examine what chain information systems actually are, and what can be done with them. For this purpose we will take a closer look at reference indexes, one of many different types of chain information systems.

Reference information indicates the place, an organisation for instance, where a piece of information can be found. Reference information therefore consists of:

- a) an identifying detail that indicates the subject or person to which the reference relates (a name, a unique number or a combination of the two);
- b) the reference itself, e.g. the name of an organisation or a register containing relevant information.

Reference material is kept in a special, purpose-designed information system, usually called a reference register or reference index (these terms are used here as synonyms). A reference index forms a 'catalogue' or 'telephone directory' for underlying data collections or source registers.

Reference information is information of a special character. Reference data about a person indirectly provide an image of that person. In combination with other data, reference data therefore frequently provide new (meta-) information. Apart from that, reference information does of course also have its limitations: it generally offers insufficient information to make a substantive decision. The decision has to be based on the information from the underlying source register.

Since 1993 the Dutch criminal law enforcement chain has had a Persons Reference Index for Criminal Law Enforcement (VIPS). Using reference information from this reference index it is possible to discover quickly which authorities have relevant information about a given person. This makes the search for relevant data easier. This is rather important to the criminal law enforcement chain, within which there are more than a thousand authorities working together, locally, regionally, nationally or increasingly internationally. An imprisonment reference indicates the prison in which an individual is serving his sentence; a reference to a district office of public prosecutions gives reference, for instance, to a summons that has been issued in that district. A person can simultaneously have a large number of references: an imprisonment reference, references to several district offices of public prosecutions concerning summons or sentences that have yet to be served and concerning unpaid fines. In this way, a reference screen of a person provides an image of his current 'cases' with the Dutch criminal law enforcement authorities.

A reference index has first of all a logistical function, because this reference information can be used to answer a variety of useful logistical questions: where does somebody's mail have to be sent, is there a new sentence to be contiguously served by a person who is about to be released, is there an outstanding writ to be served on a person, etc. For many logistical decisions it is not necessary to consult underlying source registers. If a writ is to be served in person, and the person in question has an imprisonment reference in the reference index, the writ will have to be served in the referred prison. This avoids a situation in which vain attempts are made to serve the writ at the persons' home address. If a person is suspected of a new offence, a reference to a prison can immediately rule him out as a potential perpetrator. This can speed up investigations.

Reference information can have several functions for each organisation in the value chain using the reference index for its particular task and goal. This justifies an information infrastructural set-up for a reference index. A variety of information problems can thus be solved. Two examples of important information problems in the criminal law enforcement chain to be solved using the reference index illustrate this point: *concluding status reports and monitoring consistency*.

Concluding status reports

Concluding status reports are reports from an organisation to authorities that were involved in a

case at earlier stages. These authorities often need information about what subsequently happened regarding the case in question. Concluding status reports are sorely missed in the criminal law enforcement chain, but in actual practice the distribution of concluding status reports to the right authorities in a manageable way has so far proved to be an impossible task for many organisations in the criminal law enforcement chain. Only occasionally and on request is information given about the results of the work in the later stages of a case. The initiative is necessarily left to the enquiring organisation, but that organisation cannot know that a case has in the meantime been settled or transferred to a subsequent authority in the criminal law enforcement chain. This information exchange problem can, however, be solved using a collective reference index. The transfer of a case from one stage to another becomes immediately visible in the reference index: an existing reference lapses, and a new reference is taken up in the reference index. If a new reference (or the lapse of an existing reference) automatically elicits a concluding status report for the authorities that were involved in the same case at earlier stages (they should, ideally, subscribe to later reports, and pay for them!), concluding status reports can be sent automatically to the right organisations. This facilitates a chain-wide reporting system. Provided that agreements are made about which changes to a reference elicit these (standardised) concluding status reports, this communication can proceed entirely without human intervention. Each organisation can itself decide about the subsequent processing of these concluding status reports either automatically through their own information systems or manually.

This makes many specific applications possible, such as:

- a. concluding status reports relating to the completion of a prison sentence sent to the police, so that account can be taken in investigations;
- b. automatically inputting and cleaning up the investigation register;
- c. signalling judicial contacts of criminal youngsters to supervisory youth authorities to support the prevention of juvenile delinquency;
- d. informing supervisory authorities or victims of the release of certain categories of delinquents (public decency offences, crimes of violence, stalkers).

Monitoring consistency

A reference index makes it possible to monitor the consistency of underlying source registers. The patterns of conflicting references need to be defined in advance. On this basis, the reference index can automatically signal to the right organisation(s) that its source register contains incorrect data or that irregularities have arisen which must be sorted out and repaired immediately. We need additional rules for this problem solving process, but without these signals the process cannot even start and wrong decisions can be neither prevented nor detected.

7. Analysis for chain-computerisation

In section 4 I concluded that chain information systems will often be regarded as laborious or superfluous when judged from the usual perspective of internal automation. From the point of view of chain-computerisation this is not the case, because the lack of formal and unequivocal authority in organisational networks and value chains is taken for granted. Chain-computerisation takes precisely that lack of a formal hierarchy as its starting point. Organisations cherish their own data, which means that collective databanks beyond the borders of organisations are seldom possible. Even if this does succeed, there is often a lot of bickering about the ownership of the data, authority and management tasks. The space for collective information systems is very limited and the creation of an information infrastructure is no easy task, even if chain-computerisation deliberately aims at minimum provisions at the collective level of a value chain, for instance a 'bare' reference index or a simple signalling process.

To avoid spending too much time and money on chain information systems, we need tools for diagnosis and choice. In my thesis I developed four complementary analytical tools to:

1. assess interorganisational key issues and problems in a value chain; this tool is called the *mission profile*;
2. assess the limits of the existing interorganisational co-operation in a particular value chain; this tool is called the *organisation profile*;
3. evaluate interorganisational co-ordination needs in a particular value chain with regard to mission related problems at chain level; this tool is called the *co-ordination profile*;
4. uncover structural barriers in the exchange of information between organisations; this tool is called the *information profile*.

These tools focus respectively on objectives, organisation, process and information, four aspects in hierarchical order, the latter always being dependent on the former.

mission profile

If the mission profile implies that the information problem to be solved is not a mission related problem for the value chain as a whole, then creating an information infrastructure for this problem is not *relevant*. Efforts to develop chain information systems for this particular problem will not get enough support. In these cases chain-computerisation is not an useful approach.

organisation profile

While the mission profile tests problems, the organisation profile is used to test a chain information system that might solve a chain information problem. If the organisation profile supports a particular chain information system, for instance a number system, this analysis implies that this particular value chain has already organised itself in such a way that the use of this collective information system is *feasible*. If not, chain-computerisation should not be attempted as a solution to this problem.

co-ordination profile

If the co-ordination profile endorses a particular chain information system, it is *necessary* in this value chain for its co-ordination at chain level. If it does not endorse this particular chain information system, the development of an information infrastructure for this particular chain problem should not be tried, even if the mission profile and the organisational profile endorse chain-computerisation for this problem.

information profile

The information profile indicates whether a particular chain information system, for instance a reference index, is *necessary* to bridge a gap in the information structure. Let us look again at the criminal law enforcement chain to explain this. If, as is the case in the Dutch criminal law enforcement chain (see figure 1), the first part of the chain focuses on punishable *facts*, the second part of the chain on *cases* and the last part of the chain on *persons*, the exchange of information from the one part of the chain to the other will give rise to many errors and problems, because information is gathered and kept up-to-date with a different ambition and focus of attention. These are inherent errors and problems and can probably be eliminated only by fundamentally restructuring the key processes of the value chain. The information profile of the Dutch criminal law enforcement chain shows two gaps to be bridged: facts-cases and cases-persons. This can be done for instance by a persons reference index. Such a chain information system thus proves to be a necessary component of the information infrastructure of this particular chain. If no gap shows up in an information profile, such a chain information system is not necessary and should not be developed and implemented for this problem.

Example of the use of a profile: the organisation profile

To illustrate this part of the toolkit⁵ for chain players in public administration, we apply the organisation profile to one of the two reference indexes needed to prevent benefit fraud by prisoners (our example described in the sections 3 and 5). In this manner we will be testing the reference index VIPS in the Dutch criminal law enforcement chain.

In figure 3, the grey boxes characterise the actual co-operation at chain level in this chain. A white

box indicates that this form of co-operation at chain level does not happen on a structural basis. The entries on the horizontal and the vertical axis of the organisation profile are in order of complexity or impact on the participating organisations. The upper left-hand box represents the lowest complexity or impact; the lower right-hand box the highest. Bear this in mind when interpreting the picture. This picture of the Dutch criminal law enforcement chain is for illustration purpose only. It reflects my personal opinion checked against that of some of my colleagues.

To test the feasibility of the reference index VIPS we place it in the appropriate box of the profile. In full use, this chain information system can be considered to be a COMMON NETWORK ORGANISATION at the SUPPORT-level. But during the development process it should be seen as an AD HOC JOINT ACTION (A CHAIN PROJECT). These two new forms of co-operation join the boxes which represent existing patterns of co-operation at the SUPPORT-level without leaving empty white boxes. This means that the new forms of co-operation will not trigger principle discussion or meet prolonged opposition at chain level, at least as long as they involve only a 'bare' reference index, which is a genuine *support* tool. 'Content'-information in this reference index would position this reference index in the EXECUTION OF KEY PROCESSES-level in the chain. According to the organisation profile, this would be a bridge too far for this value chain. Such an enriched reference index threatens the independence of participating organisations and each organisation's control of its own information. A 'bare' reference index, however, does not.

The CHAIN PROJECT needed to arrive eventually at the intended reference index fills the white box between the grey box representing the actual practice of JOINT DECISION MAKING at SUPPORT-LEVEL on the one hand, and the new COMMON NETWORK ORGANISATION (to manage the reference index) on the other. This indicates that it will take time to develop this reference index. But it indicates also, that this long process has a value in itself: it can be seen as a necessary process of getting used to the idea and the practise of a reference index. The organisation profile thus gives us a hint to organise the process also from this point of view.

Figure 3 Organisation profile of the Dutch criminal law enforcement chain (see fig. 1)

stage of development process at chain level	INFORMAL TALKS	FORMAL CONSULTATION	JOINT DECISION MAKING	AD HOC JOINT ACTION (CHAIN PROJECTS)	COMMON NETWORK ORGANISATION
SUPPORT				development of a <i>reference index</i>	exploitation of a <i>reference index</i>
EXECUTION OF KEY PROCESSES					
POLICY				A	

Key:
 well developed in the Dutch criminal law enforcement chain
 not well developed in the Dutch criminal law enforcement chain

White boxes perform an important role in this analysis. Deliberately organised chain projects eventually make more complex co-operation possible at the same level, as we have seen. To move to another level of complexity or impact, you probably need to do a lot more. If, in the organisation profile of a particular value chain, white boxes show up between grey boxes and a

new form of co-operation, the general message is 'not feasible' in the short term. So development of the (imaginary) component 'A' (see Figure 3) should not be undertaken at this stage of development of the co-operation in this value chain, leaving empty white boxes both horizontally and vertically.

It will be interesting to do further research on the relations within this profile. Its normative use will be enhanced if, for instance, in the Dutch criminal law enforcement chain we observe in the near future that full use of the reference index (support level) triggers joint decision making at execution level. We know that the index supports such co-operation, but will the index provoke it? This is one example of interesting future research within the domain of chain-computerisation.

8. The importance of chain-computerisation for public administration

By means of some examples I have presented you with an overview of the main components of this new chain-computerisation approach. After arguing that rigorous analysis must provide safeguards against wasting resources on chain information systems, the use of one of the four analytical tools, the organisation profile, has been demonstrated. Now I want to draw some conclusions.

Chain-computerisation is a useful approach to communication if there are many independent parties in a value chain, without one party being able to impose its will on the others. Especially if it needs only one party to put a spoke in the wheel. Chain-computerisation is also important if one cannot know beforehand where to find the relevant data at the moment that the information is required. If data from several external source registers have to be combined for a decision or if the parties have difficulty in relinquishing their own substantive data, chain-computerisation offers a new perspective.

To solve various chain information problems to as great an extent as possible, chain-computerisation requires an information infrastructure that is as minimal and 'bare' as possible, i.e. chain information systems should not contain any substantive data that are specific to, or intended for a certain group of users. The collective part of information exchange in a value chain often goes little further than a collective number, a reference, or a yes/no enquiry (verification). Fortunately, the interplay of administrative forces in a value chain makes it difficult to create more substantive collective facilities anyway.

Chain-computerisation is about the use of common information infrastructures. It derives its importance from the complex external environment of the modern organisation. This modern organisation has a great number of different links with many other organisations thus requiring a variety of communication systems for different communication problems. In these interorganisational networks or 'value chains' there is no formal supra- or interorganisational hierarchy. This causes policy and decision making by groups of organisations to differ from what we are accustomed to within our traditional organisations. It calls for a new approach to communication, too. Chain-computerisation as outlined in my thesis, analytical tools and intervention models included, answers this call.

In the world of public administration, chain-computerisation is an unusual approach, which will gain significance and acceptance as organisations orient themselves to their external interdependencies in the process of implementing public policies. The modern organisation in the public and semi-public domain is becoming more and more dependent on external relationships with other organisations, private organisations included. Just as the manager in the nineteen-eighties gradually shifted his focus from internal efficiency to external effectiveness, he should now be moving his attention in solving information issues from internally oriented, classic automation to externally oriented chain-computerisation. This shift in focus often leads to different

starting points, different system concepts and different information systems, which can be summarised as follows:

1. communication instead of registration;
2. signalling at the right moment, embedded in the primary process of an action or decision;
3. a 'bare', general purpose information infrastructure.

It often proves difficult to solve structural information problems using only application-oriented information systems. Despite that, we continue to resort to them: a separate national database of paedophiles, violent children, sexual offenders, etc. We shall have to stop creating a new databank for each and every problem. Targeted communication on a 'need to know' basis, 'just in time' and 'authorised only' better meets the requirements.

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² See: *Chain-computerisation for better privacy protection*, p. ... of this issue of II&P.

³ J.H.A.M. Grijpink, *Keteninformatisering*, ISBN 90-5409-131-2, NV Sdu, The Hague, 1997. This new Dutch term 'keteninformatisering' is translated here as 'chain-computerisation'.

(An English summary of this thesis is available on request at jgrijpin@best-dep.minjus.nl)

⁴ Bemelmans, T.M.A. and R.P.H.M. Matthijsse, *Informatie-infrastructuren*, I&I Information and Information policy, Amsterdam, 1995, Vol. 13, no.2 (Zomer), p. 57.

⁵ This article does not cover the three intervention models which I developed in my thesis to complement the four analytical tools.