

# ***Picture of Interpersonal Information Processes (PIP) for Social, Legal and Ethical Analysis and Communication***

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## **1. Introduction**

Even though it was scheduled in the "Technology Showcase" section of the conference's program, this presentation does not tackle some application software, even less a commercial product. It deals rather with the development of a method whose instructions and tools are meant to be openly and freely available.

This presentation has two objectives.

The first objective is to outline experiences and the process that led to the development of a method for the modeling of information processes that has been proven successful for achieving two complementary purposes, namely:

- a) to analyze, assess and manage the legal, social and ethical issues raised by interpersonal information or transaction systems, and
- b) to facilitate communication between the actors of such a given system or transaction:
  - between those involved in its design and operation; and
  - with its users, including those with low writing or computer literacy.

The second objective of this presentation is to invite those interested, not only to adopt and adapt this method, but also to participate in a community of practitioners interested in the analysis, evaluation and communication of interpersonal information or transaction systems.

## 2. Outline of the PIP method

Let's start with a clarification comment. Clearly, *Picture of Interpersonal Information Processes (PIP)* is indeed a method that proves useful for the implementation of standards for personal information protection (also designated as "information privacy" standards). It is also valuable for conducting an "assessment of factors relating to privacy" (also known as "privacy impact assessment").

However, the purposes of PIP go quite broader, i.e. ultimately:

- to promote the social management of our information and of our digital tools, and
- facilitate the democratization of information societies

through a more accurate and easily sharable understanding of how our relationships are supported by the handling of specific information.

In practical terms, PIP is a method for social analysis and for communication that may be used, among other things, for legal analysis and communication (as it may also serve similar purposes in other areas such as ethics or information management). When used by jurists, this method permits to take into account, not only the norms specific to the protection of personal information, but all the norms involved in all the interactions between people supported by a specific information handling.

Specifically, PIP facilitates the identification of:

- any information handling that is supporting some interpersonal interaction (regardless of whether the information items involved are:
  - personal or not, and if so,
  - related to an identifiable individual [personally identifiable information] or not);
- all interactions between all those involved in the handling of information (regardless of whether these persons:
  - are natural or legal, and
  - whatever their status and role with regard to this handling); and finally
- all the norms involved in the interaction supported by the information handling (regardless of the purpose of the norms or the source thereof).<sup>1</sup>

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<sup>1</sup> I discuss further this matter of all the norms involved in interpersonal information processes « *Par delà la vie privée : ce que tout juriste devrait savoir sur les applications des technologies de l'information et des*

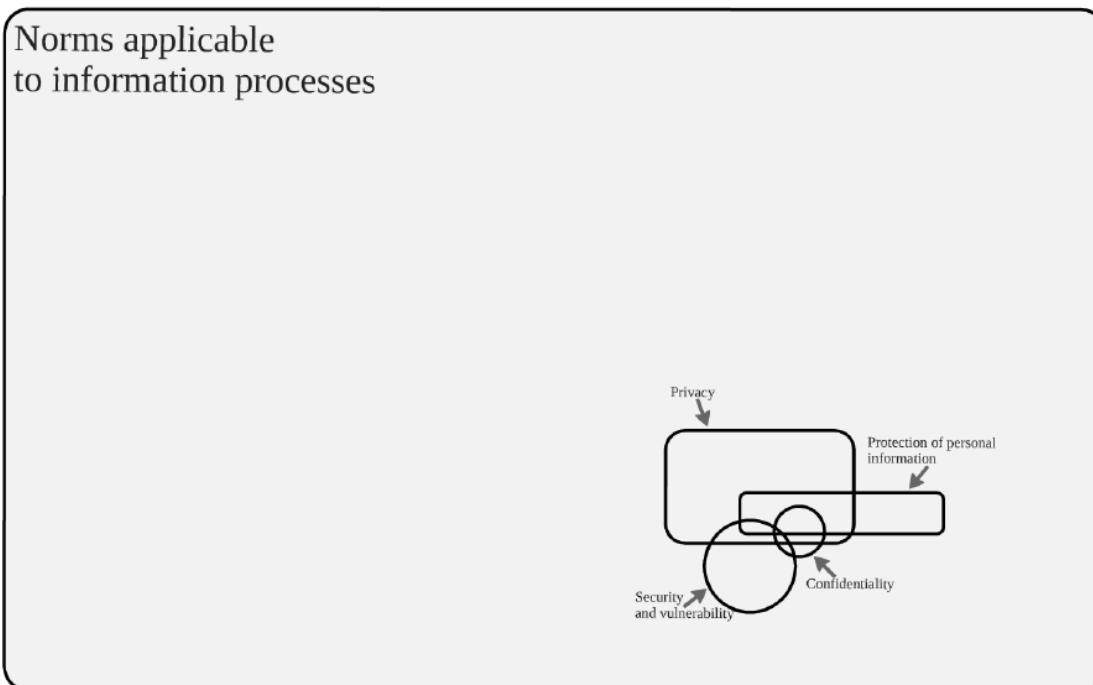


Figure 1: Norms applicable to information processes largely exceed those generally associated with protection of personal information

The wide range of the method explains why we have called it *Picture of Interpersonal Information Processes* using generic terms like "process" and "interpersonal" to describe its objects. With such a designation, we aim, among other goal, to avoid confusion with concepts specific to the protection of personal information which apply mainly to "records" or "files" (rather than to the entire process as PIP does) and to "personal information" (rather than all the kinds of information involved in an interpersonal relationship).

### 3. Relevance to jurists

PIP thus provides to jurists an instrument for the social analysis required as a prerequisite to the legal analytical work itself. As for its legal use per se, this method permits to take into account all the norms involved in the interactions between people

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*communications concernant les personnes physiques* » (Beyond privacy: what every jurist should know about information and communications technologies' applications regarding individuals)", in *Actes de la XIVe Conférence des Juristes de l'État*. Cowansville, Québec: Les Éditions Yvon Blais, 2000, 133-148. Online version: [http://pierrot-peladeau.net/fr/relations/ecr/ecr2](http://pierrot-peladeau.net/fr/rerelations/ecr/ecr2)

supported by a manipulation of information. To achieve this, PIP helps in structuring a systematic identification of:

- which persons (natural and legal) are interacting with which other persons (natural and legal);
- which handlings of which information on what or whom are producing which results concerning whom;
- which roles, legal or de facto, these persons are playing in relation to whom, and
- which actual interpersonal relationships are being established between these persons through an information handling.

Once such context is established, PIP then allows a systematic identification of legal norms and of other norms (such as technical standards, software rules, etc.) that apply or not to:

- the legal or de facto roles played by these persons;
- the information produced and handled;
- the handlings performed on such information;
- the legal or de facto interpersonal relationships

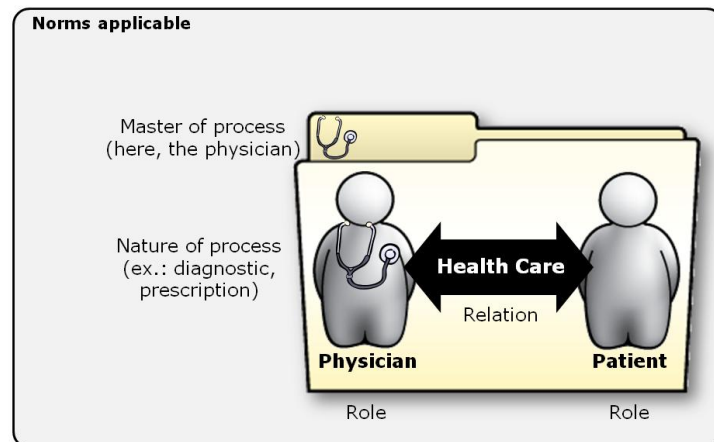


Figure 2: Norms applicable to role actually played by actors

established between the people across the handlings, and

- the decisions or actions taken through these handlings or resulting from them.

By establishing these elements, PIP provides jurists with a solid foundation for their legal analysis and communication and a possible broader examination of social and ethical issues involved.

#### 4. Why a visual model

In the 1990s, several widespread discourses proclaimed that we were living in an era of dematerialization of human activities and productions. From a strict computational point of view, such statement is flatly wrong. On the contrary, we are in reality witnessing an unprecedented materialization of interpersonal relationships. In fact, digital technologies cause an ever increasing mediatization of these relationships through physical objects, namely:

- information items and programs (which physical media, far from having disappeared, have simply moved on to microscopic scales), and
- machines (always as tangible and increasingly ubiquitous).

In principle, such materialization should greatly facilitate the identification of these interpersonal relationships, their reconstitution and their scrutiny. In principle, it would suffice to follow, step by step, the physical manifestations of the information flows and progress of the processes involved.

In practice, however, we witness the exact opposite: these interpersonal relationships appear increasingly difficult to recognize and to understand. Surprisingly, many organizations are still badly informed of their own processes and sometimes even of which information items they actually handle. And generally, this lack of knowledge is even greater among the individuals who are the very subjects of those information items and processes.

This apparent paradox derives from the fact that:

- most of the processes occurring within and between machines are beyond the direct perception of the human senses, and
- knowledge about these processes is often scattered, arcane (if it had been produced to begin with).

The consequences of such misunderstanding can be serious, including in legal terms.

##### 4.1 First example: unawareness of the very existence of information items in the Directron Média case

The most blatant example of unawareness which I witnessed was at the hearing of the case *Directron Média inc. c. Inspecteur général des institutions financières*.<sup>2</sup> The dispute involved a commercial enterprise who wished to obtain a copy of the Central

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<sup>2</sup> [1990] C.A.I. 171 (89 0 36). On line version:

[http://www.cai.gouv.qc.ca/07\\_decisions\\_de\\_la\\_cai/01\\_pdf/jurisprudence/890236ju.pdf](http://www.cai.gouv.qc.ca/07_decisions_de_la_cai/01_pdf/jurisprudence/890236ju.pdf)

Enterprises Database (CED) held by Quebec's Inspector General of Financial Institutions. The hearing lasted two long days. Yet in the end, it appeared that witnesses and lawyers for both sides had all that time depicted and discussed about an information system that was not the one that actually existed.

Contrary to what they presented, the CED did not contain only copies of the information items collected on the regulatory registration form and that were of a public nature under the *Companies Information Act* (typically individuals A, B, C, D and E are the directors of Company X - an information set that we will refer here as the "company's record"). In fact, the core of the CED was a relational database that also detained physically (a fact of legal significance here) other information items not listed on that form provided under the *Companies Information Act*.<sup>3</sup> This database included, inter alia, other sets that we will refer here as "individual records" stating that individual C is a director of companies X, Y and Z. The same database also included what we will refer here to as "address records" explaining that this particular address is the one of such business and/or of such directors).

Obviously, the fact that information items are not mentioned in any act or any regulatory form does not mean they do not exist.

In this case of the CED, the reality of a large proportion of the information items it contained had apparently not been perceived, neither by the representatives of the public body who detained them, nor by those of the business that aimed to sell them at a profit. Yet the material reality of such information items produced significant legal consequences. For example, the public or confidential nature of the information items includes in the "individual records" was not to be decided by the specific rules of the *Companies Information Act* because these items are not mentioned in it. Accordingly, this matter was therefore to be set by other legal rules of general application, namely here, the *Act on Access to documents held by public bodies and the Protection of personal information*.

Yet a simple detailed description of the database's contents could have avoided this misunderstanding as well as long hours of fruitless auditions because they were not bearing on the right object.

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<sup>3</sup> L.R.Q., c. R-22

#### **4.2 Second example: processes fed by information files systems about tenants.**

Beyond the existence or non existence of information items, there is also the question of the nature of the process in which they take part. Here, the instance that impressed on me the most was my very first assessment project of an interpersonal information system: a study of information files on tenants carried out in 1982.

At that time, four Quebec associations of rental housing owners and some Canadian commercial companies were offering tenants reporting or rental housing brokerage services. A law student at the time, I decided to make this the subject of a legal applied research project. Spontaneously, jurists felt that these files mainly raised questions of respect for privacy and reputations provided under the Civil Code of Lower Canada and the Quebec's Charter of Human Rights and Freedoms.<sup>4</sup> Building on this consensus and on publicly known facts, I could then have produced a legal assessment in a study conducted from a law library. However, I decided instead to investigate first about these files systems operating from Montreal, Saint-Jerome, Quebec City and Halifax.

I then discovered that these information services were very different from each other in terms of their objectives, the types of information produced, types of processing performed and the decisions about tenants they allowed to make. Accordingly, the discussion about their legality therefore touched on quite various legal norms and institutions, often far from those relating to respect for privacy and reputation (or even norms for the protection of personal information that apply today to such information handling).

One example among many: less than four months after the publication of my research report, Quebec's National Assembly passed a first round of legislative amendments which, inter alia, prohibited discrimination in housing based on the fact that person has exercised remedies provided by law.<sup>5</sup> Indeed, the objective of some blacklists had been to discourage tenants to use them, thus to obstruct the implementation of the new *Act respecting the Régie du logement* (setting standards and creating a board to arbitrate disputes between tenants and landlords).<sup>6</sup> The same round of amendments also prohibited discrimination because a person has a child or is pregnant (as some brokers screened different types of prospective tenants according to criteria set by their

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<sup>4</sup> *Civil Code of Lower Canada* (CCLC) and *Charter of Human Rights and Freedoms*, RSQ, c. C-12, s. 4 and 5.

<sup>5</sup> This provision became section 1899 of the present Civil Code of Quebec, RSQ c. C-1991.

<sup>6</sup> L.R.Q. c. R-8.1.

landlord clients). Never an abstract legal discussion process could have made such findings and produced such effects.

This experience has ingrained in me the idea of the need for a detailed understanding of an information handling and of its social dimensions as a prerequisite to any attempt to assess it legally, socially or otherwise. Because if one does not have clear understanding of who are the players interacting through what information and how, it becomes risky to correctly identify the applicable norms and principles, and therefore the social, legal and ethical implications.

### **4.3 Benefits of a visual mapping of processes**

Information systems are increasingly complicated devices that must achieve a proper dynamic fit with many complex social realities. The fact that a growing proportion of information processes remains unobservable to the naked eye facilitate some precedence of perceptions over facts. For often, the stakeholders' understanding can only be based on what is provided by forms and operating instructions, by contractual and regulatory texts, by metaphors and explanatory shortcuts, by promotional claims and official discourses.

In such context, the use of visual models facilitates understanding. A diagram such as an information flow chart or a business processes map is already verifiable proposition. This diagram may be confronted to the available documentation, to the devices' behaviour or to key informants' knowledge. The strict rules of diagram make-up force us to retain only the essential key elements, but all of those in a systematic, rigorous and comprehensive way.

Thus early on, I used various forms of diagrams as part of various assessment activities. However, my field experience as well as some theoretical work gradually led me to consider the need for a specific visual model for the social, legal and ethical analysis of interpersonal information processes.<sup>7</sup>

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<sup>7</sup> I discuss in detail the advantages and disadvantages of existing visual models in « La modélisation visuelle des systèmes d'information en santé pour leur gestion administrative, légale, sociale et éthique » (The visual modeling of health information systems for their administrative, legal, social and ethical management) in *L'informatique de la santé dans les soins intégrés : connaissances, applications, évaluation. Actes des 9e Journées Francophones d'Informatique Médicale*. Sherbrooke, Société Québécoise d'informatique Biomédicale et de la Santé (SoQibs), 2003, 297-308. On line version: [http://pierrot-peladeau.net/fr/relations/ecr/ecr1](http://pierrot-peladeau.net/fr/rerelations/ecr/ecr1).

## 5. Genesis of PIP

### 5.1 A system for prevention of illegal access to prescription drugs

My first attempt to develop a visual model specifically for social, legal and ethical analysis took place in 2000-2001. It was conducted as part of an assessment assignment of a system for prevention of illegal access to prescription drugs. The context was that of a technical upgrading project of the system and its extension to a new class of drugs. Yet since its inception fifteen years earlier, this system was a continuing subject of controversy between members of the board of directors of the professional corporation who managed it as well as between thousands of health professionals drawn in its use. The corporation asked me to evaluate the existing system and identify potential solutions to the conflicts.

During its fifteen years of existence, this information system had been the subject of much internal debate and several legal advices. It had also been subjected to an investigation by the Surveillance Division of the *Commission d'accès à l'information* (Access to Information Commission which also has authority on personal information protection) and of a decision by its Judicial Division. Furthermore, the system has been the subject of two coroner inquests because it did not prevent some deaths by suicide through abuse of prescription drugs.

However, when I undertook this mandate, I was to find that there was not a single document spelling out exactly how the system worked. None. For fifteen years, the professional corporation, its directors, thousands of health professionals in various fields of practice, lawyers, commission and coroners have discussed and decided about this information system only from fragmented indications and perceptions.

A credible assessment process requires the production of a description of the system that would be sufficiently detailed, accurate and objective to be considered valid by all the stakeholders involved. So I requested authorization to investigate the different information processes supported by this system in order to produce its first detailed description. The final document contained 22 series of diagrams (including four sets spanning on more than two pages) with their corresponding descriptive texts. This exercise gave me the opportunity to lay the basis for a new visual model. Why a new one? Because the different models already used in computing, as useful as they are, are often flawed from a social and legal perspective.

For example, in the case of this system for prevention of illegal access to prescription drugs, a data model would have identified that the main personal *entities* were "health

professionals" and "patients". Such categorization would have been consistent with the Canadian health data model at the time.<sup>8</sup>

In a use cases model, "patients" disappear as they are not direct users of the system. So we end up with only health care professionals informing other professionals through the information system.

By contrast, an actual social analysis reveals that the system was indeed making "professionals" and "patients" to interact together. However, at times the actual interpersonal relations were between individuals acting as informers or as agents for the detection and prevention of law violations, on one hand, and individuals suspected or alleged to have committed illegal acts to obtain prescription drugs, on the other hand.

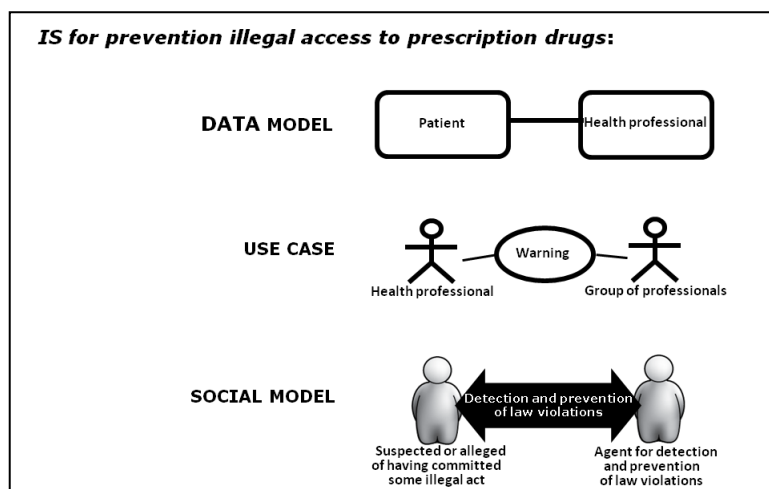


Figure 3: Comparison of the realities exposed by different visual models

Indeed, it was precisely where the main source of conflict lied. And also where was to be found the solution, not only to the controversy but also to the inefficiency of the device to prevent suicide by abuse of legally obtained drugs. Indeed, the processes that were triggering requests to health professionals for intervention were based, not on a clinical logic, but rather on a legal one of implementation of the Criminal Code, namely the provisions about the fraudulent access to prescription drugs.

The immediate benefit of this picture of interpersonal process information was of course that it offered for the first time to the interested parties a document giving an overview of the system and a detailed description of the processes they support. Even an employee whose exclusive duty for more than ten years had been the operation of the system said that she learned new things about its operation. For example, she

<sup>8</sup> Working Group 1 (Health Information Model) of the Partnership for Health Informatics/Telematics. Conceptual Health Data Model v2.3. Ottawa, Canadian Institute for Health Information, mars 2001.

discovered - as much as the corporation did - that the professionals' files management rules that weed out inactive patient records resulted in the systematic elimination of warnings that officially were still in force.

## 5.2 A data warehouse research

I conducted a subsequent experiment as part of the work of a committee on the ethics, confidentiality and privacy related issues of a medical research data warehouse project. I was a member of that committee. Some designers of data warehouse were also members of it. They had ample opportunity to provide us details about the various components of the device.

After several months of work of our committee, I tested the representation that we collectively had by producing a *PIP* model. It was a summary diagram presenting a most simplified and highest level overview of the processes, without dealing with the interpersonal relationships. We then realized that at least one third of the planned processes for the warehouse project had yet not been acknowledged. These processes had thus far eluded our analysis and our discussion.

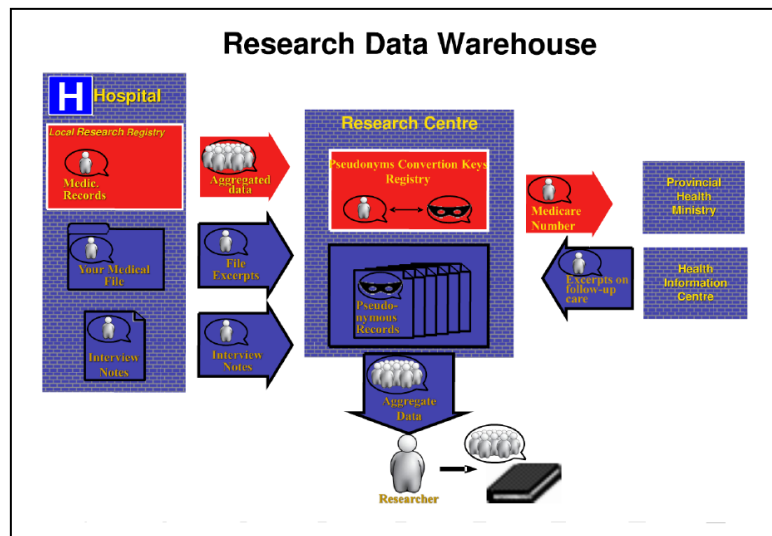


Figure 4: Unacknowledged portions of information processes (upper ones, in red) as exposed by a PIP model

Such experiments demonstrate the need for meticulous documentation of interpersonal relationships mediated by informatics and the great usefulness of visual modeling for such task.

## 6. Brief description of PIP

The general syntax of the model combines two types of pictures (or diagrams).

The first type describes the operating sequence of information processes looked at. In other words, these pictures describe the material information handling operations:

what information is produced, stored, communicated and processed to produce what results.

The second type of pictures rather describes the relationships supported by a process or a portion of it. In other words, these pictures focus instead on identifying who are the people involved in these handlings and what roles each play in regard to information items and other people.

Experience has shown that in order to distinguish these two types of pictures and of realities, it is preferable that the production of these diagrams uses distinct pictograms.

Lets us state here that the

PIP method is not prescriptive as to which symbols or pictograms should be used. Especially when it comes to communications and popularization, each user could use pictograms that are appropriate to the business sector, the cultural references of the addressees as well as the graphic signature of the issuing organization.

That being said, for the purposes of research and development of PIP, today we use two separate free access sets of generic icons.

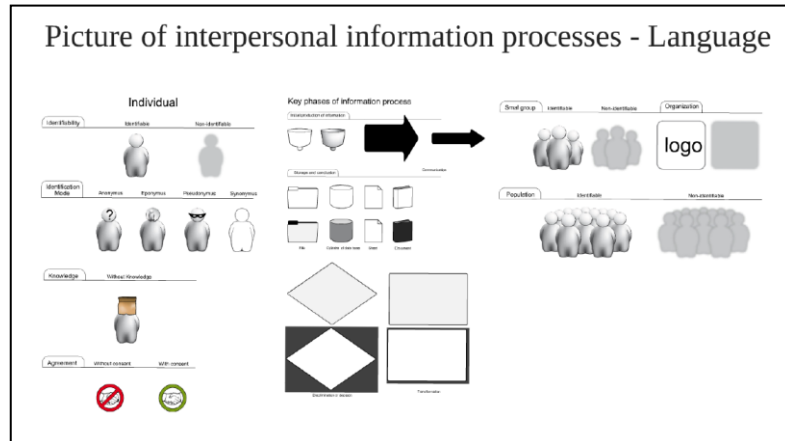


Figure 5: Basic PIP-L pictograms

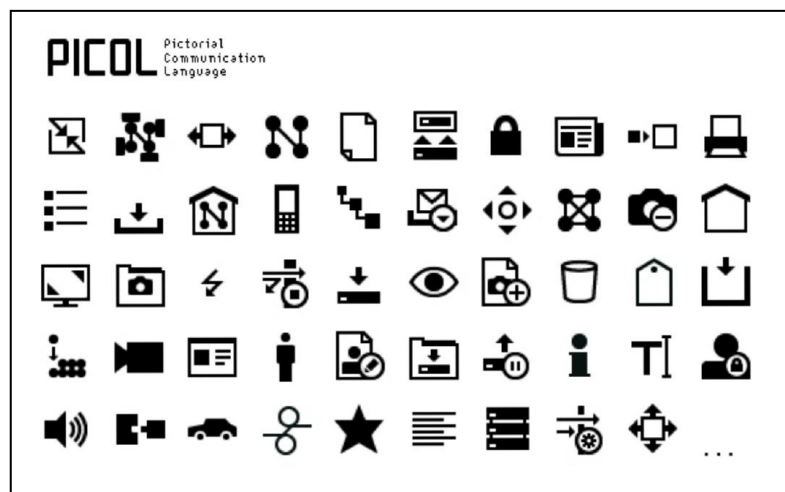


Figure 6: Sample of PICOL pictograms

For descriptions of relationships between actors, we use PIP-L (for Picture of Interpersonal Information Process - *Language*; acronym that can be pronounced

"people"). This ad hoc pictographic system was developed in collaboration with Communautique and industrial designer Caroline Cyr.<sup>9</sup>

Then, for descriptions of the processes themselves, we use PICOL (Pictorial Communication Language). This pictographic system was developed at the University of Applied Sciences in Mainz, Germany, for the description of electronic communications systems.<sup>10</sup>

## **7. Using PIP for communication and popularization**

### **7.1 Increasing communications needs-about processes**

Beyond needs analysis, and legal analysis in particular, there are growing needs for successful communication about processes that would be easily comprehensible by end users and information subjects. Indeed, the processes arising from the application of a statute or a contract are increasingly computerized. These processes are even increasingly self-administered by the various parties involved, thus less and less supported by clerks or professionals responsible for records keeping or accounts management. So instead of training a few tens or hundreds of employees about often complicated processes, we end up with thousands, even millions of users who usually have to learn to operate them more or less on their own. The quality of communication with these users is therefore crucial to the proper performance of the processes.

Jurists who advise organizations or users need themselves to properly understand these processes to legally assess and explain them. Yet as we have already seen, often the available documentation offers a poor explanation or conflicts arise simply because of differing perceptions.

In addition, how to properly explain these processes and their legal implications to the citizens who self-administer them while in Canada, 48% of adults have difficulty reading a simple text, and therefore much less a technical or legal content. That is besides the fact that many are still unfamiliar with computers or, despite a certain familiarity, are struggling to make out the operation of any electronic device?

The use of visual representations is a means, among others, to facilitate such communication.

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<sup>9</sup> PIP-L : <http://pierrot-peladeau.net/fr/pip-pip-l>

<sup>10</sup> PICOL : <http://picol.org/about.php>

## 7.2 Example of an explanation of vote in the electoral system

In 2009, we experimented with Communautique and literacy organizations the use of

PIP diagrams with groups of people with low literacy or low familiarity with computers.<sup>11</sup> We have succeeded through these diagrams, not only to explain certain processes, but also a number of basic concepts for understanding our information society. The example presented here is the explanation of vote in the Canadian electoral system from its informational basis. Among

participants, there were few foreign immigrants learning French. We then realized how much this sort of explanation could be easily understandable by people unfamiliar with our electoral system.

Note that the following diagrams are a series of pictures of interpersonal relationships. We did not

need to use specific description of the

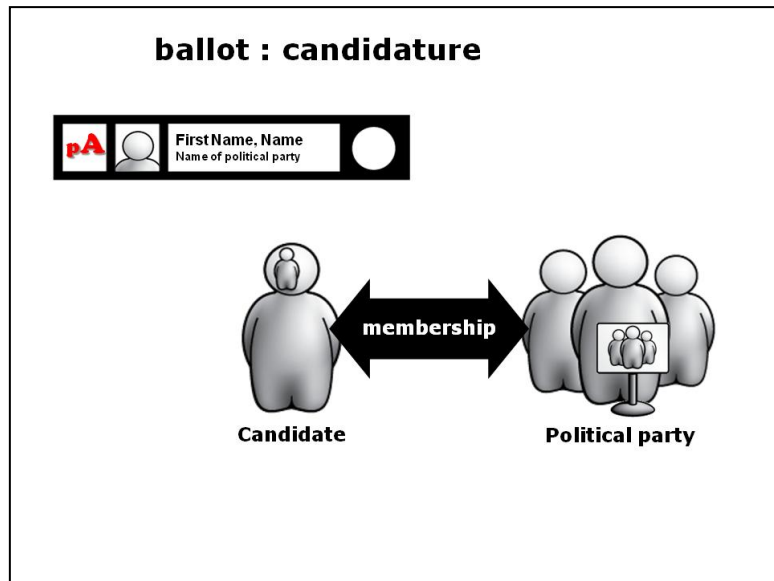


Figure 8: Interpersonal relationships in candidature

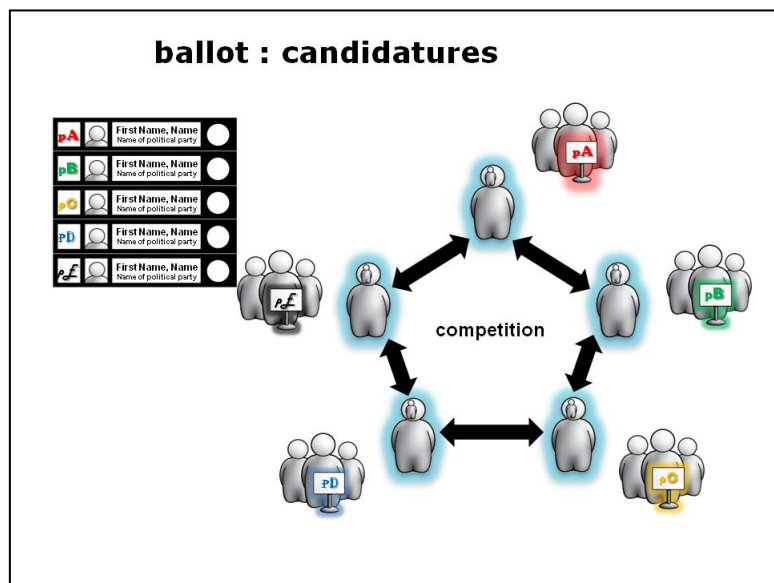


Figure 7: Interpersonal relationships between candidatures

<sup>11</sup> Project « Découvrir la société de l'information à travers nos informations personnelles » (Discovering the information society through our personal information) funded by the Canadian Council of Learning: <http://www.communautique.qc.ca/projets/projets-actifs/ateliers-appropriation.html>

information processes involves in the electoral system.

We began the explanation by taking the information object meant to be handled directly by the citizens: the ballot. First, we focused attention on the fact that each line of the ballot talks about an individual, duly identified, which is a candidate for the post of deputy (representative to a legislative assembly) and that this individual is member or not of a party, also duly identified if it is the case.

Afterward, that the ballot is a list of candidates, duly identified, member or not of a party, duly identified, which are competing with each other for the vote of every person qualified to vote.

When voting, the voter indicates one's choice among the candidates listed on the ballot. The vote is anonymous and the elector remains generally unidentifiable (anonymous

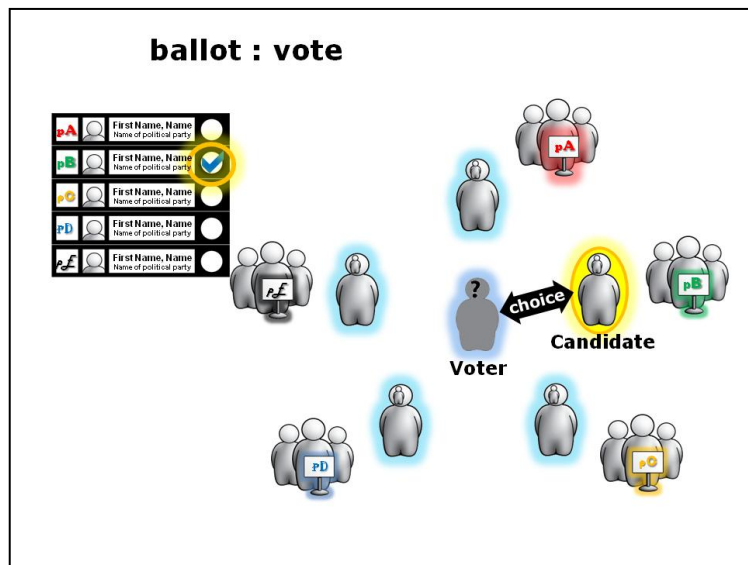


Figure 9: Interpersonal relationships in vote

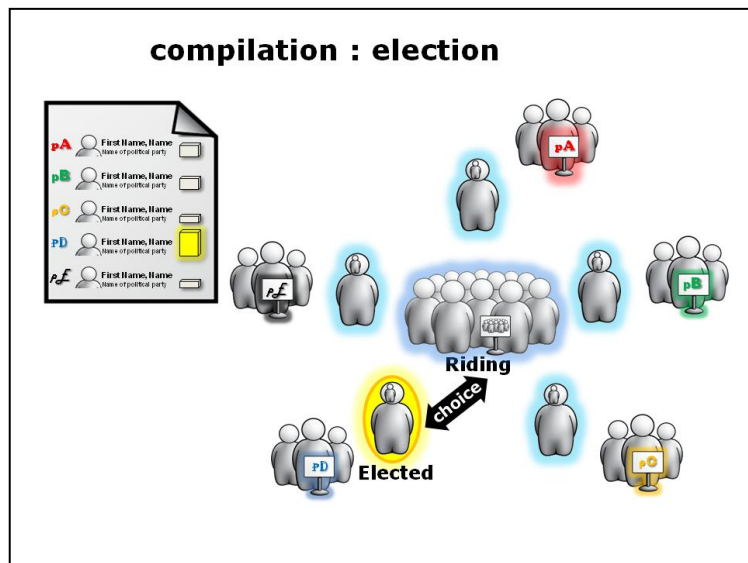


Figure 10: Interpersonal relationships in election

personal information and generally not individually identifiable).<sup>12</sup>

If the individual votes are anonymous and unidentifiable, their compiling permits to determine how many votes of the electorate of a duly identified riding have been given to each candidate. The candidate receiving the most votes wins the election and becomes representative of the population of this riding.

The group of all elected deputies composes the Legislative Assembly responsible for enacting legislation. As these acts and other decisions being taken by vote, a competition relationship remains between the deputies and their parties. Finally, according to the British

parliamentary tradition, the party or group of parliamentarians with the

largest number of seats in the legislature is usually the first to be offered to form a government politically responsible for the State businesses and its public administration.

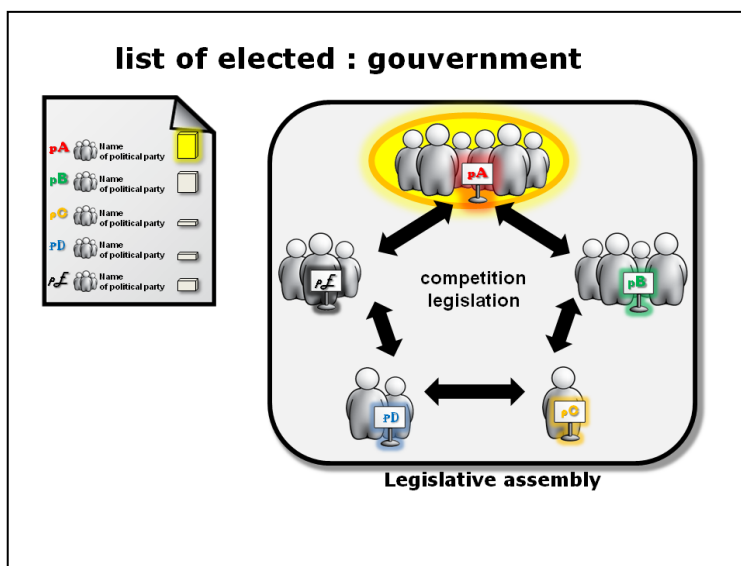


Figure 11: Interpersonal relationships in legislative assembly

### 7.3 Example of an explanation of consent in patient records

The second example is an exercise on the important issue of consent or not to some personal information handling. The following diagrams were created for a seminar of specialists in protection of personal information. This was the second versions of diagrams originally developed for a training session to health and social services workers.

These two pictures compare the consent (or lack thereof) in two contexts:

<sup>12</sup> There are scenarios like the one where, for instance, all voters of the same ballot box have vote identically, thus still anonymous ballots reveal in broad daylight the vote of each person listed as having voted, thus being identifiable in practice.

- regular communication of medical information between health professionals, and
- electronic communication, as proposed by the *Dossier Santé Québec* electronic patient record system.

Note that once the drawings illustrate both the relationships (with PIP-L) and processes (with PICOL). They are not intended to describe the whole systems involved, but to focus primarily in making visually explicit:

- the presence of consent;
- the lack of consent;
- the mandatory (statutory) nature of a set of operations, and
- the possibility for the patient to refuse certain operations among them (opting out).

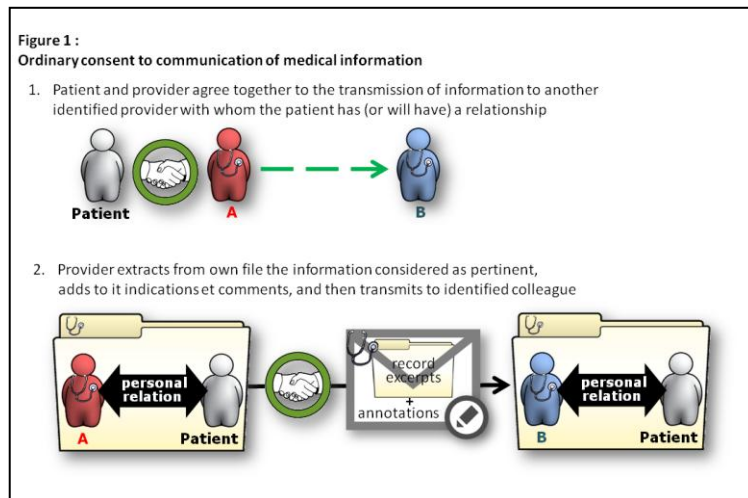


Figure 12: Picture of ordinary consent to communication of medical information

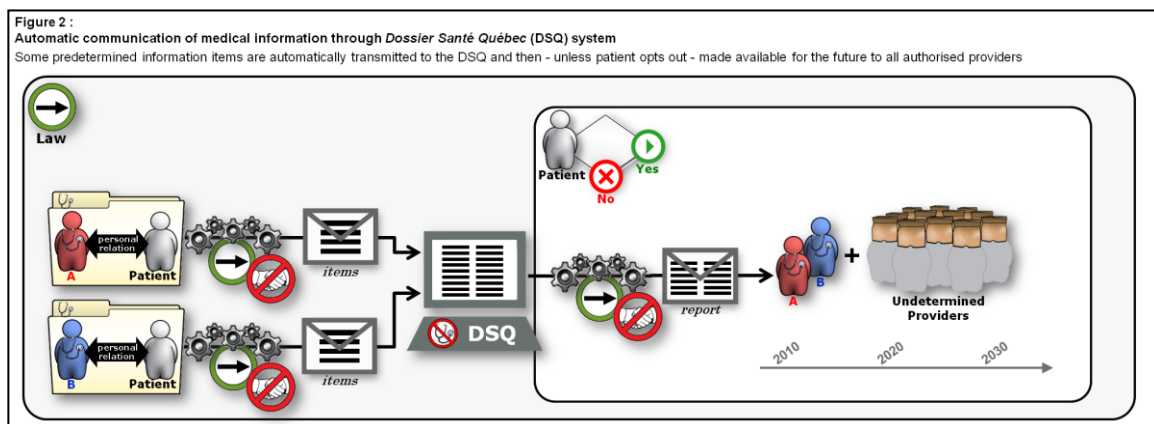


Figure 13: Picture of consent to electronic communication in *Dossier Santé Québec*

At first glance, there is no need to use words to understand that we are dealing with two very different modes of organizing communication and consent to it.

In the explanation of the *Dossier santé Québec*, the most critical point was the understanding of the opt-out option. Indeed, experience has shown that any attempt to

explain it orally or in writing was laborious. Despite the details provided and restatements, the explanation often causes confusion among the addressees.

In contrast, use of the picture clarifies the explanation by defining precisely to what the opting out applies as well as its effects. In this diagram, we have successfully:

- defined all the mandatory operations inside a box marked by the green circled arrow symbol showing the familiar road sign "mandatory direction" accompanied by the words "Law" which states that this obligation is legal;
- identified each of the mandatory operations by marking them by the same "mandatory direction" symbol, plus the gears icon (meaning automatic), plus the "no consent" symbol;
- signalled the presence of an opt-out by a diamond decision between "Yes" (and green PICOL "execute/continue operations" pictogram) and "No" (and red PICOL "cancel" symbol) that contains the word "option";
- identified the subset of operations that could be opted-out with a box (and thus, conversely, those who are not affected by exercise of opt-out).

### **8. PIP: a promising work in progress**

Clearly, the use of the *Picture of Interpersonal Information Processes* method facilitates the production of rigorous analysis and the production of intelligible and unambiguous communications, particularly on the legal dimensions. However, the development of the method and of its use is still ongoing.

At first, it is necessary to organize transfer and appropriation of the method. We thank this conference's organizers for their invitation which gives us a first opportunity to meet with jurists.

In the coming weeks, one will find on the PIP-PIP-L page, not only this presentation, but also access to symbols and then to various manuals and case uses.<sup>13</sup>

We will also provide training and guidance in using the PIP method, especially with the objective of appropriation that is at the heart of Communautique's mission, especially through training of trainers and multiplying agents.

We intend to gradually build and moderate a community of practice and R&D, including the use of PIP method for communication purposes between computer projects'

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<sup>13</sup> PIP et PIP-L page: <http://pierrot-peladeau.net/en/pip-pip-l>

stakeholders as well as with their users and other people involved. We also plan to develop real-life critical proof of concept project of use of PIP for communication.

So we send a warm invitation to all those interested, not only among jurists and lawyers but also all other categories of professionals and stakeholders involved in the design, development and operation of interpersonal information or transaction systems.

Finally, in the longer run, we are also looking to build software and methodological bridges with the practices and tools already used to design information systems in order to facilitate integration and use of PIP from the early stages of development of systems meant to support some form of interpersonal relationships.