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RED GARDEN GNOMES DON'T EXIST



ON THE ESSENCE OF ORGANISATION AND THE ROLE OF ICT

Colophon

Dietz, J.L.G.: Red garden gnomes don't exist
4th revised edition (3.2.1 +NL)
ISBN: 978-90-815449-2-4
©2018 Sapio Enterprise Engineering (www.sapio.nl)

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1st edition: 2010
2nd edition: 2012
3rd edition: 2015

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To discover the essence of organisation, one must become as small as Alice dared to

(with a wink at Lewis Carroll)

To my grandchildren

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PROLOG

This book tells the story of a student who was unsatisfied with the current status of her field of study, broadly identified by organisation and ICT (or IT). In her quest for a profound understanding of what she thinks are key notions in this field, notably communication, information, action, and organisation, she lands up in Gnome Land, where a seemingly infinite source of valuable ideas and insights opens up to her. After having found everything she was looking for, she returns to People Land, fully satisfied about her adventure and fully dedicated to the newfound mission of enterprise engineering.

Like the main character, Alice, the reader will be rewarded with valuable new ideas about and insights in matters that are not only the concern of professionals and students in the field of organisation and ICT. It is in the interest and to the benefit of every human being to have a proper understanding of the role of ICT in modern societies. So many things go wrong nowadays, and so few people understand the real causes of the endless failures of enterprise transformation, business process management, information management, and software projects. The key to the same source of enlightenment as Alice has drunk from, is in your hands. The only thing you have to do is to continue reading.

While reading, you will learn, among many other things, three basic human abilities, called *performa*, *informa*, and *forma*, of which the *performa* ability turns out to be the most important one, yet also the least understood. Deeply understanding it will lead you to the insight that communication, information, action, and organisation are only different appearances of this most human *performa* ability: the entering into and complying with commitments towards our fellow human beings regarding the things that we produce for each other.

This insight is nothing less than a paradigm shift; you must be willing to grasp and adopt it. The price is that you have to throw off your current way of thinking about organisation and ICT. The reward will be a proper understanding of the prospects and limitations of ICT for humans, organisations, and society at large, so that you will no longer feel uncomfortable with non-sensical horror stories about robots and other artificial intelligent things that would take power over us.

What has all this serious stuff to do with garden gnomes? This is a secret that will be unveiled while reading the book. You will discover that modern societies are crawling with blue and green garden gnomes, to the benefit of all of us. You must only look out for red garden gnomes because they cannot exist ...

Rijswijk, 9 October 2014,

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EVERYTHING IS RED, GREEN OR BLUE

“Bullshit is a greater enemy of truth than lies are”. This quote from Harry Frankfurt pops up in Alice’s mind, while she attends a lecture on enterprise architecture, that morning. Having read his essay¹ on the subject thoroughly, she is able to detect bullshit minutely. As she has experienced on many occasions, bullshit comes in unavoidably whenever circumstances require one to talk without really knowing what one is talking about. As Frankfurt puts it, bullshitters retreat from searching for correctness and appropriateness in their work to personal sincerity. Because they cannot be true to the facts, they try to be true to themselves. To Alice, however, such an attitude doesn’t sound very professional.

Incapable of further listening, her thoughts start to wander, as on numerous previous occasions. She is sure that it must be possible to understand communication, information, action and organisation in a truly profound and integrated way; no bullshit. There must be a theory of these core concepts that is coherent, consistent, comprehensive and concise, a theory that grasps the essence of organisation, building on sound notions of information, action, and communication. Every time her thoughts wander like this, she is looking for that theory. It is obvious to Alice that without it, one cannot master the complexity of any substantial enterprise change or transformation, and one can only exploit a fraction of the beautiful modern information and communication technology (ICT). But finding such a theory is not easy. To be honest, she hasn’t come any further since she decided for herself that it must exist. Sometimes the scary thought that it might not exist creeps up on her, that what she wants is simply impossible. At such moments she can feel very despondent and disappointed, and then indulges herself in eating lots of chocolate. On such occasions, she considers quitting her study in information systems architecture, and choosing a more solid one, like electrical engineering or medicine.

As these thoughts mull in her head, her eye is suddenly caught by a gnome, walking with a firm step from the door of the lecture hall in the direction of the windows. Because Alice, out of habit, sits in the first row she can observe the scene from very close by. The gnome has slightly wavy grey hair, and as he marches on he clearly repeats: everything is red, green or blue. The tone he uses is quite self-confident and convincing. But, Alice thinks, he cannot be very sure of what he says, because when you are sure of

¹ Frankfurt, H.G.: *On Bullshit*, Princeton University Press, New Jersey, 2005

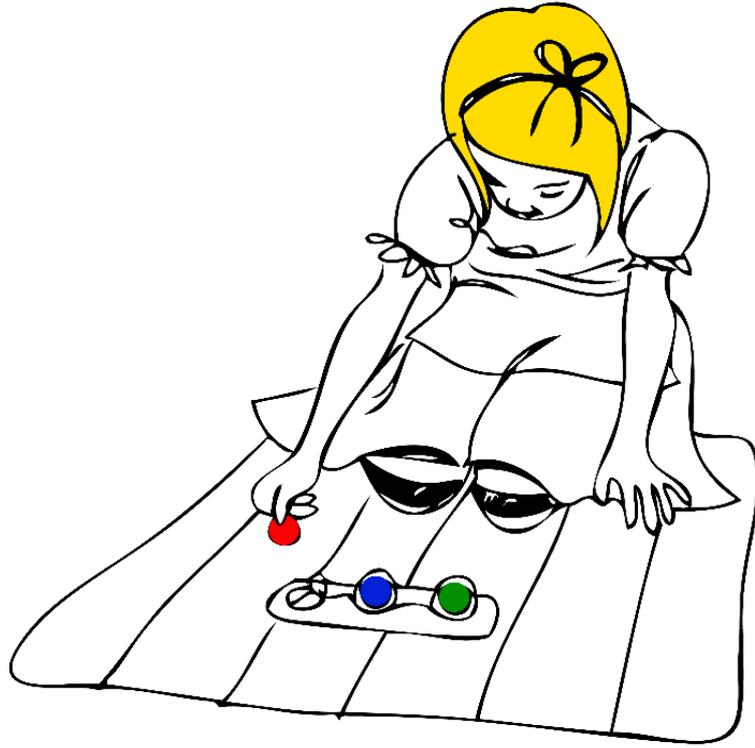
something, you do not have to repeat it to yourself so often (the thought that the gnome is not talking to himself but to her does not cross her mind).

Alice is so occupied by these and other thoughts concerning the incident, that she almost overlooks the fact that a talking gnome, walking through a lecture hall, is not a normal occurrence at all! Because she is now curious as to what her peers think about this, she looks around, and also at the lecturer, but they all seem to be oblivious to the gnome's presence. As she then tries to spot the gnome again, she just catches him disappearing through a small opening in the wall under the front window. Meanwhile her curiosity has reached such large proportions (she must and will find out what is behind that gnome!) that she doesn't think twice.

In one leap she jumps over the workbench, spurts out of the lecture hall and runs as quickly as she can to the courtyard, which lies outside the window where she saw the gnome disappearing to. As she arrives, she just catches him open a shutter in the ground, crawl under it, and let it fall closed behind him. Alice hurries to the spot, but with no plan other than to sit and cry out of disappointment (because following the gnome, considering the difference in the size of her body and the shutter, seems impossible). However, when she despondently drops to her knees and bows her head, she spots a pill strip lying on the shutter, with a little red, a little green and a little blue pill, above which is written: "EAT ME".

Again Alice doesn't think twice. She rips the strip off the shutter, presses out the pills, puts them in her mouth and swallows. Within seconds Alice shrinks to the size of a gnome, now easily fitting into the hole through which the gnome has disappeared. Without hesitation she pulls the shutter up and jumps into the hole where she lands in a steep, pitch black and curvy tunnel that she slides through at a dizzy pace. She has no idea how long she slides like this when all of a sudden it gets lighter and she can see the end of the tunnel. With a thud she falls into the grass of a meadow high on a hill, overlooking a beautiful valley.

Although the view is truly gorgeous, Alice cannot really enjoy it yet, for several reasons: because she still has to get used to her miniature size, but also because she has no idea how she will ever get back to the shutter in the garden, and how she can regain her normal proportions. For the time being however, she has no choice but to accept her fate, one that, she must admit, she has chosen for herself. She starts to look around carefully and so it happens that she perceives the grey gnome for whom she had plunged herself into this adventure. He is writing something and appears to be completely immersed in what he is doing. But then his head turns to her, a smile forms on his face and he signals for her to come over. This is enough for Alice to get over her slight fear and insecurities. She walks as fast as her little legs allow for and sits next to the gnome. The gnome starts to speak:



Hello, I was expecting you. What is your name?

So you knew I saw you and you were talking especially to me, there in the lecture hall.

Yes, but tell me your name.

My name is Alice, and yours?

Sapio.

What a funny name, Alice thinks, but this notion does not take up her thoughts for long because she is still quite taken aback by the big change that has taken place within and around her. So she says:

Where am I, what am I doing here, and how do I get back to the normal world?

Ho ho, my dear Alice, not so many questions at once, one at a time please. Where you are is easy to see: in Gnome Land. You should not actually have to ask what you are doing here either. You are looking for a better understanding of communication, information, action and organisation, aren't you?

Yes, that is true, but what do you know about this, you are only a gnome! Oh, sorry, I don't mean to offend you, but you know, I mean, those are problems in the real, eh... I mean in my world, not yours.

It does not matter that you do not know this, and I will not take your spontaneous reaction personally, but we gnomes also know about communication, information and action, just like people do, and with a lot of matters we also think it is practical to carry these out in an organised way. Moreover, your world is not as different from ours as you may think. The only thing is that you are from People Land and now you are in Gnome Land, you understand?

Yes of course, it was silly what I said, but how could you help me then?

You will experience that later, and I already helped a little as I walked through the lecture hall. Do you remember what I said?

Yes, I remember it well, because I thought it was so odd and because I didn't understand why you kept repeating it. You said: everything is red, green or blue.

Yes, you remembered it well. Do yourself a favor and never forget it!

But what do colours have to do with communication and such? Besides, it's not true that everything is red, green or blue. Look at my clothes for example.

Ha, ha, of course your clothes are not red, green or blue, just like everything else around here is not. I am not talking about all things, but just about communication, information, action and organisation. I am talking about the fact that in studying these notions you can distinguish three levels of understanding, and we gnomes simply think it is fun to indicate these with the names of the three primary colours.

Oh, I didn't know that you meant it figuratively. Now I know, but I still don't understand.

You will, as long as you keep your eyes open.

Even though she wants to understand what Sapio means, Alice has become slightly irritated at the patronising tone she feels he is using. This has nothing to do with the fact that he is a gnome. She gets the same feeling with many lecturers in People Land. At the same time she is becoming increasingly convinced that Sapio can be helpful to her, and so she decides to let it all just happen, and to try to get rid of her irritation. In doing so she lets her gaze glide over the valley that stretches out in front of her at the foot of the hill, and that provides a truly magnificent view. As she discovers the busy action of the gnomes there below, and especially the diverse range of colours of their pointy hats, she yelps with excitement.

What is it? Sapio asks curiously.

All the colours of these pointy hats, how beautiful!

What do you mean, all the colours of these pointy hats? I told you there are only three colours: red, green and blue!

But you said you use them figuratively, for the three levels at which one must study communication, information, action and organisation, and that for the rest everything can have any colour, so also pointy hats. Just look for yourself.

I am looking, and I only see red, green and blue pointy hats. Moreover, the pointy hats of gnomes cannot have any colour other than red, green or blue. Those colours have everything to do with the three levels I mentioned. I think you see so many colours because you cannot make the distinction yet, and maybe because you are looking from such a large distance. You know what, why don't you go down, walk through the valley and talk to the gnomes there. You can best learn the distinction I speak of by experiencing it for yourself. Besides, I want to continue working on my book about the non-existence of red garden gnomes.

It is clear that Sapio no longer appreciates her presence and the subject of his book seems so senseless that she doesn't want to know anything about it. Furthermore, Alice has become so curious about the difference between the three levels of communication, information, action and organisation, as well as what gnomes do, that she is eager to take a look in the valley. And so, she gets up and descends to the industrious Gnome Land over a small path. This is not easy. Frequently she has to swerve to avoid falling acorns and even grass stems appear to be quite troublesome. One time she has to take a large detour because a colony of ants crosses her path. Whether Alice jumps high or low, the ants do not get out of the way. Naturally she is familiar with all these things, but not in her current miniature size. What she experiences now is all very different. Despite the difficult side of being tiny, or perhaps thanks to this recent development, her attitude to the acorns, pine nuts, the ants and everything else she sees during her journey changes. The saying "it is the small things in life that matter" takes on an entirely different meaning. She realises that she has been quite thoughtless and conceited regarding the small things in nature. She resolves to no longer carelessly step on a colony of ants or kick an acorn, and to definitely not trample on a mushroom. Because a mushroom could very well be the house of a gnome, she thinks, although she does not really have a way of knowing this yet.

RED STANDS FOR PERFORMA

When she reaches the valley Alice first walks through the streets and over the squares for an hour, and enjoys everything she sees, hears and smells (because at times the loveliest of smells reach her, of plants and flowers, of bread and pastries, and what according to Alice cannot be anything but exquisite dishes). All gnomes she sees look cheerful and friendly. In the shops she finds a cosy hustle and bustle, and in the many factories she passes a cheerful industrious atmosphere prevails. In between all the business and hard work she has remained unnoticed, but not for long. When she turns off into an alley, looking for a place to rest, a gnome walks towards her and nods in a friendly manner. As soon as he² has reached Alice, he pauses. Automatically Alice stops also and glances at him.

Hello, I am Performa, what is your name?

Alice shakes the hand that is held out to her and tells him her name.

You are from a different land, aren't you? From which one, and how far is it from here?

I am from People Land, but I do not know how far that is from here.

Why not, you know how long you travelled, don't you?

To be honest: no. I slid through a dark tunnel very fast for some time, and then I was here. Well, actually not here, but up on the hill, with Sapio.

² The use of the word "he" does not say anything about the gnome's gender. In Gnome Land the inhabitants have made the practical agreement that differences in gender are not reflected in pronouns, and it is by pure coincidence that they use the pronouns which, in human language, are known to be male.



Oh, now I understand, you are one of Sapio's guest students.

Er... if you want to call it that, yes.

The fact that Performa does not appear to be very surprised about her presence, and that Sapio probably brings guest students to Gnome Land more often, takes away a large part of her worries about how she will be getting back to People Land. So she continues merrily.

It is indeed thanks to Sapio that I am now in Gnome Land. He has made me immensely curious about his assured and convincing claim that everything is red, green or blue. At least everything regarding communication, information, action and organisation, as I understood later.

Yes, you can learn a lot from Sapio. He really knows everything about communication, information, action and organisation in Gnome Land and he also enjoys talking about it.

All of a sudden Alice notices that Performa's pointy hat is purely red. She wants to know more about this:

Er... Performa, would you show me what it is you do, and explain to me why you wear a red pointy hat?

Of course, walk with me a while. I am just on my way to order a set of wheelbarrows for the enterprise where I work.

They only have to walk through a few streets to reach the building where Performa needs to be. Hanging from the façade is a large sign with a wheelbarrow drawn on it under which "Malum"³ is written, in fine curly letters. Performa goes ahead of her through the door and walks to the gnome who is standing in the corner of the room they enter. Alice immediately notices that this gnome, just like Performa, wears a red pointy hat, and that he is dressed noticeably smart, even more so than Performa, of whom she had noticed the same thing before. Performa greets the gnome, whom he calls Probus Vilis, and then introduces him to Alice. A light discussion arises, predominantly about acorning, a loved sport of the gnomes, and fermented grape juice, about which they appear to be equally passionate. Performa then turns to Alice:

³ Gnomes have a predilection for Greek and Latin; the Latin word "malum" means apple.

Alice, naturally you have already seen that we both wear red pointy hats. Gnomes who wear a red pointy hat are called red gnomes. The function of red gnomes is to carry out so-called original transactions. An *original transaction* is a pattern of actions that results in the bringing about of an original new fact. An example of such a fact is the having supplied to me by Probus Vilis of a number of wheelbarrows. Next to original transactions, we distinguish two other transaction sorts: *informational* and *documental*. As abbreviations, we refer to the three sorts of transactions as O-transactions, I-transactions, and D-transactions respectively.

I think I've lost the plot, Alice says, and immediately realises that this expression is unknown to the gnomes. But Performa and Probus Vilis appear to understand what Alice means and ensure her that everything will become clear along the way.

Performa then explains that every transaction is carried out by two gnomes, one in the role of *initiator* (the consumer or client) and the other in the role of *executor* (the producer or supplier), and that a transaction takes place in three phases. The first phase is the *order phase*. This is a conversation in which the initiator and the executor try to come to agreement on the *product* to be brought about. The order phase is brought to a close with the executor's promise to produce it. To do this, the executor has to take action, which is why gnomes refer to the conversation in the order phase as an actagenic⁴ conversation. After the order phase comes the *execution phase*, in which the executor carries out the necessary actions in order to create the agreed upon product. As soon as this has happened, the executor turns to the initiator and starts the *result phase* of the transaction. This is a conversation in which they try to come to agreement on whether the produced result corresponds with what was previously agreed upon. As soon as the initiator accepts the created product, the transaction is successfully completed and the resulting product becomes a fact. Gnomes therefore call the conversation in the result phase a factagenic⁵ conversation. To illustrate what he tells, Performa shows a picture to Alice < Figure 1 >.

So a transaction is more talking than doing!, Alice jokes.

Talking is doing!, Performa reacts, lightly irritated.

⁴ The word "actagenic" has partially Latin and partially Greek roots. It means generating action.

⁵ The word "factagenic" means generating a fact.

Alice is slightly put off by this resolute answer, and already regrets her well-intentioned interruption. Timidly she asks Performa what he exactly means. Performa's tone becomes milder right away:

What I mean is that by saying something you are also doing something, namely changing the state of what we refer to as the *coordination world*. For example if I ask you to tell me what time it is, then I have already changed the state of that world. It is very simple: before, I had not asked you yet, and afterwards, I have. Silly, you might say. Often it is rather unimportant whether you see talking as doing something or not, but sometimes it is very important, particularly in actagenic and factagenic conversations.

Why do you use such a strange term: coordination world? I sort of understand what you mean, I think, but can't you just say world, for example?

It is necessary to speak of coordination world in order to distinguish that world from the *production world*, which is the world where the products of transactions, together with all of their properties belong. Hence we talk of *production acts* and *coordination acts*. Have a look at this picture < Figure 2 >. To easily remember these things, we have come up with the following motto:

*a coordination act
is the focal point
of every communication*

*and a production act
is the crucial core
of every transaction*

Notice what happens in the conversation I will now have with Probus Vilis.

Performa:

I request – 10 items of Quadra 75 are delivered, by Malum to Hortus, on day 731.513.

Probus Vilis:

Havit.

Because Alice's face is completely blank, Performa explains what has been said:

Hortus⁶ is the *enterprise* where I work and Malum is, as you know, the enterprise where Probus Vilis works. For these two enterprises it is crucial that the gnomes who represent them in a transaction have the *authority* to do so, and that we both have. Furthermore, Quadra is a certain model of wheelbarrow and 75 is its capacity in sp, which stands for standard pointy hat.

I assumed something along those lines, but why do you say it in such a strange way?, Alice reacts.

The language I was speaking is OK⁷, the official gnome language. You don't know this language yet, which is why it sounded odd to you.

I see, I am starting to understand some of it. And what kind of strange thing did you reply to that, Probus Vilis?

Oh, you mean 'havit'. In a conversation the one you are speaking to always replies with 'havit' if he thinks he has understood the message. It is a confirming message or *confirmation*. If you think you have not, or not entirely, understood it, you say 'havit not'. With this message you convey a *disconfirmation*. The other then tries to clarify what he aims to bring across in another way. In transactions we try to be very precise and prevent any misunderstanding, which is why we always speak OK then.

We have done so since gnome history, Performa adds. According to wise gnomes, this is a question of evolution. It is simply better. If you do not speak OK, many more mistakes are made. But let us continue the conversation; it is Probus Vilis' turn now.

Probus Vilis:

I promise - 10 items of Quadra 75 are delivered, by Malum to Hortus, on day 731.513.

⁶ Hortus is another Latin name, meaning "garden".

⁷ OK is an acronym of "Officiële Kaboutertaal", translated in English to "Official Gnome Language". It should be pronounced as "okay", because that's how gnomes pronounce it.

Performa:
Havit.

The order phase, Alice, has now successfully been rounded off, Performa says. What we have shown you is the shortest possible execution of this phase. We have done this on purpose to highlight the most important elements. Those elements are the request by the initiator and the corresponding promise by the executor. With corresponding I mean that they concern the same product.

Next, the result of a coordination act is the creation of a coordination fact. For example, the result of a request regarding a product is the being requested of the product. The becoming existent of a fact is an *event*. So, at the moment that a *coordination event* occurs, the corresponding coordination fact starts to exist. Coordination events serve as *agenda*⁸ for gnomes. Every gnome has his own agenda, so a list of things to do. By dealing with an event, his agenda decreases, but the generated response will increase the agenda of one or more other gnomes. So, even if you try hard, you will rarely get an empty agenda. But that is no problem to us; we like to have things to do.

How funny. In People Land agendas also exist and they are quite similar. In my agenda I write for example when there is a pop concert, and when someone is celebrating his or her birthday.

That may be the case, Performa replied to this interruption of his story, but we gnomes do not have pop concerts and we do not celebrate birthdays either. So let me continue. By closing off the order phase in the transaction between Probus Vilis and me, an *agendum* has been added to his agenda, namely: live up to your promise. How he will do this, is entirely up to him. I only pay attention to the result he will show me. If you come back tomorrow you can experience how this transaction is finished.

Tomorrow already?

Yes for sure, tomorrow it is day 731.513, as today is day 731.512. And Probus Vilis has promised to supply on that day, so that is what I expect him to do.

⁸ The Latin word “agenda” means things to do. The singular form is “agendum”. Like it is the case in People Land, “agenda” is also used as a singular word in Gnome Land.

Oh, I didn't know this, but what a strange way to indicate dates.

It is not a strange way at all, and we find it a very easy way. We count the days, from the beginning of recording dates. And every time when a thousand is reached we celebrate. Thus in 488 days we celebrate that we have had 732 thousands.

That sounds like fun! In our world we celebrated the year 2000 a few years ago, namely when the year changed from 1999 to 2000. A year for us is like a thousand days for you. Today in People Land it is 26-10-2003. The current year is 2003; the 10 stands for the 10th month in the year and the 26 stands for the 26th day in the month. We started counting with 1-1-1.

Then I think you celebrated a year too early, because at the time when you celebrated, only 1999 years had gone by, Performa answers quickly and wittily.

His argumentation escapes Alice, she will have to think about it some more later, and it isn't that important anyway, is it? But she already has a better understanding of what a transaction is. Yet she still has some questions:

I think I understand what I have observed of your transaction. But you said yourself that its order phase, so the actagenic conversation, was as short as possible. How long can it be and what does it depend on?

Oh yes, I forgot to explain this. Our conversation could be so short because Probus Vilis and I know each other and each other's enterprise well. But if I had to do business with an unknown enterprise, I would have some questions first. For example, questions regarding the products that they supply, for what price, with what level of quality and so forth. The other party will also have questions such as about the creditability of Hortus and my authority to do business on behalf of Hortus. In general, you perform three checks when dealing with an agendum: the *justice* check, the *sincerity* check, and the *truth* check. The first two checks regard the gnome who performed the coordination act to which you respond. He has to be authorised for the act he performs and he must be sincere in performing it. The third one regards the product that the agendum is about. The precise meaning of truthful depends a bit on the kind of coordination act. If you respond to a request, it means that you check whether bringing about the proposed product

is feasible. But if you respond to a statement, which you will witness tomorrow, you check whether the produced product is the one that was agreed upon in the order phase.

I think I also understand that, says Alice, but then I have another question:

How would the order phase have proceeded if Probus Vilis would not be able to bring about the product that you requested?

That is a good question, Alice. In that case Probus Vilis would have to decline my request and we would have had to negotiate about a different product, for example 6 items tomorrow and 4 items later, or 6 Quadra 75's and 4 other wheelbarrows, etc. In that case, I would have to renew my request, but with an adapted product.

So actually you better first inquire about the availability of what you want, or more precisely, about the truth of the requested product.

Yes, exactly. I should have inquired about what was available before I made my request, and I had actually done this. I already knew that Malum had plenty Quadra 75's in stock. The point in the order phase is that the initiator and executor agree on the product to be accomplished. The initiator requests it and the executor promises it. Through these acts they *commit* themselves to the carrying out of the transaction. The actual sequence of messages in an actagenic conversation can take on many forms. For example it is not even necessary that the initiator starts the conversation. Sometimes Probus Vilis drops by with the question whether I need anything or with the announcement that they have a new type of wheelbarrow, and this can lead to a transaction, you see? But let us leave now, I have other things to do.

They say goodbye to Probus Vilis and walk back to the street. Alice is in a good mood. She feels like she learned something which is important for her, and while she walks next to Performa she memorises the discussions and tries to summarise them in her own words. This leads to the very last question:

Er... Performa, do original transactions only occur between organisations, or do they also occur within organisations?

Yes, definitely also within organisations. In every situation where an original new product is accomplished, there is an original transaction. They can only be realised by carrying out original transactions. Thus, every original product is the result of an original transaction, and every successfully executed original transaction results into the creation of a new original product.

Why do you place such emphasis on original?

Because that is where the essence of our work lies. The opposite of original is derived or computed. For every derivable fact there is a rule with which it can be derived or computed from original facts. Deriving facts is the task of green gnomes. You should talk about this with one of them.

I will definitely do that, but how about transactions within an enterprise?

What you usually see is that the executor of a transaction, in order to bring about an agreed upon product, must initiate other transactions, of which the results will contribute to the end result of his transaction. These other transactions can take place within the same enterprise, but that does not necessarily have to be the case. There are always also things that you acquire externally. For example, if Probus Vilis would not be able to supply from his stock, he would have to enter into a transaction with the factory of Malum, but it may as well be some other factory. The execution phase of such a transaction is usually also made up of a number of transactions, and these transactions can in turn also be composed of others. In this way, you get entire tree structures of transactions.

The tone of Alice's 'hmm' that follows, expresses that it has been enough for now, rather than that she actually understands it all. Performa also notices this and holds his tongue. Soon they reach the Hortus building and say goodbye to each other.

Do not forget to come here tomorrow afternoon, so that you can experience the completion of the supply of the wheelbarrows, Performa says.

Alice assures him that she will be there.

GREEN STANDS FOR INFORMA

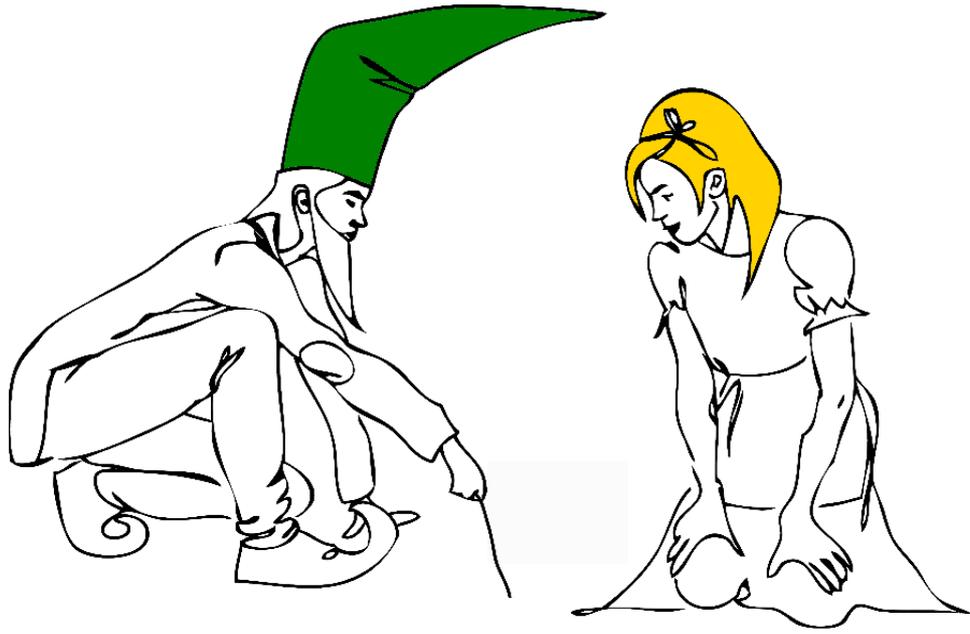
The next morning Alice wakes up early but well rested. She is already looking forward to the continuation of the transaction between Performa and Probus Vilis, and she clearly has the feeling that she is on the right track in her quest for a coherent understanding of communication, information, action and organisation. Aside from this she has begun to feel comfortable in Gnome Land. She thinks about how she will get back to People Land once in a while, but when she does, it is without many worries.

But first there is a tasty breakfast waiting for her in The Cantharellus, the inn where she spent the night. On the tables are placemats that illustrate the history of Gnome Land. Alice learns that the first proof of the existence of gnomes stems from about 800 thousands ago, and that many people believe that gnomes do not exist. Well, she will be sure to disenchant those people when she gets back! On each table there is also a vase with anemones, her favorite flowers. At first Alice thinks this is normal, but of course it isn't. She then realises that the gnomes grow their own miniature anemones. The thought of genetic manipulation crosses her mind, but she does not know for sure whether this is how they are grown, and she cares even less. The anemones are simply splendid, they are nicely arranged and smell delightfully.

After she has finished breakfast she once again immerses herself in the pleasant hustle and bustle of everyday life in Gnome Land. Because the continuation of the transaction will only take place this afternoon, she decides to talk with a green gnome first. While she comfortably walks and looks around she notices that it is very easy for her to distinguish red gnomes from the others, but that the difference between green and blue gnomes is not so clear yet. After a while she comes across a gnome with a green pointy hat, sitting on one knee, making stripes in the sand with a stick. Alice kneels next to him and greets him. The gnome looks up slightly disturbed, but as soon as he sees Alice a grin appears on his face. He greets her and they introduce themselves. His name is Informa.

I am one of Sapio's guest students, Alice says with pride in her voice. I am from People Land. That's where Sapio made me so curious about the three colours of communication, information, action and organisation, that I followed him.

That's what I thought, says Informa. And, have you become a little wiser?



Yes, I think so. I visited Performa yesterday, a red gnome, and this afternoon I will return to him to experience the continuation of an original transaction.

Oh, Performa, yes I know him. So you met him already. Then you are already somewhat informed about what it is that red gnomes do, and now you want to learn from me what green gnomes do, right?

Exactly, that is why I came to you, but if it is not convenient for you, I can come back later, or I can look for another green gnome.

No, I have time for you, and maybe a small interruption in my work is good, because I must admit I was getting a little stuck.

What exactly was it that you were doing there, with the stick in the sand?

I was computing something, something for Performa. He has a problem with the maintenance of the thousands of wheelbarrows that are scattered all over Gnome Land. There are about one hundred maintenance gnomes, who go from one place to the other to oil and paint the wheelbarrows and so forth. Every maintenance gnome works through about six or eight a day. Performa thinks this number could be increased by choosing the routes that the gnomes take more efficiently, thereby decreasing the travelling time.

That sounds very good, but not so simple. It is called optimisation, right?, Alice continues, as if she is completely familiar with this topic. But that is not the case; she has merely followed a few lectures in optimisation techniques.

Correct, it is an optimisation problem which is known here as the ‘travelling sales gnome’. There are several computational techniques that lead to satisfying solutions.

And so that is what green gnomes do: computing, Alice suggests.

Computing is one of the things we do. You could say that green gnomes do three kinds of work, all three supporting the work of red gnomes. The first is *remembering* facts. We remember all facts that are created by red gnomes, such as a delivery of wheelbarrows, provided they ask us to do so. And we recall that

knowledge when they need it, because red gnomes do not remember anything themselves. So, *recalling* is the second kind of work we do. But, red gnomes can also ask for derived facts, such as the monthly profit of Malum. *Deriving* facts consists of mathematical and/or logical computing. By the way, we also remember derived facts sometimes. We don't really pay attention to the difference between original and derived facts. If we have a needed derived fact ready, we supply it immediately, and otherwise we look for a computational rule with which we can compute it.

Performa hammered on the difference between original and derived facts, Alice interrupts him, and now I hear you saying that this is not so important.

You need to understand me correctly. For red gnomes the difference between original and derived facts is important, because they are the only ones who are able to accomplish original facts, thereby changing the state of their production world. We green gnomes do not change that world; we simply remember and spread knowledge about it. Even when we derive new knowledge from existing knowledge, the state of that world does not change. It is only presented differently, more adjusted to the needs of the red gnomes.

Hmm, yes. And what is demanded more, original or derived facts?

Oh, derived facts by far, but don't ask me why. So you can imagine what green gnomes are doing most of the time. For example, there are several large groups of green gnomes who do nothing but computing statistical data. You name it, they make it. The Statistical Hundred Day Book is very popular.

For whom is that book?

Well, I suppose there are red gnomes who have a need for it. You see, that is one of those things that we do not concern ourselves with. We simply enjoy computing, and so we do it when it is asked from us. By the way, did Performa tell you that in Gnomeland, we distinguish between three sorts of transactions?

Yes, he did: original, informational, and documental.

Right. So, now you know that green gnomes carry out informational transactions, or I-transactions for short. Accordingly, we consider every organisation to be composed of three *aspect organisations*: the O-

organisation (O from original), the I-organisation (I from informational), and the D-organisation (D from documental). In this picture, you can see how they are related to each other < Figure 3 >.

Alice is starting to understand what the role of green gnomes is, and she can imagine that they don't worry about what it is that red gnomes do with the supplied information. A case of 'separation of concerns' it flashes through her mind. The point is that you should not deal with all problems at the same time. No human is able to do this. Let alone a gnome, Alice jokes internally, but immediately she feels herself going red with shame. She didn't mean it at all, the thought just appeared. After all, she is well aware that gnomes are far from dumb. She tries to look at Informa as if nothing did happen, and says:

I have another question about the remembering function. I wonder whether you remember everything.

No, we remember a lot, and enjoy it, but not everything. To be sure that no knowledge is lost, the gnomes thought up the concept of *information* a long time ago. This is the expression of thought in form. The form in which we express thoughts is made up of a limited number of figures, which everyone can draw easily. Writing symbols we call them, and the drawing of writing symbols we call writing, logical right? Certain sequences of symbols constitute words, and from words you can make sentences, you understand? So, a sentence is actually a written thought. Thus, next to spoken language we also have a written language. The recognition of a string of symbols as a written sentence, we call reading. Besides playing tricks with numbers, most green gnomes also like playing with words and sentences. I myself find the words "sentence" and "sense" quite funny, because they originate both from the Latin word "sentire", which means 1) to perceive, to sense, and 2) to understand, to notice.

Why is that funny?

Well, you can say for example: a sentence has sense, or: what is the sense of this sentence? That's funny, isn't it?

I don't really see the fun, you could have just said: a sentence has meaning, and: what is the meaning of this sentence? That's a lot more clear!

If you don't like games like that, you probably will not appreciate the motto of green gnomes. I will tell you anyway:

*only a sentence with sense
provides us information,
means for communication,
without sense it is nonsense*

Well, I do think that is funny, Alice says honestly. Yes, funny! But, er, why is information a means for communication? Communication is the exchange of information, at least that is how I have learned it.

Then you did not learn it in the right way, so let me explain it to you. *Communication* is in essence the sharing of thoughts, for example between two gnomes. This can only take place when one gnome expresses his thoughts in *sentences* and the other interprets the sentences, thereby generating thoughts from them. The sentences are called information items. In all, this is of course a clumsy way of communicating, but there is no other way. Therefore, the best you can do is speak and write OK. But, let me continue my story. Every original fact that a red gnome wants to be remembered carefully, is written on a brown leaf. Such a written-on leaf is called a *document*. Every new document that we make is given to a blue gnome to keep. What blue gnomes do with these documents, you should ask one of them. When we need a document, we simply ask a blue gnome to give it to us for perusal, you see?

Yes, I understand, and I definitely also want to speak to a blue gnome. Er ... those derived facts, are they also recorded in documents?

What do you think? Derived facts do not need to be recorded, because you can always re-compute them. But sometimes we write them down anyway, especially if it regards facts that are asked for frequently. Thus it is a matter of trading off costs. The Statistical Hundred Day Book is a good example of documenting computed facts.

Right, yes, Alice reacts. I understand your function with respect to the knowledge of the production world, but what about the coordination world? Performa told me about that too. If I remember correctly,

the result of a transaction is always a fact in the production world, and the coordination acts in the two conversations lead to changes in the coordination world.

Indeed, that's how it is. We can also remember facts in the coordination world, such as requests and promises and so forth, and we can even compute derived facts about them.

That is what I thought, but in the conversation I experienced, there was no green gnome present.

I know that red gnomes sometimes do not have the course of a transaction remembered by a green gnome. Why this is, I don't know, and it's not my business either, you should ask Performa.

I will. I have another question about that. Do you remember it all yourself or do you use blue gnomes too?

That is a clever question Alice. Yes, definitely, that happens too. Just as with production facts, it depends on what is the best way. If the red gnomes think it is important to carefully remember the process of a transaction, we make documents, which we then give to blue gnomes to keep.

Alice is clearly happy with Informa's compliment. She also has the feeling that she understands the functions of green gnomes well now. With this, a significant piece of the puzzle of communication, information, action and organisation has been solved.

To be very precise, Informa continues, it is even simpler. I did say that green gnomes remember production as well as coordination facts, but actually they only remember coordination facts. That is sufficient, because the gnomes, at Sapio's suggestion, have agreed that the beginning of the existence of a product coincides with the acceptance of the transaction result. To top this, a *coordination fact* is more inclusive than a product. It comprises four parts: the gnome who performed the coordination act (the *performer*), the one to whom he addressed himself (the *addressee*), the *intention*, and the proposed or resulting *product*. Have a look at this picture < Figure 7 >. But it would get a little complicated if we were to go deeper into this, I think.

Oh, but I have time! And you have made me very curious by using a strange term: intention, Alice reacts.

All right then, Informa says. I think you understand the roles of the two gnomes involved. And you also have learned by now that a product has a number of *properties*, like the production time. Regarding your question, the *intention* of a coordination act is the aspired goal of the performer of the act with respect to the product. Every coordination act kind (request, promise, etc.) has its own intention. For example, the intention of a request is that the performer wants the addressee to respond to this coordination act/fact with a promise. Well then, if you know the coordination fact that is the acceptance of a transaction result, then you also know the brought about product, including all of its properties.

I see, but the document you make of such a coordination fact consists of a number of sentences. First, there is the sentence in which you express that the coordination act has been performed, and thus that the coordination fact has started to exist. Then, there are sentences in which you lay down the four parts of the coordination act/fact. In addition, there may be several sentences in which the properties of the product are stated, like the type of wheelbarrow and the number of items in the transaction between Performa and Probus Vilis that I have witnessed.

You are really a clever student, Alice, responds Informa. Indeed, that is exactly how it is. So, indeed, the documents we make, consist of several sentences.

Alice is glowing with pride, and because she has no more questions left and does not want to waste Informa's time, she thanks him, and says goodbye. It is not afternoon yet, so it is too early to go to Performa. Therefore, Alice decides to look for a blue gnome.

BLUE STANDS FOR FORMA

After the conversation with Informa the meaning of green is just as clear as the meaning of red to Alice. As a result, she now only sees blue pointy hats, next to the distinctly red and green ones. Alice notices that most hats are blue. Gnome Land is truly swarming with blue gnomes. Before this, she had already noticed that there are more green gnomes than red ones. She approaches the first blue gnome that crosses her path:

Hello, what is your name?

I am Forma, and you?

My name is Alice. Can I ask you something?

Of course, feel free.

Actually I only have one question, namely: what do blue gnomes do?

Shall I give you a short but quite accurate answer? Blue gnomes do whatever green gnomes ask them to do.

Yes, I already sort of knew that. What I mean is: what does this entail, what do blue gnomes bring about exactly? For example, what are you working on right now?

I am on my way to Informa to deliver these folders, Forma says, pointing to a large bag on his back, full of brown folders.

Where do those folders come from, and what is inside them?

They are all from the documentary around the corner.

Documentary? You mean a kind of movie?



Oh dear! Don't you know what a documentary is? Think of the word "library"; instead of books (so of "liberi" in Latin), a documentary contains documents. It is a large space, usually a hole in the ground, with racks and compartments in which hundreds of thousands of folders can be stored. Every folder contains a copy of some document. A folder is an end leaf that protects the contained document against all kinds of damage.

So the transportation of documents between documentaries and green gnomes is one of your tasks.

Indeed, yes. So, presently I am transporter. By the way, we not only transport documents between documentaries and green gnomes, but also between green gnomes, and between documentaries.

I see. And what do blue gnomes do, aside from *transporting* documents?

Another task of blue gnomes is *archiving* documents before they are stored in a documentary, so that we can retrieve them again and provide the document to whoever needs it. So, this is the third task of blue gnomes: *providing* documents when needed.

And if some other blue gnome needs to transport a document that you are carrying, does he have to wait until it is back?

No, imagine that, then green gnomes would have to wait far too long. And that is truly not an option. Then you would be letting the troll out of the bag!

That expression evokes an uncontrollable laughing fit in Alice, and she looks up with tears in her eyes only to find a perplexed Forma staring at her. She quickly tells him why she had to laugh. Although Forma really does not see the humor in it, he appears to be content with her explanation and continues his story:

What I have in the folders that I carry with me, the green gnomes refer to as documents, but instead of the original documents that they wrote themselves once, they are almost always duplicates made by blue gnomes. The boss of the documentary never allows original copies to be taken away. This is why he gets

duplicates made, whenever needed. All copies, whether original or duplicate, are called *files*. So, actually, we store and retrieve and transport files.

As Forma speaks, Alice thinks about how the meaning of “original” in original document is different from its meaning in original fact, and that derived facts can also be recorded in an original document. The fact that she notices these differences in passing fills her with a sense of pride. At the same time, she fully understands that it is a good habit to never give away original documents. As if she gets it all, Alice continues:

So that is the fourth task of blue gnomes, the copying of documents.

Indeed, the *copying* of documents is the fourth task of blue gnomes. In every documentary you find dozens of gnomes who make copies, either by writing again or by tracing. We call them copiers.

I see. And those copiers consequently know a lot about what green gnomes hear from and tell to red gnomes.

No, Alice, you are really mistaken now. They do not know anything about it, why would they? Blue gnomes do not read; they only copy. The meaning of what is written is the concern of green and red gnomes; we have nothing to do with that. To each his own, I say. That is also the message in the motto of the blue gnomes:

*writing again or tracing,
it doesn't mean a thing*

It had seemed so obvious to Alice that you know what you are copying, that she hadn't thought about the fact that this is actually not really necessary. Again she recognizes the practical value of the 'separation of concerns' principle. As her thoughts continue, she realises that perhaps this way of working is better than what she is used to in People Land. The division of red, green and blue gnomes seems to be very effective and efficient. At the same time she has to admit that her curious character would make it very difficult for her to function as a blue gnome. She has a few more questions:

Hence the tasks of the blue gnomes are primarily the archiving and providing of documents. This implies transporting, storing, and retrieving files, and the copying of documents, so the making of duplicate files. Do you do anything else?

Yes, there is another thing, but before discussing it, I have to make one correction: we talked about copying documents but to be very precise, it is copying files, of course. Well then, because red gnomes keep carrying out transactions, and the green gnomes make documents that have to be archived, and blue gnomes then copy each document several times, the number of files keeps growing. This leads to the bulging of documentaries. Of course, you can always build more documentaries but where is the limit? Therefore, it is sometimes necessary to dispose of files, so to destroy them, first the duplicates, but eventually sometimes also the originals.

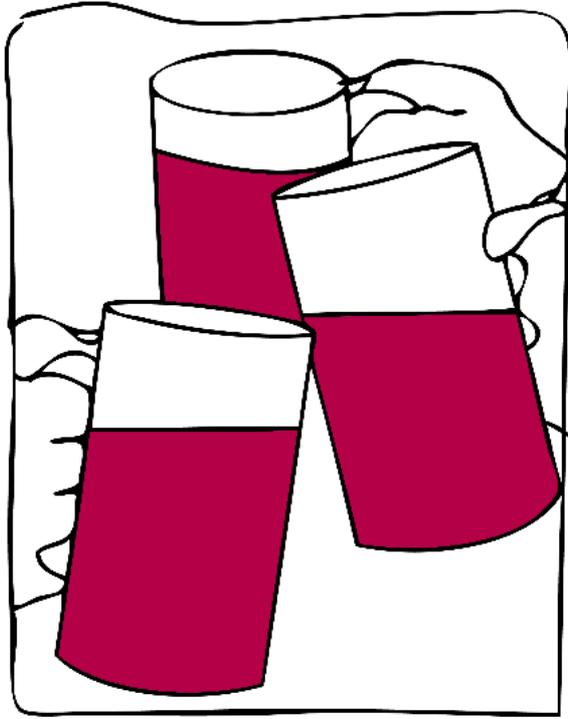
And if one of those documents is needed, what do you do?

Then unfortunately there is nothing left to do. Those are situations in which you can see green gnomes turn red. You know what I mean? But full is full! Luckily, it does not happen very often. We always destroy the documents that haven't been requested for a long time first. Many red and green gnomes think that is a silly rule, because they argue that sometimes old information can be particularly valuable. Well, let them propose a better rule I say!

So that is the fifth task of blue gnomes, the *destroying* of documents (or better: files), Alice interrupts him, because she is not very interested in these rules.

Yes exactly, and now you know them all. Here you see them all together < Figure 3 >. I think that blue gnomes do a whole lot of work in Gnome Land, you could even say: by far the most. But you don't hear us complaining. All right then, I should get on with it, or Informa will start grumbling.

Alice notices that she took it to heart, the fact that Informa may start grumbling, but why exactly she doesn't understand very well. She doesn't care about gnomes! Or does she? It's all quite confusing. The day before yesterday her thoughts were only with her friends, with the concert that they will go to next Saturday, and with the boy she secretly hopes will show up there too. Still it is an unmistakable fact that the gnomes have started to take up a little place in her heart.



FACTS ARE INTERSUBJECTIVE

Since it is almost afternoon, Alice already starts walking into the direction of Hortus, the enterprise at which Performa works. She feels very content about what she has done and learned until now. The relaxed cheer of the many industrious gnomes around her only enhances this feeling. As she reaches the Hortus building, Probus Vilis is just unloading the last wheelbarrow from a large cart. She greets Probus Vilis and walks with him to Performa.

Probus Vilis:

I state - 10 items of Quadra 75 are delivered, by Malum to Hortus, on day 731.513.

Performa:

Havit.

Alice hears immediately that they are speaking OK and understands that this is the beginning of the result phase of the transaction that Performa and Probus Vilis started the day before. She then sees that Performa counts the wheelbarrows, walks around them, and touches one once in a while as if he is inspecting them. He then turns back to Probus Vilis.

Performa:

I accept - 10 items of Quadra 75 are delivered, by Malum to Hortus, on day 731.513.

Probus Vilis:

Havit.

Together they walk to a cabinet hanging on the wall, and Performa motions for Alice to join them. He takes a bottle out of it, and a glass for each of them. Performa speaks:

What you have witnessed Alice, is the successful carrying out of the result phase of the transaction that we began yesterday. With this the transaction is completed. So from now on a new fact exists in the production world.

I understood that, yes, but what are the bottle and those glasses for? Is it your birthday today or what?

As I said yesterday, gnomes do not celebrate birthdays. We have other customs. One of them is to drink to a successful original transaction with a glass of fermented grape juice. So that's what we are going to do now. Will you drink one with us?

Alice is a little overwhelmed with the speed at which the transaction has been completed, and at which the drinking to is commenced. However, she does feel it is important for her to experience this, even though she has her doubts about the taste of the drink. Thus she agrees and the three of them raise their glasses. The taste is not bad at all. She enjoys it even, but she also has the following question:

That conversation must have been so short because the two of you know each other, which also counted for the order phase.

Not only because of that, Performa answers. The most important reason why a result phase may last longer, and in some cases fails, is the inability of the executor to state the product that was agreed upon during the order phase. The actually resulting product may differ from the promised one.

Oh, I get it. You mean if Probus Vilis had supplied less than ten wheelbarrows.

For example, but also if it had been more, or if they had been damaged, or if he had been too late, or too early. There are many reasons that could prevent the initiator from accepting the result. In that case, he will reject the executor's statement. Then the process ends up in a *discussion status*.

Then what happens?

Then they discuss and they either come yet to agreement, or not. If they fail to do so, then there are two possibilities. One is that the executor breaks off the transaction. He would only do so if he thinks he cannot make it a success. The other possibility is that the executor also feels that the delivered result is not what it should be, and that he sees the opportunity to do it better. He can then revoke his statement and carry out the production act again, in order to bring about an acceptable result. Let me show you these pictures of transaction patterns for clarification < Figures 5, 6, and 7 >.

Oh, great, that helps, but I have some other questions. Why was it necessary that you formally accept the result? Isn't it enough that Probus Vilis places the wheelbarrows here?

No, it's not that simple. A transaction is a 'play' between two *subjects*, so social individuals, like people and gnomes. It takes place in the coordination world. This world belongs to their intersubjective reality.

I cannot really follow this, Alice interrupts.

All right, to begin with there is an objective, material, reality. It contains all things that we consider to have a material existence outside of us. For example, those wheelbarrows, this building and those acorns all belong to the objective reality. Do you agree?

Alice can agree with that.

Each of us also has a subjective reality. That is the entirety of one's private thoughts, believes, desires, etc. However, this reality is not relevant for our current discussion.

I think that I understand that too, says Alice.

So, Performa continues, next to the objective reality and everyone's subjective reality there is the intersubjective reality. In the most literal sense, subjects construct this reality. What happens in the intersubjective reality is at the same time the most important thing in organisations, more important than what takes place in the objective reality.

Now I get lost, interrupts Alice. What is more objective than the fact that ten wheelbarrows are standing here? Anyone can see that!

You can indeed see ten wheelbarrows, but you cannot see that they have been delivered by Probus Vilis to me. Thus it is necessary that Probus Vilis states that it are these ten wheelbarrows that he has delivered. In addition, the presence of the wheelbarrows also does not mean that I have accepted them as the property of Hortus. Thus it is also necessary that I do this.

I see, now it is starting to make sense. Your product is the transferral of the ownership of the wheelbarrows. Such a fact cannot belong to the material objective reality, and it does not belong to one or both of your subjective reality either. So it must belong to your intersubjective reality.

More or less. What is important, is my acceptance of the product. Only by that act does the the ownership transfer fact come into existence. To go one step further, also objective facts are the results of transactions. For example if I would request you to determine how many wheelbarrows are standing here, you would create an original product. After having stated that there are ten wheelbarrows, I could accept this transaction result, by which the product would start to exist, you see? From that moment on we would agree on the fact that there are ten wheelbarrows standing here. So, all facts are actually intersubjective.

But isn't it silly to consider objective facts as results of transactions? I mean, everyone could see that there are ten wheelbarrows standing here. So, I don't see the need for the transaction you talk about.

I agree with you if it concerns objective facts that have only meaning for you personally. For example, while walking around in Gnome Land you could have observed that there are a particular number of gnomes and shops and trees etc. But imagine that the manager of Malum would feel the need to know how many wheelbarrows there are really in store, so not according to accounting but physically. Then you would need a transaction like the one I talked about and it would be important to assign the executor role in this transaction to a competent subject. Therefore, observing is also an original production act, as are the manufacturing and the transporting of wheelbarrows. Have another look at this picture < Figure 3 >.

Alice studies the picture and understands what Performa is saying, but she finds it all a bit odd. She feels many assumed certainties slip away, and this makes her restless. To regain her certainty she puts forward an idea for which there can only be one explanation:

But it is impossible that you, Performa, would accept the delivery of ten wheelbarrows if there were only nine standing there!

It sounds absurd, but in theory, yes I could. However, I wouldn't do this because then I would act irresponsibly. I just wanted to make clear that a fact in the production world only exists by virtue of its acceptance in the (intersubjective) coordination world.

Probus Vilis adds to Probus' explanation:

Maybe it helps, Alice, if we use a situation without material objects as an example. Imagine that I was authorised to make you an employee of Malum and that you asked me to do so. The fact to be accomplished then is that from a certain day on you are employed by Malum. I can state this and then you can accept it. However, you cannot see that fact anywhere. Yet it is just as much an objective fact as the fact that there are ten wheelbarrows standing over there.

I think I am starting to understand it. First of all, many facts are immaterial. So you cannot observe them, you can only agree on them intersubjectively. Next, the authority to perform certain production acts and coordination acts is crucial, isn't it?

That is definitely crucial, yes! If I, without being authorised to do so, would name you employee of Malum, this would have no effect, even if you were to accept it. That acceptance would not be effective.

And if you had stated the shipment of wheelbarrows instead of me, Probus Vilis adds, Performa would not have accepted it, because you don't have the required authority.

Clear, answers Alice, and therefore you perform the authority check in dealing with agenda. But how does one become authorised to carry out a transaction?

Oh, quite simple, answers Performa, these are results of transactions by other red gnomes. An authorisation is yet another product, and thus the result of a transaction, but then in another production world.

So different production worlds exist, with their corresponding coordination worlds?

Indeed. My production world concerns the purchasing of wheelbarrows. Next to that there is one for the using of wheelbarrows, for the maintenance, the manufacturing, and so forth, and so also one for authorising subjects. Because one cannot overview the whole universe, you always select some *Scope of Interest*, as we call it; you consider some part of the universe.

Right, I see. One more question, Performa:

What did you just say to the green gnome standing by the door?

Oh, you saw that? That is very observant of you! I told him what the created product was; we do that at each transaction.

Yes of course, I could have known that, after my talk with Informa. But he said that green gnomes do not remember the product of a successful transaction, but the coordination fact or *process step* in which it is accepted.

Spot on, very good, answers Performa, I didn't know that Informa had already been so detailed and precise. That is indeed what I told the green gnome.

But why did you not do this with the other process steps?

That was not necessary. Getting them to remember the entire process of a transaction is something Probus Vilis and I don't usually do since we, as I said before, know each other well. When it is a transaction with a new enterprise, then the whole process is often remembered. That gives one the possibility to track it later, if problems were to occur.

When they say goodbye, Performa has refilled the glasses a couple of times. Alice decides to take a walk and think over everything she has learned. When no more questions pop up in her head, not about red, not about green, and not about blue gnomes, she decides to return to Sapio.

ABOUT ORGANISATION

The climbing of the hill takes longer than Alice expected, but it's nice weather so she doesn't mind. Besides, the physical exercise calms her and allows her to order her thoughts. Sapio is already waiting for her, curious as to what she has to tell him (which he can guess of course, but Alice doesn't know). Alice notices that Sapio wears a pointy hat with three colours: red at the top, green in the middle and blue at the bottom. Naturally she needs to know what this is all about. But first she tells him about her experiences of the last two days, particularly about the meetings with Performa, Informa and Forma. Sapio nods approvingly when she ends her story.

And you know what I think is so quaint?, says Alice. That Informa happened to be computing something for Performa, and that Forma happened to hold documents for Informa!

That is less of a coincidence than you think, Alice. We call all red gnomes Performa, all green gnomes Informa and all blue gnomes Forma.

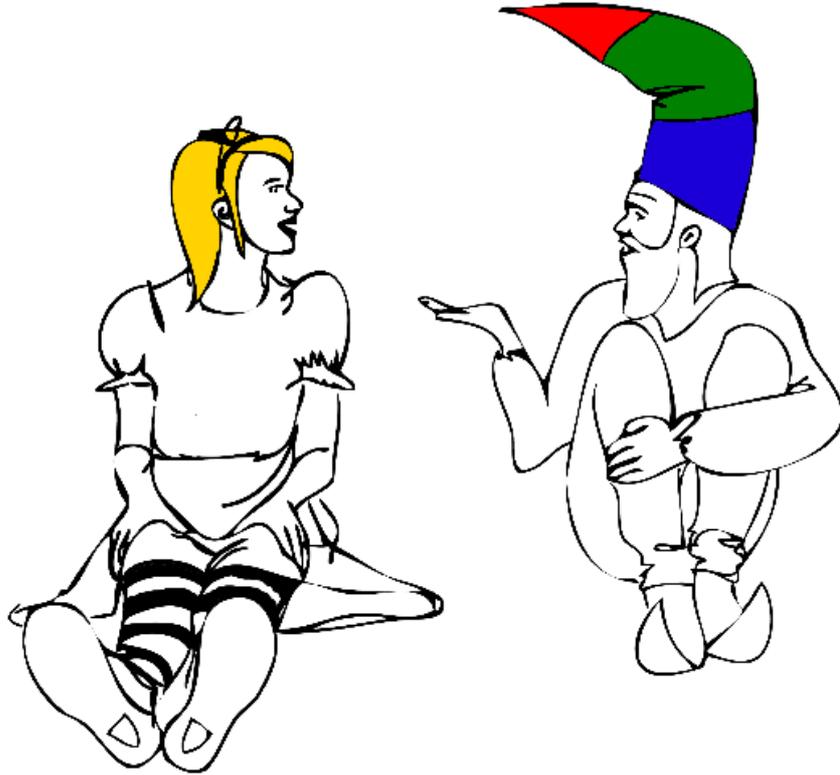
Alice is surprised and upset at the same time. It is as if she has cruelly been ripped out of a pleasant dream, and for a second she can't stand Sapio. Then she remembers that Performa spoke to Probus Vilis, and thus to a red gnome who wasn't called Performa. She's already looking forward to the defeated look that Sapio will have on his face.

Well, I actually met a red gnome who wasn't called Performa, but Probus Vilis!

Her words appear to make no impression on Sapio, and Alice doesn't know how to behave. Sapio had already guessed what was brewing in Alice's head and puts in extra effort to be kind to her and spare her of any more disillusionments:

Dear Alice, I am not here to drive you into some sort of trap. What I said is true. Probus Vilis is a nickname that the other Performa whom you met, has for him. The giving of nicknames is custom with

gnomes, an expression of courtesy. With these names you express what you think of someone; “probus” means “good, decent” and “vilis” means “cheap, not expensive”. They are Latin words; Latin is a loved language amongst gnomes, but you already gathered that, I think.



By calling him like that, your Performa expresses that he is content about what the other delivers, you understand? Other gnomes probably have other nicknames for him.

Apart from this, however, every gnome has his own identity, and when they act as executor or initiator in transactions, these identities are important, for example, to check one's authority.

Oh, so that's how it is, I would never have thought that. It is so different from how people use names. But what do gnomes do when they talk to each other about a gnome who is not present himself? It seems to me that it is very easy to run into problems then.

Laughingly Sapio answers:

Gnomes, Alice, only talk to each other, never about each other. Talking about others almost always creates problems, regardless of whether you are referring to the correct or incorrect gnome. We in Gnome Land have come to realise this!

Alice again finds herself surprised at how well gnomes in Gnome Land have organised life. Would this be why they are all so relaxed and cheerful down here she wonders. Because what Sapio is saying is all so true. She knows from her own experience how annoying it can be when you talk about others, and that sometimes you hear things from someone which you told someone else in confidence a long time ago (and which you already started regretting). Then you also notice that very little of it is accurate; it has become quite a different the story.

If I have listened to you correctly, Alice, you appear to already understand a lot about communication, information, action and organisation, and the relationships between these. Above all, you have experienced that three qualities of gnomes play a crucial role in performing production acts and coordination acts, namely *performa*, *informa*, and *forma*, and that we like to refer to them as red, green, and blue respectively. But maybe it is good to explain a few more things, and maybe you still have questions.

Yes I do. What I wonder is whether I understand properly what an organisation is. It hasn't really come up a lot, I think.

Good, let's start with organisation, the other things will come up automatically. An *organisation* is a group of gnomes who collectively deliver products or services to others. They do this together because it is too much work or too difficult for one gnome to do on his own. Take for example that Performa who delivers wheelbarrows on behalf of Malum. Basically, he could do all the work at Malum on his own. But then he would need to have all the professional knowledge and skills to make and sell wheelbarrows, and he would have to do this fast enough to meet the demand for wheelbarrows. Well, he will be short of both. The making of a modern wheelbarrow like the Quadra 75 requires several specialisations, and it takes about 30 hours to manufacture one. At Malum I think about 100 Performas with about 40 different specialisations work, and the necessary Informas and Formas of course. Together they can succeed in producing wheelbarrows of high quality and to deliver these on time. The being organised of these gnomes consists of the tuning into each other of their tasks, thus the carrying out of transactions. That is how they manage to do it, you see?

Yes, roughly I do, but what happens exactly?

Gnomes influence each other's acting in communication. There are two forms of influence: interaction and interstriction. *Interaction* takes place when they perform coordination acts in the order phase and the result phase of transactions, thus in the actagenic and factagenic conversations.

So there is interaction between the two gnomes who together carry out a transaction, interrupts Alice. But then we are talking about a single transaction. Performa, however, told me that often within a transaction another transaction is started, with another gnome as the executor. Obviously, that is also interaction, but how are these transactions related?

Such transactions are part of the same business process. A *business process* is a tree structure of transaction processes, which you know by now. Think about the transaction you experienced. During its execution phase, the salesgnome may have started a number of other transactions. This may hold for each of the transactions, and so forth, until eventually you have a transaction that is no longer composed of others, for example the assembling of a wheel to a wheelbarrow or the transportation of a wheelbarrow. Only when all the enclosed transactions are completed can the salesgnome of Malum state that the requested wheelbarrows have been delivered to the purchaser of Hortus. Have a look at this picture < Figure 9 >. The lower part shows the business process of purchasing/selling wheelbarrows.

All of a sudden you are talking about salesgnome and purchaser instead of about Probus Vilis and Performa. That must be because they are both red gnomes.

Not only because of that, but let me first proceed. So, a business process is a tree structure of transactions. The roles of initiator and executor in these transactions must be fulfilled by authorised red gnomes, as you know. But who exactly does it is not so important for understanding the business process. In other words, instead of Probus Vilis, another salesgnome of Malum could have taken on the role of executor in the delivery transaction. To distinguish between the role of a red gnome (for example: salesgnome at Malum) and the role fulfiller (for example your Probus Vilis) we have introduced the concept of *actor role*. This is the authority to be the executor for exactly one kind of transactions, for example the delivery of wheelbarrows. You can assign an actor role to as many subjects as you like. All these subjects then can act as the executor in transactions of the corresponding transaction kind.

What do you mean by transaction kind?

By *transaction kind* we mean the class of transactions that concern the same kind of product, so for example all deliveries of wheelbarrows. We consider the *competence* that is needed to be executor of transactions of some kind to be the same. Therefore we connect a particular actor role to a particular transaction kind as the executor role of that transaction kind. A similar reasoning holds for initiator roles. Being the executor of a transaction, often implies being the initiator in one or more other transactions. This is all included in the executor role. Next, a subject that fulfils an actor role we refer to as an *actor*. Every subject may fulfil several actor roles and every actor role can be fulfilled by several subjects.

I have to add something else, continues Sapio. As you now know, transactions take place in communication, namely by performing coordination acts, through which subjects enter into and comply with commitments. But there is another kind of communication, which we call secondary. In this secondary communication subjects constantly check and tune the cultural and social norms or values that they apply in the primary communication, thus in carrying through transactions.

I think I understand that. Back home I also talk a lot with my friends about all kinds of things, and I am aware that in doing this we also constantly check our social and cultural values, and adjust them if necessary. No one wants to be considered 'different', isn't it?

I couldn't have explained it better, Sapio praises her. Some gnomes call this secondary communication the 'lubricating oil' of Gnome Land. In order to emphasise that you need both primary and secondary communication to have an organisation operate 'smoothly', I have thought up this as my motto: "*communication is the thread of which organisation is woven*".

It is totally clear to me now, and I like the motto. But what is the other way of mutual influence, the one you referred to as interstriction?

For every kind of agendum, there is normally an *action rule*, which is a guideline for dealing with the kind of agendum. Here is an example < Figure 10 >. The action rules for an actor role not only contain what to do, but also under what conditions. These conditions regard the state of the production world and/or the coordination world, so which facts must exist, and which are prohibited to exist. In this way actors also influence each other, but now indirectly. By taking into account the current state of the world, you could say that an actor is restricted by facts that are produced by other actors. Put differently, actors restrict each other's 'playing field'. That is why we call it *interstriction*. Like interaction, interstriction⁹ belongs to the primary kind of communication.

It seems all pretty clear to Alice, although she has to let the motto sink in further, and in the meantime a different question has formed in her mind. She understands that red, green and blue gnomes each have their own kind of production acts, but that they are not different in carrying out coordination acts. However, at the same time she has the feeling that in coordination acts red, green and blue also play a role. She just doesn't really know how and asks Sapio.

You know Alice, discuss that question with a red gnome, a green gnome, and a blue one, the best would be all three at the same time. There may be a red, a green, and a blue gnome still at my house. I have had a meeting with them this afternoon, and I don't think they have left already.

⁹ To be precise, interstriction is realised in informational transactions. But it makes sense to abstract from them, in order to keep the things what one is focussing on, intellectually manageable.

Good, I will do that. All of a sudden I am reminded of something I read in a text book once about how business processes are set off, namely through an external happening or event. How am I meant to understand those events in relation to a transaction?

It is good you bring that up, because it is pretty confusing when you put it like that. Look, an event is a change of state at a certain moment, or in other words the creation of a fact, either in the production world or in the coordination world. Thus an event is something passive. It is the result of an act, but it is not an act itself, and it can also not bring about any action. For events in the production world this is quite clear to you, I assume. For events in the coordination world the same holds: they do not bring about action. One could only say that they give rise to action when they are responded to. Take for example the purchaser for Hortus who starts a delivery transaction by making a request. The result of this is an event in the coordination world, namely the beginning of the status “requested” of the transaction. This event (often called *business event*) is an agendum for the salesgnome of Malum. If he notices it, then he can respond to it, for example by making a promise. Hence you can see the course of a transaction as the ‘jumping’ from one status to another. Every status is an agendum for the actor who’s ‘turn it is’.

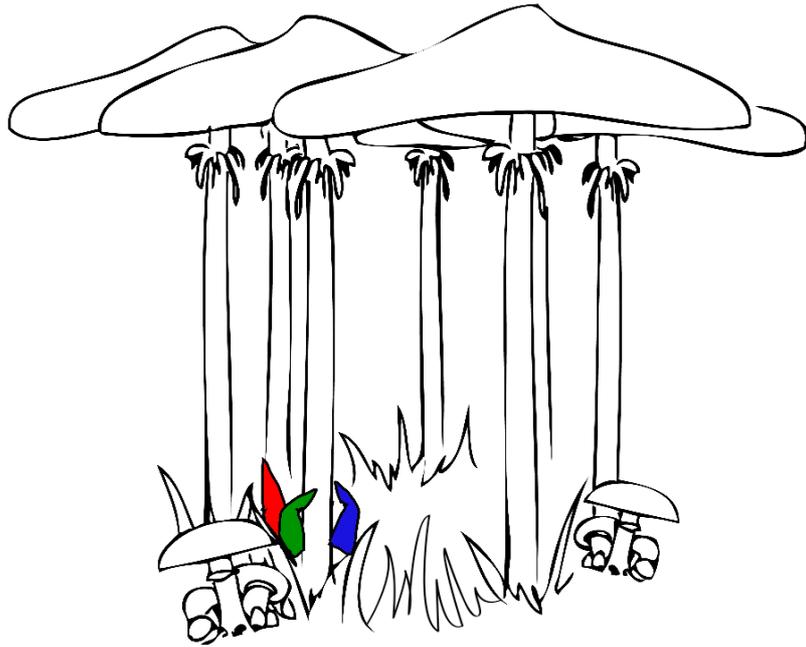
I think I follow you. But why is it so obvious that events in the production world do not give rise to action, I don’t quite see this.

Oh, just because they never act as an agendum. That is why actors are not so alert for those events. Next, they only take notice of facts in the production world when they need them, that is, when they are referred to in the condition of an action rule. That is what interstriction is about! The point in time at which the fact in question has come into existence is not so interesting. For example, when you buy a ticket for the movies, it is enough to know what such a ticket costs at that moment. The fact that the price was established yesterday and was different last week is not relevant to you, is it?

No, indeed, I just never have thought about it like that.

Alice, it’s starting to get dark, and my stomach is starting to grumble. Can I invite you to come and have a bite to eat at my house? Afterwards I would like to tell you another story about Gnome Land. And beforehand you can have your talk with Performa, Informa and Forma about coordination acts.

Well, that sounds like a good idea. Alice and Sapio walk to Sapio's house. Performa, Informa and Forma are still there talking, as Sapio had foreseen. He suggests that Alice has the conversation with them in his garden hut, which is a bit further down. Then he can start preparing their food undisturbed.



ABOUT RED, GREEN AND BLUE SHAPES

The garden hut turns out to be a circle of thin and tall mushrooms, formed in such a way that you can easily sit in between them, and still be protected against the sun and rain because the caps of the mushrooms touch each other. As soon as they reach the garden hut and each of them sits on an acorn, Alice fires away:

Sapio told me that it would be best for me to discuss my remaining questions about red, green and blue matters with all of you at the same time. What I am wondering about is this: when carrying out coordination acts, don't you need to be a little bit red, green as well as blue, since for example you need to understand what you hear, and because you have to express your commitments in sentences?

That is correct, says Performa, but I can imagine that you do not immediately understand it. At the same time it is simple and logical, but that's the way it goes with complicated things. Something is complicated because, and for as long as, you have not found a simple way to understand it. Being a student, you should know that it is always about finding and applying the right theory.

I know that one must always look for the simplest and minimal, but appropriate, theory, and that there is nothing more practical than a good theory¹⁰.

Yes, right. The theory that we apply is that performing coordination acts takes place at all three levels of abstraction, which you already know regarding production: the red, the green and the blue level. Let me take the example that a Performa, let's call him P1, asks another Performa, P2, to deliver a number of wheelbarrows. As you already heard yesterday, P1 could say that in OK as follows:

¹⁰ Alice refers here to Albert Einstein, William of Ockham, and Kurt Lewin respectively in one and the same breath, but she had forgotten their names.

I request : purchase 31416 is completed.

In this sentence, “purchase 31416” refers to a particular purchase instance, for example of 10 Quadra 75 on day 731.513, from Hortus to Malum. The blue level in communicating this request concerns the uttering of the sentence, or the showing of the written sentence, by P1 to P2.

That’s strange, Alice interrupts him, that you would write down the sentence if the other Performa, P2, is standing across from you?

That is what you assume, that P1 and P2 are standing across from each other, but I didn’t say that. Naturally, if that is the case, then they will speak to each other, but if it is not the case, then they will have to bridge their distance, which could be done with written text.

Yes of course, that was a bit dumb of me. So that is the blue level: the exchange of symbols, spoken or written or however they are uttered.

Exactly, and the undistorted transmission of the sentence uttered by P1 to P2 is a prerequisite for the success of the coordination act on the green level. There we are concerned with the meaning of the uttered sentence. So that it is a request of P1 to P2, and what exactly the requested product entails.

We call that prerequisite the *forma condition*, Forma adds, and the acts of uttering the sentence by P1 and perceiving it by P2 serve to satisfy this condition, and thus to establish *notational correspondence*. These acts are both needed at least once, as you will understand. Sometimes, however, they need to be repeated, because one or more signs got distorted during transmission. I will get back to that later. Have a look meanwhile at this picture < Figure 8 >. It will help you to understand what we are talking about.

Thank you for this explanation, says Performa, after which he continues his explanation:

The *cognitive correspondence* of the transmitted sentence takes place at the green level. It is a prerequisite for the success of the coordination act at the red level. There the concern is the accomplishment of the commitment of P1 towards P2, so the request by P1 to P2 to bring about the product.

This prerequisite we call the *informa condition*, Informa interrupts this time. However, that is easier said than done. You can never be 100% sure that you have understood someone. The formulation of P1's thought in a sentence and the interpretation of the sentence by P2, thus the generation of a thought in his mind, are processes that are simply not observable to the other. Unfortunately, misunderstandings only become apparent later, if at all. To prevent this as much as possible we always follow informing with confirming or disconfirming. You experienced this first hand yesterday. The confirmation is "Havit" and the disconfirmation is "Havit not". In the first case, both assume that P2 has understood what P1 said. In the second case, P2 thinks that this is not the case. P1 will then express the same thought in one or more other sentences, until P2 can finally say "Havit".

Yes, I already immediately found it a great way to do things, that explicitly confirming or disconfirming, Alice reacts, clearly convinced by the practical value of it and again aware of the fundamental uncertainty of understanding each other.

Yes, that is the way it is, Performa resumes the conversation, after thanking Informa for his comment:

On the red level, it is about making P2 aware of P1's commitment, but also about evoking P2's social obligation to respond adequately to the request. Together we call this the *performa condition*. Only after this has been achieved can you say that the coordination act has been performed successfully, which means that the two have reached *social correspondence*. Unfortunately in this situation too, you cannot immediately determine whether this condition is satisfied or not. It could turn out later that this was not the case. Such a situation is referred to as social misbehaviour and we take that very seriously. In Gnome Land you may misbehave one time; after the second time you are arrested and put in the House of Detention forever.

Oh my, Alice cries, obviously shocked by this language. You are so strict! But you cannot always promise to do what someone asks you!

That isn't what I mean. Of course, you cannot always promise in response to a request, but then you have to decline the request. That is also a valid response. The point is that one gives a response, in whichever way, and thus performs a coordination act. What we do not tolerate is that P2 does not respond in this situation, that he ignores his social obligation to adequately respond to P1's coordination act. That obliga-

tion weighs just as heavily as P1's commitment. Moreover, P1 can also not say after a while that his request was just a joke, or something along those lines. Insincerity in performing coordination acts is also considered social misbehaviour.

Now I get it, and I agree with that, even though I think the punishment is pretty high. It surely works, I believe that. But aren't we straying from the subject a little? I mean, what I was actually asking was how you, while being a Performa, can also take on a green, and even a blue shape.

I hadn't forgotten your question, but the explanation I gave, and the additions by Informa and Forma, were necessary to show you that all three of us can take on a red, green and blue shape when we perform coordination acts. There is no way to do this other than the way that we outlined to you. Thus the real difference between red, green and blue gnomes does not lie at the coordination side, but at the production side. Forma's production acts are always documental, Informa's are always informational, and mine are always original. But the commitments that we enter into and comply with in our transactions are all similar. And a Forma or Informa will just as easily be sent to the House of Detention for social misbehaviour as a Performa!

Yes, now I get it, I think, Alice yelps, apparently delighted with the acquired insight. And you call the transactions in which the distinct production acts occur documental (or D-) transactions, informational (or I-) transactions, and original (or O-) transactions.

I still owe you the explanation about the transmission, says Forma. Actually there is always a physical transportation of sentences in the execution of coordination acts. Only, with oral communication this is easily forgotten because the physical form is invisible and transient. But if, in our example, P1 communicates with P2 in writing, then there is no choice but to make a document. P1 makes up the contents in his green shape. Then, he writes down the sentence(s) in his blue shape. Next, he requests in his blue shape a blue gnome to bring a copy of the document to P2. So, P1 starts a D-transaction, with the blue gnome as the executor. As soon as this blue gnome has delivered the document to P2, P2 is able to perceive the sentence in his blue shape, to interpret the thought in his green shape, and to evoke the commitment that belongs to it in his red shape.

Oh, that's how it is, Alice reacts. And if a red gnome needs to have knowledge of the coordination facts of O-transactions, then he can, in his green shape, start an I-transaction with a green gnome! Oh, wait, not only red gnomes, I would say, and not only coordination facts of O-transactions. Anything goes, isn't it?

Almost, Alice, Informa continues. A red gnome can indeed be initiator of green transactions, next to red ones. And to be complete: a green gnome (in his blue shape of course) can also be initiator of blue transactions, for example to ask for documents from a documentary. And blue gnomes can also be initiator of green transactions, for example to ask for directions when transporting documents.

But for performing coordination acts all of them take on all three shapes, says Alice.

Yes, that's how it is, Informa confirms.

Alice thinks she understands it all now, but then the next question pops up in her mind. It is about understanding the possibly huge amount of transactions and actor roles in an organisation, since any actor can potentially initiate any sort of transaction. She has an image in her mind of a complicated tangle of red, green and blue transactions and the accompanying red, green and blue gnomes. How could one master such a complexity? She asks Performa the question.

It is as follows, says Performa. If you would consider all activities in an organisation at the same time, then you have indeed an enormous network of transactions and actors. Nobody is able to grasp the complexity of such a network, so one has to reduce this complexity in order to keep things intellectually manageable. The first step is to take a part of the organisation as your Scope of Interest.

As if you look through red, green or blue glasses, thereby filtering out the other colours, jokes Alice, immediately remembering from the physics lectures that it does not exactly work like that.

A nice way of looking at it, answers Performa, I have to remember that one. To be very precise, a red or blue gnome in his green shape is at that moment indistinguishable from a 'real' green gnome, as a red or green gnome in his blue shape is indistinguishable from a 'real' blue gnome. Next, you can choose to consider only one of the three sorts of transactions and actors. In doing so, recall that you can always re-

place I-transactions (and the D-transactions that realise them, and of course the corresponding actors) by interstriction relations. What do you think, have you understood everything now?

Yes, but I still have a question, says Alice. It is not about the main topic of our discussion but about something that puzzles me for some time already. We have talked about this purchase transaction of the wheelbarrows, but normally you have to pay for what you buy. So, where is the payment?

A good question, Alice, responds Performa. We should have told you earlier, but I just forgot it. Indeed, there is also a payment transaction, and this transaction is enclosed in the purchase transaction that we have discussed. Put differently, the purchase transaction is the top of a (business process) tree, and the payment transaction is one of the transactions on the next layer, maybe the only one.

Well, there is yet another one, Forma says. It is the material or physical delivery of the wheelbarrows. As you have learned, the product of the purchase transaction is the transfer of property of the wheelbarrows from Malum to Hortus. But in order to accept the result of this transaction, the Performa of Hortus had to make sure that the wheelbarrows were transported to the right place. This transportation is another enclosed transaction that has to be finished before the main transaction can be finished.

Just one more question, says Alice. You referred to the product of the purchase transaction by “purchase 31416 is completed”, but that is how Hortus sees the transaction, I would say. For Malum, however, it is a sales transaction, isn't it? So how would Malum refer to the transaction?

A very good question, says Performa. Most probably, the salesgnome of Malum would formulate the product, for example, as “Sales 1618 is completed”. Then, “purchase 31416” and “sales 1618” are synonyms, they refer to the same thing. Well, now you have the full answer to your question, I think.

She has indeed. She thanks Performa, Informa and Forma for their clear explanation and for their readiness and patience. Then she hurries to Sapio's house, because she has gotten quite peckish. The most delicious smells greet her. Sapio and Alice enjoy the meal that Sapio has prepared, making small talk. So, gnomes do that too, making small talk, Alice notes to herself.

THE INVASION OF THE INFORMATICIANS

Alice and Sapio leave the dinner table and move to the living room. There, three very comfortable looking chairs wait for them: a red one, a green one and a blue one. Alice laughs internally about this little joke of Sapio. Typical, she thinks. She has gotten used to it by now, but still finds herself surprised each time, happily surprised at that. Despite his pedantry, she actually likes him, and not only because of the fact that she has learned so much from or via him. At the crackling fireplace Sapio begins the story he still owes Alice.

What I still wanted to tell you about, is the invasion of the Informaticians in Gnome Land, about thirteen thousand days ago now. Where they came from, we still don't know. Probably not from very far, because they looked a bit like us. Only their pointy hats are totally colourless, which makes it appear as if they don't wear any! As you can understand, it was difficult for us to place them because they were not red, not green, and not blue. What they surely were is peace loving and naturally we were pleased about this. They didn't want anything from us, which is usually what happens in an invasion. Instead they wanted to give us something. Only later we experienced that it can be far more disastrous to receive something than to have to give away things.

I'm stumped, says Alice, who takes an increasingly bold attitude toward her teacher.

Huh, answers Sapio, what are you saying there? As in what happens to a tree when one cuts it down? Must be another strange habit of People Land.

Yes, indeed, sorry. It doesn't make any sense ... please continue, I won't interrupt you anymore.

You may interrupt me, if you like. I don't mind. You just said something I don't understand. Let me continue, then it will become clear for you automatically. This folk, which invaded Gnome Land, we refer to as Informaticians. What their real name is, we do not know, because we don't speak their language and they don't speak ours. We often picked up on a sound that resembles our word "information", which is

why we started calling them *Informaticians*. After they had observed everyday life in Gnome Land, they came up with an idea. You understand that it was not easy for them to communicate this to us, because there were only very few words from their language that we knew, and few that they had picked up from our language. So it was a lot of hand and foot work if you know what I mean.

Indeed, it seems to me like it wasn't an easy task. And what did they want to tell you?

It was for sure not easy, I can tell you! I can wind up myself about the mishaps that resulted! Well, they claimed, as well as it went, that they were able to make blue garden gnomes, and they insisted on showing us. Even though we clearly did not display a large amount of interest, there was no escaping. In that respect they did act like occupiers.

Garden gnomes, you say? What are they?

A *garden gnome* is a gnome that looks just like a real gnome, but isn't. Garden gnomes are artificial gnomes, not real ones. And because they aren't real, they don't need a house to live in, so you may as well put them in the garden. That is what we do and why we call them garden gnomes.

I get it. A blue garden gnome is an imitation gnome that can do the same things as a real blue gnome does.

To be very precise, they can carry out the same production acts, but their mutual coordination is another matter, to which I will come back later. A lot of blue gnomes could then be replaced by such garden gnomes. Consequently, the real blue gnomes were educated to become green or red gnomes. But that wasn't the only advantage. Garden gnomes also do everything more accurate and faster. Modern blue garden gnomes can transport incredible amounts of documents over large distances in no time, and they can copy documents incredibly fast. What the Informaticians came up with to make that happen is the coding of writing symbols in rows of binary signs, which they called bits. They represent them in electrical or magnetic or optical signals. Next, in contrast to real blue gnomes, blue garden gnomes don't have to walk for transporting. They wouldn't even be able to, naturally, because they stand still in the garden. All blue garden gnomes are connected by wires, along which those binary signals can be transported super fast, or even wireless, in which case the signals are transported on electromagnetic waves through the ether.

Gee, that's amazing! And the storage of documents, how do they do that?

That also happens very easily. Because bits can be represented microscopically small, the documentaries have become much smaller. They take up so little room, that every blue garden gnome has his own large storage. In addition to this, the content of documents have become much more varied. They are no longer only made up of sentences, but also of pictures and film frames and sound samples.

Wow, unbelievable. And how many of those blue garden gnomes are there now in Gnome Land?

By far most of the blue gnomes are garden gnomes nowadays. One thing I have to admit is that the Informaticians are great at the imitation of blue gnomes. It all works perfectly.

And the others, the green gnomes for example, can the Informaticians replicate them too?

It's as if you can read minds, I was just about to tell you. When the Informaticians had made blue garden gnomes for a few years and placed them all over Gnome Land and connected them, they excitedly claimed one day that they were able to make green garden gnomes. Well, many gnomes didn't believe that, especially the green ones. Naturally they felt their existence being threatened a little, just like the blue gnomes did before, I should mention. It isn't easy to have to stop doing something you are good at and enjoy, because an artefact can do it far better!

I can understand that too. So, green garden gnomes can really count?

Count on it! Can you remember the problem of the 'traveling sales gnome', that the Informa whom you met was busy with? For a modern green garden gnome that's a piece of cake¹¹.

And the other task of green gnomes, the remembering of facts, can garden gnomes do that too?

What do you think?

¹¹ The attentive reader naturally has already understood that over time gnomes have picked up expressions from the language of the Informaticians.

Er ... remembering is something you can do with the help of blue garden gnomes. Only the first time of drawing is something that must be done by real green gnomes I think, because for that you need to understand what it is about.

You have noticed that well Alice. The limit of what green garden gnomes can do lies with understanding. Everything for which understanding is not necessary, they can do; everything for which real understanding is necessary, can only be done by real green gnomes.

So a lot remains to be done by real green gnomes.

Not really. The Informaticians thought up something through which a lot is possible for green garden gnomes. They call it *formalisation*. What it comes down to is that you choose one sentence (or at most a few sentences) to express a certain thought. Only the agreed upon sentences you pass on to green garden gnomes, because they are only able to ‘recognise’ and to produce those. In this manner the Formal Official Gnome Language originated, abbreviated as FOK.

So you can just speak FOK to a green garden gnome and he will understand what you mean?

You could say so, but please be careful with using words like “understanding”. Truly understanding, like green gnomes do, they cannot of course, but it seems very real. Therefore the Informaticians refer to green garden gnomes as artificially intelligent. I find that a very suitable qualification. It clearly indicates they are not really intelligent, but that gnome intelligence can very strikingly be imitated. On this point I am also full of admiration for the Informaticians: they are indeed also great at imitating green gnomes.

After some thinking about Sapio’s enthusiastic words, some questions form in Alice’s mind, so she asks them right away:

But how does the computing of those green garden gnomes go exactly, I mean don’t they have to produce FOK sentences, in order to express the results of computations, which have not been inserted before?

A very good question Alice! The trick in formalising happens to be also the basis for the computing that green garden gnomes do. They process FOK sentences according to the rules that were once devised and

then inserted into them by real green gnomes. That devising and inserting we refer to as programming. A simple example of one of those rules is: $1+1=2$. By applying calculation rules FOK sentences are produced that represent the results of computations.

So then they can only process rules that have been programmed?

Yes and no. Look, computational rules are also FOK sentences, and so you can think of rules, we call them meta rules, with which new computational rules can be made. In this way green garden gnomes are able to construct new programs themselves or to adjust existing ones. Some Informaticians find the application of this trick true artificial intelligence, but for me it's just more of the same.

These are pretty far-reaching ideas that Alice has to make herself familiar with. It will take some time, which she will be allowing herself. Another question hovers in her head which she had wanted to ask when they were talking about blue garden gnomes. Before she forgets it again, she asks it:

Sapio, what you told me now about blue and green gnomes regards their production acts. That these can be mimicked by blue and green garden gnomes respectively, I mostly understand by now. But, as you know, just before our dinner I spoke to Performa, Informa and Forma for a while about red, green and blue shapes of gnomes. They take on all three when they carry out coordination acts. How does that go with blue and green garden gnomes? They cannot enter into and comply with commitments, can they?

A very clever comment, Alice, and a very good question, because I forgot to tell you about that myself. As you say, garden gnomes of whichever colour, cannot enter into and comply with commitments, so they cannot take on a real red shape. That is where there was a problem, because garden gnomes need to be able to coordinate too. The Informaticians thought we were making a fuss about nothing, but they never understood the importance of commitments and their inherently social meaning. Their standpoint in all those discussions was simply that you can automate everything, and that it is only a matter of time before this would be the case. Naturally, that is rather dumb of them, and we passionately, and over again, tried to confront them with the falseness of their arguments, but at a certain point we just stopped trying to show them they were wrong.

Anyhow, in the end we agreed that the coordination by blue and green garden gnomes can be mimicked. This is because it is not necessary to hold them responsible when it comes to the exactness of the production facts. When you speak FOK, everything is formalised and the results of a computation are just pre-defined. The same holds for all blue actions on bits.

But then, you don't have to compute anymore, Alice blurts out.

Ha ha, you got me, you must be thinking. However, I only meant that the computational rules are fixed. For example there is a rule for calculating someone's age. That rule is contained in green garden gnomes. So if you would ask a green garden gnome for your age, then he would still have to calculate it, even though it goes very fast. And if a derived fact is asked for very often, or if it takes quite some time to compute, green garden gnomes can also remember and recall them. Well then, we felt that the mutual coordination among blue and green garden gnomes could be made simpler, namely through commands and acknowledgements, which are words from the language of the Informaticians, by the way. Patterns of commands and acknowledgements are called protocols. For example, when you give a garden gnome the command to calculate your age, he responds that he has 'understood' and that he will do it. That is an acknowledgement; it is a combination of confirming and promising you could say, but it is very risky to talk about it in that way, because garden gnomes cannot promise of course.

Why do you find it so risky?

I will tell you why. I catch myself saying things like that sometimes too, not realising that it is a gnomomorphic metaphor.

Go ahead, throw in another impossibly strange term, why don't you!

It isn't that strange. You've heard of antropomorphic, haven't you? That is an originally Greek word, which means "resembling man". Man has, as you undoubtedly know far better than me, the tendency to draw himself into the things around him and to explain these phenomena from his point of view. That is

why you may think it is normal to tell your bicycle¹² that it is stupid, for example when you have fallen off of it. That is anthropomorphic thinking. Since gnomes have never been in touch with the ancient Greeks, there is no pure Greek word for gnomomorphic.

I can follow you again. But I still don't really see the danger, says Alice.

The danger is that you forget that you speak in metaphors and that you start thinking that bicycles can truly be stupid and that garden gnomes can truly promise and so forth. Try to be very aware of that.

To finish my story, we thought it was fine that garden gnomes coordinate through commands and acknowledgements, but we also saw that there had to be real blue and green garden gnomes who were eventually responsible for the proper operation of their artificial name-partners. Those so-called managers of garden gnomes can and must be held responsible for the functioning of the garden gnomes who fall under their control. This regards the 'coordination acts' in the protocols as well as the production acts. But, once the production rules are correctly inserted into the garden gnomes, then actually nothing can go wrong with them.

Thank you for this explanation, Sapio, responded Alice. I understand now that everything that has to do with cognitive intelligence, that is with thinking, computing, and reasoning, you can get done by green garden gnomes. But I am not sure if that is where the boundary lies. I mean to say: can red garden gnomes exist?

That is a very interesting question, Alice, and I very much like to discuss it with you. But let me first re-ignite the fire and pour us a glass of fermented grape juice.

¹² Although gnomes do not cycle, Sapio knows what a bicycle is. The explanation is naturally that he goes to People Land sometimes and that he has heard guest students speak about bicycles.

CAN RED GARDEN GNOMES EXIST?

While Sapio prods the smoldering wood with a poker, and puts a few new twigs onto the fire, a content and warm feeling emerges in Alice. She feels happy. When she tries to determine the cause for it, she discovers that it is a mixture of three things. First of all, it is the way that she has learned so much in such a short time. She was able to stay attentive and she wasn't bored for one moment. Secondly, it is the actual content of the things she has learned. When she started the whole adventure, she could not have imagined how elegantly the concepts of communication, information, action and organisation are understood and unified by the gnomes. Lastly, it is also the friendliness, the cheerfulness and the cosiness that is present everywhere. A spurt of discomfort shoots through her as she thinks about People Land, to which she will have to return some day. She dislikes the idea so much that she suppresses the thought immediately in order to give in to her current happy feeling again. Sapio hands her a glass of fermented grape juice and they toast to Alice's successful stay in Gnome Land. Gnomes toast by holding the glass at the level of their nose, look at each other and then take a swig while continuing to look at the other. Alice immediately finds this to be a good habit. To her it emphasises that you are not just drinking, but that you are drinking together, and thereby expressing your respect for everyone in your company.

Can red garden gnomes exist or not, that is the question, says Sapio. To answer that question you have to recall the conversations you have had with the Performas, especially the conversation during the drinking to of the transaction.

Do you mean the mind game about the authorisation to fulfill actor roles?

Amongst other things. This made it evident that there is something by which red gnomes significantly differ from green and blue ones. Apparently it does not matter so much whether you ask a particular Forma for a document or just any one, and also whether you ask a particular Informa to calculate something, or any one. But it does matter whether you ask the right Performa to appoint you as a Malum employee. What is the point in it?

I think that it is because only Performas can bring about changes in the world, while Informas merely remember and derive information about the world, and Formas only do things with the documents that contain this information.

Very good, this is indeed where a significant part of the differences lies. Only red gnomes bring about original products. They do that, as you know, by performing original production acts, which constitute the core of original transactions. The work of green and blue gnomes supports the work of red gnomes. The three levels of abstraction, which I already mentioned in the lecture hall, have a very central position in the way gnomes understand organisations. I myself remember them with the following rhyme:

*red gnomes are here for acting
green gnomes for reasoning
and blue gnomes for documenting¹³*

That is a useful rhyme, I will have to remember that. Gnome Land in a nutshell!

That must be another expression in people language ... in a nutshell, but I understand what you want to say. Well now, the documenting by the blue gnomes, the Formas, takes place at the lowest level of abstraction, which is called the documental level. The reasoning by the green gnomes takes place at the next level, which we call the informational level. At the highest level, the original acting by the red gnomes, the Performas, takes place. Accordingly, we distinguish three levels in the realisation of an enterprise, giving rise to three aspect organisations. In the order in which I discussed them, they are called the D-organisation, the I-organisation, and the O-organisation, as you know. The *business* of an enterprise is realised in its O-organisation. The I-organisation supports the O-organisation with informational services (remembering facts and sharing facts), and the D-organisation supports the I-organisation with documental services (keeping documents and providing documents). Let me clarify this to you by means of this simple picture, which you may have seen already < Figure 3 >.

Indeed, I did, says Alice. I like this picture very much.

¹³ Apparently, Sapio allows himself the poetic license to refer to the working on documents by blue gnomes as “documenting”.

Lastly, Sapio continues, if you abstract from all implementation matters (and thus from all technology), you arrive at the ontology¹⁴ or the *ontological model* of each of the aspect organisations. It implies that one abstracts from the forma and the informa level in coordination acts too, thus focussing on the performa level. So, if you only consider the original production in an organisation (by the red gnomes), combined with only the performa level acts in their coordination, you get the ontological model of the O-organisation. Similar reasonings hold for the I- and the D-organisation. Naturally, ontology also implies that one conceives an organisation as a network of actors and transactions. The Performas prefer to call the ontological model of the O-organisation of an enterprise, including the interstriction relationships, the *essential model*, to emphasise that it constitutes the essence of the enterprise's organisation. As you know by now, the interstriction relationships represent the access rights of the actors in the O-organisation to the information sources they need for carrying out their transactions.

Your explanation really helps me, but it does not explain yet why red gnomes are not as exchangeable as the green and blue ones.

Patience please. First, an addition to what I said about the green and the blue gnomes. In general an Informa is authorised to carry out a large variety of computations. In the same way a Forma is generally authorised for the archiving, copying etc., of a large number of document kinds. Why? Because it is more of the same. Subsequently, it is certainly possible to assign to all red gnomes all authorities, but we thought that wasn't a good idea. We like to deal with authorities carefully. We want to ensure that someone who carries a certain *responsibility* is also equipped for it, that he possesses the necessary competence. Every gnome must be able to give account for the way he uses his authority. Authority and responsibility are like the two sides of a medal.

I can understand that, it is about the same in People Land, I think. But I am not entirely convinced. Let me take the purchaser of Hortus as an example to explain what I mean. This purchaser is responsible for the timely replenishment of the inventory of wheelbarrows so that there is no shortage. The way he decides on replenishments, is laid down in an action rule. It could be the case, for example, that he must re-order if there are only five wheelbarrows in stock. It seems to me that you can also have a green garden gnome keep an eye on this, and place orders on time.

¹⁴ The origin of "ontology" are the Greek words "ontos" and "logos"; "ontos" means "being, essence".

Now I understand where you want to go with it, Sapio reacts. With keeping an eye on things you are completely right. Indeed, a modern purchaser lets a green garden gnome calculate when and how much he has to order. But there is a big difference between these calculations and the placement of the order. The former, just about any green gnome could do, but the latter only a red gnome with the right authority can do, you understand?

But if the Informaticians would make a garden gnome which could produce FOK sentences which mean the same as the OK sentences that the purchaser would utter, then don't you have a red garden gnome?!

That is exactly what a lot of Informaticians claim and what they try to convince us of, over and over. But they are wrong! Let me give you my arguments, in increasing order of importance. First of all, your responsibility as an O-actor can bring with it that you don't act according to the action rules. For example, imagine that the order system computes that one should order from supplier A, and that the responsible red gnome incidentally happens to know that A is about to go bankrupt. Well, wouldn't it be irresponsible to follow that 'automatic' advice?

Yes, of course, but now you are expanding the action rules!

You could see it like that, but on the other hand, it is impossible to anticipate everything. Anyhow, you must understand that in the end it revolves around the responsibility of the O-actor. I know several enterprises in which hardly explicit action rules exist. This means that every O-actor is considered to act in the interest of the enterprise, you see. But let me continue my story.

Secondly, Sapio continues, one could only speak of full-fledged red garden gnomes if you could let them participate as actors of equal quality in the intersubjective game of organisations, and of the whole of Gnome Land. And for that you would need to hold them accountable if they would act irresponsibly. The question thus is if you can hold a garden gnome accountable, whether you could fine or punish him, and whether this would have the same effect as it has on real gnomes.

Oh that's what you mean. No, the punishment of a garden gnome does not seem very useful. I can already picture them sitting in the House of Detention. That would be hilarious! The 'worst' thing you could do to them is probably to pull out the plug, but they would not really be bothered by it, I imagine.

Yes, exactly! So you cannot grant a garden gnome ontological authorities, and thus red garden gnomes cannot exist. However, more and more often you see what I tend to refer to as sham red garden gnomes. Those garden gnomes act as an *agent* of an actor who possesses the necessary authority and carries the accompanying responsibility. So, they produce 'red' FOK sentences on behalf of this actor. I find this a dangerous development because you quickly forget that they are sham red instead of red. Responsibility and accountability thereby become turbid notions.

I think I am beginning to understand. Robots are thus examples of sham red gnomes, or not?

Indeed, yes, you noticed that correctly. Robots are often used as agents in transactions in which material production acts must be executed that are very difficult or dangerous, but also in routine transactions, for example in the fabrication of wheelbarrows. In contrast to real gnomes they don't get tired or bored and thus do their job consistently and accurately. It is also of paramount importance that it is fully clear of which gnome a robot is an agent, because only this gnome is accountable for the deeds of the robot.

I understand. But if the production act is non-material of origin, so involving a decision or judgment, then can you also use sham red gnomes as agents?

Definitely, and it happens. It is then that you notice that one quickly loses the distinction between actor and agent. Expressions like "Purchasing system places wrong orders" or "Salary system pays out too high salaries" are metaphors that we are all used to, just like for example "Judiciary computer passes judgment in case Acorn". Because they are so easily taken to be reality, it is better to avoid them. Garden gnomes do not place orders, do not pay out salaries and do not pass judgments. They can only reason and document, just think about the rhyme I referred to. In addition, they don't make mistakes, only red gnomes do ... and Informaticians of course.

I don't understand that last bit. Garden gnomes can make mistakes, can't they?!

No, he who claims this, has fallen in the metaphor trap. Right and wrong are notions that you can only use meaningfully with respect to subjects. There has to be conscious behaviour and the freedom to make choices. If a garden gnome is said to make mistakes, then this can only mean that his creator has programmed him incorrectly, you understand? Again it is an example of a gnomomorphic metaphor.

Yes, of course, I understand it now, you are totally right. It's hard though, to avoid that metaphor trap.

It surely is. Therefore, I keep emphasising it. He who isn't cautious about the metaphor trap, speaks very easily nonsense.

Oh yes, Sapio, I almost forgot, says Alice after she has processed the prior statement, I have one more question, which regards your pointy hat. Why does it have all three colours? Are you Performa, Informa and Forma, all at once?

Ha ha, no no, that would be something wouldn't it? I am neither a Performa, nor an Informa, nor a Forma. I received this hat as a token of appreciation when the organisation of Gnome Land finally became the way as you have learned to know it. At the same time it serves as an homage: the wearer of this pointy hat has the right to carry the title of "DEMONstrator".

DEMONstrator?

Yes, that is what I say. A DEMONstrator is someone who is able to show how the organisation of Gnome Land fits together, who understands it all and can explain it to others, you see?

Oh yes, yes, I get it, says Alice, slowly pronouncing the words, on the one hand to really understand, and on the other hand because of the arising strong wish to be a DEMONstrator one day too.

A silence falls. A little overwhelmed by the many new thoughts, Alice slowly dozes off, partially helped along by the fermented grape juice Sapio kept re-filling. Meanwhile Sapio, content and relaxed, stares into the fireplace. He is very pleased with Alice's performance as a guest student and he hopes that many such students will come and visit him. But he also realises that one day an end will come to that, because gnomes don't possess the gift of eternal life¹⁵. He doesn't mind this, but now it is too early. First more DEMONstrators must be educated to which he can pass on his tasks with peace of mind. He wants to remain involved with this education as long as possible.

¹⁵ Many conjectures exist regarding the age that gnomes can reach. A reliable source regarding this issue is: Poortvliet, R. and Huygen, W. *Gnomes*, 1977.

In the meantime, Alice has sunk into a deep sleep. She dreams of truth and goodness and beauty and love, and garden gnomes, and many other pleasant things. Then she drops her glass. It explodes with a large thwack on the slate floor... She wakes with a start and hears more sounds around her. When she opens her eyes, she sees that the professor and her peers are leaving the lecture hall. Involuntarily her eyes move across the floor in front of the desk, but there is nothing remarkable to be seen. When she then points her gaze to the wall under the front window, she can no longer spot the opening in the wall. When she finally gets up to her feet, she feels tired and languid. But above all she is satisfied: this morning a whole new world has opened up to her.



EPILOG

The story of Alice in Gnome Land is so incredible that many people consider it to be fictional. But they are wrong. It are all great truths, that you have read. And important and shocking ones. Who could have anticipated that red garden gnomes cannot exist! Undoubtedly, like Alice, you have started to think differently about the four core concepts: communication, information, action and organisation. By now you also will appreciate Sapio's motto "*communication is the thread of which organisation is woven*". At the same time, you have developed a proper understanding of organisation, and of the role of ICT.

The first time that I have put Alice's adventures in writing was in 1996¹⁶. Based on it, I started to develop the so-called PSI theory (PSI stands for Performance in Social Interaction). Meanwhile I kept fine-tuning the story of Alice since I wanted it to be the most accessible introduction into the PSI theory. I consider the current version, the one you have read, as the final one. Next to what she told me, I have included a number of pictures, that I have drawn myself, based on the descriptions by Alice (who forgot to take the pictures back home from Gnomeland).

Some time ago I met Alice again at a meeting of the CIAO! Network¹⁷. She is working as enterprise engineer at a large international enterprise, after having finished her Master of Enterprise Engineering. It was a pleasant and inspiring meeting, and I encouraged her to write an introductory book on enterprise engineering. There is a great need for such a book and no one would be more able to write it than Alice, I think. So, if you wish to deepen your knowledge and to learn more about the practical applications of your newly acquired insights, then reading Alice's book¹⁸ is the best way to proceed.

¹⁶ Dietz, Jan: Een reis door Kabouterland, 1996, ISBN 9-014-05327-4 (Nederlands)

¹⁷ visit www.ciaonetwork.org.

¹⁸ She probably will publish it under her full name: Alicia P.C. Perinforma.

FIGURES

In the figures on the subsequent pages, two sets of primary colours are used: Red, Green, and Blue (RGB), and Cyan, Magenta, and Yellow (CMY). They support the definition of the various concepts. The concepts 'coloured' in RGB are considered to be orthogonal to the concepts 'coloured' in CMY, which means that any concept in one set may be combined with any concept in the other set.

The conventions for applying the colours (together with their web safe numbers) to the concepts are:

 original production
performa level in coordination
FF0000

 coordination act/fact
coordination world
0099CC

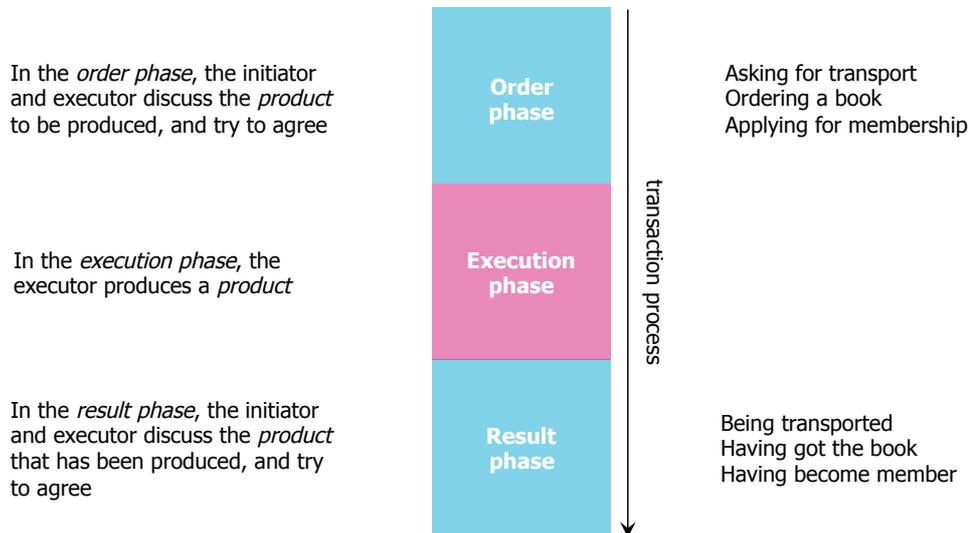
 informational production
informa level in coordination
009900

 production act/fact
production world
CC0066

 documental production
forma level in coordination
0066FF

 actor
actor role
CCCC33

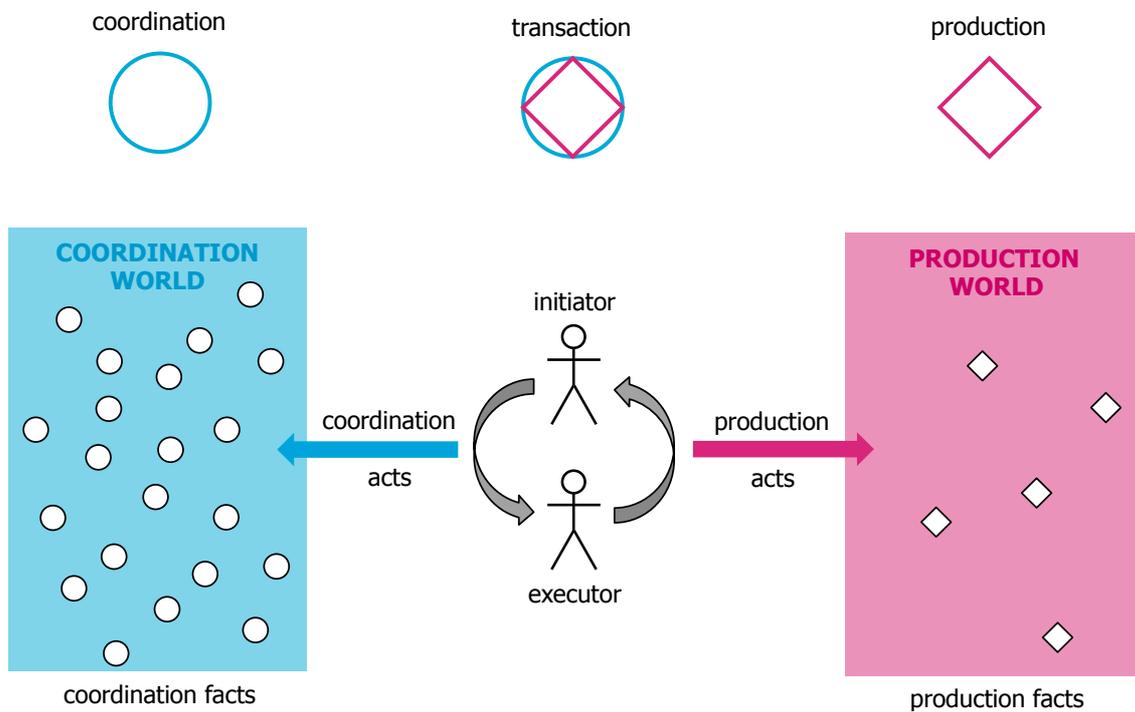
FIGURE 1 THE TRANSACTION PROCESS



A transaction proceeds in three phases: the *Order phase*, the *Execution phase*, and the *Result phase*. The order phase is an interaction between the two actors, one in the *initiator* role and one in the *executor* role, in which they aim at agreeing on the product that has to be brought about. The result phase is an interaction in which the two actors aim at agreeing on the product that has been brought about by the executor during the execution phase.

The interactions in the order phase and the result phase may take an indeterminate amount of time, and they may end up unsuccessfully. Although, in principle, they can take any form, it appears that they always follow the same, universal, patterns, as exhibited in Figures 5 and 6.

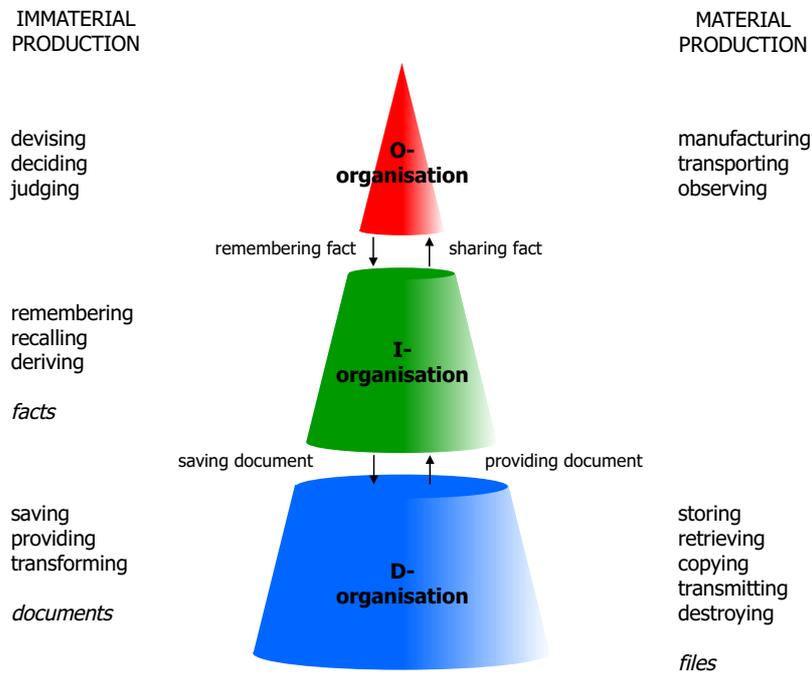
FIGURE 2 TRANSACTION=PRODUCTION+COORDINATION



A transaction is a universal pattern of *coordination acts* concerning one *production act*. The effect of a coordination | production act is a *coordination | production fact*.

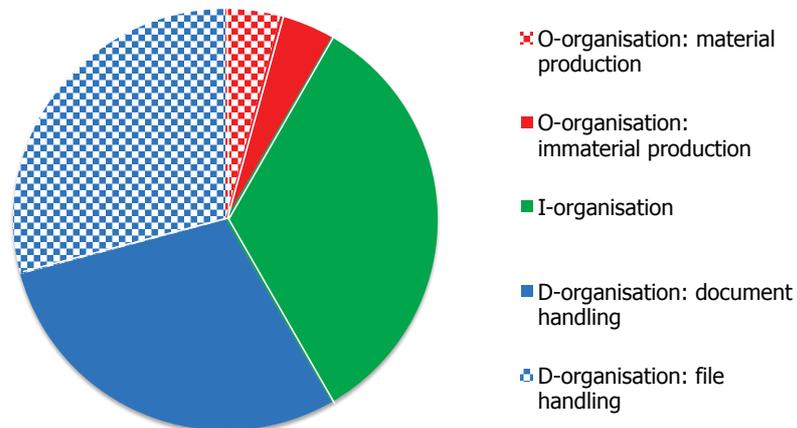
Coordination | production facts are state elements of the *coordination | production world*. The coming into being of a fact is an *event*. Events correspond with elementary *transitions* in the coordination | production world. Production events coincide with the coordination event 'accepted' (see Figure 5).

FIGURE 3 THE ASPECT ORGANISATIONS



Three sorts of production acts/facts are distinguished: *original*, *informational*, and *documental*. Accordingly, the organisation of an enterprise consists of three aspect organisations: the *O-organisation*, the *I-organisation*, and the *D-organisation*. Each of them consists of transactions, and their corresponding actors, in which respectively original, informational, and documental production acts/facts are performed. The I-organisation supports the O-organisation by means of two sorts of transactions: remembering facts and sharing facts. The D-organisation supports the I-organisation by means of two sorts of transactions: saving documents and providing documents.

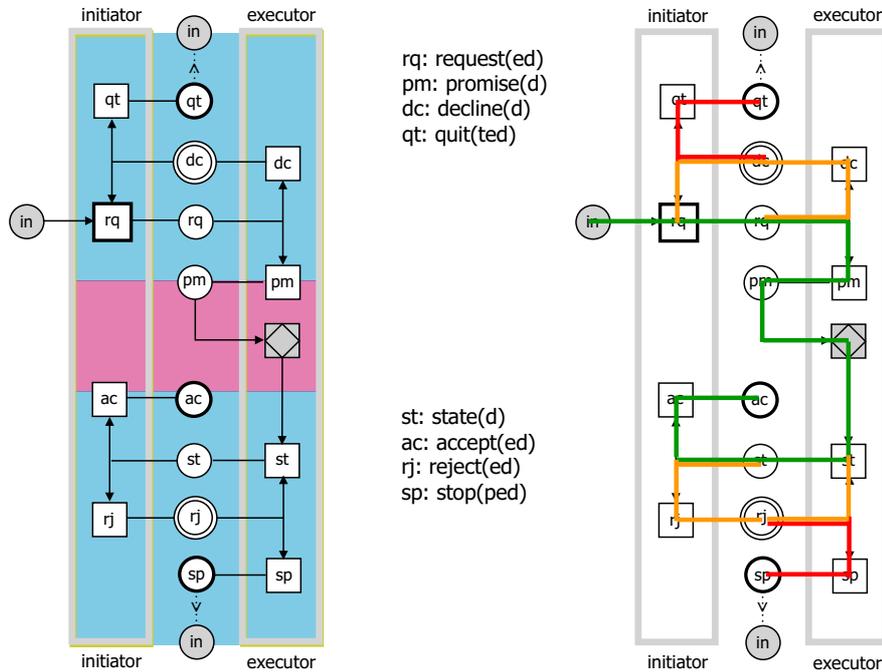
FIGURE 4 THE DISTRIBUTION OF PRODUCTION SORTS



The volumes of the red, green, and blue cone parts in Figure 3 are in the ratio 1:4:7. This ratio is also expressed in the pie chart above. In addition, the the red segment (O-organisation) is divided in two parts: *material production* and *immaterial production*. For examples, see Figure 3. Also the blue segment (D-organisation) is divided in two parts: the (immaterial) *document handling*, and the corresponding (material) *file handling*.

The two immaterial parts are drawn adjacent to each other, to clarify that file handling transactions are 'blue' from the perspective of the I-organisation (and consequently the O-organisation) it supports, but they may be 'red' in another organisation (Cf. postal mail companies that also transport parcels).

FIGURE 5 THE STANDARD TRANSACTION PATTERN

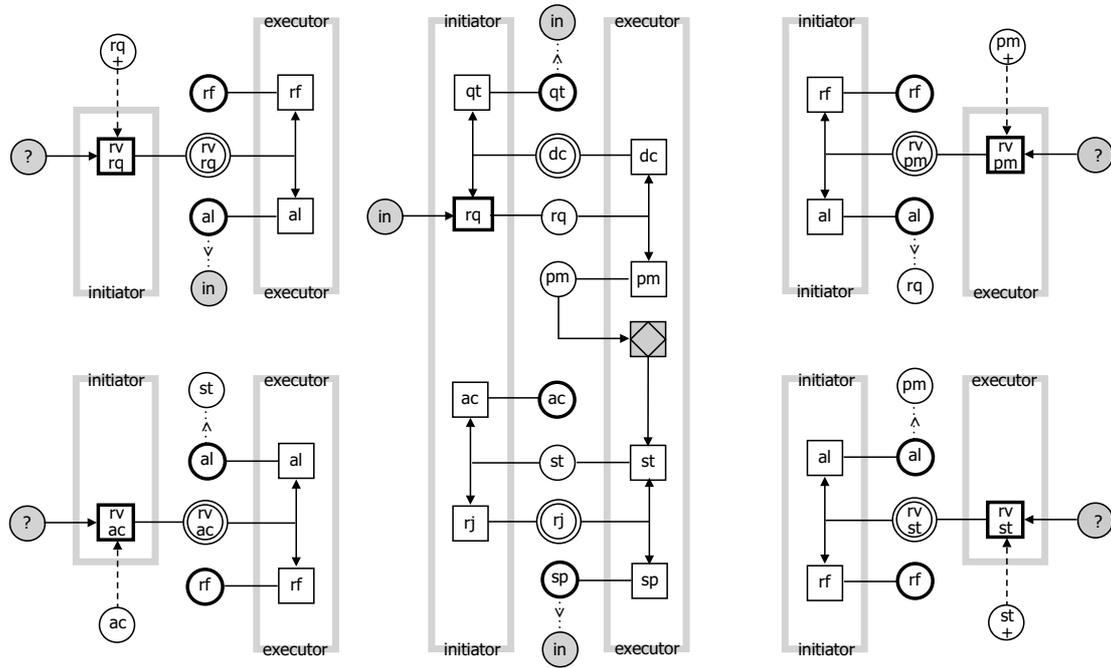


Small white boxes represent coordination acts and small white disks represent coordination facts. The small grey box represents the production act, and the small grey diamond represents the production fact. The two yellow-lined boxes represents the *responsibility areas* of the participating actors. The coordination facts are put in between these areas to express that they are knowable to both actors.

ABBREVIATIONS: in = initial status, rq = request (verzoek), pm = promise (beloof), dc = decline (wijst af), qt = quit (verlaat), st = state (verklaar), ac = accept (aanvaard), rj = reject (verwerp), sp = stop (stop).

On the right side the 'happy flow' is marked by green lines, the two 'exception' flows by orange lines, and the two 'failure' flows by red lines.

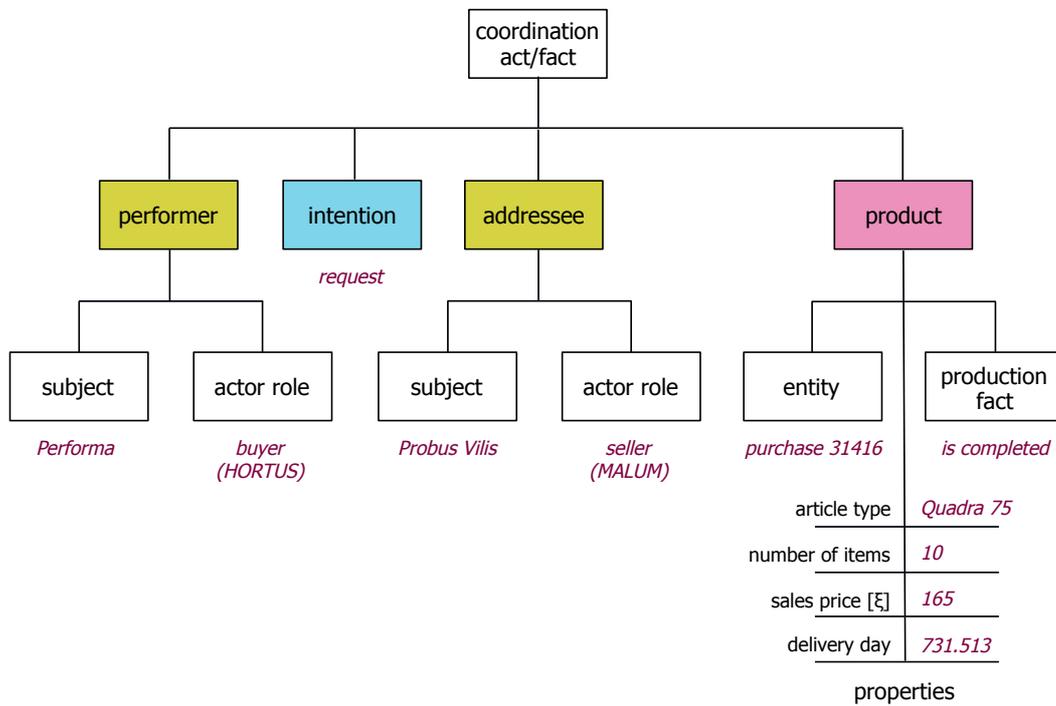
FIGURE 6 THE COMPLETE TRANSACTION PATTERN



There are four revocation patterns, one for each of the basic transaction steps: request, promise, state, and accept. The complete transaction pattern consists of the standard pattern (Figure 5) plus these revocation patterns. It is the universal pattern in which people, all over the world, do business of any kind, in enterprises of any kind.

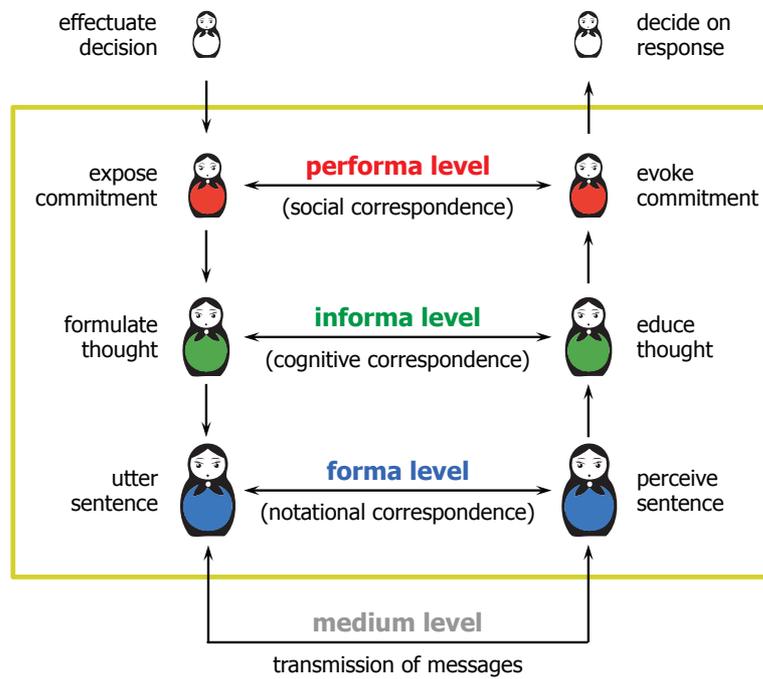
ABBREVIATIONS: rv[rq] = revoke [request] (herroep [verzoek]), rv[pm] = revoke [promise] (herroep [belofte]), rv[st] = revoke [state] (herroep [verklaring]), rv[ac] = revoke [accept] (herroep [aanvaarding]), al = allow (sta toe), rf = refuse (weiger).

FIGURE 7 THE STRUCTURE OF A COORDINATION ACT



A coordination act/fact has four main parts, the *performer*, the *addressee*, the *intention*, and the *product*. The performer and the addressee are subjects fulfilling an assigned actor role (Ex: Performer as buyer, and Probus Vilis as seller). The intention expresses the kind of commitment that the performer engages in (Ex: request). The product consists of an entity (Ex: purchase 31416), and the production act/fact, expressed as a predicate (Ex: is completed). Products have properties. These are production facts whose existence is dependent on the existence of the product (Ex: article type, delivery day, etc.).

FIGURE 8 PROCESS OF A COORDINATION ACT/FACT

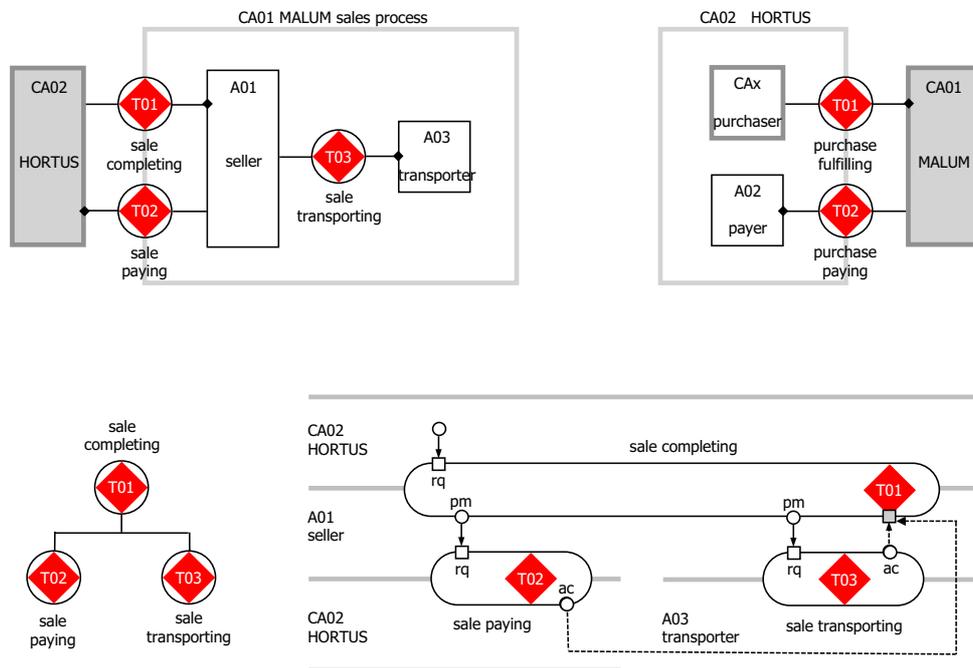


While coordinating, actors take on all three shapes (red, green, and blue). In addition, they take on the blank shape, which is their inner self, not knowable to others. The four shapes are represented by Russian dolls (matryoshka's) that fit into each other as pictured.

The process of a coordination act starts from the wish to effectuate a decision (Ex: to buy wheelbarrows) by the performer (see Figure 7). It goes through the performa, informa, forma, and medium level, up to the point that the addressee can perceive the uttered sentence. After having passed the forma, informa, and performa level, the addressee can decide how he/she will respond to the coordination fact.

The yellow (ocher) lined box delineates the area of focus.

FIGURE 9 ORGANISATION CONSTRUCTION AND PROCESS



The wheelbarrow case (pages 17-19, and 37) can be viewed from the point of view of Hortus (upper right), and of Malum (upper left). The latter shows three original transaction kinds (indicated by red diamonds) and the corresponding actor roles. A01 and A03 are inside the organisation of Malum, CAx and A02 are inside the organisation of Hortus. The small black diamonds indicate the executor roles (see Figures 5 and 6). The lower part of the figure shows the business process as a tree structure (left), and as interrelated transaction processes (right). The dashed arrows represent waiting links. Ex: the execution of T01 has to wait until T02 is promised and T03 is accepted.

FIGURE 10 THE OPERATION OF AN ORGANISATION

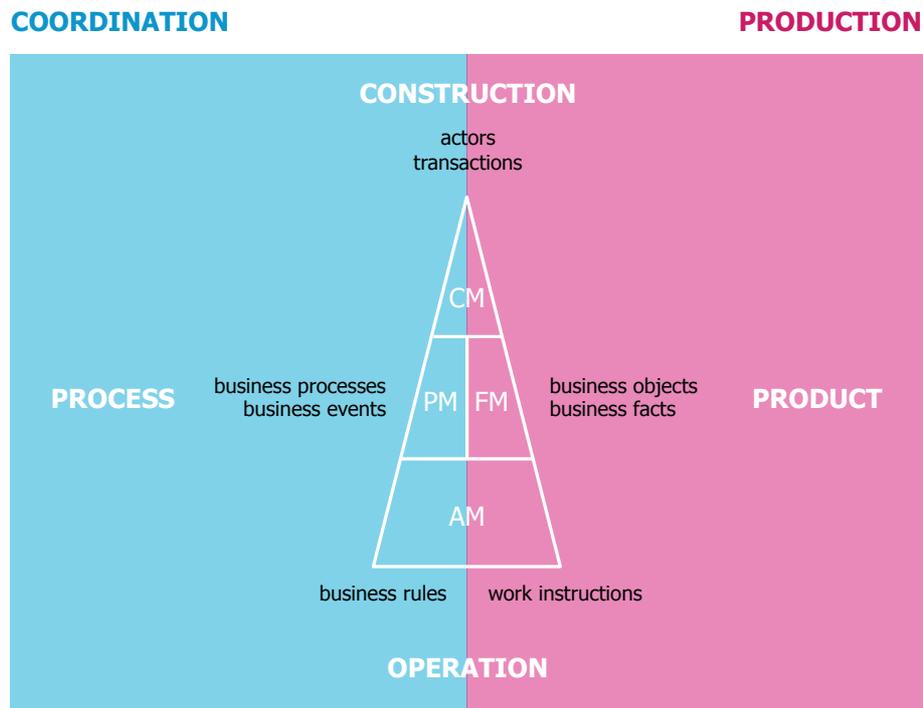
when	sale completing for Sale is <u>requested</u>	(T01/rq)	event part
with	the article type of Sale is some article type the number of items of Sale is some number the sales price of Sale is some amount [€] the delivery day of Sale is some day the buyer of Sale is some customer the payer of Sale is some debtor		
assess	<i>justice:</i> the performer of the request is the buyer of Sale; <i>sincerity:</i> < no specific condition > <i>truth:</i> the delivery day of Sale is equal to or greater than Today; the stock of the article type of Sale on the delivery day of Sale is equal to or greater than the number of items of Sale;		assess part
if	<i>complying with the assessment is considered justifiable</i>		response part
then	<u>promise</u> sale completing for Sale	[T01/pm]	
else	<u>decline</u> sale completing for Sale the addressee of the decline is the buyer of Sale;	[T01/dc]	

The figure above shows the action rule for dealing with events of the kind “sales completion of sales is requested”. Action rules guide the *operation* of an organisation. They consists of three parts.

The *event part* contains the *when-clause*. The subordinated *with-clause* lists the properties of the sales instance. The *assess part* comprises the checking of the three validity claims: the claim to *justice* (is it socially right what the performer does), the claim to *sincerity* (is the performer acting sincerely), and the claim to *truth* (does the requested product exist or can it be made to exist). The *response part* comprises the *if-clause*. The effect of executing the rule is either promising to bring about the proposed product or declining it. For both kinds of events, there is a separate action rule.

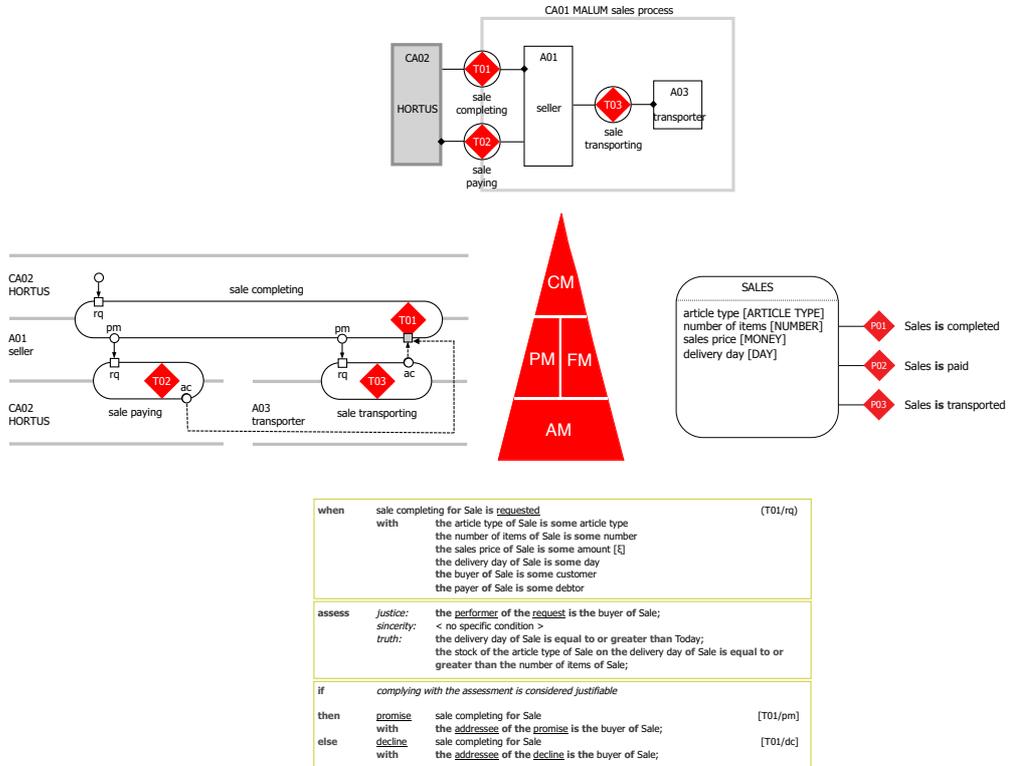
Because of the special if-condition (*if complying with request is considered justifiable*), an action rule is not an algorithm. Instead, the outcome is an autonomous decision by the executing actor, who has been *authorised* to do so, and who is held *responsible* for his deeds.

FIGURE 11 ESSENTIAL MODEL COMPONENTS



The essential model of an (aspect) organisation consists of four sub models: *construction model* (CM), *process model* (PM), *fact model* (FM), and *action model* (AM). The CM is about the *construction* of the organisation (see Figure 9), and the AM is about its *operation* (see Figure 10). The PM connects the CM and the AM by showing the precise *process* relationships (see Figure 9). It is purely about coordination. The FM connects the CM and the AM by showing the precise *product* relationships (see Figure 7). It is purely about production.

FIGURE 12 ESSENTIAL MODEL EXAMPLE



As an example of the general structure of the essential model of an organisation, as exhibited in Figure 11, the picture above shows the four sub models of the wheelbarrow case that was elaborated in Figures 7, 9, and 10. The picture clarifies in particular that the four sub models are *four views on one integrated understanding* of the organisation.

GLOSSARY

(MET NEDERLANDSE VERTALING VAN DE TERMEN)

- act** (handeling) the atomic unit of action in *organisations*. Two kinds of acts are distinguished: *coordination acts* and *production acts*. Acts are performed by *actors*. [see also *transaction*]
- action rule** (actieregel) [synonym for *business rule*] a guideline for an actor for dealing with an *agendum* kind. It consists of three consecutive parts: the *event part*, the *assess part*, and the *response part*.
- action model** (actiemodel) one of the four sub models of the *ontological model* of an *aspect organisation*. It consists of a set of *action rules*.
- actor** (actor) a *subject* in his or her fulfilment of an *actor role*.
- actor role** (actorrol) the unit of *authority* in *organisations*. [see also *elementary actor role* and *composite actor role*]
- addressee** (geadresseerde) [*property of process step*] the *actor* to whom the *coordination act* is addressed.
- agenda** (agenda) a set of *agendums*. Every *actor* has his/her own agenda.
- agendum** (agendum) a *coordination event* to which an *actor* has to respond.
- agent** (agent) an artefact that is used by an *actor* as its digital proxy. Unlike actors, agents cannot be held responsible for their deeds. Therefore, agents can only support actors.
- assess part** (vaststellingsdeel) the part of an *action rule* that contains the conditions to be evaluated. These conditions are usually divided according to the three *validity claims*.
- aspect organisation** (aspectorganisatie) the *organisation* of an *enterprise* consists of three disjoint aspect organisations: the *O-organisation*, the *I-organisation*, and the *D-organisation*.
- authority** (bevoegdheid) the entitlement (to be) assigned to a *subject* to fulfil an *actor role*. [see also *responsibility* and *competence*]
- basic transaction pattern** (basistransactiepatroon) [see *transaction pattern*]
- business event** (bedrijfsgebeurtenis) [synonym for *coordination event*]
- business fact** (bedrijfsfeit) [synonym for a *fact* in the *production world* of an *organisation*]
- business object** (bedrijfsobject) [synonym for an *object* in a *production world*]
- business process** (bedrijfsproces) [synonym for a *process* in the *O-organisation* of an *enterprise*] a tree structure of *transactions* (possibly one) in the *O-organisation* of an *enterprise*. Every transaction in the tree is enclosed in a transaction on the next higher level (except the ‘highest’ transaction), and encloses one or more transactions on the next lower level (except the ‘lowest’ transactions).
- business rule** (bedrijfsregel) [synonym for *action rule*]
- causal link** (causale verbinding) link between a *coordination act* and its resulting *coordination fact*, indicating that the fact is the result of the act. [see also *process step*]

- claim to justice** (juistheidsaanspraak) one of the three *validity claims* in a *coordination act*. The claim to justice regards the *authority* of the *performer* to perform the act.
- claim to sincerity** (waarachtigheidsaanspraak) one of the three *validity claims* in a *coordination act*. The claim to sincerity regards the sincerity of the *performer* in performing the act.
- claim to truth** (waarheidsaanspraak) one of the three *validity claims* in a *coordination act*. The claim to truth regards the (potential) existence of the *product* concerned.
- cognitive correspondence** (cognitieve overeenstemming) the mutual understanding of a *coordination act* at the *informa level* of *communication*. Cognitive correspondence is reached if the *addressee* thinks he/she has understood the content of the message correctly. Success or failure is conveyed by respectively a *confirmation* or a *disconfirmation*.
- commitment** (verplichting) the being dedicated of the *performer* of a *process step* to its *intention*. It entails that the performer feels the moral obligation to let his/her future actions be in agreement with this intention.
- communication** (communicatie) the sharing of thoughts between *subjects*. Communication is brought about by exchanging *information*.
- competence** (competentie) the collective capabilities of a *subject* that makes him/her eligible to perform specific *acts*, in particular to be assigned the *authority* to fulfil the *executor role* in *transaction kinds*. [see also *responsibility*]
- complete transaction pattern** (compleet transactiepatroon) [see *transaction pattern*]
- composite actor role** (samengestelde actorrol) a composite actor role consists of two or more *elementary actor roles* and the *transaction kinds* between them.
- confirmation** (bevestiging) the expression by the *addressee* of a *coordination act* towards the *performer* that he thinks they have reached *notational*, *cognitive*, or *social correspondence*.
- construction model** (constructiemodel) one of the four sub models of the *ontological model* of an *aspect organisation*. It contains the identified *transaction kinds* and *actor roles*, as well as the *initiator links*, the *executor links*, and the *information links* between them.
- construction** (constructie) there are two fundamentally different perspectives on any system: the construction perspective and the *function* perspective. In the construction perspective on an *enterprise* one considers the (objective) *organisation* of the enterprise, fully ignoring its (subjective) function(s).
- coordination act** (coördinatiehandeling) the atomic act in *transactions*. The result of a successfully performed coordination act is the creation of the corresponding *coordination fact*. [see also *process step*]

- coordination event** (coördinatiegebeurtenis) an *event* in the *coordination world*. The occurrence of a coordination event is identical to the coming into being of a *coordination fact*.
- coordination fact** (coördinatieféit) a *state* element in the *coordination world*. A coordination fact is the result of a successfully performed *coordination act*. [see also *process step*]
- coordination world** (coördinatiewereld) one of the two *worlds* in which the *actors* in an *organisation* cause *transitions*.
- dependent fact** (afhankelijk feit) a fact that comes into existence dependent on, and together with, an *independent fact*. [see also *properties* and *attributes*]
- disconfirmation** (weerlegging) the expression by the *addressee* of a *coordination act* towards the *performer* that he thinks they have not reached *notational*, *cognitive*, or *social correspondence*.
- discussion status** (discussiestatus) *transaction status* in which the *initiator* and the *executor* have to ‘sit together’ and discuss what the cause of the ‘exception’ is and how to proceed. The *standard transaction pattern* has two discussion statuses: declined and rejected. The revocation patterns have one discussion status each: revoked.
- document** (document) a collection of *sentences*.
- documental** (documenteel) there are three sorts of *production acts/facts*, and consequently of *actors/actor roles*, and *transactions/transaction kinds*: *original*, *informational*, and *documental*. Documental production comprises archiving, providing, and transforming *documents*, as well as storing, retrieving, copying, transmitting, and destroying *files*.
- documental service** (documentele dienst) there are three sorts of documental services that a *D-organisation* offers to the corresponding *I-organisation*: keeping *documents* and providing documents.
- D-actor (role)** (D-actor(rol)) [shorthand for *actor (role)* in the *D-organisation* of an *enterprise*]
- D-organisation** (D-organisatie) the *aspect organisation* of an *organisation* that supports its *I-organisation* by offering *documental services*. It consists of *documental actor roles* and *transaction kinds*.
- D-transaction (kind)** (D-transactie(soort)) [shorthand for *transaction (kind)* in the *D-organisation* of an *enterprise*]
- elementary actor role** (elementaire actorrol) the *authority* to fulfil the *executor role* of a *transaction kind*. A subject fulfilling an elementary actor role is selected on the basis of his/her *competence*, and is assumed to exhibit *responsibility* in practising the assigned authority.
- enterprise** the general term to refer to any kind of collaborative activity by human beings. Examples: companies, governmental agencies, health care institutions, sports clubs, and building projects. Every enterprise has a *business* and an *organisation*.

- entity (entiteit)** an *independent* unary *production fact*.
- essential model** (essentieel model) the essential model of an *organisation* is defined as the *ontological model* of its *O-organisation*, to which *information links* are added. These links represent the *informational services* of the supporting *I-organisation*.
- event** (gebeurtenis) the coming into being of a *fact*. Events occur instantly, which means that their duration falls within one *time unit*. Events that occur in the same time unit, are said to occur simultaneously. An event is a *transition* at a particular point in time.
- event part** (gebeurtenisdeel) the part of an *action rule* that contains the *agendum* that the action rule is dealing with.
- execution phase** (uitvoeringsfase) the *transaction* phase in which the *executor* performs the *production act*. It starts from the *transaction status* 'promised' and it ends at the transaction status 'stated'.
- executor (role)** (executor(rol)) a role of an *actor (role)* in a *transaction (kind)*. An actor (role) who is *authorised* to be the executor (role) of a transaction (kind), is *responsible* for performing the *production act* and the corresponding *coordination acts*, according to the complete *transaction pattern*.
- fact** (feit) elementary state of affairs in a *world*.
- fact model** (feitenmodel) one of the four sub models of the *ontological model* of an *aspect organisation*. It contains the identified *fact types* and *business laws* in the *production world* of the aspect organisation.
- file** (bestand) a physical embodiment of a *document*. A document may, for example, be inscribed by marks on paper or by magnetic bits in a computer. A document may be inscribed in many files; these files are called copies of the document.
- forma** (forma) term to refer to the *competence* of a *subject* to perform *coordination acts* at the *forma level* as well as *documental production acts*.
- forma condition** (formavorwaarde) the collective prerequisites for reaching *notational correspondence* in performing a *coordination act*.
- forma level** (formaniveau) the level of *communication* in performing a *coordination act* at which the *performer* and the *addressee* strive for *notational correspondence*.
- function** (functie) there are two fundamentally different perspectives on any system: the *construction* perspective and the function perspective. Function is not a system property but a relationship between a system and a stakeholder; therefore, a system may 'have' many functions. In the function perspective on an *enterprise* one considers the functions of the enterprise as perceived by its various stakeholders. [see also *business*]

- independent fact** (onafhankelijk feit) a *fact* that comes into existence as the direct result of performing an *act*. [see also *dependent fact*]
- informa** (informa) term to refer to the *competence* of a *subject* to perform *coordination acts* at the *informa level* as well as *informational production acts*.
- informa condition** (informavoorwaarde) the collective prerequisites for reaching *cognitive correspondence* in performing a *coordination act*.
- informa level** (informaniveau) the level of *communication* in performing a *coordination act* at which the *performer* and the *addressee* strive for *cognitive correspondence*.
- information** (informatie) the expression by a *subject* of thought(s) in a form that is perceivable for other subjects. Briefly: information is from given thought.
- information link** (informatieverbinding) a link in a *construction model* between an *actor role* and a *transaction kind*, indicating that the actor role has access to the corresponding *transaction bank*. Through these links, the *interstriction* between actors is realised.
- informational** (informatieel) there are three sorts of *production acts/facts*, and consequently of *actors/actor roles*, and *transactions/transaction kinds*: *original*, *informational*, and *documental*. Informational production comprise remembering, recalling, and deriving *facts*.
- informational service** (informatieele dienst) there are two kinds of services that an I-organisation offers to its corresponding *O-organisation*: remembering *facts* and sharing facts.
- initiator (role)** (initiator(rol)) a role of an *actor (role)* in a *transaction (kind)*. An actor (role) who is *authorised* to be the initiator (role) of a transaction (kind), is *responsible* for performing the corresponding *coordination acts*, according to the *transaction pattern*.
- intention** (intentie) [*property of process step*] the disposition of the *performer* of a *process step* regarding the *product*. Examples of intentions: ‘request’, ‘promise’, ‘decline’, ‘state’, ‘accept’, and ‘reject’ [see also *commitment*].
- interaction** (interactie) the active mutual influencing of *actors*, by performing *coordination acts*.
- interstriction** (interstrictie) the passive mutual influencing of *actors*, by taking into account the state of the *coordination world* and/or the *production world* when dealing with *agenda*.
- I-actor (role)** (I-actor(rol)) [shorthand for *actor (role)* in the *I-organisation* of an *enterprise*]
- I-organisation** (I-organisatie) the *aspect organisation* of an *enterprise* that supports its *O-organisation*, by providing *informational services*. It consists of *informational actor roles* and *transaction kinds*.
- I-transaction (kind)** (I-transactie(soort)) [shorthand for *transaction (kind)* in the *I-organisation* of an *enterprise*]

- medium level** (mediumniveau) the level of communication in performing a *coordination act* at which the *performer* and the *addressee* exchange the substances in which their messages are inscribed.
- notational correspondence** (notationele overeenstemming) the degree of mutual understanding of a *coordination act* at the *forma level of communication*. Notational correspondence is reached if the *addressee* thinks he/she has understood the form of the message correctly. Success or failure is conveyed by respectively a *confirmation* or a *disconfirmation*.
- ontological model** (ontologisch model) a conceptual model of the *construction* and the operation of a system that is fully independent of its implementation.
- operation** (werking) the operating status of the *construction* of an *organisation*. It is guided by *business rules* and *work instructions*.
- operating principle** (werkingsprincipe) the operating principle of an *organisation* is the ability and readiness of the participating *subjects* to enter into and comply with *commitments* regarding the bringing about of *products*.
- order phase** (orderfase) the *transaction* phase in which the *initiator* and the *executor* strive to reach consensus about the *product* that the executor has to bring about. It starts from the transaction status 'requested' and ends at the status 'promised' or 'quitted'.
- organisation** (organisatie) term to refer to the *construction perspective* on an *enterprise*. The organisation of an enterprise consists of a network of *actor roles* and *transaction kinds*. [see also *business*]
- original** (origineel) there are three sorts of *production acts/facts*: original, *informational*, and *documental*. Original production comprises both immaterial acts (like devising, deciding, and judging), and material acts (like manufacturing, transporting, and observing).
- O-actor (role)** (O-actor(rol)) [shorthand for *actor (role)* in the *O-organisation* of an *enterprise*]
- O-organisation** (O-organisatie) (O from original) the *aspect organisation* of an *enterprise* where only original production facts are produced. It consists of *original actor roles* and *transaction kinds*.
- O-transaction (kind)** (O-transactie(soort)) [shorthand for *transaction (kind)* in the *O-organisation* of an *enterprise*]
- performa** (performa) term to refer to the competence of a subject to perform *coordination acts* at the *performa level* as well as *original production acts*.
- performa condition** (performavoorwaarde) the collective prerequisites for reaching *social correspondence* in performing a *coordination act*.
- performa level** (performaniveau) the level of communication in performing a *coordination act* at which the *performer* and the *addressee* strive for *social correspondence*.

- performer** (verrichter) [*property of process step*] the performing *actor* of a *process step*.
- process** (proces) a sequence of *acts* in a (discrete event) system and their resulting *transitions* in its corresponding *world*.
- process model** (procesmodel) one of the four sub models of the *ontological model* of an *aspect organisation*. It contains the identified *transaction kinds* and the specific ways in which they are interrelated through *response links* and *waiting links*.
- process step** (processtap) the atomic building block of a *transaction process*. It consists of a *coordination act* and its resulting *coordination fact*. A process step has four core properties: the *performer*, the *addressee*, the *intention*, and the *product*.
- product** (product) [*property of transaction*] *independent production fact*. A product is represented by a predication of an *entity*, e.g. the predication “is delivered” of the entity “sales 1618”. A product has a number of *properties*, which are *dependent facts*.
- product kind** (productsoort) [*property of product*] *products* of the same product kind are brought about in *transactions* of the same *transaction kind*. Examples of product kinds: “Membership is started”, “Rental is contracted”, “the fee for Membership in Year is paid”. The variables in a product kind are placeholders for *entities*.
- production act** (productiehandeling) the *act* in a *transaction* by which the *executor* creates the *product* as well as its *dependent production facts*. [see also *transaction pattern*]
- production fact** (productiefait) a *state* element in the *production world*. A distinction is made between *independent* and *dependent* production facts. [see also *product*]
- production time** (productietijdstip) [*attribute of product*] the *point in time* at which the *product* of a *transaction* has started to exist or will start to exist.
- production world** (productiewereld) one of the two *worlds* in which the *actors* in an organisation cause *transitions*. A *state* of a production world is a set of *production facts*.
- property** (eigenschap) a *dependent production fact*, associated with an *entity*.
- response link** (responsverbinding) a link in a *process model* between a *coordination fact* and a *coordination act*, indicating that the *coordination act* is performed in response to the corresponding *coordination event*.
- response part** (responsdeel) the part of an *action rule* that contains the *act(s)* to be performed in response to the *agendum* that is dealt with.

- responsibility** (verantwoordelijkheid) disposition of a *subject* to be committed to the *coordination acts* he or she has performed, as well as the *agenda* he or she has to respond to [see also *authority* and *competence*]
- result phase** (resultaatafase) the *transaction* phase in which the *initiator* and the *executor* strive to reach consensus about the *product* that the executor has brought about. It starts from the transaction status 'stated' and ends at the status 'accepted' or 'stopped'.
- revocation pattern** (herroepingspatroon) a pattern of *process steps* in which one of the steps in the *basic transaction pattern* is revoked.
- sentence** (zin) the syntactic form in which thoughts, especially *facts*, are expressed.
- service** (dienst) the functional appearance of a *product* to its consumers.
- Scope of Interest** (interessegebied) the delineation of the (part of the) *organisation* that one has chosen to focus on.
- social correspondence** (sociale overeenstemming) the degree of mutual understanding of a *coordination act* at the *performa level of communication*. Social correspondence is reached if the *addressee* thinks he/she has understood the *intention* of the message correctly. Success or failure is conveyed by respectively a *confirmation* or a *disconfirmation*.
- standard transaction pattern** (standaard transactiepatroon) [see *transaction pattern*]
- state** (toestand) at any *point in time*, a *world* is in some state, defined as the set of *facts* that have been created up to (and including) the point in time.
- subject** (subject) a human being in his or her quality of social individual, in particular its being able to enter into and comply with *commitments*. Only subjects can fulfil *actor roles*.
- transaction** (transactie) the unit of *production* in an *organisation*. The result of a successfully carried out transaction is the coming into being of a *product*. [see also *transaction process*]
- transaction kind** (transactiesoort) [*property of transaction*] *transactions* of the same transaction kind regard *products* of the same *product kind*. Examples of transaction kinds: membership_start, rental_contracting
- transaction pattern** (transactiepatroon) a pattern of *process steps*, alternately taken by two *actor roles*. The *basic transaction pattern* consists of the process steps 'request', 'promise', 'state', and 'accept' (Note: in between the promise and the state act, the *production act* is performed; it precedes immediately and unconditionally the state act, but it is not considered a process step itself). The *standard transaction pattern* contains in addition the process steps 'decline', 'quit', 'reject', and 'stop'. The *complete transaction pattern* consists of the standard pattern and the four *revocation patterns*.

transaction phase (transactiefase) the *standard transaction pattern* consists of three consecutive phases: the *order phase*, the *execution phase*, and the *result phase*.

transaction process (transactieproces) a sequence of *process steps*; it is some route through the *complete transaction pattern*, during which process steps of the same process step kind may occur multiple times. [see also *transaction pattern*]

transition (transitie) a change of *state* of a *world*. A transition consists of the creation of an *independent fact*, usually together with a number of *dependent facts*.

validity claim (geldigheidsaanspraak) in performing a *coordination act*, three validity claims are raised by the *performer* and validated by the *addressee*: the *claim to truth*, the *claim to justice*, and the *claim to sincerity*. Which *act(s)* will be taken in response to a *coordination event* depends on the degree in which the three *validity claims* are accepted by the addressee. [see also *action rule*]

waiting link (wachtverbinding) a link in a *process model* between a *coordination act* and a *coordination fact*, indicating that the performance of the *coordination act* has to wait until the *coordination fact* has been created.

work instructions (werkinstructies) next to *action rules*, the *Action Model* of an *aspect organisation* may contain work instructions, i.e. guidelines for performing *production acts*.

world (wereld) with every (discrete event) system, a world is associated in which the effects of the *acts* in the system take place. More specifically, the effect of an act in the system is the creation of a *fact* in the system's world.

ABBREVIATIONS

AM	Action Model
CM	Construction Model
DEMO	Design and Engineering Methodology for Organisations
FM	Fact Model
FOK	Formal Official Gnome Language (see “OK”)
OK	Official Gnome Language (“Officiële Kaboutertaal” in Dutch)
PM	Process Model

Acknowledgements

Several people have contributed to the realisation of this book through their critical and encouraging comments. I like to mention them especially (in alphabetical order):

David Aveiro
Jan Hoogervorst
Joop de Jong
Hans Mulder
Martin Op 't Land
Niek Pluijmert
Alexander Verbraeck
Jacob Vos

Translating the original source text (Nederlands) to English was not an easy task because of the many language jokes and the rhymes on the one hand and the technical jargon on the other hand. Therefore I am grateful to the next persons for their helpful suggestions:

Gerdien de Lange
Mariska Bottema
Tamar Bottema

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Jan Dietz is the spiritual father of DEMO (Design & Engineering Methodology for Organisations), the main methodology in enterprise engineering. He is co-founder and honorary chairman of the Enterprise Engineering Institute (www.ee-institute.org) and he has participated in numerous practical DEMO projects regarding (re)designing and (re)engineering organisations. For advancing the discipline of enterprise engineering, he chairs the international CIAO! Network (www.ciaonetwork.org). He is also editor-in-chief of a book series on enterprise engineering, published by Springer Verlag, Germany.

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ABOUT THE BOOK

This book is one of the two books that constitute the DEMO basis. The other one is titled “The essence of organisation”, authored by Alicia P.C. Perinforma. Both books can be obtained from www.sapio.nl. The DEMO Basis elucidates the role of ICT (Information and Communication Technology) in organisations, and it offers an easy introduction in the emerging discipline of enterprise engineering. It is intended for everyone who feels the need for a coherent, consistent, comprehensive, and yet concise understanding of organisation and ICT. The DEMO basis aims in particular at professionals in organisation and ICT, like enterprise architects, business process managers, and information system designers. It constitutes the course material for the DEMO Bachelor course, which is taught at several universities and polytechnics, all over the world.

DEMO (Design and Engineering Methodology for Organisations) is the leading methodology in enterprise engineering, whose founding article has been published in 2013. Three generic goals are identified in this discipline. The first one, *intellectual manageability*, is the basis for mastering complexity; current approaches fall short in assisting professionals to master the complexity of enterprises and enterprise changes. The second goal, *organizational concinnity*, is conditional for making strategic initiatives operational; current approaches do not, or inadequately, address this objective. The third goal, *social devotion*, is the basis for achieving employee empowerment as well as knowledgeable management and governance; modern employees are highly educated knowledge workers; yet, the mindset of managers has not evolved accordingly. Enterprise engineering is developed by a growing international network of universities and research institutes, in close connection with practice. This so-called CIAO! network currently comprises universities and research institutes from Belgium, Brazil, Czech Republic, Germany, Japan, Luxembourg, Netherlands, Portugal, Russia, Switzerland, and USA.