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What Makes Cities Bloom and Prosper?: Connected & Cooperating People

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Abstract

People are amazed at the complexity and size of anthills in Africa, but what they do not realize that these are built not by leadership or architectural instructions, but by emergent behaviour from hundreds of thousands of face-to-face interactions between ants and subsequent massive numbers of small actions, by groups of ants with different functions. From these they together build ventilation channels, humidity control, storage rooms, escape tunnels, carry food, etc etc. These face-to-face interactions are done by smelling each other with only eight different smell codes. In the present cities of the world most tasks are done by also face-to-face in real life (IRL) meetings of people, but our small and big human-hills are much influenced by tele- (on a distance) communication also. By watching TV broadcasts, by talking on the telephones together, by looking and interacting from their PC's, smartphones or Laptops connected to fast Internet. These hundreds of millions of parallel messages and interactions daily have a massive effect on what cities look like and how they evolve.

In this chapter we present a number of ways these interactions influence and exert power on the cities. From e-mail and telephone to more complicated collaboration tools that are carrying information, knowledge and practical knowhow to get things done, to wisdom and conscious shared visions. It is not the ICT technology only, but what individuals and groups of **people do together** with those power tools that matter.

Keywords: Smart Cities, Social Networks, Connectivity, Collaboration, Network Effects, Synergy, Synthetic Apertures, Collective Intelligence, Corridoria, network effects, telescope metaphor, value creation, chains of city regions, global brain, weavelets, commons, synthecracy.

8.1 Introduction

An interesting example of a very successful, recently constructed, mega-city is Dubai, an important hub in international airline flights. In a promotional video about this city, Parag Khanna, famous map-maker of international infrastructures [1], tells what is so good about the resilience and strategy of Dubai's architects [2]. But the question remains after you see this film: what is the MOTOR of that city? Therefore, one of the research questions of this book chapter is "How can we make small and big cities bloom? What drives prosperity there?"

Many scholars have published answers to these questions. For instance Richard Florida derived guidelines for American cities who noticed that some cities were successful in attracting talented young people who started new businesses. He published the three T's related to 3 magnets: *Technology, Talent, and Tolerance*; which do interact and mix to produce a kind of 'chimney effect' of growth. Cities that do not create these conditions can be shown in the statistics to decline fast. The movers and kickers leave those towns. Other more recent influential work is in the books and lectures of Jeremy Rifkin [3]. His main advice for prosperity and attractiveness of city area's is to construct and improve the three vital infrastructures for (mega-poli) city-area's: Energy distribution infrastructure, ICT & communication digital flows infrastructure, physical goods and persons & goods transport infrastructure for logistics. For these infrastructures in order to operate & maintain there must be in place: a Communications Internet, an Energy Internet and a Transportation Internet!!! A smart energy grid cannot operate without a smart digital network. Same applies for logistics. That can only function without a vast grid of computer and human communications.

I will focus in this chapter not on the vital conditions, but on what people DO TOGETHER in cities based on those infrastructures and why that, as a motor, can create value and wealth.

8.2 Human Networking

It should be clear that the activity of "networking" is very much empowered, supported and speeded up in recent decades by Internet-Email and Social

Media use. What are less visible are the informal networks of people who help each other or refer them to others who maybe can solve the stated problem.

There is always (1) a formal network of decision makers with authority and power who delegate tasks in hierarchies and to which you have to report and (2) a second network of specialists who have knowledge on a certain, usually very narrow but deep, subject and its solutions to problems. Problem is that these much respected specialists do not refer to each other because they consider themselves as the centre of the universe and often do not think other people know anything relevant. Fortunately there is also (3) a third network present in every organization, otherwise the organization would not have existed anymore. It is the network of “carriers”/gatekeepers. They keep decision makers and specialists in balance by carrying issues forward, often by transferring questions to somebody somewhere that they think knows everything about a solution, and if not transfer it to somebody else, etcetera. Scientists are very good at this, which can usually solve anything insides or outsides the organisation within six or seven steps. There are a number of rules & ethics, elucidated in my published lecture [4] for this very important social “networking” which can take place on eMail, in corridors, at lunch, in coffeehouses or pubs. These carriers/transfer agents test each other out to know if they can be *trusted* to solve problems. So there is a lot more behind this than shaking hands at parties and exchanging business cards. You must have done work together and shown your abilities to be included in one of the many “networks” in a city. Otherwise you will be bypassed.

Interestingly there is another level of social networking which is less well known but even more important not only for the functioning of cities but for the stability of society. In 1973 the sociologist M. Granovetter noticed that graduates from universities got more successful jobs from referrals & recommendations by distant acquaintances (weak links) than from their own family members (strong links). These ‘weak links’ are in fact very strong and effective, that is why I have given them another name “Btwieners”, see [4]. Key is that they are respected in more than one tribe, like the traveller Gandalf the Gray in Tolkien’s books, welcome wherever he arrived. This rare breed of super-networker I call Btwiener who is able to **interconnect people** in different tribes/families to work together in teams based on their respective shown *different* abilities/skills/crafts allowing to contributing whatever their background is. The super-networker activates their ability to learn very fast from their colleagues. Such open teams learn from their clients and from the environment they work in and improve and innovate so fast that others can copy but not overtake them. I call that ‘**trans tribal collaboration**’.

Prof. Peter Csermely studied [5] these interconnecting people and found that a vast variety of networks, varying from proteins, people, brain repair cells to eco-systems also use weak interactions to function and solve damages. These mobile units stabilize the whole system. And only a few of them are around. You will not find them on any formal organization chart though.

Social networks on Internet support & speed up very much the activities of ‘networking’ as well as the ‘Btwiening’. I recommend that cities identify and support these Btwieners because although they most often do their work voluntary, the effect of what they do is most often underestimated. They are a make or break asset.

8.3 The Network Effects and the Value that They Generate

Now, after we have shed some light upon the people who “connect” others, we should focus more on ‘why is it valuable when people communicate, connect together and cooperate?’. This brings up the analysis of the so called ‘Network Effects’ [6], often quoted but seldom well understood.

“*Everything wants to be connected*”, is the famous ‘Renan Law’ of my friend and colleague Sheldon Renan. But, why does everything in the universe want that? What is this self-interest or incentive to connect? And what does one do after the technical connection? On how many levels and how strongly must we connect, as depicted in Figure 8.1, to achieve meaningful cooperation?



Figure 8.1 Networks of humans supported by communication networks.

And, what is even more difficult, to achieve cooperation between people with very different backgrounds?

There is a lot we can say about those questions, but let me first introduce some often-mentioned concepts or Networking Laws and see how they differ, so they are put in context and in perspective. I will avoid much of the mathematical symbols here, or put them double between brackets, since I know formulas can incite panic attacks in, for instance, sociologists and many other non-scientifically minded people.

First of all ‘Network Effects’ can be formally defined as: “How much does the *Value* change, proportional with the *Number* of people that participate in a network of connections/relations”.

((Notation ‘V’ = *the Value*, and the *number* of reached people in the network is noted as ‘N’)).

These effects are the engines for New Power (connected demand side, see [7]) and they make networks grow and interconnect. Growth of Value can trigger growth in wealth, job creation and prosperity so it is worthwhile to study and implement them.

I. Sarnoff’s Law *for broadcasting networks, radio, TV and media publication & distribution.*

The first networking effect is Sarnoff’s Law, which states: the value of a one-to-many information distribution network grows proportionally with the number of readers (books, newspapers)/listeners (radio)/viewers (TV, movies). Or in other words: number of eyeballs of consumers, as shown in Figure 8.2. Such networks simply count viewers or views, without any regard for differences between or expectations of the users.

David Sarnoff has been able to convince with this ‘law’ the many local broadcasting stations in the US to interconnect and broadcast one or more nation-wide TV channels like ABC and NBC. More eyeballs, bigger audiences for the politicians and more value for the advertisers! See Figure 8.3. This network effect – more is better – is still the driving force behind ‘publicity’ and PR and is now in the process of being transposed onto online media on the Internet, where the media advertise themselves, insisting that us looking at their broadcasts is THE way of using the Internet.

I strongly disagree with this notion that spreading commercial content is the purpose of Internet, and I am getting more irritated every day by the bombardment of propaganda and commercials and their influence on the actual content of the Internet, swamping everything with sex-and-violence memes,



Figure 8.2 Families gathered around the TV set.

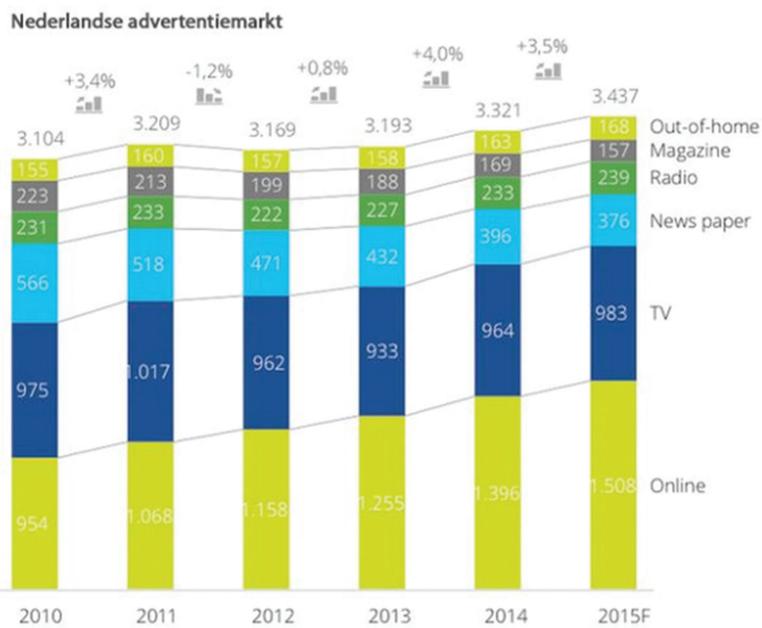


Figure 8.3 Advertising market of the Netherlands. Forecast online 2015: 1.5 billion euro's, double digit growth.

which tend to drag it down to the lowest common denominator level, like water. In contrast with what Internet did, it allowed its users, to find themselves the highest levels of their interests. Sarnoff's Law applies to one-direction messages with identical content, from a central source to as many passive, tranquilized 'information consumers' as possible – who, by the way, pay for the adds through taxes or the price of the products or services they are encouraged to buy and consume.

'Value' in this context means value for the broadcaster and commercial or public service advertisers. Politicians and business persons are fond of this form of network used to promote themselves or their products. They want to be in the centre of the public attention golden triangle of "screen, beer and bites" in which we live. And it is unfortunately also at the core of the business models of Google Search and Facebook etc. But as I've written above, users start to get annoyed by commercial breaks about things they do not want to buy, or lots of loud little, attention-grabbing and inescapable tiny films, monopolizing more and more space on our computer screens and phones, and for which we pay in subtle, indirect ways. This in my humble opinion (IMHO) is not a wrong intention of the advertisers, as long as their stuff is not forced unavoidably upon us, made obligatory so other choices are excluded. Business commercials and state propaganda have this same tendency to dominate.

((Sarnoff: Value is proportional to N viewers = 1+1+1+ ... +1;
N times)). ((one-to-many, or 1:N))

Media Value **adds up**, which means the value counts up and is cumulative, irrespective of the diversity in demand or interests of the viewers. Of course, in some types of one-to-many publications, the number sold of a book or numbers of 'views' of a blog or 'likes' of a picture is a positive measure of income, popularity and/or appreciation, and can be used for ranking and attracting more viewers/readers. So Sarnoff's Law is a driver for growth of the World Wide Web too. Documents etc. are put online on the WWW to get more eyeballs on the page and reach and communicate with possibly interested people, who can still choose themselves.

II. Metcalfe's Law for telecommunication networks with CONVERSATIONS and interconnection of networks.

The second network effect is Metcalfe's Law that states that the Value of a communication network growth is proportional with the square of the number of participants connected to it. Take for instance, a (mobile) telephone



Figure 8.4 People on the telephone.

conversation, See Figure 8.4, or an exchange of email messages. The reason is that each of the N people connected can talk to N (minus one, yourself) other people or computers.

((Value proportional to $N^2 = N \times N$ for N people/computers who can communicate with each other)).

Robert M. Metcalfe who defined this law, is also the inventor of the hugely successful (and disruptive) Ethernet Protocol. Developed to let computers share local area network resources, this is now also applied to sharing, using long-distance fiber optical cables. The value of such $N \times N$ telecommunication and computer-computer networks thus grows faster with N than $1:N$ media networks. It is also the reason why all fixed telephone and mobile telephone networks in the world are interconnected so that everybody can reach each other. It is also the driver for interconnection between datacom networks: the INTERNet and its attached services, which is, of course, a network of interconnected networks. It facilitates the SHARING of network infrastructure for digital transport. It drives peering and transit connections between Internet Service Providers (ISP's) and Carriers: a non-zero-sum game (win/win situation); a strong incentive to build and interconnect Fibre-to-the-X (FTTX)

networks, so they can scale up and be hugely successful. The X denotes Home, Business, Premises or Farm.

Because of this Law the present total value of the telecommunication industry is multiple times that of the media industries combined in the world, contrary to what the media themselves would have us believe, including film and television celebs advertising themselves. To say it more compactly: “*Content is not king – communications is*” (quote of Odlyzko).

That people consider the possibility of connecting to billions of others as valuable can be concluded from the fact that they are willing to pay for calls and internet access. That growth of network Value is however, in practice, tempered by the fact that this law does not take into account the different strengths of the links/relations between people. Or to put it more bluntly: “maybe I can talk to anybody in Brazil, but maybe I have nothing to discuss, not even to chat, except about the weather and to exchange some cat photos”. The lower than square value growth has been derived in [8, 9] as the **Odlyzko-Tilly Law** which may be more realistic than Metcalfe’s Law and Reed’s Law but still a way bigger than Sarnoff’s Law of media broadcasting.

$$((V \sim N * \text{Log } N))$$

III. Reed’s Law of GROUP MEMBERSHIP – *Value of Social (tribe internal) network*

The third network effect is in fact based on the “social networking behaviour” of people, as opposed to infrastructure investments and was formulated in 1999 [10] by prof. David P. Reed: of MIT. **Reed’s Law** states that the value for users of big networks, and more specific: social networks grow in proportion exponentially with the groups of participants (members of tribes).

You can either be or not be a member of a closed (user) group/share some [14] or tribe, as depicted in Figure 8.5. So if there are N of those groups/clubs this gives 2 to the power N possibilities for memberships, growing exponentially when more groups are added.

Just try it yourself make a matrix of vertical N groups and make horizontal rows of persons who are (1) or are not (0) member of those groups. This charts the total number of possibilities and defines the total value of social networks that support tribes.

$$(\text{Reed’s Law: Value proportional to } 2^N = 2 * 2 * 2 * \dots * 2, N \text{ times})$$

Why is being a member so valuable to people? It is the strong urge to belong, to be appreciated and be protected by fellow tribe members. That is, among



Figure 8.5 Groups.

other reasons, the drive to text/sms/Whatsapp/tweet all day and night with your friends: you confirm and are confirmed, socially, with group knowledge, you are member of the tribe, wherever you are at a given moment. It is very important for young people and they are willing to pay for it.

Reed's Law of Possibilities may have limitations, since not everybody can become a member of every club, because one's language, clothing and conduct must be acceptable to the other members of the clan. In addition, the fear of being refused or expelled can be significant. That is why members constantly confirm their mutual bonds. One does not need to be an anthropologist to see this. (Sometimes the recently initiated members even have to show themselves to be worthy of being a member by having to behave in a nasty way to non-members outside the tribe.) These social urges make the value growth of Reed's Law of group membership grow exponentially: faster and larger than either Sarnoff's or Metcalfe/Odlyzko-Tilly's.

There is something that has crept in almost surreptitiously onto the Internet, and which is implied by Reed's Law, that is, every human now can be member of more than one tribe/share some at the same time : "Multi Tribe Membership" (MTM). Before the Internet that was well-nigh impossible. Not so long ago if you were born in a village somewhere, in a certain family at a certain social level, or certain neighbourhood, the rest of your life could practically be charted until you died, no matter how hard you tried to raise your social status, for instance through education. Your own family members would frown if you started relations outside your social level, religion or tribe. And everywhere people would tag/judge you by your accent, dress or skill as "somebody from lower middle class in X".

You could go to the best schools, be a member of an elite sports club, listen to classical music and go frequent the opera and ballet; people would still remind you of your class/family/regional origins. The only escape was to move to the city or to another country, or join a different culture.

Now thanks to the Internet and other social media you can escape, be a banker in the morning, ride your Harley with your club in the afternoon and dance the tango at a samba school in another city. So you can be a member of multi tribes.

It is the exclusivity of these closed ‘tribes’ that attracts people. You join the group to be with people like yourself, with the same prejudices, dresses, who you can trust and feel safe with. The same cultural backgrounds and codes occur in Tweets, and by demonising outsiders. You can like this or not but the urge to be part of a group and be appreciated as a valuable member in that community is very strong, rational or not. And the urge not to be expelled is strong. In some parts of the world to be expelled from a village or clan can mean that you will not survive because access to water, food and shelter is taken from you. So Reed’s Law of the value of memberships is strong, and may indeed be more valuable for society than the value of its communication networks.

IV. Van Till’s Law for the value of COOPERATION & COLLABORATION

The fourth network effect, even more strong and powerful than the first three as an engine for the Collaboration and Sharing Economy, as depicted in Figure 8.6, we now live in is **Van Till’s Law** that states that the shared value for the Peer-to-Peer commons in which participants cooperate and collaborate in a network (which is more than just be a member) grows proportionally with N Factorial, [11–13].

(Van Till’s Law of Shared Value:

V proportional to $N! = N * N-1 * N-2 * \dots * 2 * 1$).

This grows even faster than exponentially (viral) because this concerns the maximal (upper limit) number of combinations you can make by networked cooperation between N unique diverse and non-interchangeable) individuals, each contributing his/her first-class skills and crafts.

Example: with a deck of playing cards, each card unique, you can lay 52 ! different rows (combinations/sequences) of cards on the table: $52 ! = 52 * 51 * 50 * \dots$ etc. With each card you choose from the deck that you lay down you have one less you can choose from. The 52 factorial combinations are a huge



Figure 8.6 Cooperation and collaboration.

number $3.1456688 \text{ E}+69$, which is bigger than the number of atoms estimated to be in our solar system. So this upper limit is impractical to estimate the value of cooperation. But it makes sense to show the richness of constructive possibilities when we connect and combine skilled people beyond the boundaries of their many closed tribes. The number of possible combinations of unique ideas is limitless, only constrained by lack of imagination and cultural and conservative prejudices and silo's with vested interests. These are the boundaries we have to cross if we want to create value and give our children a future.

Crucial point of Van Till's Law is not the upper bound of its Value, but that cooperation and co-creation by participants, with the best [16] contributions and their first-class skills, whatever their background, online and off-line, works in a *multiplicative* way to create value, as opposed to *adding up*, as with media broadcasting.

This supports the popular slogan of the P2P Open Share Economy: "To share in a smart way is to multiply value for all contributors" (in Dutch language: "Delen is vermenigvuldigen"). This is a pun in Dutch, based on the double-meaning of 'delen', as both 'sharing' and 'division', the latter being the opposite of 'multiplication'; it seems to say 'division is multiplication', which is a nice paradox).

If a valuable person joins your team, who can really DO something extremely well and this contribute as promised, it can multiply the value of the whole team. Besides, the group can act as a magnet to others, thus speeding up and progressively enhancing the learning process.

P2P 'Sharing' implies in this context not only physical resources and tools but also of practical knowledge and information about solving problems. Knowledge and information does not diminish if you share it and is therefore abundant, non-scarce and thus inexhaustible, see Figure 8.7.

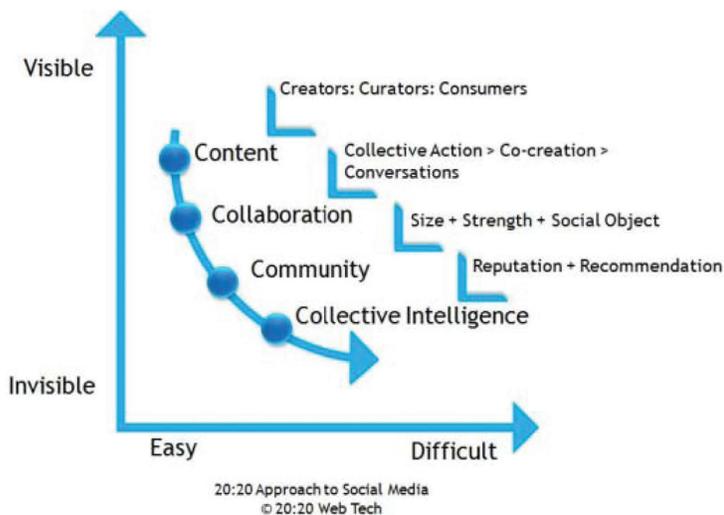
The business community is noticing the same four network effects as phases in Social Media binding of clients. For instance Gaurav Mishra of 20:20 WebTech identified four "phases" in connecting with clients and groups of clients: 1. Content 2. Collaboration 3. Community 4. Collective Intelligence, see Figure 8.8. With each step the effort becomes more invisible, but also more difficult to weave. And yes: curators, conversations, co-creation and recommendation/reputation/trust play critical roles.

8.4 The Telescope Metaphore

So from the Network Effects we may conclude that successful cities not only are built on *scale* (number of inhabitants) but also on *connectivity & scope*: depth of skills of top specialists which are co-creating by way of networking together and by cooperation.



Figure 8.7 Many small fish can together form something big.



Gaurav Mishra | gaurav@2020webtech.com | 20:20 WebTech | http://2020webtech.com **20:20 WEBTECH**

Figure 8.8 Approach to social media.

Source: Gaurav Mishra, <http://202webtech.com>

These skills must be diverse and unique, like the DIFFERENT playing cards that are combined to make a strong hand. What is the reason for this need for diversity in cities? An explanation can be found in the “Telescope Metaphor” which I did define in 1998 [18]. Centuries ago people started to make telescopes to better look at the stars. Until quite recently it was assumed that a bigger telescope with larger lenses would ‘catch more photons’ from a distant star and would have a better resolution. Radio-wavelength astronomers found out that this is not the case. By linking a number of small radio dishes, each looking at a star, and processing the combination of signals, they get a much better image than from one large telescope. The resolution of the whole *Network* of small telescopes does depend on the distance between the two little telescopes which are the most far apart! As a result astronomers now ‘network’ their telescopes in arrays for combined observation from far apart locations on earth or even by linking with one telescope on a satellite.

Telescopes were invented and improved in Holland and Venice, who both employed them to have early info about cargo ships that returned from Asia, so they could buy stock from that ship just before it arrived. Later ever bigger telescopes were used to look at the stars and planets. Bigger until the glass lenses and mirrors nearly started to collapse. Size of most things can reach an upper bound. That applies to buildings, companies and cities too.

The solution is to split up the large telescope into a number of interconnected (networked) small ones that effectively function as **one** telescope. This setup is for instance employed by the huge LOFAR array radio telescope, which in the Netherlands and Germany employs 20,000 interconnected antennas.

The same engineering trick was done with mobile (phone) networks. Instead of installing ever more powerful and more frequency carrying antennas they reversed the direction to install many small cellular antennas with short ranges Nordic Mobile Telecoms (NMT) and non-overlapping frequencies, from which the base stations where interconnected with fixed leased lines. Such cellular networks can handle many more mobile subscribers and heavy data-transport traffic. Later generations of communication networks for mobile users have the same cellular architecture of small connected cells.

Coming back on radio telescopes and to be more specific, the **Resolution** of the synthetic telescope, we know that it is related to the distance between the most widely apart little telescopes (see Figure 8.9) and the **Sensitivity** (number of bits/dynamic range of the signals) which is related to the Number of the small telescopes. The effectiveness of the total setup is depending on

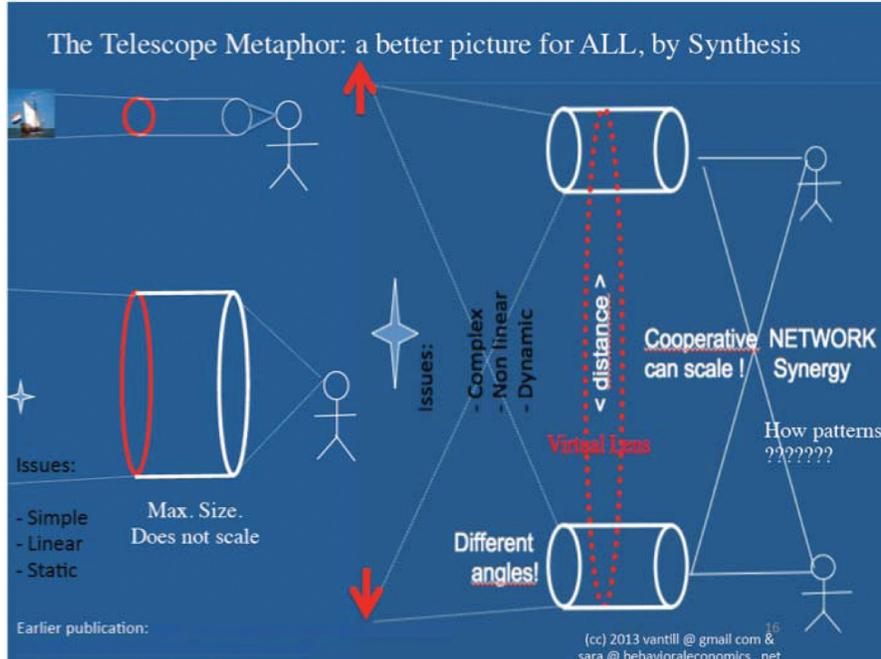


Figure 8.9 Telescope metaphor-1.

what processing and networking power is behind the telescopes. We see not with our eyes but with the lens of our brain!!

So this ‘telescope metaphor’ also applies to our body. We see depth by combining the *different* points of view of two eyes. Cover one eye to see what is lost by sensor ship. Our view is improved if we network with others who are far away from us, and who can look at the same scene from a *different angle or perspective*. Each participant gains in this process. All images which are made (processed and presented inside different brains) gain resolution.

This is the central idea of the new ‘Networked Democracy’: we all gain by communication and discussion from most different views, even the most far-fetched or un-welcome ones.

Now we can ALL see things much clearer: networked together, individual & connected! So there is an incentive for all contributors to network and collaborate together, each gets an improved overview in return for their own contribution. Personal interests are connected to the shared interests and fed back to the personal ones, in a virtuous circle. This fire the chimney effect mentioned above.

If such skilled persons and constructive teams are woven together, brought together by Networkers and Btwieners [15] and a flock or maze builds up, it suddenly is possible to have hundreds of thousands of angry women demonstrating with pink hats on squares all over the planet, who behave and act together like one non-violent coordinated stable living organism.

It turns out that Btwieners, with the help of smartphone networks, can bring stability by binding people from multiple closed groups together across boundaries, instead of dividing them by hate and conflicts erupting from multi-ethnic tribes clashing with each other.

As stated above, besides gains in resolution of a group of very different positioned people and higher perceptive sensitivity for all by having a large number of people interacting and cooperating we also need a particular kind of scalable network structure to correlate, process and distribute the information.

My prognosis is that the structure of the interconnections between people that will have the emergent property of correlation, distributed memory of patterns and “collective intelligence”, will be similar to Weavelets, defined in [19] and [20].

You should not be surprised that this Weavelet pattern will turn up in Brain Research, Social Media core structures and NSA -like psy-ops big data systems.

To explain this proposed structure, please notice that in order to synthesise a picture from a wide combination of sources, as shown in Figure 8.10, all

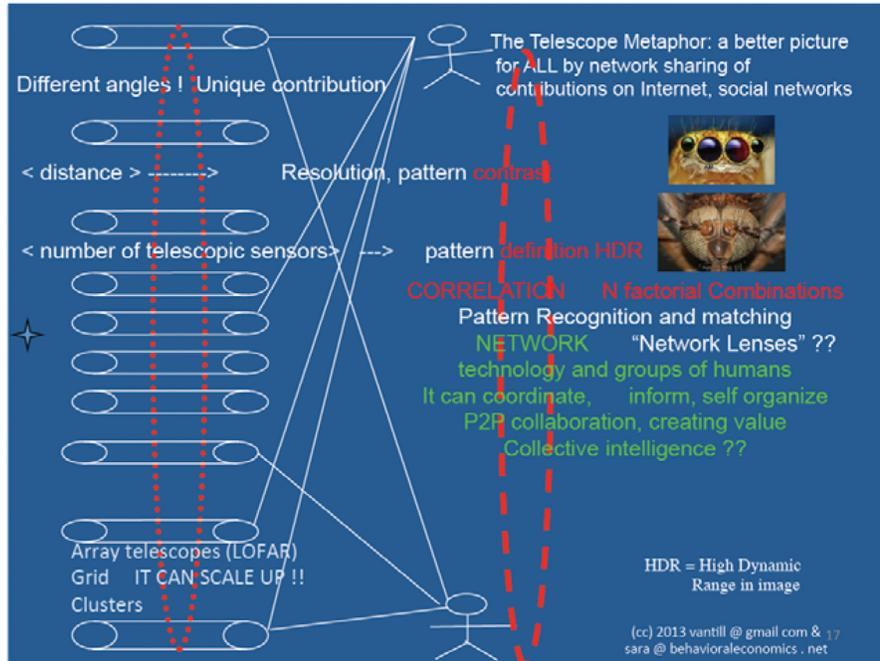
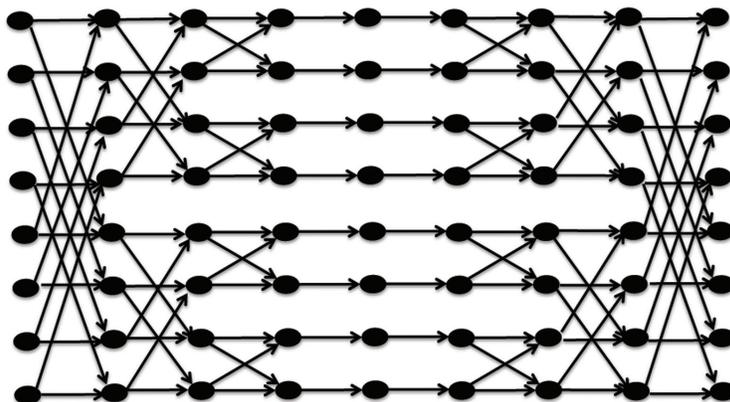


Figure 8.10 Telescope metaphor-2.

the different information streams must be connected to each other. This is done in the brain of insects with all the facet eyes, linked together. And it is done inside the head of spiders who have a number of separate eyes on their head. One of the most efficient ways to connect every sensor stream is to do that in a number of layers. If certain weighting factors for amplitude and phase are used, compare that to Twitter likes with comments, after a few layers we have transformed the spatial image into a transformed one, which can be used to correlate and recognize previous knowledge. Such a construction is fast, parallel, and resilient against damages and noise, it can store knowledge in the form of holograms which replicate copies all over the network. My conjecture is that such networks construct "synthetic apertures" and can be compared to a "lens" which can resolve knowledge and lets people learn together, by mixing view into a larger whole in which they can participate and benefit. This way we can build cities which have a collective intelligent community.

In reality human brains, social networks, 'deep thought' AI systems, search engine databases, Wikipedia, Facebook and their Chinese counterparts have 'neurons' with very many input and output connections instead of 2 in and 2

“Weavelet” Network Structure for P2P Collaboration between people (= nodes)



Derived from Cooley-Tukey algorithm for fast orthogonal transforms by Jaap van Till, 2013
Such connectivity between people can lead to “Collective Intelligence with Distributed Authority”

Figure 8.11 Fractal scaling weavelet networks that form a parallel LENS-LIKE structure, capable of correlation, pattern recognition and distributed memory.

out of the depicted Weavelet of Figure 8.11. People who are active in social networks usually have several hundred other people they frequently talk to and up to a hundred with whom they actively cooperate with. I introduced the Weavelets here to emphasize the role and importance of ‘connections’ for science, social cohesion and consensus.

The value and wealth generated by the interconnection between real top craftsmen and -women is too powerful to resist. This is also my recipe for smart cities and chains of cities beyond that:

Interconnect across boundaries the members of selfish and proud sects and tribes together into a Network, by way of problem solving, by which you need each other’s specialists, and by constructive shared goals that are impressive. Cathedrals were built in that way, by craftsmen who respected each other’s work. We can do that in the P2P Commons of the Collaborative Networked Economy too, but we first must learn to form well working Weavelets, constructive groups with “collective intelligence”.

I hope that the Fourth Network Effect of collaboration will get us out of the recent recessions at last, and will make Cities and Chains of cities bloom. May the Fourth Law Force of Synergy & Synergetics be with us !!

8.5 From Mega-Metropoli to Chains of City Areas, Example: The Eur-Asean Trade Route Called “Corridoria”

A large part of the world population has been attracted by the big cities to find work and have health services etc which are available there and not in the villages where they were born. This has resulted in mega-metropoli which have difficulty to cope with food, sewage and air pollution which reaches the boundaries of size when many extra millions of people keep coming every year to each city and the rural agricultural population diminishes. And unfortunately smart cities in most countries think themselves as being in the centre of the universe to which other smaller cities in the area should connect in a star shape. For instance Antwerp, Rotterdam and Amsterdam each think in such a self-centred way, while they are IMHO part of a city called EuroDelta.

In my opinion it is inevitable that just like with mobile phone networks and telescopes a policy & engineering reversal will be implemented to solve this problem. That means a chain of city area's (and mega-poli) connected in a string. In this way the condition of resolution [different & far away contributors can join, like in the travels of Marco Polo, bringing silk and emeralds to Venice and glass to the Khan] is fulfilled, and condition of sensitivity is also fulfilled (number of inhabitants in the whole chain) and can grow further.

This was the first drawing (Figure 8.12) I made of Corridoria on August 14, 2013 and published on my blog. The trajectory roughly followed the beds of both River Rhine and Danube which make sense since for transport you thus can ship things without great heights to climb or slide down. Armies preferred such routes as well as pilgrims, train tracks and couriers with messages on horseback. This route through Europe is now booming with growing traffic of lorries. Later that year I added the route from Istanbul to Shanghai (Figure 8.13), in China also along a river, which improves the just mentioned conditions even further. There are a lot of other reasons for this trajectory, which is detailed in [21]. Recently the Chinese Government has unfolded a huge plan of economic cooperation westward in several new Silk Route routes, mainly with train transport from China to Rotterdam, and other cities in the EU.

But these developments are more than only train tracks. There are, maybe in response to the turbulence on the UK and USA side, a number of economic pacts in Eur-Asia unfolding: *CTSS: De Turkish Council* and *OBOR: One Belt, One Road* started from the Chinese side as mentioned.

What would make more sense for commerce and prosperity than a link between EU – CTSS – OBOR? This is in essence what Corridoria can start to be!!!



Figure 8.12 First sketch of “Corridoria”, string of cities, 2013 and derived from noticeable growth of traffic and prosperity.

I would like to add two things here about Corridoria for the sake of the argument of this chapter that connected people do more than simply discuss: (1) They cooperate (Van Till’s Law which creates value) and they form network structures that exhibit emergent “collective intelligence” (condition as said before) to harness prosperity and innovate. First of all the big cities on the Corridoria line will prosper and bloom with their inner city infrastructures data centres and services now connected to all inhabitants on the chain. By traveling and university exchanges scholars and students will meet others on this Eur-Asian chain city and learn together.

Something similar has happened along the silk routes around the years 1200 in Middle Asia. Scholars followed the example of the very tolerant court of Persian Emperor Darius the Great (ca 650 BC) who understood that a MIXTURE of very wise scholars would provide knowledge and education to be successful. These scholars from China, India and European origin around 1200 met in cities like Merv and Samarkand and established “schools” from



Figure 8.13 “Corridoria” String of Cities, from Galway – Dublin – Euro Delta – Istanbul – Iran – Shanghai. 2013. From the Chinese side they are developing rail transport towards Europe (OBOR Strategy).

which a very large part of the present culture and knowledge in the world originated [22]. I hope we can repeat such huge jump in Enlightenment by letting present scholars and students meet in cities along Corridoria.

(2) A second point is that “Corridoria” is not structured simply as a line. Connected to the backbone are a multitude of smaller cities and towns in a resilient network structure as depicted on my following photo. I call that structure “Gaia’s Necklace” which will span all of Europe and Asia. That network structure will provide the Global Brain with a weave of weavelets, thus fulfilling the condition mentioned.

Notes and Remarks

ICT networks do indeed provide very powerful support for cooperating people. We should however keep in mind that there is no substitute for human contact, face-to-face in real life.

I predict however that smart networking using internet and telecommunications will improve the images we can gather about reality by:



Figure 8.14 Gaia's Necklace of city connectivity towards the global brain.

- A. *Contrast in perception* for all: related to the distances of the networks
- B. *Sensitivity of images* and perceived patterns: related to the number of inhabitants who are connected and can freely move information.
- C. *Level of consciousness* of society: related to the density of weavelet connectivity.

8.6 Conclusion

As the recent article [23] presents, we as human society are faced with an urgent problem: Dynamic Complexity resulting from (tele) interconnecting everything – with – everything, which makes controlling & dictating countries from a central point impossible without simplification and fragmentation of groups.

Commercial interests have developed tools on Internet to profile people and by confirmation of their views, filtering of the information they get and nudging their beliefs in an intended direction create “bubble” belief systems of target groups. The consequence of this is isolation, hate and conflicts between such fragmented “tribes”, that are no longer able to understand and communicate with each other, even within cities.

A possible direction of solution of this problem is to re-connect people within cities and between cities, using tools to synthesise their views and solution skills.

This can be done with ‘synthetic aperture’ tools for connected people as applied to modern array telescopes. Such synthetic aperture can be constructed

by a structure I have called “weavelets”, which are fast, resilient, can scale up and can yield information which is replicated over all participants, like a hologram. The incentive to join such connected communities is in the valuable synergy which is created together in which all participants can share, cooperate and use. This is a possible way forward in which we can build world-wide communities that live insides and outsides chains of cities.

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Biography



Jaap van Till, retired, was professor at the HAN University of Applied Sciences in Arnhem (NL) and parttime professor for Corporate Networks at the Delft University (NL) and the Tech. University of Kaunas (Lithuania). He frequently taught at post-graduate courses and business schools, like the Institut Theseus in Nice (France), at Amsterdam University, Kumasi Technical University (Ghana) and University of Indonesia.

Prof. ir. Jaap W.J. baron van Till (73) is a network engineer with a degree in signal processing & pattern recognition at Delft University. He has experience in the Telecommunication, Computer Network and Internet-infrastructure fields, and is working at the cutting edge of new disruptive innovations, social networks and emerging P2P community tools, Fiber-to-the-Home and ICT technology policies and regulatory government policy. He learned from his projects as a “Network Architect” in the corporate, laboratory and factory networks of Akzo Nobel all over Europe. Later he helped to design large corporate computer networks for businesses, government ministries, the NL NREN (national research and education network) SURFnet and the Netherlight lambda network. Jaap was member of the Technology and Science Council (WTR) of the SURF Foundation which oversees the knowledge infrastructure for 1.5 million smart people in the Netherlands.

His present research interests are: digital infrastructures, P2P value co-creating commons, Collective intelligence with distributed authority, and how to cope with complexity and the unexpected. Jaap does consulting at Tildro Research, Rhenen, NL and is non-executive board member of the NDIX, the Netherlands- German distributed Internet Exchange network.