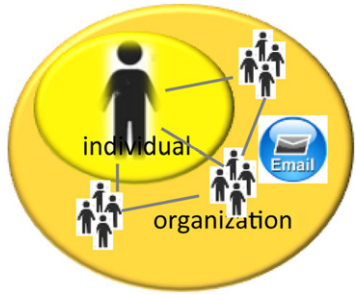
9

BECOMING A COLLABORATIVE ORGANIZATION



CHAPTER CONTENTS

- Swarm leaders take turns and are kind.
- Measuring customer satisfaction through the six honest signals of collaboration.
- Increasing organizational performance through virtual mirroring.

- Predicting employee attrition through the six honest signals of collaboration.
- Predicting sales success through the six honest signals of collaboration.
- Finding the most creative employees and successful start-ups through rotating leadership.
- Collaborative healthcare: C3N and IM-CoIIN.

How can the six honest signals and the principles of social quantum physics introduced in the preceding chapters be applied to increase organizational creativity? The key insight is that increasing organizational consciousness by building a culture of collaboration pays off. Based on the principles of social quantum physics, the goal for an organization is to create entanglement by nurturing empathy. The most important principle by far for group entanglement is rotating leadership. What happens when rotating leadership is replaced by one strong leader is vividly illustrated by King Gustavus II Adolphus in the following story.

9.1. STRONG LEADERSHIP ALONE SINKS THE STRONGEST SHIP

On a sunny day in August 1628, the newly built warship *Vasa*, the pride of the Swedish navy, set sail at the Stockholm shipyard for her maiden voyage. After 1300 meters, right in the Stockholm harbor, when the first light

breeze hit her from the side, she capsized and rapidly sank — thanks to unfettered strong leadership.

In the Thirty Years' War in 17th century Europe, Protestant king Gustavus II Adolphus of Sweden single-handedly changed the power balance of war by leading his numerically inferior but better trained military force to victory in one battle after the other against the Catholic Holy Roman Emperor. At the same time, King Gustavus II Adolphus was also waging war against Poland, for which he desperately needed to upgrade his fleet of warships. He therefore ordered his shipbuilders to build a new ship that would beat all others, the *Vasa*, and make it the strongest warship in the Baltic. In a steady stream of letters, he personally ordered to add new features like a second cannon deck, and to increase its deck height so as to have a better platform when shooting down on the enemy. When his admirals told him that changing the construction plans would decrease seaworthiness and stability of the ship, he would not accept any contradiction, telling that "…whoever will not follow my orders will incur my personal wrath." When Swedish Admiral of the Fleet Klas Fleming had 30 men run back and forth on the newly built ship to test its seaworthiness, he had to stop the test after three runs because the ship started rolling left and right dangerously. However, nobody dared to tell the king. And thus on a sunny afternoon in 1628 the fully flagged *Vasa* left the shipyard. When, after one and a half miles out at sea, the first breeze softly hit *Vasa*, she capsized and sank like a stone, taking down 30 men. Fortunately, all other crewmembers were saved, as the ship was still in the harbor. A subsequent investigation into the catastrophe did not identify

any culprits. His Majesty the king as well as everybody else involved concluded that it must have been an Act of God, as the ship had been built precisely according to the royal specification. And kings don't make mistakes. As we have seen earlier, being a strong leader in the vanguard of his troops helped King Gustavus II Adolphus win many battles. But it didn't help him to successfully complete an innovation project, such as building a novel warship. For such projects, rotating leadership, where collaborating leaders take turns, works much better.

9.2. HOW TO WIN THE NOBEL PRIZE? ANSWER: BE KIND!

While the *Vasa* illustrates how one autocratic leader can easily take down the whole ship, another Swede 200 years later started a new tradition of fostering collaborative innovation.

Alfred Nobel was by all accounts a highly creative entrepreneur and a prolific inventor with over 300 patents, who was writing poetry on the side. An avid traveller, he spoke six languages, and created a business empire with factories on all continents. While he made a major part of his riches by selling tools of war — he is most famous for having invented dynamite — at the end of his live he put his money into the service of peace and progress. On his deathbed, he willed the lion's share of his wealth to a foundation that was to use the interest of his fortune to give out five annual prizes in fields close to his own interests, for chemistry, physics, medicine, literature, and peace.

The rules for winning the Nobel Prize are such that they reward competitive collaborators over collaborative competitors. One cannot compete for the Nobel Prize, but has to be nominated by her or his peers. The final votes are given by a committee of academics. This means that scientists will be reluctant to nominate people who have been rude or arrogant against their peers. This leads to Nobel Prize winners not just being smart and creative, but also being nice. I stumbled on this by chance when I was speaking with a professor at a college in Florida. He told me that he had been fortunate enough to personally meet a few Nobel Prize winners in economics, a sixth Nobel Memorial Prize later added by the Swedish National Bank. What had struck him then was how kind and generous the Nobel Prize winners were compared to what he called the second tier of famous scientists. While the Nobel Prize winners were approachable and humble people, generous in giving praise and credit to others, the tier right below, such as editors-in-chief of the most prestigious journals, deans, chaired professors, and holders of other positions of authority, were arrogant, abrasive, claiming all good ideas for themselves, and visibly enjoying their power. This difference in personalities does seem to start to take effect much earlier, well before a Nobel Prize winner was getting nominated.[1] Comparing 68 Nobel laureates in medicine with 68 similarly scientifically productive and ranked scientists, researchers found that the Nobel laureates formed a clear network of dense collaboration, well before they got the Nobel Prize.

[1]Wagner, Horlings, Whetsell, Mattsson, and Nordqvist (2015).

This is an application of the "Homophily" or "Birds-of-a-feather-flock-together" principle, where like-minded people are searching each other out as collaborators. I have no proof for now, but I strongly suspect that it was the "kind and smart" property that brought the future Nobel laureates together in their younger years. This is quite different from the McKinsey inspired "we are the smartest guys in the room" culture of Enron, where a group of entirely extrinsically motivated people found each other to game the Californian energy system and play a host of other barely legal but clearly unethical games to enrich themselves at the public's expense.

9.3. FEEDBACK ON COMMUNICATION BUILDS COLLABORATIVE ORGANIZATIONS

What we can learn from King Gustavus II Adolphus and the Nobel Prize winners is that the six honest signals of collaboration are not just a scorecard of collaborativeness. Rather, by applying the four principles of social quantum physics — empathy, entanglement, reflection, and reboot — and encouraging people to behave according to the six honest signals will lead to more collaborative leaders and organizations. By hiring collaborators instead of competitors, and structuring the incentive system in a way that rewards collaboration, not competition, organizations will develop self-awareness through entanglement. This means, for instance, if a self-aware multinational organization encounters a serious problem in Singapore, its head office in London will learn about it minutes later, just like if somebody steps on your toes, your brain will

register it instantaneously and you will step back. Such organizations will create a culture of working toward shared goals motivated not by winning individual competitions, but by collaboratively achieving common goals. Organizational alignment along shared goals means optimizing collaboration by improving communication.

In further applications of the principles of social quantum physics, virtually mirroring communication back to the individual and the organization can help increase collaboration. Showing individuals how they are doing in adhering to the six honest signals helps reduce uncertainty, and increases organizational collaboration leading to higher performance. The swarm building principles described above have been applied in our hundreds of research projects in numerous organizations over the last 14 years to increase collaboration in a variety of business settings. Our team has analyzed social networks in many different ways, originally by surveys, but very soon using e-mails exchanged between two people as a proxy for the social relationship between the two individuals, later extended by Twitter and blog links. Measuring the six honest signals through e-mail is like a probe into the organizational consciousness of a company. We used this approach to measure customer satisfaction, to predict employee attrition, to predict sales success of the sales force, and to identify the most creative staff members in research and development departments.

9.4. MEASURING CUSTOMER SATISFACTION

Happy people answer e-mail faster. They also use different language than unhappy people. Combining all the six

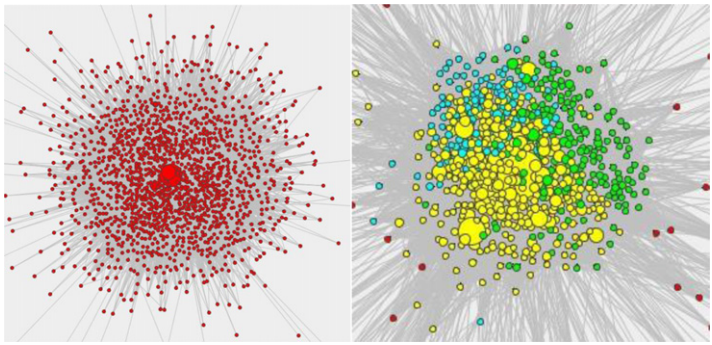
honest signals allows to quite accurately predict their satisfaction. In one project, we analyzed the e-mail networks of employees of a global services provider, which provides accounting, HR, and other business process outsourcing services to hundreds of Fortune 500 and other large companies. Over a period of three years, we collected the e-mail of the outsourcing provider's employees for more than 20 of its customers. We then compared the six honest signals of collaboration — strong leadership, balanced contribution, rotating leadership, responsiveness, honest sentiment, and shared word usage — with customer satisfaction. To measure customer satisfaction, the outsourcing provider used "Net Promoter Score," a metric introduced by Fred Reichheld in a 2003 *Harvard Business Review* article. For measuring the Net Promoter Score, the service provider asks its customers the simple question "how likely are you to recommend me to your peers" on a score of one to 10, with 10 being the most likely to recommend, and with one to not recommend the provider at all.

We found that not only could we predict Net Promoter Score based on the e-mail behavior of the account managers of the service provider working for the particular customer, but we even were able to come up with recommendations for more efficient communication. While all six honest signals of collaboration were reliable indicators of customer satisfaction, we found that in particular if the account managers showed *strong leadership,* customer satisfaction increased. If network leaders became increasingly clearly visible, creating a more recognizable and stable set of client contact points and a disciplined, predictable flow of communication made the customer more satisfied. Account managers got to see their own

communication network in social network pictures such as the one in Figure 31 so they could reflect on their own behavior. In Figure 31 each dot is a person, and each connecting line is at least one e-mail exchanged between two people. The size of the dot shows the importance of the person in the network (measured by a metric called "betweenness centrality").

The picture on the left in Figure 31 shows a network where two people are clear leaders (the large dark dots in the center). The network on the right, taken from another organization, shows a network with many leaders (there are about a dozen large grey dots). A second metric that helped us to distinguish communication with happy customers from communication with unhappy customers was *balanced contribution*. Positive contributors send more than they receive; negative contributors are mostly information consumers. In the context of the outsourcing firm, we found that if a few people from the outsourcing provider were contributing massively more than the rest, this made customers happier. If, on the other hand,

Figure 31: Social Network Showing Strong Leadership (at Left) and Distributed Leadership (at Right).



customers were flooded with information from many different sources, it made them unhappier. A third criterion was *responsiveness* of both service providers and customers. Service providers responding quickly to customers did not increase customer satisfaction per se; however, how quickly a customer responded to a message from a service provider staff member was a reliable indicator of customer satisfaction. Happy customers answer e-mails faster.

The fourth metric, which in my view is the most important one, is *rotating leadership* — or in this case "steady leadership." It seems that for a well-established outsourcing relationship, a "King Gustavus II Adolphus" type of strong leadership is better than many changes in this role. While for creative teams, rotating leadership is best with a few strong leaders taking turns, for the outsourcing provider steady leadership produced more satisfied customers. This means that the same two or three people were always in charge of the relationship, they were steady contributors of information flowing to the customers, and were reliable points of contact for information coming back from the customer. While in a project phase, creativity might be at a premium, once the relationship is established, reliability of communication with the provider is more important for the customer.

It pays to use honest language. Analyzing the content of the communication provided additional valuable cues to track customer satisfaction. We measured *honest sentiment* of the e-mail subject lines exchanged between service providers and customers. Because of privacy reasons we did not look at the content of the messages. While we were expecting that more positive sentiment in the

communication would be indicative of happy customers, we found the opposite. The more positive the service providers were talking to the customers, the less happy the customers actually were. An even better predictor of customer satisfaction was the "honesty" of the language, that is both the positivity and negativity of the words used in the subject line. This means that if the language exchanged between customers and service providers was more emotional, the customer was happier. We defined emotional, or "honest" language as including both highly positive as well as highly negative words.

Finally, we also found that if the service providers were using simple language, the customer was happier. The sixth "honest signal" is based on *shared language*. We measured it between service providers and customers through new word usage and message complexity, again restricted to just analyzing the subject line. In innovation communities, we had found that if groups started using a novel vocabulary, making up their own acronyms and abbreviations, it was indicative of creative influence. For the relationships between outsourcing customers and providers, the opposite was true: the simpler the language used between the two parties, and the more adhering to standard English, the happier the customer was.

Through measuring the six honest signals of collaboration, the outsourcing provider was able to track collective consciousness between its customers and its employees working for the customer. This allowed the outsourcing provider not only to anticipate customer dissatisfaction flashpoints before they became a major issue, but even to increase collective consciousness through virtual mirroring.

9.5. INCREASING CUSTOMER SATISFACTION THROUGH VIRTUAL MIRRORING

> *Mirror mirror on the wall, who is the fairest of them all?*
>
> *– Evil Queen, the stepmother of Snow White, asking if she is the most beautiful woman alive*

The Heisenberg uncertainty principle suggests that if individuals become aware of their own communication behavior, this will change it for the better. Self-reflection through the eyes of others can be an eye-opening experience. In our work with the global service provider, we used the system above to calculate numeric scores for the six metrics: "strong leadership," "balanced contribution," "responsiveness," "rotating leadership," "honest sentiment," and "shared context." These scores, together with network pictures such as the one in Figure 31, were shown to people periodically in a process we call "virtual mirroring." Just like Snow White's stepmother, the Evil Queen, who had a mirror that always told her the truth, our virtual mirror will tell people the truth about how they communicate with others, and how they are seen by others. Our hypothesis is that through the Heisenberg uncertainty principle these "honest signals of collaboration" will induce the people looking into the virtual mirror to change their behavior through self-reflection.

We tested this hypothesis with the account managers of the service provider described in the previous section. Account managers of 24 large customers of the service provider were shown their virtual mirror every month for the duration of seven months. The virtual mirror was calculated not just for them, but also for all the members

on their team, ranging in size from 10 people up to a few hundred. Additionally the account managers were also given recommendations how they and the staff members on their account might change their communication behavior to make the customers happier. After seven months the results were quite clear: compared to the 200 accounts whose managers did not get the virtual mirroring, the accounts of the 24 mirrored managers improved customer satisfaction by 5%. Customer satisfaction of the other 200 accounts without virtual mirroring, on the other hand, went down by 12%. Note that the only selection criterion for the 24 accounts to be included in our study was that they were using the e-mail system of the outsourcing service provider. The other 200 accounts were using the e-mail system of their customer, a criterion that had nothing to do with the overall performance of the teams. In all other aspects the two groups were alike.

We have applied the virtual mirroring process in different environments, mostly based on collecting e-mail archives. It was initially developed and tested with the COINs (Collaborative Innovation Networks) seminar described in detail in Section 8.5, where showing teams of students how they communicated greatly increased collaborative performance. It has also been applied in the context of collaborative healthcare, described later in Section 9.11, where teams of healthcare practitioners and researchers were shown their communication networks calculated from the e-mails they exchanged, to increase their collaboration efficiency and effectiveness.

9.6. MEASURING EMPLOYEE DISSATISFACTION

In the same global outsourcing company where we measured customer satisfaction, we also looked at employee satisfaction. As the ultimate criteria of satisfaction we took the attrition of employees, literally letting employees vote with their feet about how much they like their employer. More specifically, we collected the e-mail of the 3000 most senior employees of the 60,000-employee company over 18 months. We then looked if we could see any difference in the six honest signals of collaboration between people who had left the company over these 18 months and people still with the company. What we found is that there are really two categories of mid-level managers, let's call them the *nomads* and the *settlers*. Settlers stay with the company for extended periods of time; nomads switch company every few years. When looking at the communication network among peers at the outsourcing company, we found that nomads communicate much less with their peers, and more with outside parties. On the other hand, they are more passionate and responsive, they need less "pings" until they respond back, while others also show them more respect, needing less reminders until they answer back to nomads. Additionally, nomads are more "matter of fact" and less emotional in the e-mail subject lines. They are also less "close" to their peers in terms of social network distance. Overall, there emerges a picture of the nomads as being more emotionally balanced, of being well respected, being highly passionate about their work, and being more subject matter focused, and less status focused.

However, once nomads get frustrated at their workplace, turning from "happy nomads" to "unhappy

nomads," they show a markedly different behavior. When they start looking for greener pastures, ready to leave their current employer, their communication patterns change. They start showing more closeness to their peers at the company, making efforts to contact strategically placed colleagues, while at the same time becoming more passive in their contribution patterns. However, others at the company need more nudges to answer to their e-mails, thus showing them less respect. Unhappy nomads start using more complex language in their e-mail subject headings, and they also change their networking position more frequently from being central to being peripheral, and back. Overall, the picture that emerges from the communication behavior of unhappy nomads is one of rejected love, of frustration, and of trying to reach out to better connected colleagues within their peer group trying to find opportunities within the company. However, this is usually to no avail, and therefore unhappy nomads will move on, to new opportunities at another company.

In our analysis at the outsourcing company, we were able to quite accurately distinguish "nomads" from "settlers," and also identify "happy" and "unhappy" nomads, leading to valuable suggestions for the organization of how to keep high-potential nomads happy by giving them more internal recognition and embedding them in peer-support nomad groups. Put in other words, as long as nomads are happy, they define collective consciousness as demonstrated through their rotating leadership behavior, and their passion and respect revealed through theirs and others' responsiveness. Once they are frustrated, they step outside the collective as shown through radically different communication patterns.

Besides predicting employee attrition, the same approach also works to predict sales success.

9.7. PREDICTING SALES SUCCESS

Analyzing just a small slice of communication data will predict how well the entire sales force of a huge enterprise is doing. In this project, we analyzed one week of the full e-mail archive of a high-tech company with over 90,000 employees, as well as one month of the company's Web conferencing data. We did not look at any content, neither in message body nor the subject line of the e-mail, only tracking structure and dynamics of the communication. We then compared the annual sales performance of the global sales force of the company with the communication behavior of the same people.

In general, we found that the fewer e-mails the sales force members sent, the more successful they were. The more passive they were in their mailing behavior, that is the less they sent compared to the number of e-mails they received, the more they sold. This means that just bombarding customers with e-mail is a poor sales strategy. On the other hand, we also found that if they were responsive to e-mails, meaning that it took them fewer nudges or "pings" from their customers until they responded, they were more successful.

We also noticed some national differences, confirming cultural stereotypes. In the Western world, and in the United States, Canada, and Germany, the global company trend of being more successful when sending less was confirmed (not that surprising, as this is a Western

company). The less e-mail salespeople in the United States, Canada, and Germany sent and the faster they responded, the more they sold. In India, however, the leadership pattern was a better indicator of a successful salesperson: the more steady their communication behavior, and the less rotating leadership behavior they demonstrated, the more successful as salespeople they were. For Japan, the best predictor of a high-performing salesperson was focus: the fewer different communication partners they had, meaning that the more the salespeople focused on a few selected communication partners, the more successful they were.

We also noticed hierarchical differences between sales managers, and sales specialists across all geographical regions. For sales managers, the more steady leadership they showed, the more they sold. For sales specialists, it was their and their customers' speed of response: the faster they replied to each other, the more they sold. Finally, we also found that selling different types of products mandates different types of communication behavior. For sales specialists selling products in mature fields of technology, it's steady leadership that helps selling, while for sales specialists selling novel technology products, rotating leadership — associated with creativity — is the best predictor of high sales.

Besides analyzing the e-mail communication behavior, we also looked at the social networking behavior gathered through Web conferencing, particularly with the Webcam turned on. We found that Web conferencing was an even better predictor of sales success than e-mail. While the overall amount of Web conferencing interaction was lower than for e-mail, it was highly indicative of high

sales. The more a pattern of rotating leadership emerged for a salesperson, switching between participating in and organizing Web conference sessions, the more successful the salesperson was. We also found that the more different communication partners a salesperson had, and the more proactive in setting up Web conferences a salesperson was, the higher was the sales success. These Web conferencing communication patterns were independent of geography, hierarchy level, and product line. The bottom line is that face-to-face interaction trumps e-mail communication, even in the virtual world: the more Web conferencing, particularly with the video camera turned on, and the less e-mails salespeople send, the more successful they are. A successful sales relationship is based on trust, and trust is much better built in face-to-face interaction than in e-mail. The more the sales force succeeded in creating shared collective consciousness with its customers, the more the customers were willing to buy its products.

9.8. IDENTIFYING THE MOST INNOVATIVE EMPLOYEES

Looking at communication tells a lot about individual and group creativity. Starting with the e-mail archive of the World Wide Web Consortium, we have studied the communication patterns of many particularly creative teams. The way how the Web's founder, Tim Berners-Lee, communicated provided the blueprint for many later projects analyzing communication patterns of particularly creative people.

For instance, in a global energy company we analyzed the corporate e-mail network to find the most innovative employees among the thousands of employees of the research and development department. We collected the complete e-mail traffic among a few thousand employees over 13 months. We also looked at how the R&D staff members communicated with outside researchers from universities. To test and verify our assumptions, we looked at which staff members filed for patents or published scientific papers. In addition, the company conferred annual awards for the best publication, and for the most innovative employees.

When measuring the six honest signals of collaboration, there were marked differences in communication behavior between innovators and their peers in the R&D department. The innovators were more respected, as their peers within the department answered them on average in 20 hours instead of the 22 hours it took for others to get a response. Innovators were also more passionate, as they answered e-mails with less nudging; on average it took others less than two e-mails to elicit a response from innovators, and their peers took more than two nudges until they responded. Innovators also showed more rotating leadership; over the entire observation period of 13 months, they changed their network position 170 times from being leaders to being listeners, compared to their peers who showed the rotating leadership behavior on average for 166 times. The most striking difference however was the intrinsic motivation they showed within their peer group, which we measured by calculating the centrality of their social network position. We used a metric called "betweenness" which measures information flow in the

network, as access to information is access to power. It turned out that innovators are over three times less central — and thus attention seeking — than their peers. They are also more passive senders of e-mail in terms of their contribution of new messages. When restricting the communication to the local lab of the innovators, however, their pattern flipped, and they became more central within their local lab network than their peers. This means that innovators are much more focused in their communication.

The picture also changes when we switch our lens from analyzing the communication within the R&D department to analyzing the communication with external universities. The innovators get more mails from senders with university e-mail addresses, and they are more proactive in sending e-mail to university researchers compared to their peers within the R&D department. Their rotating leadership behavior becomes even more pronounced in communication with universities; they change their position from being the leader to the listeners 65 times in the 13 months observation period, compared to 41 rotational changes in leadership for their peers within the company. Innovators also talk with more different people at the university over these 13 months, initiating an e-mail dialog with 56 outside people instead of 37.

We also found that output-oriented innovators — the ones producing papers and patents — communicate quite differently from outcome oriented innovators — the ones garnering awards for being most innovative and for writing the best paper. Paper and patent writing innovators show more introvert behavior than their peers, while award winning innovators show more extrovert behavior: while on average innovators send less e-mail than their

peers, award-winning innovators were the most active senders and receivers of e-mail in the entire R&D department. However, it seems that paper- and patent-writing innovators are more respected than award-winning innovators, as they were responded faster than award-winning innovators. Paper- and patent-writing innovators are less central — more introvert — than award-winning innovators, who must be highly visible in order to be nominated for their awards. Award-winning innovators also show more rotating leadership, switching between leading and listening, than the more introvert paper- and patent-writing innovators.

Finally, we also looked at whether there is a difference between repeat innovators — who have been included at least twice on the list of most innovative researchers — and one-shot innovators. We found that repeat innovators send twice as much e-mail to their peers, and also receive much more e-mail than one-shot innovators. Repeat innovators show higher rotating leadership, changing from leading to listening 30% more than one-shot innovators. They also have slightly higher respect — they are responded a bit faster, and are somewhat more central in the network.

In sum, we find that intrinsically motivated innovators can be found by looking at the "honest signals of collaboration," with signs of respect shown as rapid response by others, and the innovators showing high passion by answering their e-mails faster than their peers. A second key insight is that innovators are less "political" in their e-mailing behavior by sending much less e-mail within their organization. They are the "queen bees" of building collective consciousness within the R&D organization by rather using their communication bandwidth to reach out

to outside parties to develop new innovative ideas instead of sending "political" e-mails to colleagues within the company.

9.9. FINDING THE MOST INNOVATIVE BIOTECH START-UPS IN BOSTON

Similar patterns of creativity were confirmed studying social networks of members of the R&D departments of biotech start-ups in the greater Boston area. This project was motivated by an earlier project with 100 software start-ups in Israel,[2] where we had looked at communication between the CEOs of these start-ups in 1998; information about the communication was collected in personal interviews with the CEOs. We then checked six years later, in 2004, which of the software start-ups were still around, having survived the dotcom crash and the burst of the e-Business bubble. At that time, we had found that the start-up CEOs who had been willing to participate in the interview three years before the dotcom crash had a much higher chance of surviving the dotcom crash, demonstrating that thinking outside the box, and collaborating with academics was a good long-term predictor of success. We also found that the more connected a CEO was to her peers at the helm of the other start-ups, the higher the chances of survival for her start-up.

In the follow-on project in the greater Boston area, we were trying to further untangle the connection between communication and location of start-up entrepreneurs. For the duration of a year, from 2005 to 2006, Ornit Raz, a

[2]Raz and Gloor (2007).

post-doc at MIT, collected the communication network of 10% of all members of the R&D departments of 200 biotech start-ups through an online survey. At a random day per week, for the duration of one year, selected members of the research staff got an e-mail with a link to an online survey, where they reported with whom they had spoken on that day face-to-face, on the phone, or exchanged an e-mail. They reported on communication with other start-ups, with large pharmaceutical companies, with research hospitals, and with university researchers.

We used the data from this project to investigate two related questions: "does location matter for communication," and "does location help for start-up performance?" We measured creative performance of the start-ups as the number of patent applications they filed in the three subsequent years after the communication data was collected, as direct financial data for the start-ups was not available. The results were quite clear. We found that location greatly boosted communication. Companies located inside a circle with a radius of seven kilometers with the center between Harvard and MIT communicated exponentially more with each other than the companies outside this circle.[3] However, communication did not translate into creative performance.[4] Two other criteria were much better predictors of high patent application count, our proxy for high innovation capability. The first one was network position in the communication network, independent of location. Biotech companies, which were highly central in the R&D communication network and

[3]Allen, Raz, and Gloor (2009).
[4]Allen, Gloor, Raz, Woerner, and Fronzetti (2016).

also located inside the Boston biotech cluster, had on average 20 patent applications in the next two years. Companies located in the center of the Boston biotech cluster, but peripheral in the communication network, had only five patent applications. Companies not central in the communication network, and located outside of Boston on average had only three patent applications in 2006 and 2007. Companies central in the communication network, but located outside the Boston biotech cluster, however, had 23 patent applications. This means that the more central a company was in the communication network — and not the geographical network — the higher was its creative performance.

The second criterion of innovation was rotating leadership. The more the R&D leaders of a company changed their network position from being peripheral to being central and back, the more patent applications the company filed. In sum, this project confirmed the results we obtained from innovators inside the company outlined in the previous section: communicating intensively with a lot of outside peers, and passing the baton back and forth are the most important predictors of creativity.

Besides numerous applications in industry, competitive collaboration is also prevalent in many fields of healthcare.

9.10. COLLABORATIVE HEALTHCARE

> *Mens sana in corpore sano — a healthy mind in a healthy body (Latin)*

My friend Arlette provides an eye-opening experience illustrating the positive power of collaboration on health.

Arlette has cystic fibrosis and celebrated her 60th birthday in 2015. Most other cystic fibrosis patients of Arlette's generation did not live over 20. Cystic fibrosis is a chronic disease, which children inherit from parents through their gene combination. It is characterized by an overproduction of mucus in the lungs, leading to breathing difficulties, reduced growth, and secondary diseases like diabetes. When Arlette was born, the life expectancy of a patient with cystic fibrosis was about 10 years. I met Arlette in 2000; at 45 she was already then unusually old for a patient with cystic fibroses. With an unquestioningly positive, accepting attitude toward life, and collaborating closely within a close-knit support network of relatives, friends, and other cystic fibrosis patients, Arlette succeeded to reach a biblical age for cystic fibrosis patients. A key factor for her longevity was the loving care of her parents during her youth, and then the warm relationships she created with about 50 close friends over her lifetime, demonstrating the positive effects of embeddedness in social networks. It also helps that Arlette was trained as a pharmacist's assistant, so she was able to medicate herself, and treat many of her ailments. You can listen to Arlette tell her life story on YouTube.[5]

The goal of collaborative healthcare is to empower patients like Arlette to take their life into their own hands, and collaboratively, with their health providers, doctors, nurses, and insurers, lead a healthy high-quality life. Collaborative healthcare needs collaborative leaders like Arlette, who are willing to not just care for themselves, but

[5]Arlette Maurer — 60 years with Cystic Fibrosis https://www.youtube.com/watch?v=1UnTkyEVVSs

share and help others to innovate and lead better lives. Frequently these leaders are patients themselves. I call them "empowered patients," as besides being afflicted with the disease they are working to cure, they also have training as nurses, doctors, or researchers. Frequently they also have family members and loved ones who suffer from this condition. By having a lot of "skin in the game," these patient-researchers will be highly motivated and passionate leaders of these collaboration teams.

9.11. COLLABORATIVE CHRONIC CARE NETWORKS

Collaborative Chronic Care Networks (C3N) are a key example of collaborative healthcare. C3Ns have been invented in 2009 by two professors at Cincinnati Children's Hospital, Peter Margolis and Michael Seid, and Richard Colletti, a professor at University of Vermont. C3Ns grew out of an earlier project of Peter and Richard, ImproveCareNow, which brought together patients of Crohn's disease and their family members with Crohn's doctors to one- to two-day learning sessions combined with sharing patient data of participating hospitals across the United States. Crohn's disease or inflammatory bowel disease (IBD) is a chronic disease of the intestines. Crohn's is incurable until now; the goal of treatment is to drive the disease into remission and allow patients to lead a normal life.

The C3Ns project was funded by the National Institute of Health with a multimillion-dollar grant in 2009. C3Ns combine concepts of process improvement, learning

communities, lead user innovation, and COINs. The objective of C3Ns is to leverage the innovative ideas of the patients, by combining them in small teams with researchers and medical providers such as doctors and nurses. They collaborate to improve the lives of the patients, with the long-term vision of developing a cure for Crohn's. Patients meet at regular learning sessions; over the past years, a small core team of C3N researchers has built a self-organizing, vibrant research community of hundreds of patients, clinicians, and researchers working on improving the lives of patients. Twenty-seven creative ideas have been picked up by COINs, 23 have seen the light of day, and are rolled out to thousands of patients with Crohn's. Topics for the C3N COINs range from mentoring programs, patient guidelines, and self-help videos to online matchmaking tools, data collection smartphone apps, and games for better managing the disease. Most importantly, remission rates of the Crohn's patients participating in the C3Ns have been going up steeply. Since 2014 the concept of C3Ns has been extended from Crohn's to pediatric kidney transplant patients and cystic fibrosis. Using the same blueprint, groups of patients, caregivers, providers, and researchers have come together to develop innovations for kidney transplant and cystic fibrosis patients.

The process consists of three parallel streams. In the first work stream, patient innovators, family members, medical researchers, and doctors meet virtually and face-to-face, to develop new innovations to improve the lives of the patients. In "virtual brownbag" sessions, novel ideas are shared among the group. In addition, in a series of design meetings, the group, usually about 50 to 70

people strong, gets together for two days to brainstorm and innovate, and create dozens of new COINs around breakthrough ideas. For example, for the cystic fibrosis design meeting, teams developed over 50 innovative ideas, ranging from patient monitoring apps, community building, to onboarding guidelines for new patients and parents. These ideas were then taken up by the innovation teams, and turned into real prototypes and tested with patient groups.

The second work stream consists of larger gatherings of doctors and patients structured as learning sessions, applying the Breakthrough Series method developed by IHI, the Institute for Healthcare Improvement in Cambridge MA. IHI was created by a team of medical researchers around Don Berwick 20 years ago with a focus on building learning communities in healthcare. The learning sessions focus on process improvements by putting a measurement system in place and implementing best practices among participants from many different institutions.

The third work stream develops a patient data registry, to collect patient records on a case-by-case basis. Its goal is to build a database of patient records across participating institutions, not just with hospitals and physicians in the United States; links also have been fostered with similar patient registries in Northern European countries, the United Kingdom, Canada, and other countries in Europe, Australia, and elsewhere. These registries extend existing patient databases, for example, by the Cystic Fibrosis Foundation of the United States which through their patient registry has been able to develop breakthrough medication and treatment regimens, greatly extending the lifespan of cystic fibrosis patients. Similar registries are

built through ImproveCareNow for Crohn's patients, and for the pediatric kidney transplant patient communities.

By fostering collaboration among health providers such as doctors and nurses, patients, patient family members, and researchers, C3Ns have the potential to increase the quality of life exponentially for patients of chronic diseases. The key is to put patient innovators into the center, with doctors and researchers learning from them, and not the other way around.

9.12. INFANT MORTALITY COIINS

Collaborative Improvement and Innovation Networks (CoIINs), created by the Maternal and Child Health Bureau of the US Health Resources and Services Administration since 2012, are another great example of collaborative healthcare. They have been started by Michael Lu, the associate administrator of the Maternal and Child Health Bureau (MCHB) of the US Department of Health. These CoIINs combine social workers and health administrators of all 50 US states to address the disparities in infant mortality between middle-class children and children from low-income backgrounds. CoIINs bring together leaders from the community, grassroots activists, and government officials to develop novel ideas to reduce infant mortality and provide children born in poverty with better prospects for their later lives. The main Infant Mortality CoIIN is focused on health administrators mostly on the US state level, trying to develop new policies and interventions by running learning sessions conducted according to the IHI Breakthrough Series model. Health administrators are trying to increase

awareness of risky behavior for infants and mothers, such as smoking while pregnant, reducing preterm births, and unsafe sleep habits for babies. In a second Home Visiting CoIIN, social workers, the "home visitors," get together to increase the efficiency of the "Home Visiting Program." The social workers, the "home visitors," visit expecting and young low-income mothers at home in the first few years after the infant's birth to help disadvantaged mothers improve infant and maternal health, and prevent abuse and neglect.

The goal is not just to create learning communities, but, inspired through the C3Ns, to also create innovation teams — COINs — that develop radical innovations to drastically reduce infant mortality. For example, in one of these COINs, a group of state health administrators and researchers work together to bring ideas for trauma-informed care to fruition: It has been found that adverse childhood experiences in the first few years of an infant have the potential to wreak havoc on the entire remaining life of the future adult. Traumatic experiences such as childhood rape, violent treatment of the mother in front of the child, or incarceration of a parent will lead to health-averse adult behavior such as severe obesity, alcohol and drug abuse, and smoking, resulting in bad health through diseases such as depression, diabetes, and cancer. By raising awareness of the bad effects of traumatic experiences in early childhood, and by increasing resilience to traumatic experiences, the vicious circle can be broken.

After having been in operation for three years, a vibrant ecosystem of health CoIINs addressing all aspects of maternal and child health has developed. It operates on three levels. On the top level, administrators in

Washington and the 50 US states collaborate and innovate to develop better policies and programs to improve the quality of care and of life of mother and infant. On the middle level, social workers on the ground collaborate and innovate to directly work with mothers and their family members to improve the environment for the newborns in many ways. And most exciting, on the grassroots level, mothers, fathers, grandparents, and other family members self-organize, supported by home visitors and social workers, and by state policies, to provide a nurturing environment for the future lives of their children.

In our work supporting both the C3N and the Infant Mortality CoIINs, we have supported the COIN creation process through coolfarming innovative ideas for better care of Crohn's patients and mothers and infants. We have also measured the progress in creating collective consciousness within the COINs by analyzing its communication behavior through e-mail analysis, and by providing virtual mirroring to its leaders. This has helped the COIN leaders to recognize emergent junior leaders, nurturing a new generation of young guides and mentors to the community. At the same time, virtual mirroring has also helped weaving a more dense community network, as it has made visible otherwise hidden connections between different groups working on similar topics on Crohn's disease, cystic fibrosis, and infant mortality.

9.13. FROM COMPETITIVE TO COLLABORATIVE OPEN SOURCE HEALTHCARE

This aspect of patients collaborating with researchers to share their patient data records for further research

allows them to actively contribute to new insights regarding their own disease. A new Open Science model, based on conducting research in public-private partnership, is pioneered by Sage Bionetworks, which collects, analyzes, and shares complex biological data, for instance, providing smartphone-based data collection apps to patients to contribute their own data on breast cancer and melanomas. Similar to Jonas Salk, who refused to patent the polio vaccine, saying, "There is no patent. Could you patent the sun?" the results for Sage Bionetworks research will be freely available.

As long as mainstream healthcare is still run through unfettered capitalism and competition, collaborative healthcare leads a niche existence. Pharmaceutical companies still try to outcompete each other in optimizing revenue for their shareholders. For instance, a breakthrough treatment against hepatitis C in the form of novel and highly effective drugs Harvoni and Sovaldi by Gilead, costs $1000 per pill, summing up to almost $100,000 per treatment. The only way to get Gilead to reduce the prices was through competition, as competitor AbbVie was bringing competing drugs to the market.[6] Or even worse, Turing Pharmaceuticals funded by former investment banker Martin Shkreli obtained licenses for out-of-patent drugs, and raised their prices by up to 5000%, for instance, increasing the price of the AIDs drug Daraprim from $13.50 to $750 per pill. As long as investors and authorities are willing to accept such highly competitive

[6] http://time.com/3643996/hepatitis-c-drugs/

and amoral behavior, collaborative competition will trump competitive collaboration — also in healthcare.

Valeant and Turing are shocking examples of competitive healthcare. However, there is hope, as such companies as Sage Bionetworks are combining collaborative healthcare with open source principles. Sage Bionetworks integrates patients into the research and development process while applying an open source computational modeling process inspired by open source software development. While it is still early days, if open source software development is any guide, the future for open source healthcare should be bright. Whether it is open source drug development, or open source software development, learning from each other — "stepping on the shoulders of giants," as Isaac Newton said — is one of the key advantages of the open source process.

The main findings from this chapter is that to increase organizational collaboration, one can measure and optimize rotating leadership, passion and respect, and honest sentiment, through virtual mirroring. Passion is measured as the time it takes an individual to respond to others. Respect is measured as the time it takes everybody else to answer to the individual. To measure and increase organizational innovativeness, measure and increase COIN creation and destruction. The more new COINs are created — which means that by definition some old ones will be destroyed — the more creative is the company or organization.

In the final chapter, we will look at what the future might bring to a society where money is complemented by social capital, and competitive collaboration has become widely accepted.

MAIN LESSONS LEARNED

- Swarm leaders are respectful, humble, kind, and take turns.
- Measuring the six honest signals of collaboration, and providing them as a virtual mirror to members of the organization will increase organizational performance, satisfaction, and creativity.
- The six honest signals of collaboration can predict and improve customer satisfaction, employee attrition and satisfaction, sales success, and employee creativity.
- COINs also help create breakthrough solutions for patients of chronic diseases, and to reduce infant mortality.