CHAPTER II

USER ORGANIZATIONS OF CLOUD COMPUTING

Potential Customers of Cloud Technology

According to the broad definition of a user organization, anyone who so far has been benefiting from enterprise technology, not just IT, is a potential user of the cloud. This includes traditional data processing, office automation, computer-aided design (CAD),® productivity tools, social networking, scheduling, procurement, sales and marketing, applications software platforms, or other means employed to promote innovation, greater competitiveness, and profitability.

Companies interested or potentially interested in being cloud computing users fall into two broad classes. The one is composed of large- to medium-size corporations with a long history in data processing, which have installed and been using the IT vendors' wares—both tactical and strategic products—for many decades. These are much more likely to adopt the solution of private clouds and hybrids.

By contrast, medium-size and small companies may be tempted to give up their IT operations (and head count) in favor of cloud computing, though it is still too early to have a clear opinion on this matter. Cost alone should not be used as the decisions.

The way to bet is that large enterprises contemplating cloud computing will be guided in that direction by their current hardware vendors, and they will be getting a big quantity of it rather than cherry-picking cloud services as smaller companies now do (and should do). This will be a slow-going process for two reasons:

- inertia coupled with the longer time necessary for reengineering, and
- cloud computing will upset their IT organizations (~~Chapter 5~~), creating con-siderable resistance to change.

Therefore, according to at least some of the experts, in the near future wise vendors of cloud computing services should^spek the best market: for them, which is made up of *small and medium enterprises* (SME).

These have a major incentive in using onDemand products and services, because of their ongoing effort to change capex into opex. In addition, their applications are not as complex as those of big enterprises, which means that the necessary reengineering work will be easier to accomplish.

Next to the SMEs an interesting population of potential users may be that of *virtual companies.* A virtual company typically outsources most of its products and services. It may have only a small head office combined with a sales office, letting third parties produce and deliver everything else—all the way from accounting records to manufacturing.

Still another population of potential cloud computing users will be consumers communicating through social networking. Cloud vendors address-ing the members of that group of users may offer scaled-down products appealing to the other classes of user organizations, as it happened with Facebook.

No matter in which of the aforementioned populations of computer users one belongs, the effect of the strategic inflection point described in Chapter 3 will not take long to be felt. As for the vendors, they will be confronted not only by a shift in demand for products and services they have been classically providing but also by novel risks and opportunities:

- the cloud presents both *promises* and *threats* for which they must be ade-quately prepared, and
- though their future course of action cannot be planned, as Peter Drucker once said, events can often be foreseen.

One of the foreseeable events to characterize the better-run enterprises in the next ten years is whether or not information is managed as a product. User orga-nizations that have been active in IT and its evolution for more than five decades know that among financial and industrial organizations, let alone among govern-ments and other state authorities:

- for the most part, information is not well managed;
- it is available in overabundance or not at all;
- it is seldom accurate, timely, and complete; and

- it is provided at a cost that cannot be determined with assurance.

What is more, to a very substantial extent today's approach to information management is based on yesterday's concept and technologies. In the majority of cases, the image of what can be done with present-day media steadily dates back to three or four decades ago and sometimes more. Watch the surprising popularity of Cobol, which is obsolete, cumbersome, inefficient, and of very low productivity— yet widely used.

Leadership is important, but leadership alone will not develop a system that gets and keeps ahead of the curve. This requires:

- a decision to change,
- superb organization, and
- able, uninhibited use of high technology

New business models are needed to capture the pulse of the market, and these cannot be served through programming languages that are more than fifty years old. The language we use forms our mind, and something similar could be said of software. This is good news for vendors of onDemand applications who appreciate that capturing business opportunity requires:

- rapid identification of customer needs,
- swift product evaluation and brokering,
- on-time negotiation and confirmation of commitments, and
- a first-class after-sales product service (not just help desks).

Organizations choosing cloud computing will also be well advised to remember that in the coming competitive environment, dynamic markets, supply chains, and interactive distribution channels will obey the law of *volatility in returns*. Uncertainty about increasing or diminishing appeal of their products from one year to the next:

- will create a world of instability, not equilibrium, and
- will penalize those staying behind to the point of going bust.

One of the interesting statistics from the first years of onDemand software is that the top vendors in one year were not the same as those of the preceding and fol-lowing years. The law, if there were one, would be that more successful companies were distinguished by their ability to keep on being on the run but not necessarily in first or second place year after year. This means that market leadership is still up for grabs.

After a strategic inflection point the doors of risk and return are adjacent and indistinguishable. Able management is anticipating change and identifying new opportunities. Still, if it wants to be one of the first exploiting and conquering a new commercial territory, it cannot wait for large amounts of evidence. By the time that is available, the market would have been de-creamed by someone else; hence the wisdom of distinguishing between strategic and tactical products

The Cloud Interests Small and Medium Enterprises

Companies can be generally classified as very large and usually global, medium to large, small and medium, and very small. The SMEs are typically those employing from ten to less than five hundred people and making roughly less than $160 million (110 million euros) per year.

The medium to small enterprises (and not the very big ones) are those that make the economy kick. They provide most of employment, are faster to hire in an upturn, and (on average) are by far the best users of Internet services—and therefore also the best prospects for cloud computing.

In regard to the cloud, small and medium enterprises will require services for:

- developing and advertising new products;
- marketing B2B, B2C, C2B, and C2C|; and
- searching for means to reach their clients online.

This means great opportunities for onDemand software for B2B, B2C, C2B, and C2C, as well as to support online reporting services. Apart from external com-munications with business partners, many SMEs already use intranets for internal company communications, provide an information backbone and interactive staff support, care for interactive training chores, and are great believers in using tech-nology for cost reduction

Applications like sales force management, marketing, advertising, customer handholding, customer support, and public relations do not call for complex link-ages to accounting systems. Therefore, they are a good market for platform usage by medium-size firms. They can also be enriched with standardized processes such as payroll, accounting, and the like. Other applications, by contrast, are rather customized. They include:

- financial settlement,
- order fulfillment,
- supply chain management, and
- the wider area of logistics, scheduling, and inventory control.

While the attraction of cloud computing to the SMEs will most likely vary by the industry sector in which they operate, it is reasonable to expect that greater dif-ferences will be presented in terms of style of management rather than by product line. Alert managers push for client-oriented web applications that handle:

- the majority of transactions,
- content management,
- customer support,
- sales analysis, and
- campaign management.

Knowing the pattern of the SMEs' use of the web is important for cloud ven-dors because usually companies that have already adopted the Internet are more prone to go for cloud computing services, because their culture will not stand in the way when doing that transition, and the market these user organizations represent may be impressive as their numbers continue to grow.

Even more interesting has been the finding that the Internet-active population of SMEs might welcome enabling services.

Virtual Companies and the Cloud

A *virtual company* is a temporary consortium of independent member firms coming together, often on a limited time frame, to quickly exploit fast-changing national or worldwide business opportunities. Virtual enterprises share with their suppliers costs, skills, and core competencies that collectively enable them to:

- access global markets and
- provide world-class solutions each *of* them could not deliver individually.

These are the basic concepts on which rest a virtual organization. At the same time, however, the *notion underpinning* a *virtual* organization is in flux, as the term tends to be interpreted in different ways by different people. Hence, it lacks a universally accepted definition (though in this book we will stick to the aforemen-tioned concept).

Important in regard to cloud computing is the fact that the *temporary network* of independent business partners—customers, suppliers, even erstwhile rivals—is linked by information technology that enables its members to share data, manage-ment skills, R&D expertise, manufacturing capacity, marketing thrust, and costs. As such, it constitutes an excellent client base for vendors active in the cloud:

- The virtual company possesses *virtual resources* where and when they are needed.
- The result of ephemeral partnerships among firms is to effectively access one another's customer base in a way that is profitable to all of them.

Ephemeral alliances are made to satisfy requirements in a com-pressed time frame and to overtake other, similar virtual company efforts. In order to produce results quickly, such alliances depend to a very large degree on immedi-ately available applications (hence onDemand software), platforms for added-value developments, broadband telecommunications, as well as fully distributed data-bases and effective any-to-any workstation connections—in short, the stuff cloud computing can offer.

What might be seen as common ground of virtual companies is a set of prin-ciples for metamanaging industrial and financial activities. These are undertaken by virtual teams—or groups of individuals that collectively possesses certain neces-sary skills but need to effectively communicate with one another in a way involving no misunderstanding or loss of time.

The resources virtual companies possess are left in place but are integrated to support a particular product effort for the way determined in advance or as long as this is viable. Such resources are selectively allocated to specific tasks, which becomes practicable because computers and communications provide the infra-structure, while optimizers make it possible to minimize the cost of switching among real companies as required by different activities.

For this purpose, virtual companies must be supported by virtual office systems, such as offered by several vendors on the cloud, to help expand the boundaries of each organization by providing a common ground. They do so by facilitating interactions with a broader business range than is possible under traditional approaches.

Because in a dynamic market intra- and intercompany resource availability can change almost minute to minute, advantages are accruing to parties able to rap-idly arbitrage their resources. In addition, virtual organizations use information technology to supplement their cognitive capabilities, thereby providing themselves with an advantage given tight time constraints.

Virtual companies would not have been possible without knowledge-assisted artifacts. Technology has made them available since the mid-1980s, though only the best-managed firms have been effectively using them. Moreover, the synergy of deeper market changes and knowledge engineering made it possible to rethink many of the organizational principles of an entity, the majority of which date back to the *I920s.*

The goal of a virtual company may be

- complementarity in a range of products and services,
- rapid engineering and development,
- unbeatable low-cost production and sales conditions,

- marketing muscle (to smash a market leader's hold),
- a level of quality competitors cannot emulate, or
- truly leading-edge technology.

A major challenge for virtual companies, and for e-commerce at large, is the notion of *stable establishment.* The term comes from the time of brick and mortar but is still present. Is the server in a cloud's infrastructure a stable establishment? The answer is both yes and no at the same time. Online transborder trade changes the concept underpinning this term. A company (any firm, not just a virtual one) may have a stable establishment in one country, not in others, but:

- it trades over the Internet in many countries, and
- it uses a cloud computing infrastructure based in a far-away jurisdiction.

The stable establishments identification becomes even more complex with vir-tual companies, because they may have no brick and mortar at all. Nomadic com-puting adds another layer of uncertainty and there are, as well, other challenges. Bilateral agreements protect from double taxation. But there is no way to apply double-taxation agreements on the Internet. Hence, who should be taxing Internet commerce? And who will be taxing the cloud's infrastructure?

Virtual Networked Objects

A project that contributed a great deal to shaping up some basic aspects of new technology has been MIT's *virtual customer* (VC) Initiative, a multidisciplinary approach that targeted significant improvements in speed, accuracy, and usability of customer input to a supplier's product design process. One of its deliverables was the *virtual double* (VD), which can be briefly defined as an information element:

- mapping a real object and
- open to qualification through a function (which may be another VD).

VDs are stored and retrieved as objects that are dynamically and seamlessly upgraded, updated, massaged, and reported to produce personalized ad hoc reports in real time. Figure shows

how easily a virtual double can create a virtual cus-tomer identification that becomes available at no time.

This virtual double may be the double of a customer, with the specific mission to instruct on execution of certain functions. As such, it will gather vital informa-tion over the life of the relationship and (if this is part of its objective) it will come up with a proposal. Dynamic insurance policies provide an example.

Networked sensors can serve as online input devices to the virtual double. For instance, smart dust embedded into cars can help in tracking both the driver and the vehicle. Auto intelligence will be informing the driver "you crossed the speed threshold" but will also transmit to a control center that "this driver":

- goes too fast,
- talks on the handheld, and .
- does not respect pedestrian crossings.

In addition, with GPS becoming increasingly popular, there is no problem in supporting two-way transmission. Nor is there any challenge in keeping driver pro-files on a virtual double. The technical solution, too, is far from being demanding. To be useful, data streaming from sensors requires:

- registration,
- integration,
- filtering, and
- analysis for insight.

Each of these steps can lead to messaging. Because of being an intelligent arti-fact, the VD of a real object has qualities the original object and its classical file are lacking. This greater sophistication helps to manage complexity.

- with globalization technological advancesTnust be coordinated cross-border, and
- short of this, desired benefits will be limited and cost-effectiveness reduced

Virtual doubles can be used to track customer profitability; analyze customer balances, loans, interest paid, and trading transactions; establish whether a person or company is profitable enough to qualify for waivers and white- glove treatment; and establish which profits stream (to the bank), which gives cus-tomers greater negotiating power.

Information can be particularly valuable in strategic decisions, in reposi-tioning the bank, and in marketing campaigns. Without the benefit of hindsight, sales programs fail to measure the potential value of a customer. Institutions that limit themselves to statistics from past transactions are usually very poorly informed about their depositors, borrowers, and investment partners.

The concept underpinning the use of virtual doubles is well suited to a cloud computing environment, particularly so as vendors must get to know their clients in a more fundamental way than through statistics—and onDemand software can handle the chores discussed in the preceding examples. There are, however, prob-lems lying ahead and requiring able answers. Outstanding among them are security and reliability/availability.

Virtual customer files, indeed all virtual doubles, have significant privacy requirements, but cloud computing infrastructures cur-rently provide a less transparent mechanism of storing and processing data than proprietary installations.

This makes many companies uncomfortable with their sensitive information being located somewhere in the cloud, outside of their direct control, particularly so because cloud computing services are multitenant. Beyond this, the regulatory environmentobliges companies to be very cautious with their data, as violations of the law can have serious legal, financial, and reputational consequences to the user organization.

Reliability, too, should be looked at in a most serious way.There exist no reliability norms with cloud computing solutions. Theoretically service level agreements (SLAs) can be structured to meet reliability and availability objectives; practical SLAs printed by the vendor leave the door open to all sorts of failures. User organizations, therefore, should write their own contracts when nego-tiating infrastructural and other services.

Consumer Technologies and the Cloud

Consumer technologies brought along a revolution in information technology and, when successful, they morphed into business technologies. As such, consumer technologies replaced the federal govern-ment's large military handouts as number one supporter of the IT industry. One example is provided by Facebook, another by Google's New Services, which are

- offering corporate products free of cost,
- prodding a switch from traditional software to onDemand, and
- migrating applications, files, and service accounts on cloud servers.

As Figure suggests, today business technologies and consumer technologies share a rapidly growing common ground, with the former benefiting from the lat-ter. Therefore, information systems departments that reject consumer technologies as being beneath them increasingly find out that they made a big mistake.

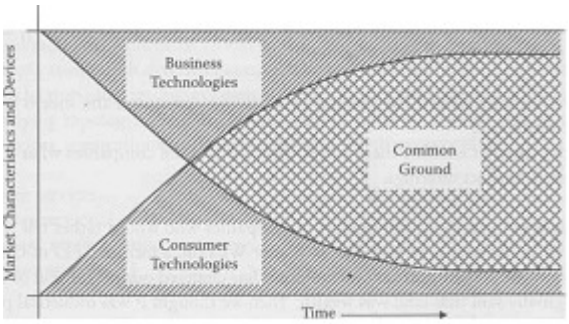

Figure: Business technologies and consumer technologies share a growing common ground

This error or rejection took place first in the 1980s, when many corporate IT operations stuck to mainframes and dumb terminals, refusing personal comput-ers as toys (and by consequence client-server solutions); continued programming in Cobol rather than by painting on video; and looked at knowledge engineering artifacts as academia's hobbies.

Companies that refused innovation in IT eventually found out the hard way that they lost a couple of decades in terms of competitiveness, along with the oppor-tunity to cut their information technology costs with a sharp knife. What was intended to be another display of "professionals know best" turned into a major failure in judgment.

In a similar way today, companies that do not examine how they can benefit from consumer technologies are missing several potential benefits. One of them is resource flexibility, as the larger cloud computing providers can shift resource allocation among their servers, enabling customers to scale up capacity (subject to the constraints already discussed). Another is the cloud's pay-as-you-do pric-ing, which:

- helps in eliminating up-front expenditures and
- permits the converting of fixed costs into variable costs.

Besides dollars and cents, another after effect of capitalizing on consumer technol-ogies is *empowering.* The biggest benefit of the Internet has been to empower the user, and this has shifted contractual power from the *sell side* to the *buy side.* It has also been an eye-opener for IT service providers who sensed a new business in the making.

Until recently most computers and communications companies typically con-sidered as a market worthy of their attention the one that could be expressed in massive statistical terms. The Internet turned this argument on its head, by pricing emphasis to personalization—and cloud computing will, most probably, do even more in this direction. In the aftermath:

- technology leveled the playing field, giving consumers the means to be in control, and
- the Internet enabled them to get together and tell companies what to do in their product offerings.

This is not exactly in the interest of companies who would rather tell the con-sumer what "he needs" to buy. But as Walter Wriston, a former CEO of Citibank, once observed: "The information revolution has changed our perception of wealth. We originally said that land was wealth. Then we thought it was industrial production.

Now we realize it's intellectual capital." One of the best expressions of intel- lec al capital is flexibility and adaptability.

Hands-on adaptability can capitalize on a mass market with global dimensions, exploiting a previously unthinkable number of possibilities to make a profit through the right product at the right

time. The Internet, and by extension cloud computing, lowers the barriers to entry, promoting innovation and competition directly in the consumer landscape.

Computer capacity, including databases and telecoms, can be rented as needed— and novel products may become hotcakes.

The Internet has promoted a better use of information by providing a framework for integrated distribution of products, services, and business support functions— with timely feedback. This permitted economies of scale traditionally associated with massive production, while supporting personalization made necessary by coexistence of multiple user communities.

The cloud has the potential to add to this transformation by supporting onDe- mand applications with diverse characteristics and quality of service requirements, as well as by providing multiple classes of service to user communities with a variety of underlying topology. The user communities in reference include end users, net-work services, applications, and their interfaces, which are providing:

- data services,
- voice services,
- image services, and
- video services.

Consumer technology that provides common applica-tion interfaces for reliable end-to-end multimedia transfers. One of the advantages is that it is shielding applications, applications making interfaces and protocols seamless to the users—a feat that, ironically, major computer vendors took years to materialize.

Because of such advantages, this consumer technology made feasible a diverse set of traffic characteristics and also offered potential solutions to other stand-ing problems, permitting fairly well-defined service offerings and operational procedures. Based on the strength of these developments, cloud providers can say that the wares they offer are sufficiently flexible to support interconnection of components across heterogeneous user organizations while ensuring end-to-end connectivity.

Internet-based migration capabilities through a path, making feasible phased implementation of the next generation of applications. The net accom-modates disparities in terminal equipment and software, thereby ensuring an evolutionary deployment characterized by:

- an adaptable flexible framework as applications evolve,
- enhancement of quality of service at an affordable cost,
- expansion of network transport services and features as applications war-rant, and
- a balance between near-term pragmatic implementation realities and longer- term development goals.

This has become possible because consumer technologies developed on the Internet can be leveraged by all businesses and consumers. Applications interact with other applications across the network, as well as with external networks and applica-tions in a dynamic environment that supports a wide range of service facilities.

While the passage from consumer technologies to a professional IT implemen-tation brings up the need for certain improvements like configuration management, these are well within the range of a service structure based on components that are shared, like access gateways, value-added processes, and so on. Nevertheless, a global management view is necessary to directly control system functionality.

The most important constraint for business is the ever-growing *data center demand*, which becomes increasingly difficult to satisfy. Global demand for data centers is projected to grow at an average of 12 to 15 per-cent per year over the next four years, surpassing supply growth by 300 percent.

Supply has lagged for several reasons. Data center construction is highly capital intensive and lead times are generally a year to year and a half. Data center building processes require design expertise and procurement of materials such as generators that are in short supply, and the 2007-2009 economic crisis has further reduced supply by:

- limiting access to capital and

- promoting demand, as SMEs chose to outsource their data center needs.

Another major factor limiting the supply of storage facilities comes from the fact that after having grown in an impressive way, the density of recording has stagnated. Counted in *bits per gram,* in antiquity the storage potential of cuneiform was 10-2; that of paper, 103; microfilm, 105; and mag tape, 106. This grew with optical disks to 108. The difference from cuneiform to optical disks is ten orders of magnitude, but that's about where we are.

Social Networks and Multimedia Messaging

Social networking is a label that, at least in some countries, has produced a high degree of excitement. Its definition is, however, ambiguous, as well as elastic. It can expand from chatting between members of social groups to the usage of the Internet by companies to help themselves in microtargeting consumer clusters.

Online social networks serve not just as ways of wasting time chatting but also as a communications tool for business purposes. Marketing people are eager to use fast-growing socia.l networks to promote their products. For instance, Dell has made $3 million in sales from Twitter.§ Several experts now suggest that the social networking paradigm:

- is turning into a sought-out catalyst and
- permits us to take advantage to influence trends through self-help.

Plenty of companies are harnessing the knowledge garnered from social network-ing. They are as well capitalizing on demographic change whereby a younger genera-tion is more likely to use the web for1 service issues rather than the classical telephone. As an example, the integration with Facebook and Twitter by Salesforce.com helps companies to quickly research, anticipate, and resolve customer issues proactively.

There is a widely held belief that as social networking becomes more pragmatic its impact will increase, helped by the fact that its population of fans grows. In mid- September 2009 Facebook reported that 50 million people had joined its service since July, taking the total number of users to 300 million.

Under these conditions, the reason justifying continuing use of the label *social networking* is that the social media is where it is happening. Another, more theoreti-cal, reason is its characteristically easy accessibility, informality, and wider reach, mainly by bloggers who aim to chatter, make fun, provoke, inform, and engage in a way that cannot be effectively replicated offline—and buy goods and services. All this is another demonstration of consumer technology's impact.

The social and even ideological implica-tions of social networking can be enormous. That may be true, but one can also exaggerate, as happened a few decades ago, when an opinion consistently heard was that man-made systems were less than thirty years away from giving managers, workers, bureaucrats, secretaries, shopkeepers, and farmers the opportunity of a new, direct stake in an economic welfare "propelled by intelligent machines."!

Three decades have passed by and these projections are still awaiting their (doubtful) fulfillment. On the other hand, as a service industry with wide appeal, IT stands to gain from social networking—if for no other reason because some of its wares:

- are designed to facilitate proximity of the participants to the social network, and
- as such, they find themselves in the mainstream of the information sys-tems market.

Everything counted, the proximity brought by social networking has been unparalleled. Compared to it, the telephone is a limited way of taking our ears to another place, while what is called "presence" has become necessary to truly achieve interaction and understanding.

Social networking is in its formative years and has plenty of space to grow. Eventually, it will find its limits, as other events that preceded it suggest. Air travel brought us together physically but with great expenditure of natural resources and side effects of carbon dioxide and other pollutants. Even in the realm of travel, how-ever, networking provides us with the ability to negotiate lower prices for airfares, hotel rooms, rental cars, and other items.

It is not without reason that people with broadband stay on the Internet four times longer than dial-up users—to an average of twenty-two hours per week vs. five hours for TV. They also tend to use networking during the day as opposed to evening hours.

An interesting contribution of social networking is that it has opened a market for group

activities, family participation programs, and the chance to reinvent entertain-ment—beyond information, and communications formats necessary for multimedia messaging services (MMSs). Mobile operators had put a great deal of their hopes, and strategic plans, on market penetration and subsequent boom of multimedia messaging, though they are still struggling to position MMSs to users, as limited camera phone penetration, lack of interoperability, and other reasons have inhibited a take-off.

Costs matter. The expense associated with multimedia messaging services is turning off many potential users, forcing mobile operators to develop new business models around pricing and value-added services. MMS vendors have invested heav-ily in infrastructure to handle peak usage of thousands of messages a second, but so far they haven't found return on their money.

Multimedia mes-saging did not take off as expected. A key point is lack of interoperability, which led operators to develop and promote content-based rather than interpersonal MMSs. This makes mobile operators nervous because it is very difficult to build a multime-dia messaging business starting with content. And there are too many handsets on the market that cannot speak to each other because of lack of common standards.

The pros say that this standards snarl will not be repeated with cloud computing because of *netbooks*, the basic very low-cost laptops that have been selling like hot- cakes. One of the problems, however, is that the more classical netbooks are being supplanted by myriad new gadgets, including tablets and increasingly computer-like mobile phones.

All these devices share a common idea: that a near-permanent connection to the Internet permits simpler technology and is more cost-effective. No wonder that this is the market also targeted by mobile Internet devices, which fit between smart phones and netbooks, like *net-tops* and *all-in-ones* with touchscreens instead of keyboards.

Problems include high porting charges, cumbersome application pro-cedures, and handset subsidies given by operators to tie in their customers. (These have impaired the success of MNP in many jurisdictions.) The fact that portability levels are low works against both social networking and the transfer of applications from a consumer to a business environment.

On the other hand, technology has its own dynamics. The combination of the Internet, low-cost portable devices, and cloud computing will oblige mobile network operators to change their strategies toward consumers, and by so doing, it will give a big boost to social networking, which will benefit from converging technologies. However, as the Epilog documents, not everything is positive with social networking,