VIRTUAL TEAMS WORK AND VIRTUAL ENTERPRISE NETWORK

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Abstract: The term "virtual enterprise" has been used in articulating the strategy for the 21st century global manufacturing enterprises. One of the key requirements is to develop an Information System infrastructure to integrate and control the interoperability of the distributed, heterogeneous and concurrent systems in the participating organizations. This article presents an innovative Information System infrastructure and its Networking Solution to help describing global information technology support for interorganizational enterprises with the background of modern information and communication technology in the PREMINV platform. .

Key words: virtual enterprise, virtual team, virtual enterprise network, e-economy.

1. INTRODUCTION

Under the concept of a global economy, enterprises are assigning design and production environments around the world in different areas. A serious issue of information exchange emerges as companies use traditional hardware and very distinct software appropriate to their field of expertise. To overcome the problem of low productivity due to the interruption of information, the concept of simultaneous engineering and concurrent design becomes very significant. Currently, the biggest problem for virtual networks is that the companies which need them the most are not becoming members. If one monitors the activities of companies involved in international trade on the Internet, one would notice rather quickly that many of the most active companies are very small. We would never speak badly of very small companies, being one ourselves. However, it is probably these companies more than any other who has the most to gain by joining virtual networks. Unfortunately, many of these companies either can not afford or are unwilling to pay for a WWW presence, which is usually a prerequisite for joining an active virtual network. There is also usually a membership fee and in some cases the fees are slightly expensive when one considers that the organizations are very new and have no proven record of success. Some proponents of the Internet have stated that its real benefit in the current situation is that it will allow small and medium sized companies to be competitive with large multinational enterprises. We do not completely agree with this position. We argue that the market power of large multinational corporations is so great that it dwarfs SME's in comparison [1]. However, we would also point out that SME's using a strategic alliance methodology can achieve greater success in market penetration in global markets thereby affording them new business opportunities. So, while we do not view the Internet as giving SME's greater power in head to head business competition, we do see the potential of the Internet as an evolving global marketplace. The importance of the virtual network can not be over emphasized in this context.

The ability of companies to form global networks on the Internet will transform the way that we do business in the future. Our view is that the future of global networking is very promising. The recent corporate downsizing which is happening in many countries means that new industries will have to provide employment opportunities in order for consumer demand worldwide to grow. We believe that the Internet will provide the means for companies to associate themselves with one another in virtual networks and begin to develop new business opportunities for each other in global markets. Furthermore, we believe that many companies who are now considered small will exert tremendous market power with the help of global networks. The ability to share information and resources gives even very small companies an opportunity to pursue larger projects, knowing that other members of a network will provide support and also participate as partners [2]. Finally, local or provincial government agencies will be able to assist their local business community by joining virtual networks. The ramifications for local economic development are quite significant. By accessing a virtual network, your agency can now reach more companies and enhance your business attraction promotional activities [3].

2. THE NEW DIGITAL ECONOMY

The development of the digital economy will be the set of strategies and actions to contribute to driving the competitivity of the country's productive sector by inserting it into the digital economy; which implies migrating from an economy with a scarce use of information technologies, to one where the use of these technologies is generalized in all economic, cultural and social activities. The generalized use of IT generates increases in the productivity and competitiveness of the economic agents, in this way contributing to the generation of well being and greater opportunities for progress.

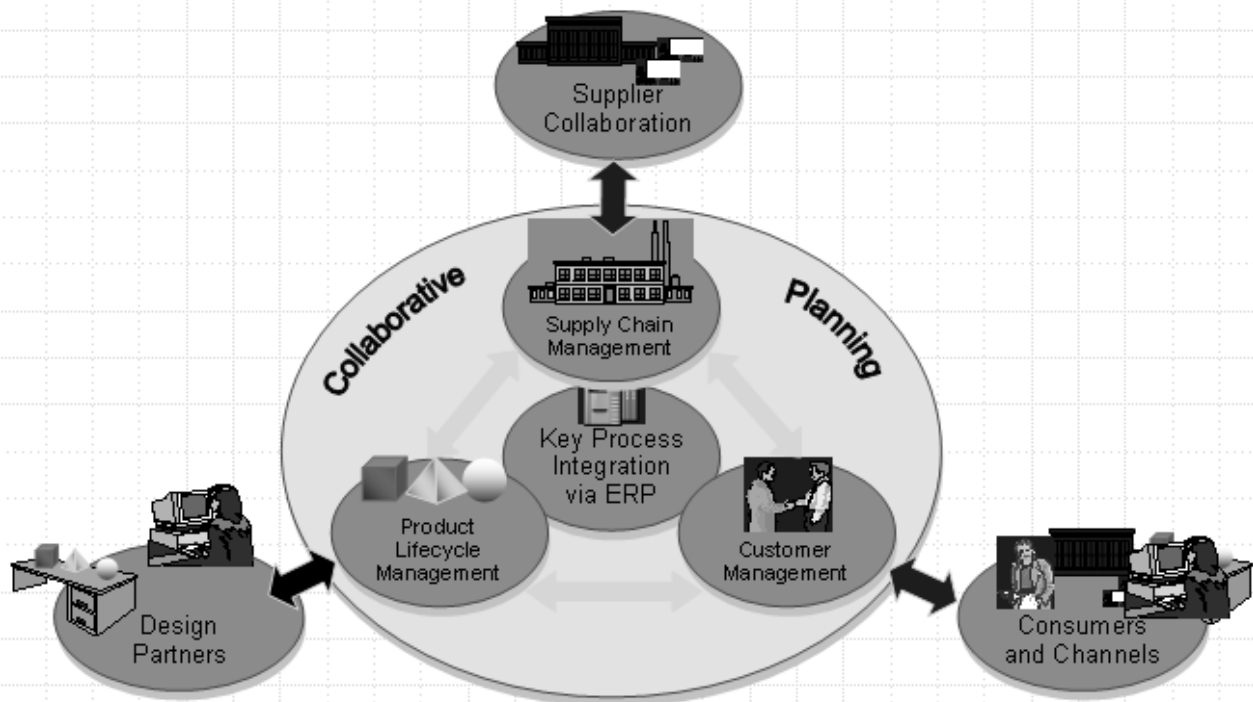Today, the Challenge in the world is of the change agents in the countries and through its technological and

Fig. 1. ERP overview.

social components, has among one of its objectives, to accelerate the digital economy's development process in businesses, especially the micro, small and medium ones, for increasing the competitiveness of economy; as well as develop a digitalization culture in society, particularly in the consumers [4].

As the e-economy evolves, we must reexamine our beliefs about what can be achieved. New ideas and consumer demand trigger new business opportunities which proliferate so rapidly that three months in the e-economy is considered the equivalent of a full year in a traditional business development cycle. More than two thirds of businesses now have a web presence which offers product or catalogue information for customer convenience. However, few organizations have really taken the trouble to find out what their channel partners need in terms of rapid information deployment to better manage the supply chain.

To grasp how the e-economy will affect your business, you need to think about how web technology is going to transform your relationship with your customers. During the next years, the supply chain model of the e-economy will bear little resemblance to today's model. Competitive forces and new technology will continuously alter the shape and flow of commerce [5].

To predict the future course of the emerging electronic economy we must consider what is happening now. Many companies have installed an Enterprise Resource Planning (ERP) software business model to handle their interaction with customers, suppliers, and other business partners (see Fig. 1).

After a lot of expense, heartache, and prescriptive remedies, many fail to perform adequately. Why?

First of all, most ERP systems are, in the very nature of their design, focused on the manufacturing link of the supply chain. Yet, a fundamental shift in thinking is beginning to concentrate on the demand side of the supply chain. The critical difference: demand chain

thinking starts with the customer and works in reverse. The new approach acknowledges that customers have individual needs and service requirements.

Another problem with most ERP business models is their inability to work seamlessly within an organization to handle some of the critical links of the supply chain process. The net result of awkward integration into other business systems within the supply chain has created a new industry of Integration Service Providers (ISPs) that link ERP systems. New ways of sharing information are gaining acceptance. These include Extensible Markup Language (XML), which offers a way to pass messages along the supply chain to inform those who require notification of occurrences that merit attention. The Internet, or in some cases extranets, provide the network-or highway by which these messages are transmitted.

This new century heralds the coming of age for the electronic economy. With a tremendous knowledge base and the increase in bandwidth via digital subscriber lines, the capacity for processing information has increased tenfold.

The desire to integrate the supply chain of businesses and consumers will generate even more change. Existing communication frameworks are heading for extinction [6]. Let's consider business systems as they work today. A customer places a purchase order on his system that in turn becomes a sales order at the distribution centre, with data flowing up the supply chain. Likewise, a payment becomes a receipt and the process is analogous to an upward movement of information [7].

Almost 70 percent of all database information is duplicated elsewhere, leaving many companies with the burden of expensive investments in computer hardware, software, and IT personnel to sustain the model. This represents a significant portion of doing business [8].

In the short term, the e-economy will enable customers to shop for products using their customized web browser ("the client shopping experience"). They will place the

order or have an order automatically generated to replenish their inventory, all the while having online access to the latest information [9]. Currently, all of this information is processed and stored throughout the disparate systems of one's business partners, with each maintaining a copy of the same basic information.

What happens if we did away with unnecessary duplication and simply tracked the order on the Internet? If a change in a production schedule indicated a delivery delay, all of the affected parties could be easily notified. All of the issues associated with maintaining synchronized databases and customer information would eliminate significant costs from the supply chain.

The e-economy will propel us into a completely different business world, one far more efficient than the one we live in today. Users will define their own desktop "client experience" to cater to their part of the business process. Users will also subscribe to a network service in which the software will be downloaded. Version control will be easier because the system will recognize that a new version is available and proceed to download it automatically. With storage networks, companies can still decide where they want their data to reside. Sensitive information may still be maintained locally but more often, data pieces will be distributed over the network for necessary access.

As enterprises gradually decentralize their operations and new networked business ecosystems start to find their way into profitable niche marketplaces, virtual, networked business teams gradually emerge as the wave of the future.

To be successful, virtual networked teams need a strategic framework in which to operate. They also need good planning and in-depth project analysis, effective and accessible technologies, constant coaching, systematic fine-tuning, feedback processes and the full understanding that their success cannot be determined by a pre-designated set of communication technologies by itself. But, until now, projects supported by virtual teams have not been brought back major successes. Virtual teams are having major problems and managing their progress has been a superlative challenge for most. Organizations face for the first time the need to analyze and comprehend which are the key obstacles to the successful management of effective online collaborative business networks. Though the answer is not simple, the solution is to be found in examples that are closer to us than we have yet realized [10].

3. VIRTUAL TEAMS AND VEN

A virtual product development by the virtual teams in a virtual enterprise is a temporary alliance of teams that come together to share skills, abilities and resources in order to attend a project opportunity and whose cooperation is supported by computer network and adequate tools, competencies and special application software [11]. Virtual Enterprise operates as nodes in a network. A different architecture, engineer and construction organization, a fresh virtual team [12] is needed every time for every new project. Innovative techniques to co-ordinate and manage information,

resources and documents need to be developed to integrate successfully and reduce lead times, increase quality and keep within budget constraints. Consequently, the partners in the virtual enterprise need to exchange legacy data and migrate with other systems outside their own secure corporate boundary. In order to achieve collaboration between different actors in the Virtual Enterprise, there needs to be common processes supporting the distributed product development process.

Also, what is a virtual enterprise network (VEN)?

• A way for businesses to achieve virtual scale enabling them to operate as if they had more resources and capacity than they actually have;

• Allowing them to operate with all the resources and reach of a large enterprise but without sacrificing their speed, agility and low overheads;

• Enabling them to compete for bigger more profitable contacts with higher innovation and design elements with bigger customers who are prepared to have strategic partnerships with their suppliers.

A Virtual Enterprise Network needs its own Private Member Collaboration System to communicate and develop its projects and bids. It needs its distinctive Network Business Applications such as Capability Aggregation and Tender Matching to enable it to function effectively as a co-operative in both pre-sales and contract operations. It also needs a Public Web Site to manage its interactions with potential customers and new members.

Today's virtual teams don't appear to be able to fully leverage the much touted opportunities offered by always-on interconnectedness, easy access to unlimited information sources and real-time communication tools.

While much of the Internet-generated new media revolution talks about greater and more effective collaboration opportunities, business teams appear to be engulfed by:

• technology adoption issues;

• lack of effective communication approaches;

• reliance on old traditional work methods; absence of strong team motivation

• effective cooperative workflows.

The adoption of new tools without the parallel development of a new culture that supports their use and the potentialities opened by these new media scenarios is typical of all phases of technology adoption. We have yet not uncovered the full potential available to us when we operate, like nature operates, as cooperative, highly motivated teams [13].

The solution we propose to the above issues is the systematic study of nature's most successful living teams and the extraction of principles about their operational logistics, behavior patterns, command-structure, communication methods that can provide us with useful guidelines on how teams need to operate to be truly successful. It is our goal to analyze these principles and to see where and how some of the teaming principles can be transferred to the areas of organizational design, leadership, online collaboration, business networking, and human resources management.

Building an e-economy for the 21st century is a complex challenge. It requires:

• transform business models and organizational structures in the private and public sectors to generate con-

tinuous streams of productivity gains and product innovations, through the applications and use of ICTs;

• create a climate of trust among consumers and businesses that fosters the growth of the e-economy in each country and internationally and creates global markets for electronic goods and services; and

• build an intelligent infrastructure to serve as the backbone of the e-economy – by encouraging investment, strengthening research, enhancing commercialization and ensuring that all persons have access to this infrastructure and know how to use it.

Developing and implementing these strategies will require partnership and collaboration among the private, public and academic sectors as well as other agencies and organizations that strive to link these together. It will also require the active involvement of consumers and citizens.

Also, today, the critical and strategically questions are:

• What overall strategies are needed to catalyze actions that respond successfully to the opportunities and challenges presented by the e-economy?

• Are there other factors in addition to those already identified that are yet to be understood or fully harnessed, and that will enable each enterprise to benefit more fully as we progress towards a mature e-economy?

• What is needed to make the e-economy a priority?

• What additional measures are needed to address the broader challenges of the e-economy?

Enterprises are now facing growing global competition and the continual success in the marketplace depends very much on how efficient and effective the companies are able to respond to customer demands.

The formation of virtual enterprise network is taking up momentum to meet this challenge. The idea of virtual enterprise network is meant to establish a dynamic organization by the synergetic combination of dissimilar companies with different core competencies, thereby forming a "best of everything" consortium to perform a given business project to achieve maximum degree of customer satisfaction. In this emerging business model of virtual enterprise network, the decision support functionality, which addresses the issues such as selection of business partners, coordination in the distribution of production processes and the prediction of production problems, is an important domain to be studied. Virtual collaboration for networked business teams is a complex and challenging activity in which there are major important components to be accounted for [14].

Virtual teams do not operate like traditional physical teams, as their requirements reflect a whole new way of communicating, working collaboratively, sharing information and mutually supporting other team members. The new technologies and approaches required to achieve this are completely alien to most of our present organizational culture. And this is why they fail. Cooperative processes are not the automatic results of implementing collaborative, real-time communication technologies, but the result of a carefully designed and systematically maintained virtual team development plan (see Fig. 2).

For those of you who have already exposed themselves to the positive advantages made available by the use of cutting-edge communication and collaboration technologies, this should sound as a familiar melody. How many times have you been witness to technologically-based collaboration projects that have miserably failed?

Why is there so much disjoint between technology potential and the productive use that business team members make of them?

If the solution is not in the technology enabling such networked business teams to easily interoperate, where is it then? Who are virtual teams :
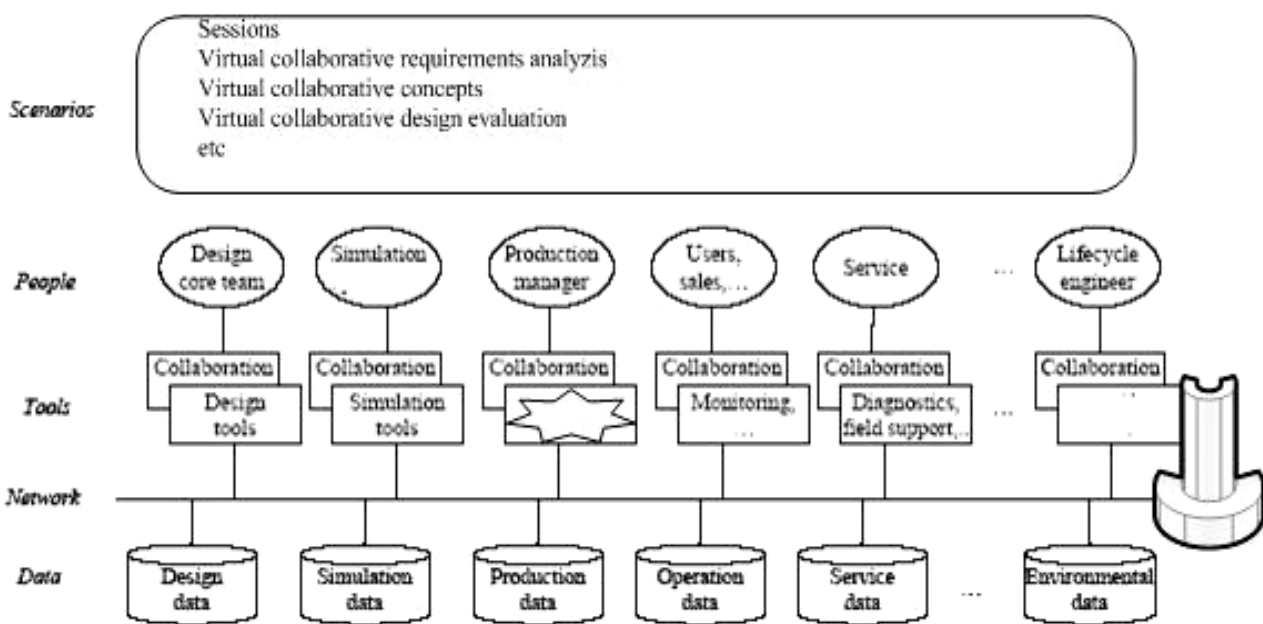

Fig. 2. The key elements of collabotation and communication in the PREMINV platform.

- Corporate Teams involving a collection of staff from different functions including IT and Key Business Functions;
- Collaborative Businesses Networks involve groups of businesses (SMEs) who have come together to operate as a collective in areas such as business development and product development;
- Collaborative Supply Chains generally centre round a major customer/OEM and a number of its suppliers. The major customer can mandate and encourage technology usage to a certain extent;
- Interdepartmental Government Teams are where a number of central or local government departments such as healthcare, economic development and education come together for a specific project;
- Inter-departmental and often inter-company;
- Inter- disciplinary with a mix of skills and professions from different functions;
- Project-based - formed to deliver a specific project by a specific deadline (rather than management or best practice sharing- oriented);
- Highly Mobile;
- "Political" with the need to manage the expectations of multiple stakeholders;
- High profile/high risk - engaged in strategic/creative work which is higher risk and more challenging than the typical work assignment;
- Multi-location - not based in a single location;
- Mixed Involvement of full-time and part-time players - typically a small inner core of full-timers complemented by a larger outer core of part-time reviewers and specialists.

The ideal solution framework suggests making a systematic pragmatical reference to the key interdependent components of a successful virtual business team - each of which must be set-up correctly and then kept in constant equilibrium as the team evolves and produces results.

These are:

- Shared Team Understanding (There are a number of key ideas, principles and rules that any successful virtual team needs to personalize and absorb in full);
- New Processes and Practices (Business virtual teams need to adopt and understand new work practices, sharing attitudes and communication modes to effectively empower the team they are part of);
- Ongoing Team Coaching (ust like a sports team a business team needs a coach so virtual teams do. The virtual team coach is a critically important component in helping the team find its identity and best way of operating)
- Holistic approach to Team Support Technology (Provided you have a clear blueprint for what is that it needs to be achieved by the Virtual Team, the best technology to use is not the one with the best feature set but the one you already have installed and every team member is able to use. So wherever possible it is better to integrate an organization's existing technology (intranet, extranet, team room, portal....) into the team support environment rather than scouting for the ultimate solution among new

collaboration technologies. You may also need to plug some gaps but generally adding to, rather than replacing existing technology infrastructure is the proper way to go);

- True understanding of the dynamic nature of networked business teams (A networked business team is a living thing).

Virtual enterprise network demonstrates an approach to solve many of the problems of interoperability, heterogeneity of platforms, and data sharing (see Fig. 3).
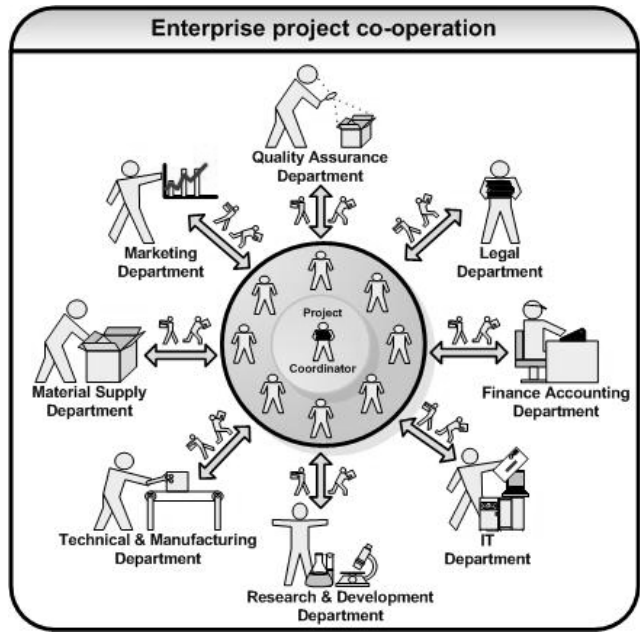

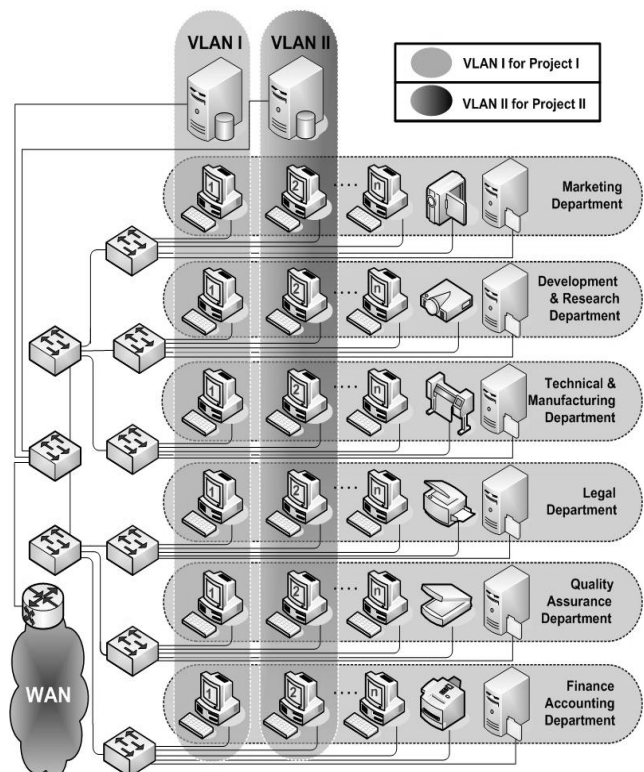**Fig. 3.** Collaborative tools in a VEN.

Fig. 4. A general view of virtual teams or VEN.

An applet provides a convenient user interface capable of being launched from almost any platform with the proper network connections (see Fig. 4). By being individually interfaced with this system, the various tools and workspaces can inter-operate even from heterogeneous platforms (see Fig. 4).

4. CONCLUSIONS

The presented solution is based on PREMINV platforms that defines a standard for developing multi-tier, portable and platform neutral enterprise applications based on the technology of Web Services. Striving to discover the main problems of collaborative product data management, the theoretical backgrounds in the particular research area were analyzed, and interviews with the members of the design departments of SMS companies were carried out.

Finally, so what exactly is the "Value Proposition" for a VEN?

A VEN connects businesses into peer networks that are supported by appropriate technology to give them the capabilities and competitive advantages of global enterprises particularly:

- Sales;
- Marketing reach;
- Product development;
- Human, capital and IT resources;

Whilst exploiting their inherent competitive advantages in being able to be more agile in areas such as:

- Speed and responsiveness;
- Entreprenneurship & innovation;
- Flexibility;
- Low overheads.

A virtual enterprise network is a virtual team. However it is made up of individuals from many different organisations with different ambitions, IT awareness, business cultures many of whom do not know each other well.

It is therefore a classic Virtually Networked Team and as such needs to agree the way these people will work together, make decisions, handle conflicts, share information and use the virtual collaboration technology. An aspect of VENs which seem to differentiate them from other forms of networking is the willingness of the members to invest in the development of these shared working practices.

Without such practices it is unlikely that trust will grow in the network to the extent necessary to achieve anything significant.

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