NeoClusters

New Business Opportunities for Finnish Real Estate and ICT Clusters

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Summary

This document reports a two phase pre-study – NeoClusters - to analyze the trends in real estate business and new opportunities provided by clustering of real estate and technology businesses. The report consists of NeoClusters I & II reports.

NeoClusters work was supervised and sponsored by The Finnish Association of Building Owners and Construction Clients RAKLI, Technology Industries of Finland and Federation of The Finnish Information Industries, representing the potential clustering parties, and National Technology Agency of Finland (Tekes), which funded the project.

The first part of the project, NeoClusters I, focused on the domestic real estate and ICT markets, mapping the current state of affairs and seeking to obtain expert opinions on signs of future trends in the respective market areas. Several major companies, operating in the Finnish real estate market, were explored through expert interviews conducted by the project team. The key findings of these interviews formed the basis for the second part of the project, NeoClusters II.

NeoClusters II was conducted as follows. The findings of the first part were benchmarked to the current trends in the US market, the main focus being to get acquainted with US building technology research and real estate business trends. This part was carried out in The University of California at Berkeley, Center for Built Environment (CBE). Asian trends and best practices were also explored during a ten day tour to Japan, Korea, China and Singapore. Parallel to this, project work in Finland commenced with the aims of further narrowing the focus to workplace industry and retail business, of identifying feasible research and development project ideas from among the industrial and scientific communities, and of supporting the preparatory work of the interested parties.

To summarize the findings, the real estate markets and the firms operating in those markets are facing a rapid change of global business. The role of Asia is increasing as a market and business area. Many manufacturing companies have moved their operations to these new markets so both manufacturing and real estate business are growing fast in Asia. The Asian countries are investing heavily in education, R&D and new technologies to improve their own capabilities in global competition.

The so called old industrial countries have developed new strategies to compete with the growing Asian markets. Customer orientation, service business, networking and new applications of information and communication technologies (ICT) are continuous trends

in this competition. Improved productivity, the so called hyper efficiency, is a way to sharpen the competitive edge of western companies.

Real estate (RE) business and companies are involved with this global change. RE companies must improve their service capabilities and the efficiency of operations to keep their customers. The customers with their increasingly dynamic behavior play a central role in profit making real estate business. This has led to the new concepts of workplace services and new combinations of business infrastructure solutions. In Finland, these new concepts are still shaping up and finding their role in the marketplace.

Applications of new and wireless ICT are important tools for the real estate business to serve the customers and manage the property portfolios and services. New business models and networking with the ICT providers are ways to facilitate business performance.

A number of R&D proposals have been made and activities have started based on the findings of the NeoClusters pre-study. Several research projects are also under preparation and will be submitted for funding from the most relevant of ongoing and starting Tekes programs i.e. VAMOS, SERVE, LIIKE, INTO, UBI and MASI.

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Part I - R&D Challenges and Networking Opportunities in Finnish Real Estate and ICT Businesses

Introduction

This report is of a pre-study project concerning potential formation of new clusters from the real estate (RE) and the information and communication technology (ICT) clusters. The goal of the pre-study was to identify new and viable opportunities for business networking

The Finnish Association of Building Owners and Construction Clients RAKLI, Technology Industries of Finland, Federation of The Finnish Information Industries and National Technology Agency of Finland Tekes jointly carried out the pre-study. It was based on the perceived strong synergies of their visions and strategies[1].

The process included a literature survey, twenty company interviews, two expert workshops, two seminars and a web-enquiry. The NeoClusters-project was coordinated by RAKLI.

The rapid change and growth of international operations in real estate markets open new channels for ICT-products and ICT-based services. Customers have been increasingly outsourcing their properties to professional property owners and the property related operations to specialized management companies whose added value is to support the core business of customers providing agility and cost efficiency regarding occupancy.

On the customer side the outsourcing of the property related operations has led the corporate real estate management (CREM) functions to focus increasingly on adding value to the core business. This has in many cases turned customer real estate activities into relatively small professional management units that focus on integrated corporate infrastructure management (CIM).

[1]The Finnish Real Estate Vision 2010 "Foundations for a good life", http://www.visio2010.org/
eProM, http://www.rakli.fi/kehitys/eprom/index.htm
Valor, http://www.teknologiateollisuus.fi/files/4583_valor.pdf
Tekes, http://www.tekes.fi/tekes/teknologiastrategia.html

Information and communication technology in buildings is integrating into systems and services with Internet based communication protocols. These systems provide services to customers' enterprise systems and integrate into business infrastructure.

We can expect a profound change in the business processes and working procedures of the global, networked and agile enterprises. The work will be highly distributed, connected, mobile, team and knowledge based. The workplaces supporting the work will consist of a set of services and tools in addition to the spaces. Work, the supporting services, tools and workplaces are in dynamic relationship. The Workplace Industry providing the services and tools is a cluster of ICT-, service- and real estate firms that deliver the working environments and workplace portfolios to the customers in collaboration with the customer's business infrastructure management functions.

These trends open new international markets and service opportunities for service-, ICT- and real estate companies and networks. These markets are new and need innovative ideas to develop business models, products and services. The big ICT vendors have noticed this change and have expressed their interest to the markets. The real estate and ICT-clusters have their opportunity to combine forces by networking and taking advantage of the growing global and local markets.

In this report - Part I - we propose development and research topics for further elaboration, based on the findings of the project.

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1 Real Estate & Service Business Trends[2]

1.1 Future Business Drivers

We can expect that globalization, technology, change of workforce and nature of work, innovation, management of risk, corporate social responsibility and sustainability will be the driving forces of future business. The role and importance of each factor change heavily in a networked environment. Strategic role of place will be even higher in globally networked operations. Leadership, vision, excellent process management and robust but flexible company infrastructure will separate the winners from the losers also in the future.

1.2 Networked Enterprise

Successful enterprises will be characterized by their flexibility and agility of business operations, lean and focused business model with clear and distinct value proposition, and capability to continuous innovation. The structure of organization will be geographically dispersed and consists of multicultural teams working together on global basis. Free agents will represent a growing part of workforce. Brand, reputation, social responsibility and sustainability will be important assets of these companies.

To respond to the challenges new business models are evolving in both private and public sectors. Enterprises will be flat, fast, and flexible, process driven, global, highly interdependent and networked. Business networks are web-enabled and defined by product, service and information flows between the nodes. Some of the networks are created for a special purpose. Others are more permanent. We don't yet fully understand the scope and implications of the networks we are creating.

1.3 Networked Service Procurement

In the future a greater share of services will be outsourced to a small number of strategic partners who will be expected to share a greater portion of the business risk. Ability to manage a network of service partners will be a critical success factor for senior infrastructure executives.

[2] Chapter 1 follows the lines of Corporate Real Estate 2010, Enabling Work in a Networked World, CoreNet Global, Nov 2003

Common reasons for network development are speed and quality of services delivered by specialized firms that can offer the customers higher levels of efficiency and lower costs. These service networks can exploit economies of scale and leverage with greater flexibility and capacity when workload exceeds the capabilities of in-house workforce. By using specialized service providers the customers get access to skills beyond their in-house teams, and to best practices and experience from other clients. A goal to change the operational cost structure from fixed costs to variable may also be reached.

1.4 Networked Service Delivery

As customers change and network based models evolve the provider industry must meet the new expectations. We will face consolidation towards fewer providers who can deliver a greater range of services across a broader geographical range to domestic and multi-national customers. Customers will use fewer and more strategic partners. Greater reliance will be based on service provider systems and open data standards. Higher level of skills will be needed within service providers that meet those of senior corporate RE and infrastructure executives.

1.5 Corporate Infrastructure Management

CIM is systematic integration of corporate infrastructure functions to support business, profitability, productivity and service quality. Seamless infrastructure consists of RE, IT, HR, even finance and legal services that support the firm's core business. Different implementations of infrastructure management will be found in different firms. Great business and economic forces like speed, flexibility, rationalization and leverage are drivers of this development. The trend will result in major changes to the service provider industry.

2 Characteristics of Real Estate Markets and Customers

From technology and service providers points of view real estate market has traditionally been highly fragmented with a large number of local customers. The market has been geographically dispersed. In Europe and Finland operators own most of their properties. The firms often consider the properties only a necessary support function to their core business. The result has been a cost minimizing RE-business with small and local operators on both sides. The picture is changing.

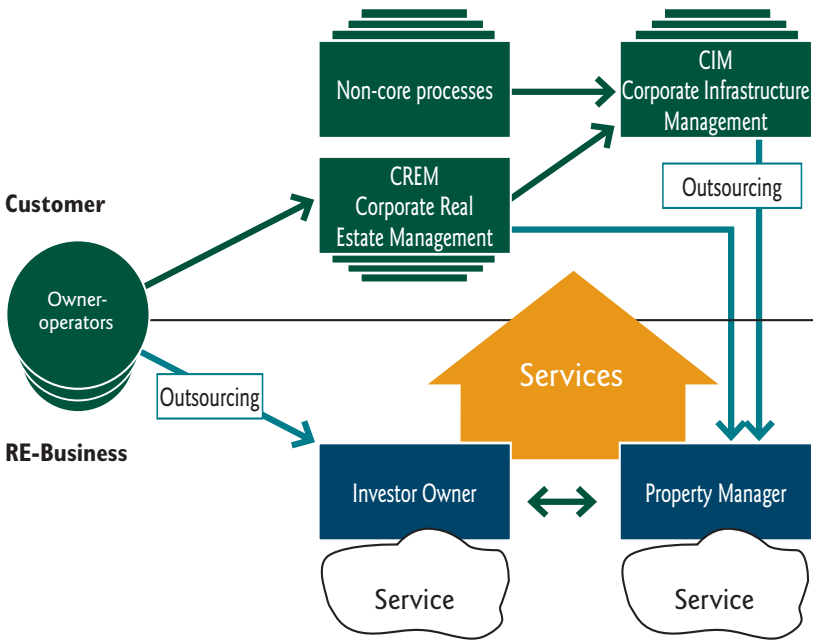

Figure 1: Outsourcing changes real estate business structure and consolidates operations to international, specialized and professional firms.

2.1 Changing Structure of Ownership[3]

European firms own 70% and lease 30% of the real estate in which they operate. This is roughly the inverse of the proportion in the US. Outsourcing and sale-leaseback transactions provide companies benefits like the opportunity to raise capital to core business, retire dept, invest in new technology or increase flexibility. UK firms could save $28b and increase profits 13% by using property more efficiently according to the survey by Ernst&Young. Both industries and services are outsourcing their properties.

These transactions were rare in Europe until a few years ago. The trend is expected to intensify when more multi-national companies come to Europe and European firms become international. Close to $80b new investments to Europe are expected in next four years.

Changing the ownership by using for instance sale-leaseback transactions offers equal opportunities for the public sector as a new financing instrument to property investments.

2.2 Changing Structure of RE Service Markets[3]

Customers look for service providers with processes that achieve consistent results and savings across the customer's business area. Outsourcing real estate duties has been growing for 10 years but accelerated since 1999.

Cutting costs and increasing shareholder value are main reasons to hire service providers. Reported direct savings of property cost are 5-10% up to 15%. Customers have reached the savings by integrating building service networks and applying economies of scale. Customers can also save systems and technology investments the service providers have done. The more real estate duties are outsourced the more competitors feel the pressure to do the same.

[3]Across the Pond, Corporate Real Estate Execs Break with Tradition, Joe Gose, National Real Estate Investor, Oct 1, 2003

2.3 Property is Information[4]

Agile business requires controllable, immediately accessible information enabling intelligent and fast decisions regarding real estate and costs, regardless of the physical location. Management of a real estate portfolio is inefficient or impossible without knowing the contents. If a company has all the real estate information on multiple platforms and costs buried in the organization and operating costs, it cannot measure or compare different sites, costs or benchmark the industry.

3 Business and Technology Development in Integrated Corporate Infrastructure

Opening of the international financial markets has brought large amounts of investments to RE-markets. These investments look for profit. Still 70% of European properties are operator owned. Financing and transactions were first international RE-services. Late 90's RE-management services turned international. Global RE-market consolidates and is not as dispersed as it used to be.

Today customers consolidate their internal RE-operations as corporate real estate or corporate infrastructure management functions. These CRE functions focus on firm's core business and RE-efficiency. Customers outsource their property ownership and their RE-management and –services to globally operating firms.

We can identify the RE operators who provide global channels and access to customers and their properties for ICT, technology and service providers.

- Investors and owners
- Real estate companies
- Management companies
- Facilities service companies

[4]Multinational Corporations Zero In on Cost-Efficiency, Joe Gose, National Real Estate Investor, Feb 1, 2004

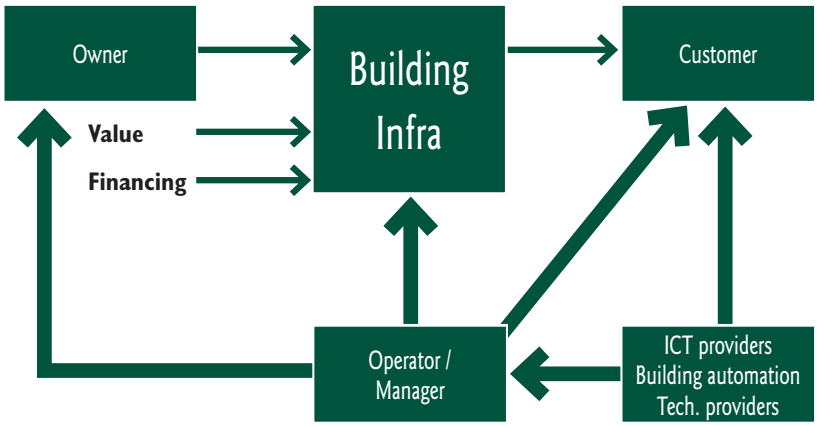

Figure 2: Consolidation of RE-markets and focus on customer core business in RE-operations open new channels to global markets for networked service and technology providers. The RE-operators grow bigger and global, so do markets.

On the technology side we can identify trends, which open markets for networked and integrated systems based on open communication standards. These standards also provide interfaces to the business IT-systems used by the tenant enterprises.

Trends in open, integrated building system networks:

- Buildings in Internet and IP based systems
- LON and BACnet, also COBA in Finland
- Single point of systems control, remote control

- XML-based communication and integration
- Web Services
- Wireless systems and devices
- Less installation costs, increased flexibility

- Services and systems improving tenant's business
- Integration of enterprise and building IT-systems
- Cost savings, flexibility of services

Big or new ICT-firms to be watched in the RE-business are: CISCO, HP, Oracle, Nokia, Sun Microsystems, GE, Honeywell, Siemens and even Microsoft.

Big RE-firms and users to be watched in the ICT and technology business are:

- Management: CB Richard Ellis Holding, Cushman & Wakefield, Jones Lang LaSalle
- Investors: Equity Office Properties Trust, Simon Property Group, Lend Lease
- User organizations: BP, Nokia, Deutsche Bank, Sun Microsystems

3.1 Enterprise and Building Networks are Integrating

ICT will be a major part of the building infrastructure. Standard interfaces and communication networks support interoperability of systems and facilities. Wireless and backbone networks need less cabling and save costs, increase flexibility and connectivity, and allow remote or single point of service and control. Enterprise and building ICT systems can communicate and provide the tenants with new integrated services that are not based on square feet. Value added services to the tenants increase customer reliability.

Communication integrates the systems and networks may be cabled or wireless.

- Systems communicate to each other
- Systems provide interoperability
- Single point of control / remote control

Integration of building systems to customer business IT systems allows interoperability and development of new services. Among several application areas are human resource management, facilities and cost management, integrated security and risk management systems. Tenants and their personnel may also be given rights to control their own environment, access rights, temperature, lighting, maintenance calls, guide guests etc.

Levels of integration:

- Services level – IP based networks
- Systems level – IP and BACnet networks, COBA in Finland
- Controller level – BACnet, LON, IP networks
- Device level – LON, automation networks

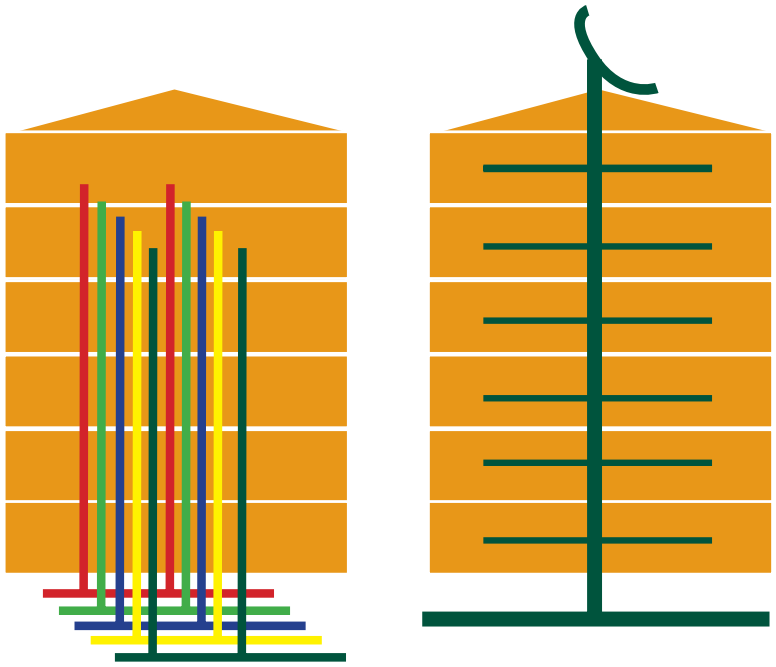

Figure 3: Traditional building systems are proprietary and difficult to integrate. Network configurations are laborious to install, maintain and upgrade. New backbone and wireless networks save costs, they are flexible and efficient. Building systems will integrate by using standard interfaces, IP-based communication and support interoperability.

4 Proposals for Development Topics

Following chapters describe the development and research topics based on the findings in the NeoClusters project. The proposals are based on the perceived trends in business, technology and corporate infrastructure.

Development of Workplace Services and Technologies – Workplace Industry

Working and the concept of workplace are facing a profound change in the near future due to the structural changes of enterprises, supported by new information and communication technologies and developments in the business and social environments. Chapters 5 & 7 propose activities focusing on people and business process oriented workplace research and development.

R&D Activities of Workplace Industry – Empowering Innovation in Business and Infrastructure

Chapter 6 proposes service and tool r&d-activities for the workplace industry. We propose that the r&d-activities of the workplace-cluster should focus on the innovation power in business processes and infrastructure. We believe that a solid but flexible business infrastructure separates the successful firms from the others in the future. Innovation power has to be increased in this field to change it from a cost saving to cost effective and innovative business and services. The customer firms are changing rapidly their structures and operations. In many respects the services offered by the RE-providers are similar to the CRE-operations of networked customer firms.

The structural changes of customers lead to changes in service provider business models and structures. Information and communication technology supports and improves service network management. It also offers an opportunity to develop self-service capabilities for the end-users.

Cross Disciplinary Research in Real Estate, Construction, Automation and Information Technologies

Real estate and buildings as a service and technology platform for business and living is a wide scope and multi disciplinary research challenge. It is not only a major engineering challenge that requires development of new construction, information and automation technologies and their applications but a challenge requiring also intensive research of work and operational paradigms of companies

in close collaboration with the changing user and social requirements. Chapter 7 is a proposal for such research activity. It can form a basis for international research networking among Finnish and foreign research bodies.

5 Development of Workplace Services and Technologies – Workplace Industry

Firm's overall business strategy will drive how and where people work. Location will still be heavily influenced by many factors like key markets, sources of supply, labor, transportation, communications, utilities, incentives and other traditional issues. In the networked world the role and weight of these factors can fundamentally alter the structure of a firm.

In the future work will be done by a mix of free agents, part-time workers and full time employees working independently and in teams across time and space to leverage the knowledge and talent of global workforce. Teamwork is already today about 70%, individual work 30% and the proportion of teamwork is increasing. The enterprises will leverage their networks and capabilities to expand, contract and connect in ways that have not been practical in the past.

These changes will affect the ways where enterprises locate, how they configure and manage their portfolios, how they acquire the skills and how they design and manage new workplaces. The workplaces will be fully integrated and organized around the core business processes and capabilities needed. The workplace will be designed to be people centric and facilitate knowledge sharing, teamwork and innovation. The core will be new ways of thinking how and where the work will be done as traditional boundaries become irrelevant.[1]

[1] Corporate Real Estate 2010, Enabling Work in a Networked World, CoreNet Global, Nov 2003

In addition to the physical space and place requirements the future corporate workplace portfolio consists of a set of services and tools, especially ICT. The work, the supporting services and tools, and the workplace are in dynamic relationship with each other and the corporate infrastructure. The suppliers of workplace services and products need a common understanding of the customer's workplace strategy to serve the customer efficiently. Definition of customer workplace strategy and improvement of workplace portfolios may be new and important services in the near future.

The workplace industry is a cluster of several specialties including ICT and other technologies, services, products and systems like furniture, real estate and facilities services. We have a window of opportunity to develop tools, services and business concepts for the Finnish workplace industry operating globally. The work should be done in collaboration with the customers.

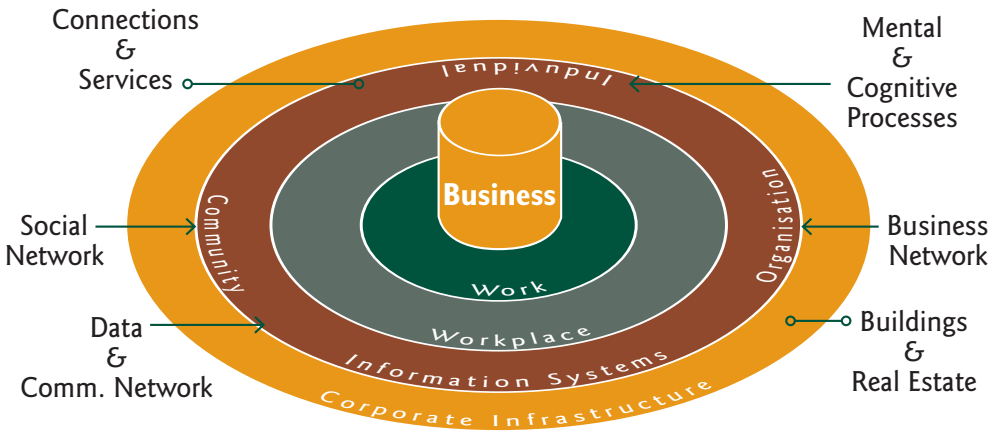

Figure 4: A services and tools environment supports the work and workplaces. The layer provides services and connections to the information systems and networks. Corporate infrastructure and real estate services provide the platform.

5.1 R&D of Workplace Services for International Customers

Workplace services and tools implement the operations of the networked and global customer firms. The development program should work in collaboration with the customer enterprises and focus on definition and understanding of common concepts and strategies – the corporate workplace strategy.

Similar work can be organized in different ways in different environments. The attributes of work reflect to the workplace services and tools. The required workplace services and tools differ for example according to the position and the ownership of work. The position can vary from fixed to mobile and the ownership from individual to team. Individual work in fixed workplaces and mobile teamwork differ fundamentally from the supporting service and tool configurations point of view. The customer defines the workplace portfolio according to its workplace strategy. Other aspects the workplace provider needs to consider when designing the workplaces and services are among others customer business processes, working procedures, company and local cultures.

The development of innovative service business models, services and products of the workplace industry is a networked and multidimensional activity requiring many competences. Several technology challenges must be overcome to support the activities in the dynamic workplaces. Agile companies look for new concepts to increase the productivity and flexibility of work and workplace portfolios, and to save the total cost of occupancy. New service concepts based on brand, added value and serving changing customer requirements should be studied.

6 R&D Activities of Workplace Industry – Empowering Innovation in Business and Infrastructure

6.1 Innovation Power and -Management are the Driving Forces of Global Business Networks

This chapter proposes service and tool development activities aiming at the integrated and flexible business and infrastructure services of the workplace industry to the global and networked customer enterprises. ICT becomes the core technology of RE/CRE business networks and buildings. Interoperability, compatibility and integration of business and building systems will be features of the future winning services and systems. Mobile and wireless communication and networking are their technological basis.

Management of portfolio efficiency and productivity emphasize the property information management and analysis. Capital efficiency and new investment schemes should be investigated. Success in RE-business will be possible only with efficient management of service networks, improving the controllability of service networks and high service quality.

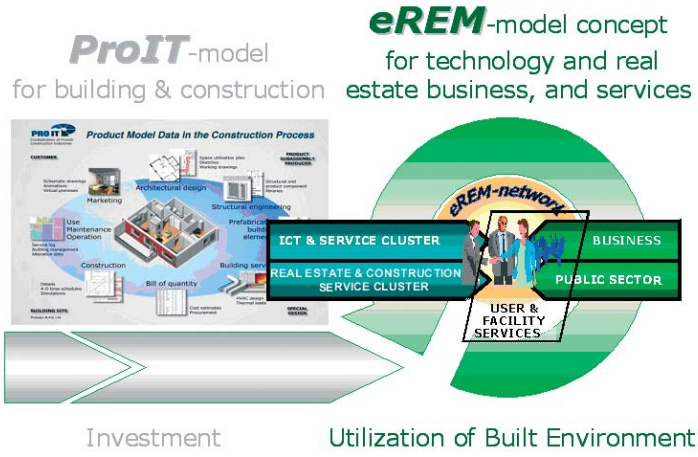

Figure 5: Electronic Real Estate and Service Modeling integrates the service processes and property life cycle management. It has the tools to model and maintain building and workplace system and service configurations. eREM-concept serves both customer and provider business networks.

Electronic real estate and service management with customer and service-oriented models of the buildings, integrated building technology systems and operational service processes – the eREM-concept – should be investigated. The goal is to develop integration and communication of RE- and CRE-management systems and services, property lifecycle management and configurable web-based service applications (Figure 5).

6.2 Workplace Service Network Integration

Members of the network have their own interests and points of views concerning their business. Customers with their workplace portfolios, service and systems providers, property managers and owners / investors have all their business goals and viewpoints.

The environment shall provide each user in the network with a personalized self-service web application. This makes the services more accessible and easier to work with, and saves the customer's and other users' time.

Service providers shall provide the customer, a non-product centric web experience, which is focused on relationships and customized to the needs of the most important stakeholder segments: customers, service and systems providers, property investors and the provider's own personnel. Service providers can significantly improve the quality and efficiency of their service, and simultaneously reduce the operating costs by enabling all users to easily obtain the information they need for self-servicing their demands.

User interfaces are personalized according to each user groups' or individual users' interests. The web-service will provide also the network partners with access to the network's services like an ERP system to those service providers that cannot afford to invest in their own systems.

6.3 Development Goals – Configurable Web-based Self-services for Workplace Industry

The goal is to offer through the web cost-effective, semi- or fully automatic mass-customized and individualized services. A development program should be commissioned to carry out the following tasks:

1. Model and manage the services to be offered as a service product family consisting of service elements, and knowledge and rules how to configure and combine these services together.
2. The knowledge and rules must be generated in order to clarify the concepts of configurable services and their effects on the operations and management of the business network.
3. Analyze and develop the business concepts of configurable services, including analysis and definition of
    - Customizable service business,
    - Services related to business processes and operations in the business network,
    - Characteristics of the service products and components
4. Develop a prototype environment in which services can be described and made available on the web, and customized on the basis of customer requirements.
5. Evaluate and validate the business concept of configurable services and prototype environment in real contexts.

7 Cross Disciplinary Research in Real Estate, Construction, Automation and Information Technologies

The social and business environment and the user profiles of buildings are changing in constantly faster cycles. Our society is based on a rather rigid separation between work, home and public services. Also our basic understanding of a building is very rigid with low application of technologies compared to many other basic structures of business and manufacturing where flexibility, adaptability to fast change cycles and efficient reconfigurability are important characteristics already today.

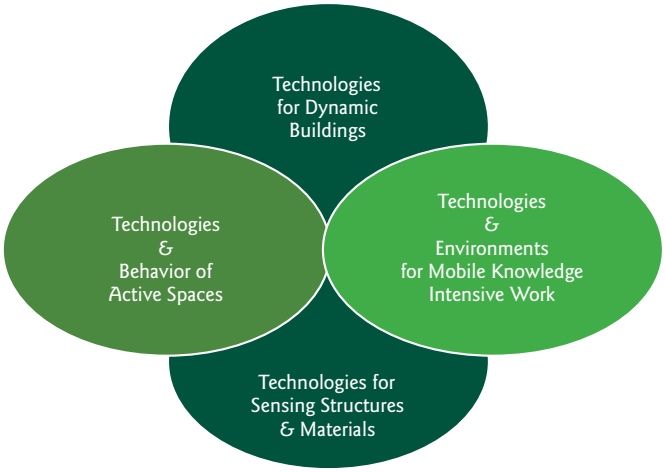

Figure 6: The four R&D areas of the cross-disciplinary research program.

This proposal consists of four focus areas, depicted above, which integrate the new engineering requirements and technologies of dynamic building concepts to the future high tech workplace concepts and technologies supporting mobile, knowledge intensive and non-routine work in the core of the dynamic and even global organizations. The four focus areas are:

1. Dynamic buildings as platforms for business, public services and living
2. Technologies and applications of sensing structures and construction materials
3. Technologies and behavior of active spaces in buildings
4. Technologies and environments for mobile, knowledge intensive work

These four focus areas establish an integrated connection between a building as a service platform and its users during the life cycle of a building.

7.1 Dynamic Buildings as Platforms for Business, Services and Living

The intended use and the profiles of users during the life cycle of a building are currently rather explicitly defined already during the definition and design phase. On the other hand we know that the users will be more and more dynamic and their behavior difficult to predict.

In such an environment efficient reconfigurability and even total change of use extend the lifecycle of a building and improve its productivity with a lower investment risk. From the productivity point of view of the whole society it would be beneficial to consider also new concepts of private/public owned or operated multi-purpose buildings where several types of users including at least business and public services can be co-located. This would decrease the amount of totally unnecessary and unproductive traffic and time spending on daily commuting.

We are facing a change of markets where older buildings have difficulties to find customers but there exists a steady or even growing market for new buildings serving the customers effectively. If old buildings cannot be reconfigured or upgraded to new use and cannot find markets, they turn to be costs instead of assets. This cycle may become faster in the future.

Buildings serving as platforms to business, services and living are in fact interfaces of these functions to the surrounding environment. In a business or service environment the connection point is the workplace. Using the same analogy home is a similar service platform and an interface between the social environment and a family.

Active spaces have the capability to identify individuals and recognize their characteristic requirements for connections, communications and applications with data services. So the active space can establish broadband or multimedia communication links for a working team to their services and to other teams working in their active spaces.

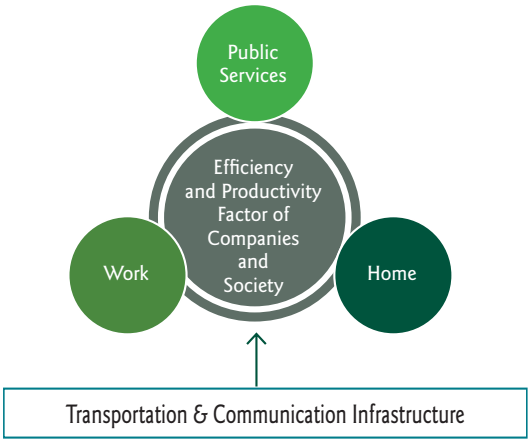

Figure 7: Home, work and services together with the transportation and communication infrastructure constitute many of the efficiency and productivity factors of the society.

When the business processes of an organization change they will influence the work of individuals and teams and their connections to the organization. At the time business and communication processes where based on paper, the workplace concept was rather stable and the physical address of a worker important. Currently business processes and communication flow mostly in computer networks and the most important aspect is to identify the worker, his or her role and rights when he or she connects to the network. This connection can be done basically everywhere in the world when working is mobile.

The role of teams and teamwork has grown constantly because business processes become parallel instead of sequential and multiple types of knowledge and information is needed on the same spot to accomplish work. This saves time and people, the increasingly important resources of an enterprise.

The new operation paradigms of enterprises change radically the concept of workplace in the near future and set new requirements to the sensing capabilities and the structural concepts of buildings and also to the behavior of the active workspaces where the working processes and people connect to the business processes and information flows.

Sensor- and rfid-technologies provide almost endless possibilities from sensors that can be cast with cement to monitor its strengthening process or strain gauges to fully integrated systems like reporting buildings.

A similar development can be expected in homes, where the changing requirements of a family during its life cycle could be served more effectively by applying the capabilities of new technologies. Adapting new concepts of dynamic buildings to the dynamic requirements of families can improve their quality of life.

7.2 Summary of the Cross Disciplinary Research Program

Matching the dynamic and even unpredictable user requirements with the rather inflexible and even eternal building concepts is a multidisciplinary research challenge. It is not only a major engineering challenge that requires development of new construction, information and automation technologies and their applications but requires also intensive research of work and operational paradigms of companies in close collaboration with the changing user and social requirements.

It offers higher productivity and longer life cycles with lower risks for investments and improves the competitive edge of companies and even the whole society in the continuously sharpening global competition.

Potential domestic and international research partners of this multidisciplinary program are among others:

- Helsinki University of Technology
- Helsinki School of Economics
- Tampere University of Technology
- University of Oulu
- Technical Research Centre of Finland
- Massachusetts Institute of Technology
  - Sloan School of Management
  - Department of Urban Studies and Planning
- Stanford University
  - Center for Integrated Facilities Engineering (CIFE)
  - Center for Design Research (CDR)
  - Stanford Center for Innovation and Learning (SCIL)
- University of California, Berkeley
  - Center for Information Technology Research in the Interest of Society (CITRIS)
  - Fisher Center
  - School of Information Managements & Systems (SIMS)
  - Center for Built Environment (CBE)
- Kungliga Tekniska Högskolan
- University of Reading
  - The College of Estate Management (CEM)

Part II - NeoClusters

In this report we give an overview to the formation of new clusters and to the forces changing the global business environment, as well as to the firms - including their operations and structures - which are serving their customers in these markets. Some of the trends are subtle even if consistent and their effects on firms and their strategies are not immediately obvious.

Most of these trends are not new, such as globalization, technology and networking, but their interrelations, the development of new markets and market demand require new offerings, continuous innovation, agility, and focused value proposition by the companies to survive and succeed in these global markets.

Networking may be the most powerful trend in the global markets (Fig 0.1). To maintain their competitive edge in open and global markets firms are focusing on their core business, and concentrating on delivering value to their customers. We believe that this trend will change the provider market toward networks of specialized companies. These networks form flexible business structures with lifecycles that range from a single project to services extending over long living products or enduring business relations. The effectiveness and efficiency of these networks rely heavily on the solutions of information technology and knowledge. A growing share of business operations will consist of knowledge work and processes delivered using ICT solutions and data networks.

Figure 0.1 The evolution of networked business structures. Adapted from CoreNet Global CoRE 2010

The focus of this Part II report is on the workplace solutions, i.e. the key functions, which enable for the networked firm its competitive core business. In most cases these key functions are Human Resource Management (HRM), Solutions of Information and Communication Technologies (ICT) and Corporate Real Estate (CRE). Depending on the business of a firm there may also be others such as finance, logistics, production or marketing.

Integration of HRM, ICT and CRE forms the Workplace Strategy and Workplace Solutions of the future knowledge driven firm and the working environment of its key value creating resource, the knowledge workers. We will use the workplace solutions as the key application and business case of the NeoClusters. We believe the integrated resource and infrastructure solutions providing the new workplace solutions are an important new development and business area in the future global business and it needs new business approaches to serve the customers effectively and efficiently (Fig 0.2).

The works covers a whole arena of enterprise core business enablers although we will use Corporate Real Estate as an example in many cases. The same conclusions and considerations are applicable to many other services, such as ICT, logistics or manufacturing depending of the core business of the enterprise.

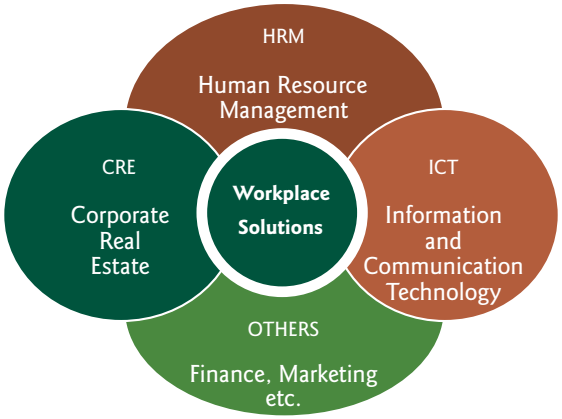

Figure 0.2 The integrated resource and infrastructure solutions. Adapted from CoreNet Global CoRE 2010

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1 Customer Orientation

Customer orientation and customer centric business are compelling trends for most current industries. At the same time the share of value adding services to customers has increased in business. The strong development of information and communication technology (ICT) solutions, especially in the area of mobile applications and wireless networks, supports the development of new products, services, business functions, and models.

Customer orientation is in the first place a set of mind and business driver. The traditional industries have faced difficulties to introduce and mobilize it in their business. Turning a firm from a product oriented business to a customer service business has proved to be a slow process. Reaching the goal often requires re-establishing the firm's value structure, which may turn out be painful for an organization proud of its superb products. Customer orientation and customer relations are also abstract concepts compared to products and systems whose performance and quality are easy to measure.

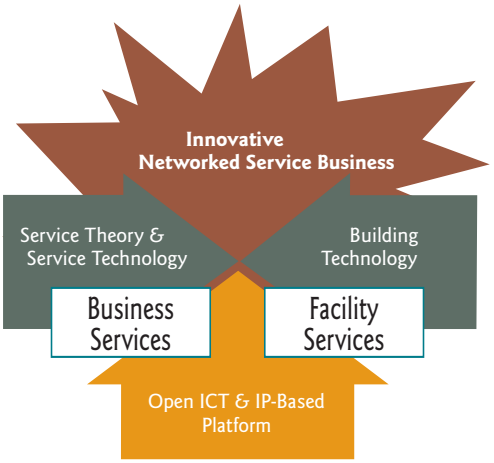

Figure 1.1 Service innovations in RE business and workplace solutions will be based on an open technology platform.

Based on the responses to our interviews, customer orientation is considered internationally an important R&D focus in this area. This is especially true in real estate business and construction industry where the performance and function of a building are increasingly important drivers. In the US, R&D of construction industry is evolving from cost minimizing building processes to understanding and developing the performance and customer service capabilities of a building. Real estate and portfolio customer value are new trends.

1.1 Who Is The Client?

In a networked environment a clear understanding of who the client is and what his needs and requirements are is the basis for successful business. It can be argued that in service business the ultimate client is the party benefiting most directly from the provision of the service. In workplace industry the ultimate client is the knowledge worker who in turn can increase his productivity by utilizing the provided services.

Producing value to the end customer effectively should be the main driver of a business network. This sets new requirements to the firm responsible for orchestrating the operations of the network. New leadership and management skills, vision and innovation are needed to lead the customer relations and resources of the focal firm and its supply and service networks.

Service business relies on the capability to deliver real value not once or twice but over the whole lifecycle of the customer relation. The optimal structure of the service supply network evolves with the customer relation and the changes in the business environment, such as technology or competition.

ICT solutions and the independence of place and even time set the enterprises new functional and technological challenges and provide new possibilities to serve their clients more effectively and efficiently.

1.2 Workplace Service Challenges

The global competition between clients and strain on their business performance require careful consideration and development of all factors of their business operations. The clients focus their development efforts on core business efficiency and acquire the services that most efficiently and effectively support their core activities. Constant improvement demands for return on capital and efficient use of assets are related to real estate portfolio and workplace operations.

The strategic role of place remains in the foreseeable future despite the increasing mobility of work and operations. A larger set of factors contribute to the choice of an optimal place. These factors interact directly with the workplace services together with real estate and construction businesses and they must be identified correctly in order to be able to serve the clients.

Globalization of both client, and real estate and construction cluster businesses increase the need for networking and the demand for international services.

In most industries the supply offering outreaches the demand in global markets. As long as the economy is growing the demand of real estate has been steady, but in the future both local and global demand of real estate may become polarized. This trend requires changes and renewal of business practices and models in traditionally local construction and real estate industries. International ownership of Finnish real estate has grown fast lately.

Customer orientation is not restricted to asking clients for their opinion, but it is a deep understanding of his needs and business practices. It is not uncommon that the client cannot identify or express his future needs, so that a service provider or designer understands them, but merely mirrors his past experience or does not understand correctly the questions posed. These may be some of the reasons why new needs remain unidentified. The increasing dynamics of client business accelerate change cycles and shortens planning horizon. Successful workplace services in the future business environment set totally new demands of flexibility, and responsiveness for the buildings, technologies and partners providing these services.

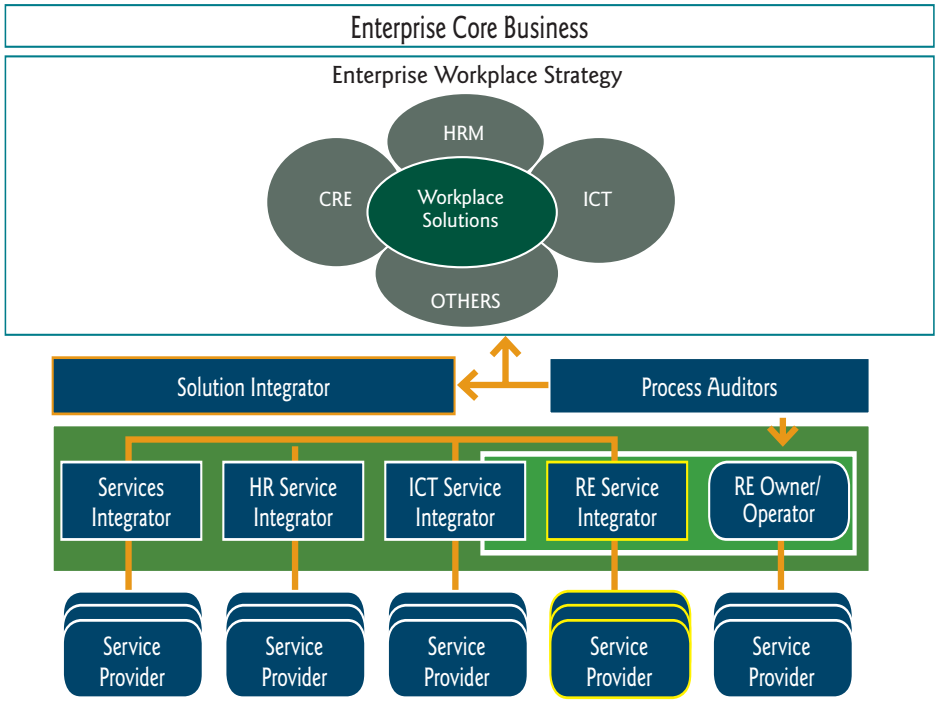

Figure 1.2 The workplace solutions service provider network architecture. Adapted from CoreNet Global CoRE 2010

We assume that the clients will require higher productivity and will spend less on their resources and infrastructure. They will strive for these goals by integrating their resource and infrastructure management. HR, ICT and CRE will form aggregate services responsible for enabling the business operations. These service units will be managed on the C-level and they will participate and offer their competence in the business strategy planning. It may turn out that the CRE organizations in their current form will not exist any more in the near future but rather their main function will be to understand and manage the nature of work in the core business, its primary processes, and the activities of individual workers, as well as designing global workplaces to enable the work and the core processes.

This development will have profound effects on the service provider industry. The provider firms must be able to negotiate with the client's C-suite, be able to contribute to the client's strategy process and provide integrated services to clients. Integration of service offering can be achieved most effectively by networking businesses into workplace service networks (Fig 1.2).

2 From Cost Minimization to Value Maximization

Diversifying and branding are essential competitive advantages in customer oriented and value creating business.

Many business enabling services, and especially construction and real estate business have traditionally been cost driven. Cost per square unit or total area have been the prime decision criteria. Cost awareness is fundamental in every business, but as a primary driver it reduces the service offering to bulk, stripping it of any value adding features. If buildings, spaces, their location, and the services involved are identical from the client perspective and he considers them only to be a cost, the client has no other option than haggle over the price.

Value maximization in construction and real estate business concentrates mainly on the value that the real estate creates for the client. The owner value is well understood and easy to verify but the concept of customer value is usually not.

The significant role of place in a global business network was referred to earlier. In a networked world firms have a much larger number of options to locate their operations optimally. Management needs new tools to optimize the productivity and value of their business networks to support the decisions on locations.

Value creation is directly related to the lifecycle of a building or in practice a portfolio. The challenge is how to get access to the value created over the whole lifecycle of a building or a portfolio. The value in this respect is the value created to the clients in the building and their business, not only to the owner. The created value evolves with the demand and user requirements, but is an essential part of the cash flow and value created to the owner.

How can a building and the services it offers be designed to comply with the future needs, even without clearly knowing them in advance? The services are delivered mostly by the technology and systems installed in the building. ICT and building control systems will play a major role in the future. The flexibility and capabilities of these systems and their operational lifecycles are different from the overall lifecycle of the buildings and the clients and their business in the buildings.

Straight forward lifecycle thinking is challenging because the overall lifecycle consists of shorter cycles and the decisions are usually made to optimize those. Even though

in business management partial optimization has long been recognized as potentially detrimental to overall performance, changing the traditional mindset is possible only through the customer oriented approach: it is always a hard decision to add cost during the construction phase to ensure the revenue and predicted profits or savings in the future. The trends increasing the importance of sustainability and corporate social responsibility may further change the scenario in the near future.

Model based building design, construction, and engineering should extend to the overall lifecycle management: in an integrated, model based operations environment facilities management and maintenance can theoretically be supported in many ways with a building model and building data management system. However, lessons learned in other industries reveal that the product models defined for design and manufacturing purposes seldom serve well the operations, service and maintenance requirements. The design models are often an order of magnitude too complex and they lack essential data and capabilities indispensably needed by the after sales – or post purchase – operations (Fig 2.1).

It is hard to imagine that the real estate and construction cluster would differ substantially from the other industries in this respect.

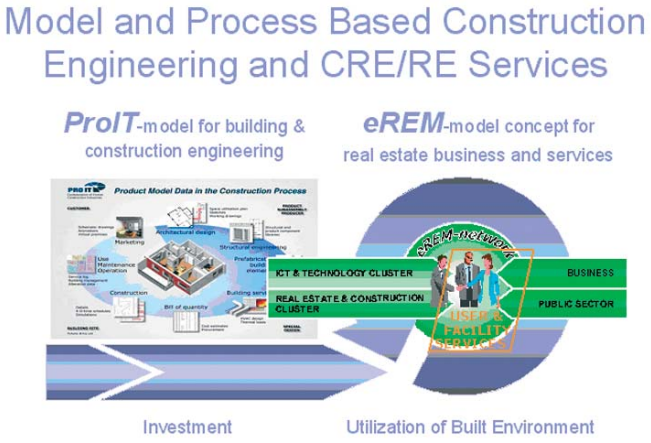

Figure 2.1 The relationship between a construction model and real estate data management.

3 Specialization and Market Segmentation

Customer orientation and value proposition are based on a deep understanding of customer business and behavior. Different customers and their businesses require different operational environments and workplace solutions. As defined earlier workplace solutions consist of integration of HRM, ICT and CRE services.

Workplace solutions should be considered from the client's business processes and their evolution point of view. The future business will be more dynamic and more networked. The mobility of work, team work and global distribution will increase. Connectivity and continuous communications with clients, network partners, suppliers, and service providers will be vital to every business (Fig 3.1).

No theory can cover or explain all businesses; firms must focus on carefully chosen businesses and customer segments to get deep into value creating services and workplace solutions.

We propose the following segments to be of importance as examples of research and development areas

- Workplace solutions for knowledge work (as opposed to traditional manufacturing industry)
- Shopping centers and new retail services (both from the point of view of b2b2c services and specialized one-off construction)
- Hospitals and health care services (from the point of view of societal importance, specialized equipment and facilities maintenance, as well as specialized one-off construction)

Future home or living environments are so closely related to the above operational environments that we do not propose them as a separate R&D area.

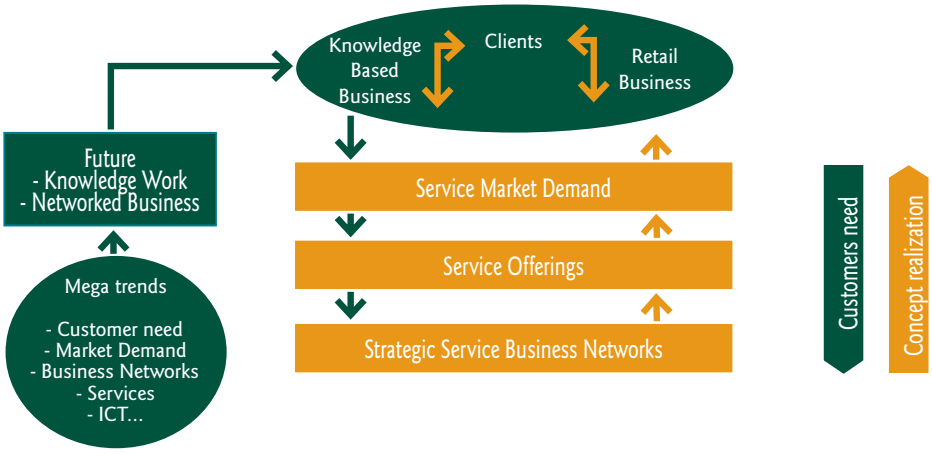

Figure 3.1 The structure of service market development.

4 Significance of Services

Customer orientation means supporting the customer's business processes effectively and cost efficiently. Traditionally, facility management or real estate services have not touched upon the strategic core of the client's business or captured a wide enough share of the client's value creation system to warrant a close partnership kind of relationship[5]. The future business models will be based on the service business paradigm; a network of suppliers and service providers support and execute the non core and even core business functions of the client (Fig 4.1) in close collaboration with the client's key resources. Furthermore, through forming novel constellations of service provision and integration of related services into larger entities, the service provider network can attain critical mass and enough leverage to gain access to the strategic C-suite level.

Buildings and real estate portfolios comprise service environments and service functions among other providers for the client's core business functions. What these services are and how they will be delivered depends on the customer's requirements that must be satisfied.

Distribution of work, responsibilities and the interface between the client and its service providers like the client CRE and the facilities management services will be changing; with high value proposition the client is motivated to outsource its internal processes to service providers. To be a viable option for its clients the external service providers must deliver better services at lower cost or be able to come up with new value propositions which make it easy for the customer to become and stay one.

From the client perspective managing the supply and service networks opens a new business area for customer oriented services, especially CRE, and workplace services.

[5] Paloheimo K.-S., Miettinen I. and Brax S. (2004).Customer Oriented Industrial Services. Report-Series Helsinki University of Technology BIT Research Centre, p. 16.

Customer Business Services

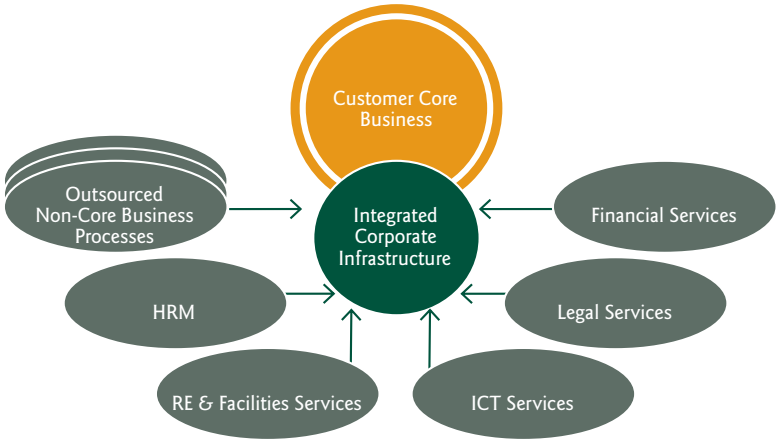

Figure 4.1 The role of service providers integrated to the customer business

5 New Roles and Structure of Workplace Industry

Real estate service business is one of the business areas that on one hand is undergoing profound changes, and on the other hand, is growing in Western countries, and especially in Asia. As end-user organizations focus on their core business the ownership of facilities concentrates to professional owners, and related services are procured from specialized service providers (Fig 5.1).

The facilities management has developed from a support function of organizations to a separate business function. The goal of facilities management is to deliver value-added services to the facility users, usually end-user enterprises, in an economically efficient way to benefit both the facility users and the owners.

For many organizations, the fact that real estate and RE related costs represent a major item in organizations' balance and expense sheets, has reinforced the strategic importance of real estate as a business resource and the need for managing this resource as effectively and efficiently as possible.

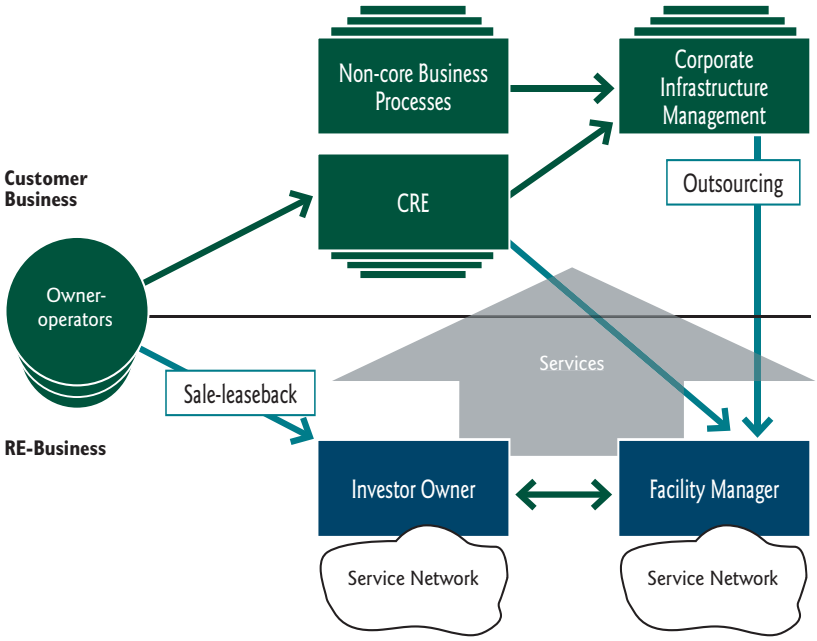

Figure 5.1 The evolution of real estate business and services

Real estate and facilities management need to move closer to end-users' core business strategy with people, facilities and support services seen as key business resources to be dynamically deployed for long-term advantage.

The relationship between physical environment, organization's results and effectiveness has to be optimized so that the working environment supports the goals, while utilizing space efficiently. Being able to balance the needs of separated roles there is a need for a holistic workplace management function, as shown in (Fig 5.2) depicting the development and separation of the roles of different actors in real estate business. However, research in real estate business is still quite scarce[6].

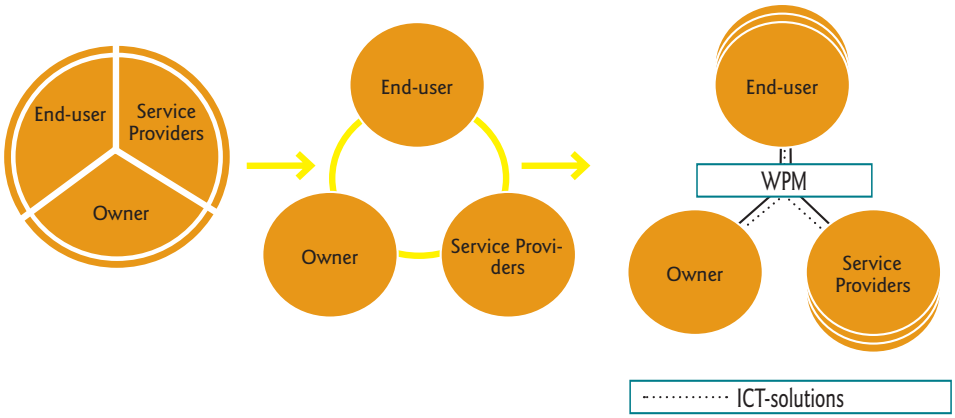

Figure 5.2 Development of roles of different actors in real estate business and forming of workplace management (WPM) function.

The ideal workplace adjusts itself to customer organization's needs and is thus preferably dynamic and evolving, not static and rigidly fixed to some physical space. The workplace includes, besides the physical equipment and environment, the supporting services and technologies that are needed to perform the work. Workplace management encompasses all aspects of support services, the management of assets and resources in partnership with core business activity.

[6] Nutt B. (1999). Linking FM practice and research. Facilities, vol. 17, pp. 11-17.

Workplace management is about helping companies to achieve optimum productivity. Today the management of workplaces is often scattered and involves many parts of the organization. No single component of the workplace systems can drive the organization forward, but the absence of any critical component drags it down. Thus, the integration of all perspectives into holistic workplace solutions management is needed. Being a relatively new concept the workplace management terminology is not well established.

In this study, we comply with CoreNet Global, CoRE 2010 (2004), and Gartner and Massachusetts Institute of Technology's (MIT) School of Architecture and Planning (2004) in the definition of the workplace industry:

> ***"The industry that includes the corporate organizations responsible for housing the workforce, and the firms that design, build, furnish and operate work environments. The workplace industry also includes those portions of the IT industry that provision, connect and support the tools and communications networks which are fundamental to work in the modern economy. Finally, the workplace industry encompasses the HR services and corporate managers whose policies influence how and where people work".***

5.1 Service business and customer focus

The needs of end-user organizations are in a flux of change by business pressures due to global competition that has to be met with increased mobility, interactivity and flexibility.

From a services theory perspective, attention is shifting towards services supporting the end-user's business[7]. This pushes the service providers to become more customer focused, which implies that facilities and facility services together can be seen as value-adding services to the work and business processes of end-user organizations.

Satisfying the end-user needs in workplace industry opens up new business opportunities for the existing and possibly emerging actors. At the moment, however, it is not at all clear whether it should be the customer needs, customer expectations or customer requirements that drive the development, production and management of services. Furthermore, the roles of different actors required to satisfy the end-user needs are still obscure.

[7] cf. Paloheimo et al. (2004), p. 23

Strong customer involvement in new service development is the primary driver for successful service business. The Customer Relationship Management (CRM) discipline, often approaching customer relationships from the perspective of new customer acquisition or customer profitability, has not been able to shed light for understanding the customer relationship during its entire lifecycle.

The personnel of a high value-adding company are their main value-creating resource. The network of actors in the workplace industry ensures the optimal output of this valuable asset by providing the end-users with appropriate facilities and related services. Still, a gap exists in the current knowledge on how these service concepts should be constructed to optimally service all parts of the end-user organization.

5.2 ICT as an enabler in real estate business

The ICT systems used in real estate industry are not designed to meet the demands of networked business processes of end-user customers. Furthermore, these systems are often designed from a technological perspective and serve isolated needs. In fact, many of these systems are originally not designed to support real estate business at all. As a result, these systems do not take into account the special characteristics of RE services.

In this study, ICT is seen as a vehicle to operationalise the workplace management concepts by matching together end-user needs and services needed to satisfy them in a conceptually simple and coherent manner. The key element is seen to be mass-customization of services, to match the needs of each particular customer.

By mass customization we mean a process where the customer specific service offering is composed from existing component services with predefined rules and constraints and therefore can be composed without human intervention. Mass customization has been widely researched and developed during the past ten years for mechanical and electrical products. Mass customization of services opens up new challenges that need R&D of their own.

6 Business Networking

The circumstances shown above lead to increasingly networked business practices aiming at the satisfaction of clients' needs with the operations of partner or contractor networks. Partnerships are usually based on long business relations with mutual distribution of work and trust. Contractor networks are competition based and with loose connections.

Deep understanding of value networks is the first prerequisite to promote the activity with suitable software systems.

On the other hand networking supports specialization of the network partners, it enables investments, and more productive and effective delivery of services than without. An important function of a network is to constitute complete service offerings and deliver them to clients without the clients need to manage and procure separate services and their providers.

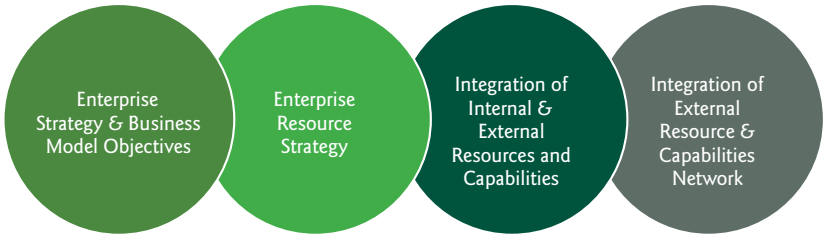

Figure 6.1 New solutions delivery structure. Networking means integration on all levels of business. Adapted from CoreNet Global CoRE 2010

7 Implications on Information and Communication Technology

The real estate and construction cluster is not leading the way in ICT exploitation, as compared to many other manufacturing and service industries. The reason is evidently not conservatism, but if anything the challenges of applying the technology and solutions in this business environment. The products i.e. buildings and portfolios of buildings are

- Complex and they contain several different systems and technologies
- Unique configurations
- Long lasting with long lifecycles
- The engineering and constructions projects consist of a great number of parties with special competencies and the parties change from one project to another
- Construction sites are one-off projects which must be established and dissolved every time
- From ICT point of view a construction site is a vulnerable and hostile environment
- The material flows to sites are diverse
- Coordination of activities and contractors at sites is challenging

The challenges are big, but there is no reason to suspect that real estate and construction cluster could not attain the same benefits as the other industries have, like

- Higher productivity
- Less errors and hassle costs
- Faster delivery cycles
- Better delivery reliability

The REC cluster has good opportunity to learn from the lessons of other industries and so avoid the mistakes the others have already done.

The REC cluster is an important user of ICT and its importance will grow in the future, but it may not be the industry defining the course of ICT development and solutions. It is important for RECC to understand the options offered by ICT and channel its own development taking them into consideration.

Especially significant to the buildings and their users will be the development of wireless communication. It offers totally new solutions and more flexible and maintainable systems which are easier to install. It seems evident that these benefits will pass by the higher initial costs.

Roughly the effects of ICT can be focused in four fields

- ICT solutions in building design, engineering and construction
- ICT solutions in building lifecycle and facilities management
- ICT solutions enabling business networks and delivering networked services to clients
- Embedded ICT solutions in buildings – building technology. This is closely related to the lifecycle management but due to different technology it deserves to be looked separately.

8 Model Based Construction and Real Estate Business

In many other industries the so called model based solutions have become highly common during the last 20 years.

Development has started from computer aided single activities and partial solutions toward comprehensive product models including data to support several different tasks and activities. The practical requirements for higher productivity and better capabilities of ICT tools have channeled this development.

As the result of extensive development efforts it has been possible in some cases to apply comprehensive or integrated 3D-modeling.

In REC cluster the modeling methods have been investigated and developed and taken into practice especially in the first phases of the construction process. One can not say that the applications of building models would be substantial although computer aided methods, 2D-drawing, and 3D-visualization are used routinely.

As we mentioned the implementation of highly integrated solutions is a result of long learning processes and cost effective applications require stability and maturity of the whole workflow. The "one-of-a-kind-character" of the construction industry and the constant change of parties from site to site increase the challenge of the task compared to industrial production and engineering. In most successful cases the economy of computer aided modeling is based on frequent re-use of the modes. A common case would be the design of a new product by modifying the old model which seems not to be the practice in construction industry.

To be able to utilize the models and the data stored in their own work the partners of the production and engineering process must agree on common interfaces, data contents and representations.

There is no reason to doubt the importance of the model based thinking for the development of REC cluster but it is equally important to channel the research and development activities so that they constitute a solid basis and the risks are identified. The extensive investments and lessons learned in other industries should be utilized carefully.

Figure 8.1 The traditional concept of integrated modeling is centralized. Future integration will be based on connectivity and networked solutions.

9 Lifecycle Business

Lifecycle management involves several dimensions and elements. In theory the issue is the optimization of a "total investment" made to a building or a portfolio to maximize the value created to the clients and all other stakeholders.

Straight forward lifecycle thinking is challenging because the overall lifecycle consists of several even contradictory aspects, and of several shorter cycles. The decisions are usually made to optimize either one aspect focusing on the current short cycle.

The aspects of a real estate lifecycle to be considered are at least:

- Technical or physical building lifecycle
- Financial lifecycles
- Occupancy lifecycles
- Systems or building technology lifecycles
- Data or information lifecycle
- Portfolio related lifecycles

In most cases the physical or technical lifecycle of a building is the longest spanning over tens of years. The information lifecycle should cover and integrate the total lifecycle of a building and is based on building data management and modeling. The other lifecycles "live in" the physical lifecycle extending or shortening it and having their own, often contradictory behaviors. The task to reach an overall optimum is challenging and requires continuous decision making in a changing environment.

Changing the traditional mindset is possible only through the customer oriented approach: it is always a hard decision to add costs during the construction phase to get the revenue and predicted profits or savings and higher utilization rates in the future. These "pay now, benefit later"- proposals are easy to make but wise business managements looks them cautiously.

Making facilities management, services and maintenance more effective is involved in the lifecycle approach. Already today facilities are serviced by a number of service providers in a networked manner. This development will continue and strengthen in the future.

Model based building design, construction, and engineering extends to the overall lifecycle management: in an integrated, model based operations environment facilities

management and maintenance can theoretically be supported in many ways with a building model and data management system.

Lessons learned in other industries tell that those product models defined for design and manufacturing purposes seldom serve well the service and maintenance requirements. The models are an order of magnitude too complex and they lack essential data and capabilities indispensably needed by the after sales or post delivery operations.

It is hard to imagine that the real estate and construction cluster would differ substantially from the other industries in this respect.

10 Building Performance and Services – Embedded ICT in Buildings

The characteristics of a building or a portfolio can be approached by evaluating its technical building performance and capabilities to deliver services to clients – service capabilities. These aspects constitute the competitive advantage and an essential part of the lifecycle features of a building or portfolio.

Building performance is based on the structural features, installed systems, and their controls. For example the energy efficiency of a building is an important factor which can be governed by several means during the design, engineering, controlling operations and maintenance. The energy costs are expected to be rising and their share in the total lifecycle costs of a building is increasing, the control of energy usage is a good investment opportunity for the future.

ICT as a part of the building automation has an essential influence to the building performance. The progress of ICT has been fast lately and there is no reason to assume that it will slow down. It is encouraging that the standards have also progressed. Especially the development of wireless and mobile technologies and systems has been fast.

In addition to the traditional building systems the core of new building technology comprises of

- Sensors and actuators
- Wired and wireless networks
- Energy usage optimization
- Control of the internal environment quality.

Many of these systems extend to a portfolio of buildings because both owners and users operate globally distributed total portfolios.

The service capability of a building starts from a user oriented approach and its challenge is to fulfill changing user requirements flexibly and effectively. The increasing dynamics of customer business and mobility of work set new needs for the flexibility of buildings, workplaces and workplace services. It can be assumed that the rental agreements become shorter and more flexible, and both offering and demand polarize globally into growing metropoles.

Carefully planned customer oriented offerings and high quality services comprise the core competitiveness of real estate business, where the service capability of a building is an important competitive tool.

ICT builds the technology platform for the networked and integrated customer processes.

It can be presumed that an increasing share of the ICT systems and solutions serving customer firms' core business processes will integrate and embed in the buildings and structures. Interactive spaces, their technology and services are an intensive international R&D focus.

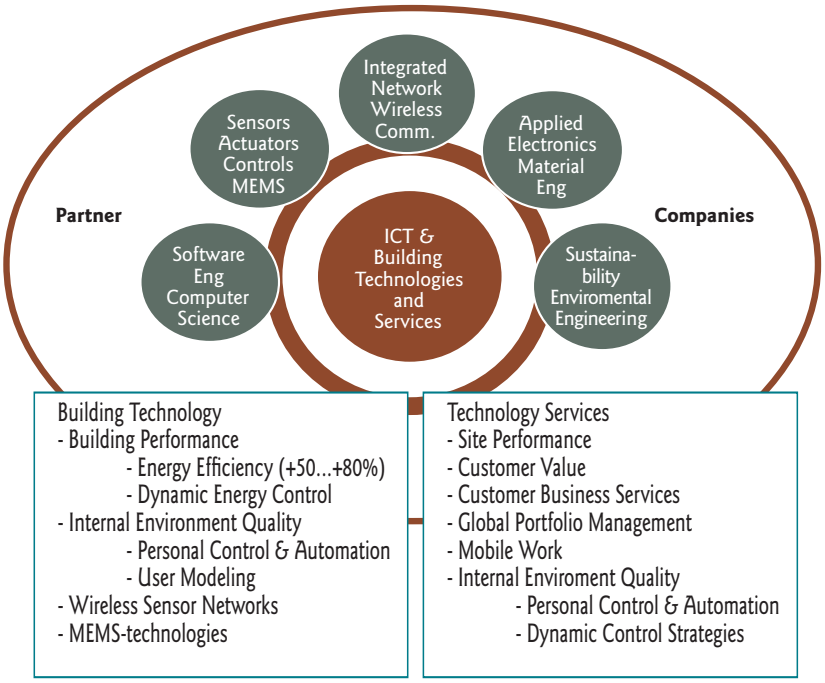

Figure 10.1 The set of technologies and services comprising the embedded technology platform.

Internet based (IP) wired and wireless networks have expanded fast so that they cover not only single buildings but whole city centers or campus areas. The border line between phone and data networks is blurring and opens business for new services and service provider concepts – the capacity of phone networks increases allowing high speed data transfer and IP-networks integrate voice and data services.

We assume that the traditional building systems will become integrated and network connected so that the control of systems and user services can be designed to use a common user interface in a common backbone network of a building.

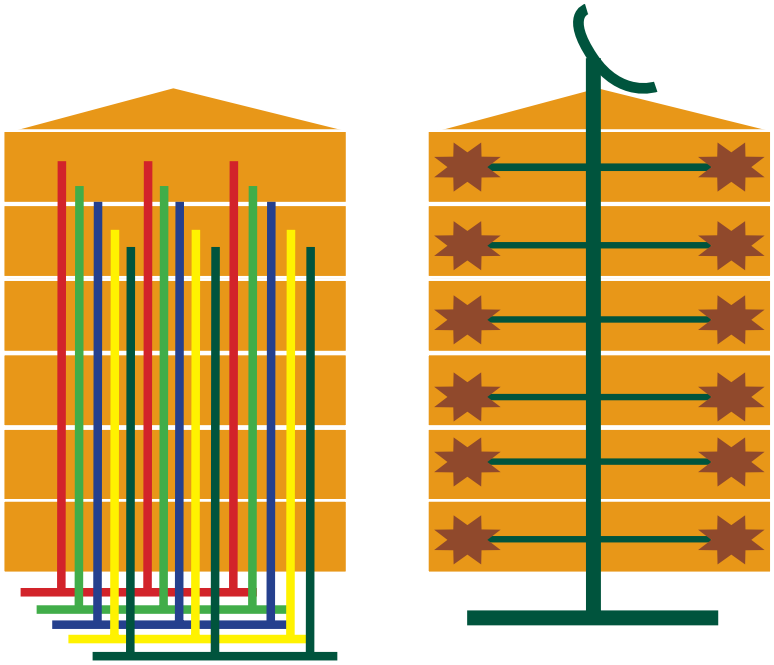

Figure 10.2 Building systems and user services with independent networks will integrate to a backbone and simplify the building network and communication environment.

The integration will proceed on several levels and interfaces.

- Communication between building operations oriented systems, like
  - Access control
  - Energy control
  - Safety and security
  - Fire
  - HVAC
  - Lighting
  - Lifts, escalators and internal logistics performance
  - 24/7 monitoring and maintenance
- Communication between facilities management and users, like
  - Maintenance work orders and reporting
  - Lobby services and guest guidance
  - Reporting and billing
- Communication services to users and communication among the building management and service providers, like
  - Wireless and wired networks
  - VPN, secured and open access to occupants and their guests
  - Management and control of the building operations, service and maintenance operators
- Integration of enterprise systems and services.
  - The backbone can be configured and segmented to provide all users their communication and data transfer services within and outside the building.

The technology controlling buildings will be based on wireless or wired sensors and actuators with processing capabilities that will be integrated into systems using both wireless and wired networks. The building control networks and user data networks will integrate to systems offering integrated services.

The services in different environments like workplaces, retail or hospitals will be different and adapted to application but we assume that the technology platforms will be almost identical.

11 NeoClusters Framework and Project Proposals

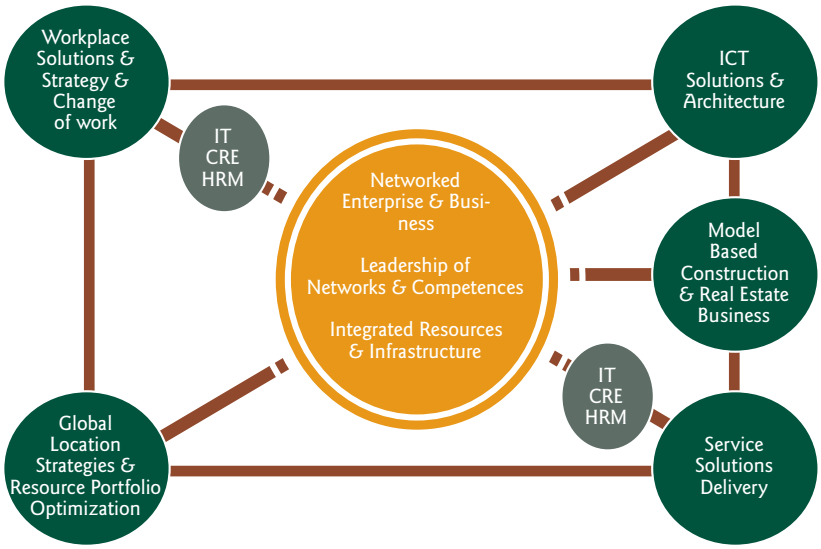

Figure 11.1 NeoClusters framework

11.1 Networked Enterprise and Business

The proposed NeoClusters framework is based on enterprise networking. We assume that the networking proceeds in all levels, internally and externally and is a result from the increasing demand on flexibility, agility, productivity of business operations.

The internal networking is led by the necessity to focus on core business processes and integrate the enterprise operations to reach the effectiveness and efficiency. The non core business processes will also be integrated and this will result to the new concept of workplace solutions.

Workplace solutions provide the working environments for the business processes with all the required tools, services and facilities.

The two R&D topics in this area are

- Leadership of networks and competencies
- Integrated resource and infrastructure solutions

The internal networking of enterprises and integration of operations will have profound implications on the service provider industry. They should adapt and develop their business practices and models. On the other hand it is expected that an increasing amount of business services and non core processes will be outsourced to service partners, which increases their business opportunities. The border between service providers and the customer enterprise will gradually be blurring.

11.1.1 Project Proposal – Network Structures and Management

Business networks in different business environments have different characteristics and behavior concerning their value creation, structure and leadership.

We propose to start a project to investigate this topic. We should be able to develop better understanding of business networking in different phases of market development.

The evolution of customer, real estate, construction, and service businesses provide an extensive R&D area for this project. Better understanding of networking processes support the enterprises to develop their business and service strategies. The results will be directly applicable to networking real estate business and especially the new business area of workplace solutions.

11.2 Workplace Solutions, Strategies and Service Delivery

The demand for integrated services will open totally new business roles to service and solutions integrators who will package and configure the services of individual specialized providers to match needs of the clients.

Integrated workplace solutions based on HRM, IT and CRE services will be an important R&D focus area. The proposed topics are

- Enterprise workplace solutions and strategies
- Change of work
- Integration of HRM, IT and CRE activities

The above developments are based on the R&D of the service solutions provider business

- Service solutions delivery
- Configuration of services
- Integration of HRM, IT and CRE service offerings

11.2.1 Project Proposal – Workplace Solutions

The workplace solutions are an emerging business area without a history of established business practices or theory. It is based on the evolution of global markets and the strategies of the firms operating on these markets.

The key concepts of workplace solutions are

- knowledge intensive and mobile work in global environments
- new management practices and networked organizations
- integrated business infrastructures – HR, CRE and ICT services – of networked and global customer enterprises
- integrated services to customer enterprises and integrated service delivery networks

Finland as a flexible and technology oriented business environment has an opportunity to develop leading competencies and business models for this new market. The new business practices and service offerings serve the Finnish international customer enterprises as well as the Finnish real estate and construction businesses, and the other service providers of the workplace solutions networks. These workplace solutions networks are by definition international because their customers are international.

The R&D project should be based on the best knowledge of HRM, CRE, and ICT solutions in the research institutions and companies working together to reach solid understanding, service offerings and business models.

11.3 Location Strategies and Resource Portfolio Optimization

The above outlines development of enterprise structures and business operations is expected to change the traditional asset management strategies. The assets will not be managed as separate silos but and an integrated entity.

The possibilities to locate the business will increase in the future. The share of knowledge work is also increasing and it is not bound to location, distance or even time. Firms have opportunities to offshore their operations to areas optimal from their business, resources and assets points of view.

The two R&D topics proposed are

- Global location strategies
  - Tools for global location decisions
- Resource portfolio optimization

11.4 ICT Solutions and Architecture

ICT is the most important enabler of the business and the developments outlined above in this report. The focus of future ICT solutions will be on providing

- Seamless and end to end integration for business processes and workflows.

Global distribution of enterprise and business operations is based on the fast development of communication technologies and networks providing the connectivity. Without connectivity to customers, partners, suppliers and the internal members of the network enterprise business would not be possible today. The ICT companies are investing to improve the security of networks and IT systems.

The changing business environment with networking and global distribution is an important driver for technology development. The corporate networks extend and override over national borders in international trade.

Technology lowers costs by compressing cycle times, eliminating redundant and manual work, reducing personnel, providing decision support with real time data and reporting, improving efficiency and productivity

Outsourcing contributes significantly to the impact of technology on the workplace. It creates a need for methods of

- Control the processes over the corporate borders
- Control the ownership, residence, management, and access to data essential to real time decision making
- Control the security of data and safeguard it against hostile activities

The role of CRE function is changing due to technology. It provides

- electronic oversight of traditionally labor intensive and manual work

This leads in many cases to reducing the CRE staff. At the same time it is profoundly altering the nature and scope of their responsibilities. The new role of CRE is more strategic, needs more management and senior level leadership skills.

The already old concept of intelligent buildings is gaining new contents with programmable, network based and the future wireless technologies.

- Standard building systems and networks enable integration and simple upgrades.
- The personal control of internal environment, service calls, and occupant systems use billing or tracking can be done using a single user interface with a computer or VOIP phone.
- Utility costs can be optimized using dynamic control strategies.

We expect that the intelligent building will improve the productivity of the occupants, but a different focus is needed.

- The building technology and intelligence should be designed and implemented to benefit the occupant, the client of the building, not only the building operations
- The building performance and the service capabilities should be considered carefully to be able to implement the flexibility of a building for future customer needs.
- This is related to the customer value of a building, which not only technology but may be based on it in many cases.

Although it is evident the enterprises are willing to pay less of the infrastructure services, it can be expected they are willing to pay a certain premium for high quality and efficient working and service environments.

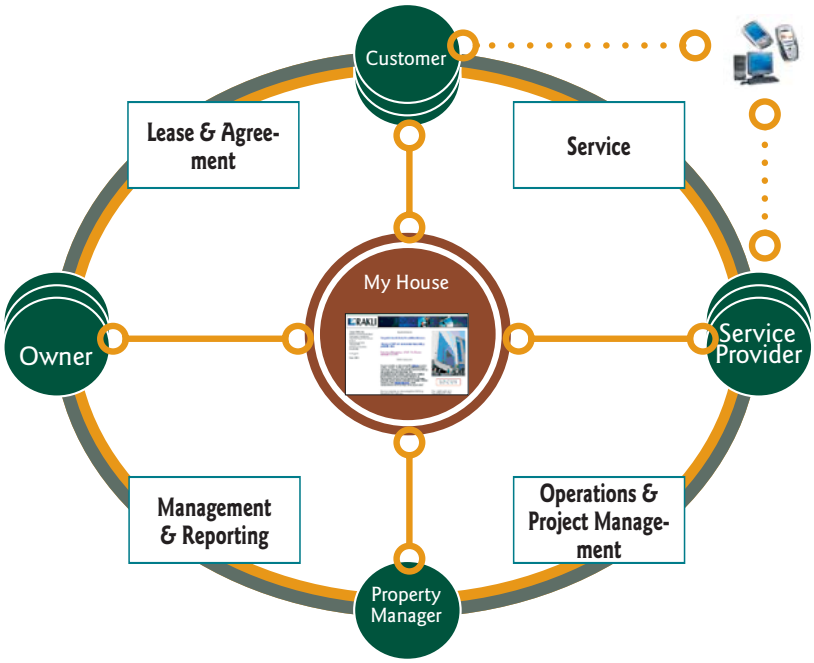

Fig 11.2 Integrated building and portfolio management system

11.4.1 Project Proposal – Integrated Building and Portfolio Management

This project focuses on development of an integrated:

1. communication and control interface to a building and its systems – a plug and play building
2. management system for a building, with interfaces for the operator and the occupants
   including the service provider network
3. management system for a portfolio of a buildings
4. integrated building performance measurement system
5. integrated building service capabilities system

To reach quick results in this area is a challenging task because of the different legacy systems and many proprietary solutions in buildings. The important starting point would be joining to the international standardization bodies and applying new xml- and web based techniques to solve the integration of separate islands (Fig 11.2).

11.4.2 Project Proposal – Mobile Facilities Operations Management

We propose a R&D project that investigates and develops wireless and mobile systems for facilities services and operations. The systems can be phone or wlan based depending on application. The focus areas could be

- Service network management
- Integrated service order management
- Data access and delivery to mobile service personnel
- Applications of RFID-technology in service and maintenance operations

Building operations management should not differ fundamentally of other operations management tasks. The mobility of personnel, long distances, unfriendly environments in, and between buildings including the multi supplier service networks add some application specific flavors to this application (Fig 11.3).

The productivity and controllability of the whole operations network is based on wireless communication.

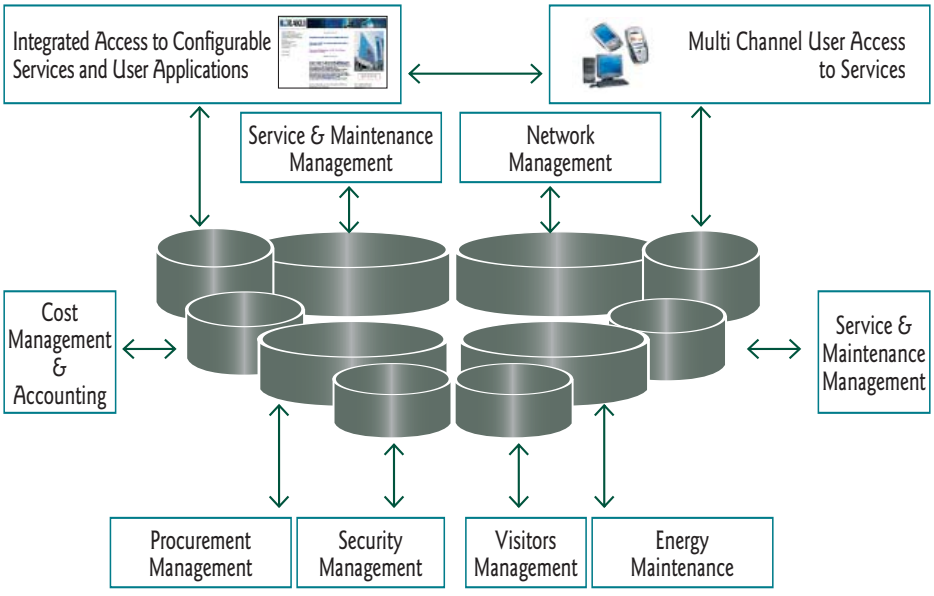

Fig 11.3 Operations management system consists of integrated applications and a multi channel user interface with mobile access.

11.5 Model Based Real Estate and Construction

As discussed earlier in this report the modeling activities have focused primarily the first phases of building design and construction. It is evident that the productivity of work in an ever more complex environment of RE and construction can be supported with model based tools (Fig 2.1).

The modeling activities are closely related to the data and information lifecycle of buildings. To serve the users and improve their productivity the models must be able to represent the required data in a format useful to the user. The models must be integrated to the applications using the model data. The models must be up to date which requires that all meaningful changes must be updated to the model.

In addition to the technical modeling aspects, the ownership of model data, the maintenance and updating both data and modeling systems and their interfaces to other systems must be agreed on. These are mostly legal, organizational and business questions.

11.5.1 Project Proposal – Model Based RE

The modeling activities should be focused on making the user's work and processes effective. We propose to start a R&D activity to define the

- Needs of the RE business to building models
- Common data representations and interfaces
- Processes and process models to be supported by building models
- Lifecycle management aspects of building models

This work could benefit of the results in other industries, like the Rosetta Net, not forgetting the work of OSCRE, PISCES, e-Ehyt and e-Kyy (developed in Finland), IAI, VTT and others who have made extensive work in this area. Also the new application platforms like Web Services and others should be considered carefully.

Literature and References

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Appendix 1:
Summary of RealComm NextGen Asia Tour 03/2005

Tokio – Soul – Shanghai – Hong Kong – Singapore

The idea of mapping the most interesting real estate projects in Asia was already evoked in 2002. To start with, RealComm www.realcomm.com acquainted themselves with 15 projects in the USA, from Los Angeles to New York, and continued in the winter of 2004 with a reconnaissance trip to 37 real estate sites in Asia. Based on the experience accumulated from both endeavors RealComm was convinced that American real estate players should become exposed to the bursting economic and technology development in Asia, which are supported by equally strong construction and development of real estate, real estate concepts and real estate technologies.

On this tour, 32 participants got acquainted with 17 real estate and technology projects in five metropolitan areas in Asia. The participants represented a wide spectrum of real estate and technology areas and comprised two Finns and three Brits among the twelve Americans. During the short stays in the cities, the group enjoyed the hospitality of the NAI Global www.naidirect.com/ local representatives.

It has been estimated that 20 % of the world's working construction cranes are located in Shanghai and even if it were not exactly true, it is easy to believe as the economic growth in the area from Soul to Singapore is not based merely on cheap labor but also on intensive development and application of technology, which was evident in all of the 17 projects that the group visited. These were all hi-tech, breathtakingly large technology centers which housed tens of thousands of researchers and developers, in active cooperation with universities, in collaboration with international top universities.

This rapidly accelerating industrial revolution in Asia is not slowed down by outdated technologies or the old and rigid industrial and societal structures of the West and it will play a major role in the global economy.

The visited sites were commercial mixed use projects ranging in size from whole cities (in excess of 100,000 workplaces or residences) to single buildings of 40-90 stories. Typically, they contained offices, hotels, residences, recreation centers, fair centers, malls, services, and parking and traffic services in varying proportions.

A full account of the tour can be found (in Finnish) at
http://www.rakli.fi/kehitys/uusklusteri/RealComm_Asia_NextGen_Tour.doc

Appendix 2:
Project board members, NeoClusters I and II

NeoClusters I project and steering board members:

Project Board Members

YIT Kiinteistötekniikka Oy	Antero Lehtinen*	Vice President, Building Systems Services
Solita Oy	Heikki Halme	CEO
Senate Properties	Kaj Hedvall	Director, Business Development
VVO-yhtymä Oyj	Jouko Heino	Director, Business Development
Oy Esmi Ab	Raimo Helasmäki	Managing Director
Tekes	Reijo Kangas	Technology Manager
Nokia Corporation	Marja Kauttu	Workplace Research Coordinator
Nokia Corporation	Aki Laiho	Head of Demand Supply Netw. Advanced Devel.
Ovenia Oy	Aki Puska	CEO
Ensto Electric Oy	Matti Rae	Director, Product Development
Fujitsu Services Oy	Lasse Rautio	Director, Manufacturing & Services
Visma Software Oyj	Jari Vanhanen	Director, Visma Products

Steering Board Members

Technology Industries	Leo Laaksonen*	Group Manager, Business & Tech Development
RAKLI	Erkki Aalto	Development Manager
RAKLI	Jussi Kanerva	NeoCluster Project Manager
Tekes	Reijo Kangas	Technology Manager
Finnish Information Ind.	Erja Nuottimäki	Liaison Officer
RAKLI	Juhani Reen	Managing Director

*Chairman of the board

NeoClusters II:

Project Board

RAKLI	Juhani Reen	Managing Director, Chairman of the board
RAKLI	Erkki Aalto	Development Manager
Tekes	Satu Haaparanta	Senior Technology Adviser
Solita Oy	Heikki Halme	CEO
Senate Properties	Kaj Hedvall	Director, Business Development
VVO-yhtymä Oyj	Jouko Heino	Director, Business Development
Oy Esmi Ab	Raimo Helasmäki	Managing Director
Finnish Information Ind.	Laura Jääskeläinen	Information and Member Services
Tekes	Reijo Kangas	Technology Manager
Technology Industries	Leo Laaksonen	Group Manager, Business & Tech Development
Nokia Corporation	Aki Laiho	Head of Demand Supply Netw. Advanced Devel.
YIT Kiinteistötekniikka Oy	Kimmo Liukkonen	Vice President, Technology
Ovenia Oy	Aki Puska	CEO
Fujitsu Services Oy	Lasse Rautio	Director, Manufacturing & Services
Visma Software Oyj	Arto Rintala	Director, Visma Products
Helsinki School of Econ	Markku Salimäki	Program Director
Finnish Information Ind.	Tarja Virmala	Managing Director
Helsinki School of Econ	Jussi Kanerva	Project Manager
Helsinki University of Tech	Kaija-Stiina Paloheimo	Project Manager, secretary of the board