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Increasing the cake and splitting it too: Interfirm relations through phases of technology and market developement

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Abstract

This paper discusses the interfirm relations in an economy with strong demand side economies of scale (network externalities) and scope (service complementarities). In the ICT business, the behavior of other, complementary suppliers in the hardware, software and service software market have significant effect on the revenues and technological innovation rate and pace of each firm. Moreover, there is a convergence of technology and business models, in which the IT industry's technology is adopted by the telecommunications firms while the business models of telecommunications companies are adopted by IT firms, that further motivates and complicates inter-firm relations

The Norwegian and Nordic ICT industry, with special focus on the rapidly emerging market for mobile phone services is used to illustrate the unique nature of co-opetive context in this industry. This region, a leader in mobile technology development and use, includes internationally competitive equipment manufacturing firms, operators and service providers, as well as consulting firms. These firms differ in business logic with potential implications for both within group and between group implications for inter-firm relationships.

A conceptual model of the mobile phone marketplace is developed, with reference to the Norwegian market, to analyze and discuss roles, motives and dominant inter-firm relation between the various actors.

Introduction – the two phases of network externalities

> Where you go to work is largely a matter of which parking lot you choose to park in on any given day.
> *Silicon valley worker*

Information and communications technology (ICT) has given us the means to coordinate and communicate across organizational boundaries, resulting in forms of interfirm cooperation that previously might have required direct ownership (Konsynski and McFarlan 1990). The ICT industry itself abounds with cooperative efforts in technology development, production, technology standard setting, industry governance, political influence and even civic participation (Bengtsson and Kock 2000).

Much of the literature on inter-firm relationships in the ICT industries has focused on cooperation on the supply side: The coming together of companies to create a product based on pooling of resources, such as knowledge, capital or production technology. Dell Computer is held up as a company with sustained connections to component vendors, effectively reducing lead time and capital (Pearlson and Yeh 1999) as well as

reducing risk of technology obsolescence. The modularity of the technology and the rapid increases in relative performance drives a model of cooperation where every company does only what it is best at, outsourcing everything else (Sanchez 2001). However, the strong complementarities and externalities of the demand side calls for a reexamination of the motives for and the nature of the inter-firm relationships in the ICT industry. Further much of the theory development and the empirical research has been focused around customer-supplier relationships (Håkansson and Johanson 1993; de Ruyter, Moorman et al. 2001) and less is known about emerging "new economy" forms of inter-firm relations.

The issue of concern in our current research is twofold: (1) how do changes from supply side economies of scope and scale to demand side economies of scope and scale impact the motivation and form of inter-firm relations; and (2) how does the extensive aspect of non-tangible exchanges and the absence in many cases of specific customer-supplier exchanges between firms jointly creating value impact the inter-relationships. Relationships among knowledge based firms have been studied in the movie industry (DeFillippi and Arthur 1998), in the construction industry (Eccles 1981), and investment banking (Eccles and Crane 1987). We have however not identified any studies dealing explicitly with inter-firm relations in layered inter-connected industries, as found in the telecommunications industry in general (Fjeldstad 1999) and the mobile services industry in particular. As our research is at an early stage we will use research that describes and develops properties of the mobile services system to discuss possible implications for inter-firm relations. A recent typology of three value configurations (Stabell and Fjeldstad 1998) will be used to describe the firms and discuss possible differences in expectations toward inter-firm relations.

The remainder of this paper is structured as follows. First, the impact of demand side externalities and complementarity is discussed in the context of ICT services and products. The discussion is illustrated by examples from the ICT industry. This is followed by a conceptual model of the mobile marketplace applied to the Norwegian market. The economic properties that have lead to the exceptional development of this market, particularly in a global sense, are reviewed. Several of these are closely related to a need for multi-firm actions. Finally the paper discusses areas in which there is a need for research to explore the properties of inter-firm relations.

Demand side economies of scale and scope

Demand side economies of scale exist when the value of a product depends on the number of customers that adopt it (Katz and Shapiro 1985). Demand side economies of scope on the other hand reflect product complementarity. While demand-side cooperative behavior in both industries are driven by network externalities (Katz and Shapiro 1985), there are differences in what kind of network externalities exist and how new services and products are introduced. In the IT industry, network externalities are expressed in terms of functionality – especially functionality of the existing products a new product either replaces or complements. Market inertia (Katz

and Shapiro 1992) implied by these network externalities is overcome by making sure the new product is backward compatible (meaning the user can migrate old data into the new application) and laterally interoperable (meaning that the users of the new product can exchange data with users of competing and complementing products.). The most cited example is that of Microsoft Word, which, despite in many ways being a technically inferior product to the leading word processor at its introduction, became the most common word processor largely because it was well integrated with other programs, such the spreadsheet Excel or the presentation program PowerPoint (Succi, Predonzani et al. 1999). Similarly, in industries supplying components of system goods (Farrell and Katz 2000) there is tension between increasing the total demand for the products and extracting the value from inter-dependent components in the market. Much of the discussion around Microsoft's market power has been centered around the company's practice of including other companies' software functionality as part of the various operating systems offered – and then, when the market has accepted these "free" substitutes, enhancing the functionality while reducing the backward compatibility to other products.

In the presence of network externalities service value becomes more tightly linked to which other customer a new customer can access rather than the sheer number of users of the technology itself (Fjeldstad 1999). A telecommunications company has little choice, whether driven by regulation or sheer market force, but to allow other competitors to access its networks, and offer connection to other networks from its own network. However, network externalities can be exploited through price discrimination for within-network communication to avoid interconnect charges, and extension of own network through acquisition, recruiting[1], and cooperative agreements (Lafonte & al. 1998).

Further, the IT and telecommunication industries are converging. Companies that previously had clearly defined customer-supplier or complementor (Nalebuff and Brandenburger 1997) relationships find themselves entering each others' primary markets. Broadly, we can say that the telecommunications industry is adopting the technology from the IT industry and that the IT industry increasingly is adopting the business models from telecommunications. For instance, the telecommunications industry is increasingly using IP-based2 technology for switching phone calls and as the underlying communications protocol, as well as IT-based terminal equipment. Examples here include software-based telephone switches, Voice over IP (VoIP) technology, and digital delivery of formerly analog-based entertainment and communications services over ISDN or broadband technologies. The IT industry is increasingly offering hardware and software to companies and individuals on a "pay as you go" or subscription basis. Examples here include outsourcing agreements (McFarlan and Nolan 1995; DiRomualdo and Gurbaxani 1998), application service

[1] The most well known example is the MCI Friends and Family program, launched in 1992, which gave deeply discounted long distance call fares to "friends and family" members (other MCI subscribers named by the customer.) MCI was first in the industry to offer this kind of programs, and achieved considerable market penetration before the competitors, mainly AT&T, could reprogram their computers to offer the same service.

[2] IP: Internet Protocol, popularly speaking a technology where the communication is split up into packages and sent over shared lines rather than sent over a dedicated, time-switched line.

providers (ASPs) (InformationWEEK 1999), and advertising-funded services offered to end consumers over the Internet (such as Yahoo or Microsoft's electronic mail and file storage services).

The Norwegian ICT business

As part of a study of value creation and international competitiveness in Norwegian industry clusters (Porter 1999; Reve and Jakobsen 2000) the competitiveness and value creation of the information and communications technology sector (ICT-sector) in Norway was studied. Few cluster attributes were present with the exceptions of a satellite-broadband sub-cluster and the mobile services industry as a part of a larger Nordic cluster. Inter-firm relations are of particular interest in strong industrial cluster because of the strong theoretical assumptions about reduced transaction costs and knowledge transfer as cluster mechanisms (McEvily and Zaheer 1999). The Norwegian ICT-sector with the IT-industry and the telecommunications-industry consisted of 4975 companies in 1998. In terms of value configurations (Stabell and Fjeldstad 1998; Afuah and Tucci 2000), the largest number of companies were consulting companies (value shops) and communications companies (value networks) while there were few companies supplying hardware (value chains). The sector had a turnover of NOK 85,3b in 1998 generating a profit margin of 3% and a return of capital of 7%. The growth in value creation and productivity was strong compared with other sectors, but the share of total value creation in Norway was still relatively low. The communications part of the sector differs in a number of ways: In most ICT areas Norway was a net importer, except for communication services that had an export surplus mostly generated by Telenor's mobile and broadcast satellite business. The surplus is in contrast to the other Nordic countries that were net importers. Co-operation between companies in this sub-cluster focuses on inter-connect, standardization, and regulation.

When seen in a Nordic context, the Norwegian mobile service industry is part of a Nordic mobile technologies and services cluster. The Nordic countries, along with the UK and possible the Netherlands, are frequently cited as the world leaders in use of mobile technology[3]. The European countries all use the same technology (GSM 900/1800), have roughly the same regulatory landscape, and economics and demographics that are comparable. Despite the almost total lack of domestic equipment vendors, the Norwegian mobile services industry is one of the most developed in the world, with a rate of adoption and use both of basic mobile telephony and additional services that belies the country's size and geographical remoteness (figure 1) .

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insert figure 1 here

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[3] Japan, with NTT Docomo's iMode technology, is rapidly catching up.

The mobile telephone services market

We currently think of the Internet as running over the phone system, but we may have to get used to the idea of the phone system running over the Internet.
-- Eric Schmidt, CEO of Novell:

The core mobile industry currently consists of a variety of technologies and network operators, service providers, equipment manufacturers and service creators, all aiming for a piece of the huge market emerging as businesses and consumers start using mobile technologies and services as an integral aspect of their own activities. The mobile phone services market illustrates the effects of demand side network externalities and supply side technical cooperation in order to exploit market complementarities. The mobile phone services business is competitive both within countries (where many countries have had competing national companies) and internationally (where multi-national companies are trying to extend their networks by forming alliances with, acquiring or starting virtual or network operators. the decision to adopt the technology, and which operator to use, is to a large extent and in most markets individual. A number of services have emerged, both introduced by the operators (mobile answering services), introduced by the equipment makers (ring tones and logos on mobile phones), or discovered and grown by the users themselves (SMS or short messaging services chat). The decision to adopt is relatively independent of the presence or use of other technology. Most people use their mobile phone to talk or to send messages – only fairly small segments of the market (business professionals reading e-mail on the road) have a usage pattern influenced by adoption of other technology, such as laptop computers, groupware, or presentation software.

The telecommunications market of Western Europe can be classified as consisting of three main segments[4]: (1) the *prepaid market* (about 50% of the subscribers), which buys mobile telephone services through pre-paid cards (often called cash cards). The typical user here is young, cost conscious, and uses the phone less for voice communications than for sending SMS messages; (2) the *private full subscription market* (about 38% of subscribers), where the typical user is either a family member or a business professional with limited mobility needs. This group is cost conscious, has medium voice usage and little use of SMS; and (3) the *business market* (about 12% of subscribers), consisting mostly of business professionals with high mobility needs, high voice usage and potentially high data traffic usage.

A conceptual model of the mobile phone services market

At the core of the mobile marketplace is a set of layered networking services (Fjeldstad 1999) provided to businesses, governments and consumers (fig. 2).

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insert figure 2 here

[4] Source: www.cit-online.com, The Concours Group.

This conceptual model, while strongly simplified, shows the possible interrelationships between the various providers of services that together enables the customer to exchange information, coordinate activities or conduct transactions via the mobile phone network. The different service providers do this in a setting where they both cooperate and compete in the development and production of a mobile service offering. In the model, the growth and technical evolution of a network is driven not just by developments in the particular layer of the network, but by developments in other network layers as well.

In this model, the layers are: *network operators*, which own and operate a physical network or radio base stations (often called cells) and a land-line or satellite-powered backbone network to connect the radio base stations together; *virtual* operators, which typically buys network capacity in bulk (often at prices fixed by regulation) and resells it to its customers. The virtual operators can be independent companies, or they can be the same company as the network operators, but the organizational and transactional distinction stands both for regulatory reasons and because the skills necessary to sell a mobile phone service is very different from growing and maintaining the physical network; *SMS or WAP hosting* – these can be the network or virtual operators, allowing sending of SMS messages or use of WAP as part of the regular mobile services subscription, or companies allowing sending of SMS messages from their Internet sites (often to draw people to it). The hosting service can also allow companies to send and receives SMS messages from their internal IT systems; *payment providers*. Again, these can be the network or virtual operators, facilitating payment by billing against the mobile phone subscription. It can also be a credit card company, a bank, or a specialized payment company such as the German PayPal; *merchants*, which are companies offering products or services over the mobile phone network. There are a variety of services available, most of them with a pricing structure centered on payment per received SMS message, either directly (ring sounds or logos) or by subscription (jokes, financial information, etc.)

The remaining players in this model are the *customers* (which can be both individuals and companies), *equipment vendors*, which sell equipment both to the individual customers and to the service providers, and *content providers* (where content can be products or information. Finally there are *service creators*, often consulting firms that developing software or business concepts.

Evolution and interplay of layers

Acceptance of network services tend to follow a "hockey stick" curve, with initial acceptance low and growth of use slow, until the customer set reaches critical mass and the growth of the use of the service takes off dramatically, often exponentially[5]. However, he investment structure of most of the services – particularly the network operators – tend to be heavily front-loaded, i.e., a large investment is required to build

[5] Examples of this evolution is found in the growth of mobile phone use in the Nordic countries, in use of the SMS service in Norway, in installation and use of the file sharing service Napster.

the network, and the size of the initial investment is only partially related to actual use. For the operators most of the costs are fixed.
To build acceptance, each layer must make itself attractive by connecting to and often investing in other parts of the market. The mobile phone market got its start by heavily subsidizing mobile phones, getting the customers to overcome initial reluctance. The mobile phone service benefited strongly from existing networks – you can use a mobile phone to call a fixed line. Once mobile phone adoption was over a certain mass, other layers were established, such as virtual operators and SMS services. SMS, initially a largely forgotten part of the GSM standard[6], took off in 1998 when teenagers discovered that they could send and receive messages on their phones even after the pre-paid telephone service were used up. Consider as an example the Norwegian market. As the SMS chat discovery spread in teenage circles, the number of SMS messages ballooned until Telenor's mobile phone network was overloaded. Charging for messages was instituted shortly thereafter, but teenagers continue to use their phones more for messages than for talking – it is cheaper, and they have the time to type them and the inclination to learn to type using the poor handset keyboard.

Once SMS usage is widespread, there is a surge in merchants that offer various services or products delivered via mobile phones. These services can be direct purchases, typically ring tones or logos for the mobile phone, or subscription services such as information on the stock market, the weather or a highly popular service that broadcast messages about observed police speed controls.

The dramatic uptake of SMS contrasts sharply with the adoption of WAP services, which, despite heavy marketing by the equipment industry and the service providers has not been anywhere near what was rosily predicted when WAP was introduced. There are a number of reasons for this: WAP over GSM requires a lengthy and expensive sign-on process, and that the content has been lacking, a function of difficulties of publication rather than access. Importantly, many of the operators have restricted WAP access to their own portals, allowing neither the open surfing nor the easy publication that has made the World Wide Web so successful.

Herein lies the dilemma of network markets and network portals: A portal (i.e., an aggregator or customers or content) can help the establishment and growth in the early phases of network adoption, but may retard its growth in the long term because the portal has neither the mechanisms nor the inclination to incorporate new, complementing layers of service into its model.

Equipment vendors have made much money on the Internet and the mobile service market – witness the astounding growth of companies like Nokia, Cisco, Ericsson and Siemens – because they have been subject to the network "hockey stick"growth rate but are better placed to extract value than the network operators because they sell

[6] The first short message is believed to have been sent in December 1992 from a Personal Computer to a mobile phone on the Vodafone GSM network in the UK

physical products and thus can control sales and distribution of their output[7]. The effect can be dramatic –. Contrary to the Internet, content providers have made money, since in this market can extract value by observing the relatively few channels of distribution[8].

Antecedents of inter-firm relations in the mobile industry

Inter-firm relations are in part based on activities performed jointly by firms and on exchange transactions (Anderson, Håkansson et al. 1994). The nature of exchange transactions have been studied in supplier-customer relationships, in advisor-client relationships and in joint problem solving relationships. We have identified no systematic research on the nature of inter-connect and inter-layer relationships found in network industries of which mobile services are prime examples. Table 1. provides an overview of differences between various forms of value creation with possible implications for the nature of inter-firm relationships. These differences may lead to the primary inter-firm relationships in network industries being different from those of industries with a different value creation logic, and second the relationships between network industry firms and firms with a different value creation logic should be explored for possible uniqueness based on differences in value creation, activity interdependence and strategic objectives. As a case in point, the strong requirements for compatibility and inter-connectivity in network industries should impact the relationship between the firms and their suppliers as well as the relationship between the suppliers. Strong motives for cooperation in the development of standards and protocols, should lead to intensive knowledge exchange among the suppliers to network industry firms. High mutual dependence between network firms in the development of markets with network externalities, coupled with strong complementarities requiring stepwise completion of layers, e.g. the SMS market was develop on top a highly penetrated mobile terminal market, should lead to initial close cooperation between otherwise directly competing network operators and service providers.

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insert figure 3 (chain, shop, network table) here

On the contrary there are several factors that could be expected to limit cooperation. Following the propositions develop by Bengtson and Kock (2000) we present some issues that motivate further exploration of how firms subject to network service inter-

[7] Furthermore, much of the revenues in handsets comes from the service providers themselves, since they subsidize the mobile phones to force the adoption curve.

[8] For instance, TONO, the Norwegian Association for Music Artists and Composers, reported income of "more than NOK 6m" ($700,000) from fees on mobile phone users' downloading of ring sounds for their mobiles. The figure for the Swedish association Stim was between SEK 15-20m, or $1.6-2.1m. (www.Dagbladet.no/kultur/2001/04/26/254384.html). This is a new source of income for the composers, and doesn't replace other income.

firm relations deal with a combination of strong motives for cooperation with challenging obstacles to cooperation from absence of several mechanisms that can protect the actors.

The most important resource for a network services firm may be its customer base. Price differentiation toward the end customer in inter-connects (as is found in the Norwegian market between Telenor and Netcom) can lead to significant advantages for the larger operator (Lafonte & al 1998), and inter-layer services leads to the firms sharing the same customer base with similar activity sets (Fjeldstad 1999). The low heterogeniety in primary resource (Kock and Bengtson 2000) may hinder relationship development or lead to very strong relationships with high degrees of trust and commitment (a potential explanation for the many mergers and merger attempts in the industy).

In the layered inter-connected system described above no layer is "closer" to the customer than the others. They all have direct customer relationships. This may complicate relationship development because there is less of a basis for dividing competition and cooperation based on closeness of activity to customers (Kock and Bengtson 2000).

Further due to the two stage nature of the markets resulting from both network externalites and layered service complementarities, the relationship motivation may have a "hot and cold" nature. The firms need each other strongly in phases of industry and service developments and have stronger motives to compete in later stages. The quote from the CEO of Novel cited above may very well exemplify this property of the market and the potential implications for inter-firm relations. Finally the relationships are highly complex. In many cases the same the firms are concurrently each other suppliers, customers and competitors in the same markets. The supply each other with inter-connect, services and capacity while competing directly for the very same customers in the market.

Of the more prevalent inter-configuration challenges are the "churn chain" relationship between networks and their distribution channels, and the content-owner, content mediator conflict. The former reflects that while the retailers of terminals and frequently bundled subscriptions have motives to sell as many subscriptions as possible whereas the network operators must try to avoid "churn", i.e. short term subscription and re-subscription from frequent provider switching. Little is known of how the operator – retailer relationships can be structured in what represents a deviation from the typical continuos supply chain contexts prevailing in other industries. The latter is reflect the conflict between the dual requirements of a mediator initially needing to stimulate demand from services through ensuring the availability of content and the longer term need for mediators to be unbiased third parties for the market to develop. This is well illustrated by an example from another mediation industry, stock brokering. Nobody likes to deal with a broker that personally invests in the same stocks as you.

To summarize, our research is aimed better understanding the impact on the nature of inter-firm relationships in an industry where there are strong motives for cooperation from demand side economies of scale and scope, but where there are few tangible clear customer-supplier relationships, where resource bases overlap both intrinsically through overlapping customer sets and currently from a convergence of basic technologies. Finally the industry also offers a unique opportunity to study inter-configuration relationships that may lead both to unique "win-win" situations, but also to unexplored sources of conflict.

Figure 1: Key numbers on Nordic and UK mobile phone services market

	Norway	**Sweden**	**Denmark**	**Finland**	**UK**
GSM Subscribers Mobile 2000 (thousands)	2,992	5,522	3,543	3,700	34,383
GSM Penetration %	66.43%	62.17%	66.47%	71.55%	57.79%
Prepaid%	50.13%	42.74%	39.94%	1.08%	62.77%
SMS Messages 2000 (millions)	1205	483	753	1000	6225
% Annual growth from 1999	134%	243%	N/A	42%	443%
SMS pr. Subscription 2000	403	87	212	270	181
SMS Revenues (NOK million)	1201	657	577	1151	6308
SMS Revenues 2000 pr. Subscription (NOK)	401	119	163	311	183

Sources:

Norway	Norges post og teletilsyn
Sweden	Post-och telestyrelsen
Denmark	National Telecom Agency Denmark
Finland	Ministry of transportation and communication
UK	Oftel

Figure 2: Conceptual view of mobile services market

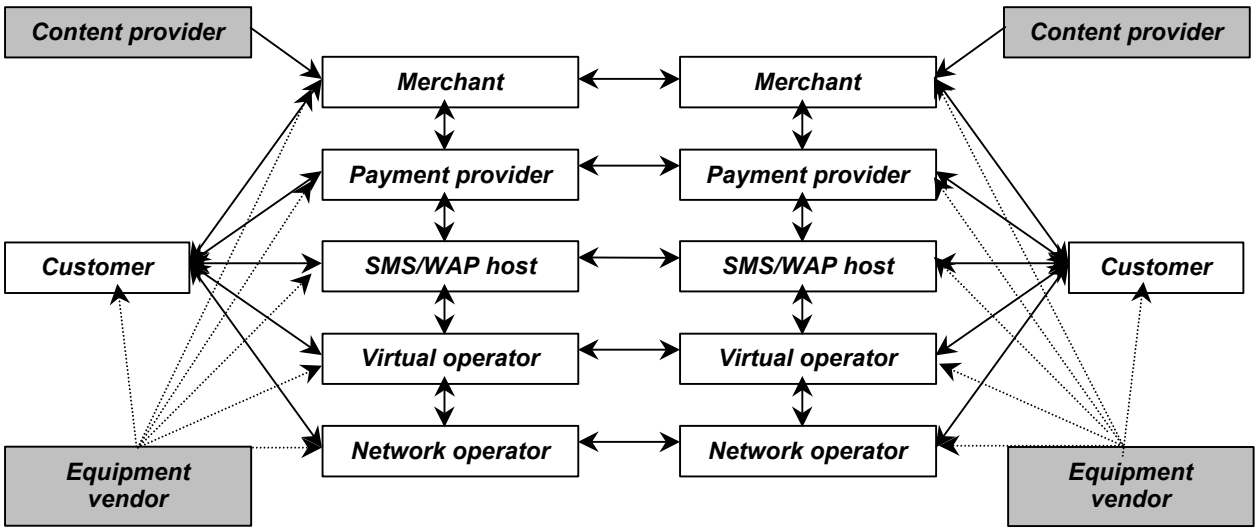

Fig 3 Configuration and potential inter-firm relationship antecedents

	Chains (HW&SW)	Shops (consulting)	Networks (mobile services)
Deliverable	Product	Solutions	Connectivity
Value elements	Components	Competencies (people)	Connections
Activity interdependence	Sequential	Sequential and reciprocal	reciprocal
Industry structure	Supplier chain	Referral and subcontracting	Interconnected layered networks
Actor performance	Product profitability	People profitability	Network(customer) profitability
Risk	Capital assets	Reputation	Customer network
Strategic objectives	Economies of scale – better and cheaper products	Knowledge and reputation – better people	Network economies of scale and scope – better and bigger customer set
Inter-firm challenge	Minimize transaction costs – clear division of labor	Maximize solution value – interdisciplinary integration	Maximize network and complementarity effects – interconnects and standards
Incentive problem	Cost distribution	Solution credits and rights	Internalizing externalities vs. externalizing internals
Resource constraint	Production Capacity	Competence	Network capacity
Learning	Streamlining delivery system	Deeper and broader competencies	Composition

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