We are what we do (and how we do it):

Organizational technology as a cue for constructing organizational identity

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Abstract

Past research has highlighted multiple interrelations between technology and social cognition. In this paper, building on past studies, as well as on our own research, we advance propositions about the conditions under which technological features are likely to serve as cues for the construction of organizational identity and about the consequences of this fact for the enduringness of these features. In doing so, our emerging framework may contribute to increase more general understanding of how organizational features come to be perceived as part of organizational identity.

1. Introduction

Technology – broadly understood as tools, machines, and techniques for instrumental actions, as well as the beliefs and principles they embody (Woodward, 1965; Dosi, 1982; Barley, 1990; Griffith, 1999) – is considered a central element for understanding organizations, as it affects both the way they are organized as well as the pattern of evolution of internal structures and processes (Woodward, 1965, Patel and Pavitt, 2000).

Past research on the influence of technology on organizational life has highlighted the interaction between technologies, technological features and the social structure of organizations (e.g. Barley, 1986: Orlikowski, 1992, D'Adderio, 2003), as well as the reciprocal influence between technology and managers' mental models (e.g. Garud and Rappa, 1994; Tripsas and Gavetti, 2000; Kaplan, and al., 2003). Collectively, these studies suggest that technology shapes how organizational members make sense of and organize their social reality. In this paper, we focus on a specific aspect of organizational sensemaking, that is how members develop and preserve a collective sense of what their organization is and stands for – or, in other words, of their organizational identity (Albert and Whetten, 1985; Brown and al., 2006).

Past research has highlighted the influence of organizational identity on strategic processes (Dutton and Dukerich, 1991; Gioia and Thomas, 1996; Ravasi and Schultz, 2006) as well as internal social dynamics (Golden-Biddle and Rao, 1997; Glynn, 2000; Humphreys and Brown, 2002). Some studies have pointed at the role of leaders in shaping identity beliefs and understandings (Gioia and Thomas, 1996; Fiol, 2002). However, how certain specific features of the organization – values, practices, symbols or else – become part of what members perceive as their organization's identity is still unclear.

In this paper, building on past literature on organizational identity, as well as on our own research, we develop a framework for understanding under what circumstances technological features embedded in organizational products or processes are likely to be perceived as constitutive elements of the identity of the organization, and how this fact influences organizational decisions and actions. In the next section we account for the main constructs and notions concerning organizational identity research and technology sensemaking. In section three, we propose some antecedents of technology as identity referents and we illustrate our arguments with reference to our own as well as published research. In the following section, we discuss the potential consequences of the inclusion of technological features among identity referents. We conclude by discussing implications of our proposed interpretations for research on organizational technologies and organizational identities.

2. Literature Review

Organizational identity

Organizational identity was initially defined by Albert and Whetten (1985) as a set of features perceived by members to be central, enduring and distinctive of their organization. According to David Whetten, these features – or *identity referents* – contribute to craft a self-referencing narrative that help members construct a collective sense of self, and that satisfies organizational and individual needs for continuity, coherence and distinctiveness (Whetten and Mackey, 2002; Whetten, 2006). In this view, organizational identities are conceived as emotionally laden, stable and enduring self-descriptions or characterizations of an organization (Ashforth and Mael, 1996), underpinning deeply held beliefs, embodied in formal claims, that tend to change only rarely and never easily (Whetten and Mackey, 2002).

Empirical evidence of changing interpretations about the identity of organizations, however, has

led other scholars to observe how members' beliefs about central and distinctive characters of their organization may indeed evolve in the face of internal and external stimuli (Dutton and Dukerich, 1991; Gioia and Thomas, 1996). In their view, organizational identities reside in shared interpretive schemes that members collectively construct in order to provide meaning to their experience (Gioia, 1998). These shared schemes may, or may not, correspond to the official narrative (Ashforth and Mael, 1996). Scholars embracing this perspective observe how substantial organizational changes generally require alterations in the way members interpret what is central and distinctive about their organization. In other words, substantial changes require members to "make new sense"– i.e. to develop new interpretations – of what their organization is about (Fiol, 1991; Gioia and Chittipeddi, 1991).

Recent research suggests that these apparently conflicting perspectives may emphasize different aspects of the construction of organizational identities (Ravasi and Schultz, 2006). Together, they suggest how organizational identities arise from processes of sensemaking and sensegiving, through which members periodically re-construct shared understandings and revise formal claims of what the organization is and stands for.

Constructing organizational identities

Even if organizational identity scholars may disagree on where organizational identities mainly reside – members' beliefs, claims, or even fleeting images – or on whether they are more or less prone to change, most researchers tend to agree on the idea that organizational identities are the product of social construction (Corley and al., 2006). How organizational identities are constructed – or, in other words, how a certain feature or a categorical descriptor of the organization comes to be perceived as a self-defining attribute – however, is still unclear.

According to David Whetten, making sense of an organization is a process based largely on

inter-organizational comparison. In other words, developing an understanding of what an organization is and stands for requires members to define how and to what extent it is different from and/or similar to other comparable organizations (Whetten and Mackey, 2002). Past research has shown how, on the one hand, members may draw on existing social categories – i.e., broadly accepted labels that are used to encompass a certain type of organization – to position their organization within a social space (e.g. Rao, Monin, and Durand, 2003). For organizations engaged in market competition, for instance, a particularly relevant subset of categories may be represented by clusters of competitors sharing similar strategies (firm scope, resource commitment, etc.) and a common "strategic group identity" (Peteraf and Shanley, 1997). In their respective industries, general categories such as "low cost carrier", "nouvelle cuisine restaurant", or "vertical retailer" are associated to a subset of strategic and structural choices that can be used, not only to identify the organization within its market space, but also as a template for organizing choices.

On the other hand, when members' attention shifts to issues of differentiation, they are more likely to search for cues inside the organization. Past research has shown, for instance, how members' interpretations of what their organization is and stands for may draw on various sources of cues, such as collective practices (Pratt and Rafaeli, 1997), shared professional backgrounds (Glynn, 2000), organizational artefacts (Brunninge, 2007), or even refracted images (Dutton and Dukerich, 1991). In particular, past research has observed how organizational culture may serve as a powerful referent, helping organizational members substantiate their identity claims and express their perceived uniqueness in terms of collective values and their embodiment in practices, rituals, and artefacts (Albert and Whetten, 1985; Ravasi and Schultz, 2006).

It is generally understood that, as members invoke the identity of their organization or ask questions about it in different circumstances, they are likely to produce different answers (Albert and Whetten, 1985), as different claims and beliefs may be more or less salient (Ashforth and Johnson, 2001) to the issue that members are called to address. While members of a given

organization may share various identity referents – some based on social categories, others based on organizational features – only some of these referents may be perceived as relevant to a given issue. How a certain feature comes to be included – explicitly or implicitly – among the identity referents of an organization, however, is much less understood.

In this paper, we focus on one potential referent – organizational technological features – and we develop a tentative framework for understanding how these attributes come to be perceived as part of the identity of an organization.

Technology and social cognition

Building on the seminal work of Joan Woodward (1965) on the relative appropriateness of different organizing principles for different production technologies, in the last few decades research has investigated the influence of technology on organizational structures and processes and vice versa (DeSanctis and Scott Poole, 1994; Barley, 1986; Orlikowski, 2000, 2007). These studies have underlined the importance of considering technology both in its physical dimension (e.g. the structural features and properties of material artefacts such as machineries, products, or components of end products) and in its cognitive dimension (i.e. a set of goals and beliefs defining the appropriate way of accomplishing a task, designing and/or using an object).

Past research has emphasized how, on the one hand, structural and cognitive features of a technology are the result of social processes occurring at organizational or institutional level (e.g. Bijker and al., 1987; Garud and Rappa, 1994; Kaplan and Tripsas, 2007), while on the other hand they contribute to shape social interaction and the social order within which they are embedded (Barley, 1986; De Sanctis and Poole, 1994: Tripsas and Gavetti, 2000). Garud and Rappa's (1994) study of the evolution of Cochlear implants, for instance, shows how the development of a technology within a social environment requires the interaction between the physical forms and

functions of an artefact and the beliefs that engineers and managers hold concerning the logic of usage of the technology, its main characteristics and its evaluation metrics. Eventually, then, the establishment of a given technology in the market does not derive only from the physical and functional properties of technology itself, but also from the institutionalized routines through which technological "improvements" are assessed.

Within organizations, defining technology as composed by physical and cognitive features highlights the interaction between tangible features and the mental models of organizational members (Weick, 1990; Griffith, 1999). Scholars that have studied technology adoption and usage, for instance, have investigated the way in which individuals and groups adapt and interact with new artefacts and technologies in organizations (e.g. Barley, 1986, 1990; Leonard-Barton, 1988; Dean, Yoon and Susman, 1992; Orlikowski, 2007). Based on empirical findings, this stream of literature has progressively abandoned a deterministic view of technology, where machines and infrastructures are conceived as structures that dictate and shape individual and organizational responses, in favour of a more nuanced and interpretive perspective that stresses the relevance of the process of sense making and appropriation of new artefacts and their design logics (Weick, 1995; De Sanctis and Poole, 1994). Empirical studies have focused mainly on the interaction between designers, artefacts and users, and on the processes of sense making and appropriation that derive from the translation and adaptation of designers' cognitive logics, as embedded in technology artefacts, to users' cognitive domain (Orlikowski, 1992; De Sanctis and Poole, 1994; Orlikowsky and al., 1995; D'Adderio, 2003).

Other scholars have addressed a similar research question at a higher level of analysis, and investigated how technology dimensions can affect sense making at organizational level, i.e. how technology characteristics can affect the pattern of evolution and learning of organizations. For example, Leonard Barton (1992) discussed how, thanks to the local nature of learning processes, extant technologies and competencies limit the possibilities of future developments and constrain

innovation opportunities. According to Leonard-Barton, such rigidity is not only linked to the cost of developing organizational knowledge in more than one direction, but also to the specific beliefs and values that inspired the development of those competencies in first place. Later on, Tripsas and Gavetti (2000) extended this line of inquiry, by showing how entrenched managerial understandings of core organizational technologies tend to influence opportunity interpretation and future strategic decisions, therefore contributing to strategic inertia. More recently, Kaplan and al. (2003) have provided large scale quantitative evidence of how mental models influence how a new technology is interpreted by senior managers, and therefore, how managers respond to technological opportunities.

These streams of research show the reciprocal influence of technology and sensemaking, both at individual and organizational level. However, while the influence of mental models on individual and organizational responses to new technologies has been investigated in the past, both conceptually (e.g. Griffith, 1999; Weick, 1995) and empirically (e.g. Tripsas and Gavetti, 2000; Kaplan and al., 2003), less is known about how *technological features* of an organization – e.g. the tools, machines and techniques used in operational and administrative activities, as well as the design principles and technological attributes of its final products and services (i.e. their materials, components, functions, etc.) – become cognitive anchors, acting either as a source of stimuli or inertia in the face of environmental change.

In the next section, we propose that one of the ways in which technological features may come to influence organizational members' cognitive processes is by becoming embedded in relatively shared beliefs and understandings about what the organization is and stands for – or in other words, by becoming identity referents.

3. Technology as an identity referent

Despite the overall relevance of organizational technologies for organizational strategies, structures and processes, we would expect organizations to vary in the degree of significance they ascribe to technology attributes. As previous research has shown, while organizations are periodically engaged in changes in their production systems, information systems, product technologies, etc., occasionally, some of them display a tendency to resist the alteration of some of their technological features (e.g. Leonard-Barton, 1992; Tripsas and Gavetti, 2000).

Anecdotal evidence from research on organizational identity suggests a connection between *organizational technologies* – e.g. the core technical capabilities of an organization (Ravasi and Schultz, 2006; Fiol, 2002), the routines underlying how instrumental tasks are accomplished (Nag, Corley and Gioia, 2007), the technological features of organizational products (Ravasi and Schultz, 2007; Brunninge, 2007) – and *organizational identity*. In this respect, organizational responses to external pressures for the alteration of some of its technological features might be explained by the emotional and cognitive reaction to the alteration of features that are perceived as part of the identity of the organization (Reger and al., 1994). How technological features become part of members' identity beliefs in the first place, however, is still poorly understood.

Organizational-referencing discourse is frequently observed in organizations. However, according to David Whetten (2006), not all organizational descriptions (or self-descriptions) qualify as *bona fide* identity claims – or, in other words, would be highly emotionally laden and influential on organizational actions (Lerpold and al., 2007). According to Whetten, only those attributes that "are manifested as an organization's core programs, policies and procedures (Whetten, 2006: 222)", "have repeatedly demonstrated their value as distinguishing organizational features (2006: 221)", and "have withstood the test of time (2006: 224)," will act as legitimate identity referents. Whetten refers to these properties as centrality, distinctiveness, and enduringness (Albert and Whetten,

1985). He observes how only distinctive attributes effectively specify the way in which an organization is similar to or different from other comparable organizations. However, only attributes that are essential to the organization as it is known to its members, and to which members have shown deep commitment in the past, are likely to be considered distinguishing for the organization (Whetten, 2006).

In this paper, we follow Whetten's arguments, and we argue that the likelihood that a certain organizational feature becomes an identity referent depends on the extent to which the focal feature is perceived by organizational members as central, distinctive and enduring. In this section, we propose four potential factors increasing the likelihood that a given technological features comes to be perceived as central and distinctive – hence to be considered as an identity referent. In the following section, we indicate some potential consequences of the inclusion of technological features among organizational identity referents, which may results in the increased enduringness of the feature (see Figure 1). In turn, as displayed by the feedback loop in the figure, we expect the long-lasting commitment to a given feature to further reinforce member's perception of it as a fundamental identity referent.

Figure 1 about here

The centrality of technological features

Centrality refers to the extent to which a certain feature is perceived by members as essential to the survival of the organization as it is; a feature without which the organization would no longer be, or would become something different from what has been so far (Albert and Whetten, 1985). In family-owned business firms, for example, the active participation of family members in the management and control of the organization is often reputed essential for the organization to be

considered as “family business”. The decision of family members to relegate themselves to the role of pure investors may be resisted (or, conversely, be advocated) because of the changes in managerial philosophy, human resource policies, and in the overall atmosphere, that would result from changing perceptions of what the organization is (and, therefore, how it should be managed) that would follow the loss of family members’ involvement, in spite of the *de facto* preservation of the “family-owned” condition.

An organizational feature, then, is defined as central when it is considered by its members as one of the fundamental attributes of the organization itself, shaping and conditioning decisions about more peripheral structural features and processes. In organizations, some features (such as, for instance, the corporate form or the mission of the organization) provide a sense of direction, or, as David Whetten says, “constrain and give meaning (2006: 225)” to lower level choices (such as human resource policies or pricing decisions). They provide a sort of a template against which potential courses of actions are evaluated and judged as “appropriate” or “inappropriate”. Whenever actions and decisions are perceived as violating these features, emotional responses may arise in the organization, as members are likely to resist, debate and challenge courses of action that contravene their need for coherence and continuity (Dutton and Dukerich, 1991; Golden-Biddle and Rao, 1997; Ravasi and Schultz, 2006).

Organizations, however, unlike individuals, have few if any “objective” identity referents such as gender, or ethnicity, that tend to naturally – and often implicitly – condition self-perception and influence other choices regarding personal lifestyle, professional career, or sentimental relationships. As social artefacts, organizations are by definition social constructions, subjected to continuous re-shaping and re-interpretation by internal and external actors, and there are few if any objective referents, such as industry or geographical location, that members cannot alter, should they really wish to do so (Whetten, 2003). Perceived or claimed constraints, therefore, should be looked for somewhere else. In particular, we argue that a given technology – or, more generally, a

given feature – may come to be perceived as central to the organization to the extent that: i) it is historically associated with the founding of the organization, or with other major events in the life of the organization that are considered crucial in shaping the organization as it is currently known, and ii) it underpins the pattern of activities and relationships which ensures the equilibrium of the organization in its environment – or, in other words, its "business model".

Foundational features and centrality

As social constructions, organizations are not "naturally" born with certain traits: their features – such as their legal form, their geographical location or their activity – are the result of more or less conscious, more or less deliberate choices of their founders. Once taken, however, these fundamental choices are likely to be taken as "given" and shape the identity of the organization in the following years (Whetten, 2003). In the future, alterations of "foundational" features may encounter emotional or cognitive resistance as they imply a change in what may be considered as a "natural" characteristic of the organization (Reger et al., 1994). Eventually, the relative ease with which change occurs will depend also on the perceived distinctiveness (is the feature perceived as making the organization comparatively better than others?) and endurance (has the feature been around for a long time?) of the attribute (Whetten, 2006). We will return later on the interrelations between centrality, distinctiveness and enduringness.

If we accept this notion, a technology can be considered "foundational" if it is historically connected to the founding of the organization – its "birth" – or to other major events (or individuals) which deeply affected the organization as it is currently known by its members. Sometimes firms, for instance, are founded in order to exploit a specific technological innovation embodied in a new product or production process (Helfat and Lieberman, 2002). Their initial structures, strategies and patterns of activities may be constructed around this technology. To the extent that these technological features are associated to corporate success, later on, corporate mythology may trace an explicit link between the founders – or other prominent members – and

innovative technological features or innovations on which the fortunes of the organization were built. Eventually, this technology – or technological feature – would become embedded in organizational self-referencing narratives and in members' beliefs as a central feature of the organization – a legacy of its past – to be preserved, refined, developed even when economic or commercial concern would suggest otherwise.

Take the case of Piaggio, an Italian manufacturer of motorcycles, scooters and other light vehicles, currently one of the leading global competitors in the two-wheel business. Before the Second World War, Piaggio was one of the largest national producers of airplanes, trains, trams, and other means of transportation. During the war, production focused on war supplies. After the war, Piaggio had to quickly convert its production into something commercially viable. In the late forties and early fifties, the rebirth of the company was linked to the development of what became the archetypal scooter, Vespa: a light motorcycle, whose frame – so the myth says – was obtained by legendary designer Corradino D'Ascanio from the steel plate of an airplane, bent in order to provide ample frontal protection for the legs and a comfortable footrest. Mr. D'Ascanio was an aeronautical engineer and he did not like motorcycles: the new product, therefore, incorporated a number of features, from the gear change on the hand-grip to the bodywork completely covering the working parts, aimed at increasing comfort and simplicity of operation.

The quick commercial success and the immense popularity around the world in the years to come made of Vespa a landmark for the entire organizations. In the late seventies and early the eighties, the product seemed to gradually lose its appeal in the face of the multitude of smaller and cheaper scooters made available by the introduction of plastics – a technology mastered by Japanese manufacturers. The decline of Vespa seriously affected the financial conditions of the company. In the mid eighties, therefore, the company's efforts focused on the expansion of its range with new models, different from Vespa and based on the less expensive plastic technologies. Yet, the company refused to terminate the production of its flagship product, even if no really new Vespa

models had been developed since the PX version in 1977. Only in the mid nineties designers and engineers decided to re-propose the old Vespa scooter in an entirely revamped version. As the chief engineer at Piaggio told us:

> If we had insisted on proposing Vespa as our core product, clients might have doubted that we were able to produce anything else. We absolutely had to demonstrate that we were able to make good plastic scooters. (…) Once we did that, we could re-propose Vespa as our reference product.

While the new model was vastly redesigned in order to include more modern technical solutions, some features were preserved even if they countered current trends in scooter designs. Among these was the metal body – by then, a unique feature that no other competing product sported anymore. As the head of the design centre remarked:

> Vespa has to be metallic: that's the bottom line. (…) Vespa has always had this rather maternal backside, very enveloping, and a somewhat slim, bony-looking front part rounded just right, but still made out of a single metal sheet with great industrial savvy.

According to a corporate historian, the decision, which substantially affected the industrial cost of the product, was profoundly linked with a collective sense of self which was re-captured in the design of the new product:

> [It] meant the revival of celebrated moulding factory, the nucleus around which production was centred until the eighties, when every two-wheeled Piaggio, from the PX to the mopeds, was in sheet metal. (…) There is said to be a certain amount of pride in those one the production line, who feel they are somehow involved in carrying on the special metal-working tradition (…) It's a question of collective identity, workmanship ability, professional updating and, at the same time, link with the past (Mazzanti and Sessa, 2003: 274-275).

As a Piaggio manager observed, touching Vespa "involves the very identity of the company". Eventually, a strong sense of what was central to the company and its core products – even from a technological point of view – had ensured the preservation of a unique identity on the market, embodied in its Vespa scooters, which was central in the late nineties to the turnaround of the group.

Proposition 1. *The tighter the perceived connection between a technological feature and the founding of an organization – or other major turning point in its history – the higher the likelihood that it will come to be perceived as an identity referent.*

Organizational business model and centrality

Although management scholars belonging to different schools of thought may differ in their focus of attention – the organization vs. the environment – they tend to agree that the survival of organizations depends on the interaction between environmental conditions and the pattern of resources and activities that characterizes an organization. According to Michael Porter (1996), successful organizational strategies rest on a few core concepts (such as cost minimization in the case of Southwest Airlines, or "design at low cost" for Ikea), which give sense, coherence and direction to this pattern of resources and activities. In this respect, it has been argued that organizational identity and strategy perform similar functions (Ashforth and Mael, 1996), and several studies have shown multiple interrelations between organizational strategies and identity beliefs (Collins and Porras, 1996; Gioia and Thomas, 1996; Corley and Gioia, 2004; Ravasi and Schultz, 2006).

If we accept this notion, then, it is not unreasonable to think that in organizations characterized by established models of interaction with the environment – in organizations engaged in market-competition we might refer to them as their "business models" – members come to consider as central those features that drive more general choices shaping the pattern of resources and activities. On the one hand, as central to the business model, these features are likely to be acknowledged as essential for the survival of the organization; challenging these features may be perceived as endangering the equilibrium on which survival rests and the very future of the organization. On the other hand, altering these features are likely to imply a further round of changes in the rest of the organization – its structures, its commercial policies, its reward systems, etc. – which may as well result in a profound transformation of the organization as members know it and understand it.

The case of Benetton, an Italian producer of fashion apparel operating on a global scale, is illustrative of the link between the configuration of resources and activities underpinning organizational advantage and the perceived centrality of a technological feature. Between the 1980s

and 1990s, Benetton became a global leader in the apparel industry, thanks to a well-honed business model (see Stevenson and al., 1989; Camuffo and al., 2001). Benetton's business model rested on a few innovative features – a network of independent franchisees providing frequent feedback about changing customers' preferences, a proprietary technology enabling it to dye finished wool products, a sophisticated automated warehouse reducing delivering time throughout the world, and colourful and provocative advertising campaigns supporting the slogan "United Colours of Benetton".

The combination of these features allowed Benetton to establish a dominant brand in the mass segment of the fashion industry, leveraging on its capacity to respond quickly and effectively to shifting customers' preferences. In the late 1990s and early 2000s, however, the sustainability of Benetton's model was seriously challenged by a new cohort of competitors, led by the Spanish group Inditex (better known for its Zara chain) and the Swedish retailer H&M, adopting a so-called "fast fashion" model, based on a tighter interaction between the retail outlets and the design centres at the headquarters, and on a more frequent, almost obsessive, renewal of the collections (Ferdows and al., 2004).

Benetton's response was slow and, as one of its managers admitted later, conditioned by its technological heritage. While in the managerial folklore Benetton had been often described as a flexible, light organization, embedded in a network of subcontractors and franchisees, the reality was different. The company was highly integrated upstream: around 60% of its sales were produced in-house. The company even owned large sheep farms around the world. On the one hand, for a mass-market, global brand such as Benetton, vertical integration had ensured high efficiency of large scale productions and tight control on the quality and timing of the process. On the other hand, the presence of the large plants, constantly required intensive use of the productive capacity, to cover the fixed costs (i.e. workforce). The industrial heritage of the organization, however, seemed to affect its responses to external changes in a more subtle way. As a manager put it:

> Of course sheep and workers are a constraint. But the real constraint is not material: it is a matter of identity. (…) Genetically, Benetton is a manufacturer: Zara and H&M have a history as retailers (…) The unanswered question now is: will Benetton become a retailer or not?

The difference was not purely semantic. The "manufacturing" identity and tradition, for instance, brought managers at Benetton to assess performance in terms of "sell-in" (items sold by the company to the network of franchisees), rather than "sell-out" (items sold in the shop to the customer). Pricing was determined as a mark-up on industrial cost. Product development followed the logic of seasonal collections (to be presented to the franchisees), rather than the logic of the in-shop assortment (to be proposed the final clients). Production was spread over twelve months to smooth down production peaks, rather than flexibly adjusting to market demands. While these practices had work well for several years, in a relatively stable and predictable environment, the arrival of fast fashion had changed the rule of the game. In the eye of its managers, effective response to the new challenge required substantial changes in the way sales were monitored, products were developed, production was planned, etc. In turn, these changes seemed to imply a more profound revision of the widespread conceptualization of the organization, which underpinned its business model.

As the case of Benetton illustrates, an organization's business model rests on an internally coherent set of activities and resources, embedded in a web of cultural practices and schemes, and underpinned by a relatively shared organizational identity. Changing business models – changing "strategy" – therefore, often requires an alteration in the commonly, albeit tacitly, held beliefs about what the organization is (Gioia and al., 1994; Ashforth and Mael, 1996). In this respect, organizational technologies that are central to this pattern of activities may come to influence the very way in which organizational members understand their organization, potentially limiting their capacity to envision alternative models that would disrupt the equilibrium that is associated to those technological features. In summary:

Proposition 2. *The greater the centrality of a technology for the business model of an*

organization, the higher the likelihood that it will come to be perceived as an identity referent.

The distinctiveness of technological features

In the previous section, we have proposed that features that are perceived as "foundational" and central to the business model of an organization are more likely to be perceived as central to the organization, hence, to become part of its identity. However, not all features that characterize the organization at its inception and/or define its current business model are equally likely to be considered as identity referents. Individual and organizational identities satisfy both needs for coherence and continuity, *and* self-esteem (Ashforth and Mael, 1996; Whetten and Mackey, 2002). Organizational identity referents, therefore, should be perceived as both central *and* distinctive (Albert and Whetten, 1985; Whetten, 2006).

According to Whetten (2006), organizational attributes may satisfy members' needs for self-esteem to the extent that they make the organization positively different – or *distinguished* – from competitors and other comparable organizations. It is not sufficient that a certain feature makes the organization *different* from but also *better than* others: such difference, in other words, should be perceived as increasing the social status of the organization – hence of its members. In this respect, we argue that the likelihood that a technological feature comes to be perceived as an identity referent is related to i) the extent to which the focal technology is related to past organizational achievements, and ii) the extent to which the focal technology has earned the organization widespread social acknowledgement. It is not unusual for these factors to coincide, as superior technologies and product design may not only let the organization succeed in competition, but also earn the organization social recognition in the form of design awards, favourable press coverage, positive expert feedback, improved reputation, etc.

Extraordinary achievements and distinctiveness

Many organizations are, occasionally or systematically, engaged in some forms of inter-organizational contests, such as sport races for carmakers (Rao, 1994) or the annual competition for status that takes place among fine restaurants (Rao, Monin and Durand, 2003) or wine makers (Benjamin and Podolny, 1999). Success in these contests is usually perceived externally – but also internally – as a sign of superior capabilities (Rao, 1994). Other organizations may be silently engaged in more subtle contests, as they compete for the introduction of technological innovation, the establishment of industry standards, the pre-emption of distribution channels, the geographical expansion, the attention of the media, etc. More generally, most business firms are involved in market competition, and tend to gauge their performance in relative terms by comparing their turnover, growth rates, financial ratios, and market share with their competitors.

Organizational features that make an organization particularly successful in these contests may have a profound impact on members' collective imagery and sense of self. Even in "unofficial" competitive contests, extraordinary success may be marked by specific events (the introduction of a radically innovative product, the disclosure of outstanding results, etc.) that underlie the primacy of the organization over its competitors. As pride and enthusiasm for the organizational accomplishment spread throughout the organization, merits are likely to be attributed to organizational features such as people, practices, products, technologies or else. Eventually, stories will diffuse and myths will arise, celebrating these features and shaping retrospective reconstruction of the causes of organizational success (Boje, 1995; Lounsbury and Glynn, 2001). In turn, as members engage in a more or less explicit attempt to make sense of what distinguishes their organization from competitors, these "memories" encased in the organizational narrative may provide them with commonly accepted reference points to define how and why the organization is not just different, but *superior* to other comparable ones (Ravasi and Schultz, 2007).

In the early seventies, for instance, managers at Bang & Olufsen, a Danish producer of high-

quality and high-design audio video systems, engaged in a reflection on what made their company different from their competitors. The reflections were meant to reinforce commercial strategies aimed at countering the rising threat of Japanese producers, to provide guidelines for communication efforts and to imbue with meaning the new slogan: “We think differently.” The obvious starting point for the company was the highly popular products that had reaped design awards in recent years. A review of the way successful products had been designed in the last ten years brought to the identification of seven fundamental principles of product design, which were presented to the rest of the organization as the Seven Corporate Identity Components (CICs).

In the previous decade, attention to design and user experience had intensified under the leadership of product developer Jens Bang and chief designer Jacob Jensen. Design principles codified in the Seven CICs underpinned an approach to product design that, as one of our informants put it, unlike most of its competitors started from users and developed products around them rather than the other way around. Simplicity and essentiality had characterized the philosophy of the company and the design of its products since the very beginning (Bang and Palshøy, 2000). The influence of the Bauhaus movement in art and design was evident in early material expressions of the company: from the first B&O logo, dated 1932 and readopted in 1994, to products like the bakelite Beolit 39 radio. Later, the Seven CICs elaborated on the concept, observing how simplicity should inspire concept development (Essentiality), the design of human–machine interfaces (Domesticity and Autovisuality), and even customer information (Credibility). Over the years, the search for simplicity inspired such milestones as the Beomaster 1900 audio system, where user interfaces were designed to facilitate access to music reproduction, and the one-thumb integrated remote control, the Beolink 1000, connected to all the video and audio sources in a house (Bang and Palshøy, 2000).

Although their popularity waxed and waned throughout the years, in the following three decades, the Seven CICs represented a fundamental reference point for organizational members. While, later

on, corporate mottos and espoused cultural values changed, reflecting the shifting focus of business strategies, the Seven CICs – an emblem of a golden age culminated in the exhibition of the company's products at the Museum of Modern Arts in New York in 1976 – were never forgotten and periodically reappeared in different forms in internal communication, training material, and corporate statements, to illustrate the unchanged principles which, in the eye of its members, have kept Bang & Olufsen viable – the only surviving European producer of a full range of audio-visual equipment – in an increasingly competitive market, dominated by corporation whose yearly research budget exceeds the overall turnover of the Danish company (Ravasi and Schultz, 2007).

In summary:

Proposition 3. *The closer the relationship between a certain technological feature and an organization's extraordinary achievements, the higher the likelihood that it will be considered as an identity referent.*

Social acknowledgement and distinctiveness

A considerable body of research indicates that members' beliefs about the identity of the organization tend to be influenced also by how the organization itself is portrayed by external actors, such as customers (Ravasi and Schultz, 2006), public opinion (Dutton and Dukerich, 1991), and the media (Elsbach and Kramer, 1997). Past research has shown how members' beliefs and understandings about their organization tend to mirror the feedback that they receive from external audiences (Dutton and Dukerich, 1991; Hatch and Schultz, 2002). As the seminal study by Dutton and Dukerich (1991) indicates, of all the potential identity referents of an organization, organizational leaders and members will emphasize those that seem to resonate with the impressions and expectations of the general public. If we accept this notion, then, it is not unreasonable to expect that technological features that seemed to receive a broad social

acknowledgement – hence contributing to cast the organization in a favourable light in the eye of its external audiences – are more likely to be included among the identity referent of the organization.

At times, widespread social acknowledgement may be associated to triumph in the inter-organizational competitions mentioned above (Rao, 1994). Such is the case, for instance, of companies such as carmaker Alfa Romeo or motorcycle producer Ducati, whose members are proud to remind how few or no companies in their respective fields have won as many races as they have in their history. Similarly, at Bang & Olufsen, member's pride for the excellence of their design was reinforced by the numerous awards that their products were granted. Finally, it is not unreasonable to think that managers may be unwilling to abandon features that are celebrated in the management narrative as well as acknowledged in class discussions as central and unique to their success cases.

Organizations, however, may not gain social recognition only for their successes. Organizations, for instance, are constantly evaluated by the media and the public on the conformity of their actions to social values and expectations (Meyer and Rowan, 1977). While organizations may not be deliberately engaged in a competition for public goodwill, actions that are consistently perceived as consistent with social concerns may earn a company a positive social acknowledgement in the form or favourable media coverage or supportive consumer advocacy (Fombrun and al., 2000).

Finally, but not less important, some organizations, their products or brands may acquire a particular significance within society, as they become more or less publicly associated with certain values, lifestyles, people or objects (Ravasi and Rindova, 2008). In these cases, the organization and/or its product may come to affect the meaning of existing social categories (think for instance of how Apple, through its iPod, enriched the meaning of portable music players, or how Levi Strauss contributed to the diffusion – and characterization – of jeans pants around the world) or even foster the establishment of new ones (Kleenex and paper tissues, Xerox and copy machines, or Ryanair and low-cost flights in Europe). In some cases, the cultural significance of the organization is manifested in the spontaneous association between the organization and broader social categories,

manifested, for instance in the use of its very name as a synonym for a certain category of products (Polaroid and instant photography), people (the "iPod generation"), or else. The emergence and diffusion of these categories provides a powerful feedback to organizational members about what really identifies the organization in the eye of the broader public, and, to the extent that they do not possess negative connotations, what makes the organization distinguished. In addition, the fact that organizational features – often embodied in their products – become embedded in the cultural world may increase the commitment of members to preserve what has now become a social institution[1].

Take for instance the case of Scania, a Swedish producer of trucks, buses and engines (Brunninge, 2007). In 2005, Scania was the last European manufacturer to discontinue the production of bonneted cab trucks – the once dominant design, where engine was placed under a bonnet in front of the driver's cab. The viability of bonneted cab trucks compared to the alternative design – the cab-over-engine trucks – had initially been questioned in the 1960s, when, in the face of rising European length restrictions, the higher comfort of bonneted cab trucks was offset by the lower transport capacity, as cargo space was sacrificed for the front "nose" of the truck. Consequently, most manufacturers soon abandoned the design, as the decreasing sales volumes would not cover the development costs of new products. At Scania, however, the decision to discontinue the development and production of bonneted cab trucks came much later and not without an intense debate (Brunninge, 2007).

As Brunninge's study shows, while other producers gradually abandoned bonneted cabs, Scania continued investing and developing new lines until eventually, in Europe, the name of Scania became strongly associated with bonneted cab trucks. Overtime, however, the market for bonneted cabs became smaller and smaller. Nevertheless, Scania kept producing bonneted cab trucks even when their share on the total turnover of the company became minimal and their profitability questionable. The first proposals to discontinue the production of bonneted cabs were met with

[1] We gratefully acknowledge David Whetten's helpful examples and constructive comments to this section.

"uproar", as organizational members refused to even consider such a decision – despite the apparent profit-orientation of the company.

The bonneted cab was perceived as representing "the essence of Scania" (Brunninge, 2007: 27). In fact, in 2000 an internal manual, defining design principles for Scania trucks, used mostly stories and examples from old trucks from the 1960s and 1970s, most of which were bonneted cab. Externally, Scania managers found in the popular appeal of bonneted cab trucks arguments reinforcing their beliefs. In fact, among the general public, bonneted cab trucks were still popular, perhaps due to the anthropomorphic appearance that the bonnet conferred them. Indeed, a common story at Scania observed how children, when asked to draw a truck, they intuitively drew a bonneted cab: that was how a truck – a Scania truck – was supposed to look like.

Eventually, even Scania had to surrender to the shrinking sales volume of the once dominant design: while bonneted cabs – like steam engines – still enjoyed high popularity among the public, economic concerns among clients undermined their commercial viability. The Scania case, however, is illustrative of how the way in which technological features of an organization and/or its products become embedded in social and cultural understandings may co-evolve with internal interpretations and decisions: while, on the one hand, external interpretations are partly the result of organizational decisions (such as persisting in the production of bonneted cab trucks when all the other producers are not), one the other hand, they may eventually come to reinforce – or constrain – internal interpretations of what is central and distinctive of the organization.

Proposition 4. *The greater the extent to which a technological attribute is socially acknowledged, the higher the likelihood that is will come to be considered as an identity referent.*

4. The consequences of technology as an identity referent

In the previous section, we have argued how technological features that are associated to foundational moments in the life of an organization, central to its business model, related to past accomplishments, and widely acknowledged by external audiences are more likely to become part of members' beliefs about central and distinctive features of their organization – or, in other words, to become identity referents. In this section, building on past research on organizational identities, we explore how, by being embedded in shared identity beliefs and reflected in institutional claims and strategies, these features are also less likely to be discarded in the face of external or internal pressures – hence they will become increasingly "enduring".

Research on organizational identity has shown how organizational features that are perceived as central and distinctive to an organization tend to influence how strategic decisions unfold (see Lerpold et al., 2007 for a review). According to Whetten (2006), organizational identities are most likely to be invoked in novel, consequential strategic choices, expected to have a profound effect on the organization. Ravasi and Schultz (2006) have shown how changes in the competitive environment may be perceived as "identity threats" – and addressed as such – to the extent that they challenge the viability of central, enduring and distinctive features of an organization. Under these circumstances, organizational leaders would try to maintain a consistency between the past and current identity of the organizations, and its future evolution. While not always conscious, this drive reflects a fundamental human need to maintain direction and cohesion in action (Ashforth and Mael, 1996). As new strategic issues arise, then, organizational members are likely to look for responses that are perceived as coherent with the identity of the organization. Identity-referent technological features may inspire, orient, or even constrain the search for solutions. At Scania, for instance, as concerns for general safety in the case of collision arose throughout Europe and truck manufacturers were expected to find solutions, designers proposed a reinterpretation of the traditional bonneted cab, which used the front "nose" to buffer the impact of the crash and reduce

damages to other vehicles (Brunninge, 2007).

This is not to say that, in presence of strongly held organizational identity referents, strategic change will be impossible, but that strategic decisions would need to pass a test of coherence with the extant self-referential mental models of organizational members and with established patterns of activities (Nag et al., 2007). In this respect, organizational identities that are based on stringent definitions and few, narrowly understood identity referents may restrain the capacity of organizational leaders to envision new identity-congruent patterns of activities in the face of changing external conditions. Conversely, the adaptability of an organization may be increased by the inclusion among identity referents of broader, process-based technical capabilities, rather than specific technological features. Despite the immense popularity and success of products such as Post It and the Scotch tape, for instance, 3M was always considered by its members an "innovation company", rather than an "adhesive company", allowing for continuous growth and exploration of new technologies and businesses (Canato, 2008)

An additional source of enduringness for identity beliefs comes from their possible inclusion in formal organizational claims. Under normal circumstances, attempts to deliver a favourable image of the organization to its various audiences are likely to draw – more or less consciously – on members' beliefs about what is essential and distinguishing of their organization. By doing so, members genuinely manifest their beliefs and aspirations about the organization (Hatch and Schultz, 1997, 2002), try to avoid dangerous incongruence between what they claim and what they believe their organization really is and does (van Riel, 1995), and possibly search for consensus based on convergence of values with external audiences (Scott and Lane, 2000).

To the extent that certain features – including technological features – are perceived as central and distinguishing, therefore, they are likely to surface in organizational communication. Think, for instance, of the traditional emphasis of Benetton on colour (as summarized in the tagline "United Colours of Benetton", but also reflected in the image selected for advertising campaigns, etc.),

reflecting the organization's unique dyeing technology, or the emphasis of Toyota on quality, reflecting its massive efforts in developing superior manufacturing techniques. To the extent that these claims come to shape external constituents' interpretations and expectations about the organization, members' collective sense of self may be reinforced by "mirroring" in these external images (Hatch and Schultz, 2002), and members themselves may be reluctant to revise their identity referents for fear of confusing organizational audiences and losing their support.

Finally, research has provided robust evidence of a more general unwillingness of organizational members to drop features that are perceived as part of the identity of the organization, even in the presence of deliberate attempts of organizational leaders to change collective self conceptualizations (e.g. Humphreys and Brown, 2002; Nag et al., 2007). The replacement of identity referents or the introduction of new features that are perceived as incoherent with the identity of the organization may threaten members' sense of self and continuity, therefore eliciting emotional resistance to the proposed changes (Whetten and Mackey, 2002). New features may also require an adaptation of current mental models, unleashing the opposition of confused members who are required to revise their understanding of what the organization is and what it stands for (Reger at al., 1994). Also, organizational changes that touch identity-relevant features may be resisted as it may result in an alteration of established working practices and social relations that are underpinned by the identity of the organization (Nag et al. 2007).

Based on these considerations, we argue that technological features that are internally perceived as central and distinctive characteristics for the organization, would display a natural tendency to resist change even against commercial, technical and economic considerations:

Proposition 5. *The inclusion of a certain technological feature among identity referent will increase the likelihood that it will be retained over time even in the face of external or internal pressures for change.*

In summary, in this section, we have pointed at how past research on organizational identity has

observed how identity-related features are likely to be preserved over time. In part this occurs because of a more or less explicit resistance of members to proposed organizational changes that question the set of referents over which their conceptualization of the organization is built. In part this occurs more subtly as, under normal circumstances, strategic decisions as well as organizational claims tend to reflect and build on current identity beliefs. In doing so, these decisions commit the organization to the preservation and reinforcement of these features, as strategic decisions will be backed up by investments and organizational communication will create expectations that will have to be met. In this respect, while the a claim of endurance was initially proposed as a constitutive requirement for "true" identity features, these observations seem to indicate that endurance may as well be both an antecedent *and* a consequence of the inclusion of a feature in the identity of an organization.

5. Discussion and conclusions

Organizational research on technology suggests that, in addition to the requirements that organizational technologies pose on organizational structures and processes – as first evidenced by Joan Woodward – social schemata and social structures themselves tend to affect how technologies are developed and used in organizations.

In this paper, we have investigated some antecedents and consequences of the inclusion of certain technological features of an organization among organizational identity referents – that is among those features that are likely to be part of collective self-conceptualizations of an organization. Based on the idea that identity referents are characterized by centrality, distinctiveness and enduringness, we have identified potential antecedents in the foundational nature of a technological feature, its centrality in the model of interaction between the organization and its environment, its association with past achievements, and its social acknowledgement. We have also

argued how the inclusion of a technological feature among identity referents is likely to feed back on the endurance of the feature, with reinforcing effects on their identity-related status.

The claim of endurance has been the subject of an intense debate, as some scholars challenged the notion that identity is comprised only of those features that are preserved over time, even when everything else changes (Corley et al., 2006). Advocates of a social construction perspective, such as Dennis Gioia and colleagues, have observed how organizational adaptation to a changing environment may require a periodic renegotiation of the fundamental understandings shared by its members (Gioia and al., 2000). While formal claims may remain the same, then, the underlying meanings may evolve along with expectations and demands from the environment. Recently, in a contribution aimed at clarifying and strengthening the notion of organizational identity, David Whetten has addressed these concerns about the rigidity of a strict interpretation of the concept endurance by observing how even relatively "recent" feature may come to be perceived as identity referent insofar as they are associated to "irreversible commitments" – i.e. to decisions that clearly signal the intent of an organization to commit to a certain feature and to make it central to its policies and practices (Whetten, 2006).

In this paper, we build on this discussion – and on the analysis carried out in the previous sections – to suggest a partially different view. We propose to consider endurance not as an input, but as an outcome of the process that leads a certain organizational feature to be included among identity referents. In other words, we argue that a given feature is not considered an identity referent simply because it has been around for a long time, but that it will be retained over time even amid other changes exactly because it is considered an identity referent – i.e. something that is central and distinguishing for the organization. In the specific case of technological features, we argue that the willingness to preserve a given technological feature is a choice that organizational members have to face at different points in time, as changes inside and outside the organization come to question current ways of designing products, of producing them, etc. If we accept this notion, then

endurance can be conceived as a consequence of a more or less explicit understanding of a given technological feature as central and distinctive to an organization. In turn, because of the implications described in the previous section (i.e. emotional and cognitive resistance, salience to strategic decisions, and centrality in projected images) the inclusion of a certain technological feature among identity referents will result in the retention of this feature even when other opportunities for technological change may arise. Organizational strategies will build on and strengthen these technological features and the business model that rests upon them. Their incorporation in organizational communication will reinforce internal commitment to and external acknowledgement of them as distinguishing feature of the organization. This path will ultimately lead to the stabilization of technologies in organizations, as the identification of a specific set of technological knowledge as relevant cognitive dimensions of the organizations would make organizational leaders and members less willing to abandon established configurations and induce them to continue over the same technological trajectory.

While organizations may be reluctant to dispose of identity referents, they may eventually do so under intense internal or external pressure. As the case of Scania illustrates, however, this may not occur easily. Other times, such as in the case of Piaggio and the steel frame of Vespa scooters, identity-related technologies survive contingent adverse conditions and are eventually preserved through short-term, or short-sighted, pressures. As the case of Polaroid described by Tripsas and Gavetti (2000) seems to indicate, however, it is not uncommon that the stubborn refusal to challenge central, foundational, distinguishing technological features of the organization eventually results in undermining the very conditions of its survival in the face of radical environmental changes.

We believe that our emerging framework may contribute to literature in both the fields of technology and organizational identity. On the one hand, we expand studies of technology in organization by tracing a link between technological features and some of the cognitive structures,

namely organizational identity beliefs and understanding, which drive individual as well as collective behaviour in organizations. More specifically, we observe how, under certain conditions, technological features may become embedded in relatively shared and emotionally laden members' conceptualizations of what the organization is and stands, which in turn will lead to consolidate the incorporation of the feature in organizational processes and products. In doing so, our paper expands our understanding of the cognitive processes that underpin the use, preservation and replacement of technology in organizations. Future research on the conditions that influence the adoption and discard of new technology may try to test our propositions, for instance, by empirically exploring the connections between the diffusion of a given technology within a population of organizations and their categorical identities.

On the other hand, our paper attempts to extend current theorizing on organizational identity, by addressing explicitly the factors that influence the likelihood that a given organizational feature becomes an identity referent and under which conditions this occurs. We have attempted to disentangle the interrelation between centrality, distinctiveness and endurance, by suggesting how the three attributes of identity referents may be tied by longitudinal, mutually constitutive relationships. We are aware that we have only begun to tackle the issue of how certain features – and not others – become embedded in members' beliefs and understandings about the identity of their organization. By no means we consider our potential antecedents as exhaustive of the possible range of factors that cause a certain feature to become an identity referent. We believe that there is still ample room for longitudinal, qualitative studies to investigate in more depth and richness the conditions under which organizational feature acquire – or lose – enduringness. In particular, future research may want to shed more light on multiple feedback effects between certain attributes of technological features and the consequences of these features becoming identity referents – think for instance of the potential relationships between the centrality in projected images and on the social acknowledgement of a certain feature, or the salience to strategic decisions and the centrality

to the business model – which are only foreshadowed in our model and, given space constraints, could not be developed here.

Finally, the processes our model describes seem to occur spontaneously, as certain interpretations – and not others – emerge and consolidate among members. However, research shows that certain actors may have interests in shaping emerging interpretations and do engage in it (e.g. Gioia and Thomas, 1996; Humphreys and Brown, 2002). Indeed, future research, may be aimed at developing a more comprehensive understanding of how relatively "emergent" processes of identity construction, such as those we described in this paper, are affected by deliberate attempts at influencing shared beliefs – and how these two parallel dynamics influence identity constructions in organizations.

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Figure 1. Organizational identity and technology