

Speciation through entrepreneurial spin-off: The Acorn-ARM story

Elizabeth Garnsey^{a,*}, Gianni Lorenzoni^b, Simone Ferriani^b

^a *University of Cambridge, Center of Technology Management, Mill Lane, Cambridge CB2 1RX, UK*

^b *University of Bologna, Management Department, Via Capo di Lucca 24, 40126 Bologna, Italy*

Received 25 April 2006; received in revised form 13 September 2007; accepted 1 November 2007

Available online 22 January 2008

Abstract

Can the concept of speciation explain evidence on how technologies branch and advance? Can evidence on innovation through spin-off usefully inform the concept of speciation? These questions are addressed through a case study of detailed processes enabling the shift of technology to new domains of application. An innovative IT firm developed its own semiconductor technology to remedy supplier deficiencies but it required a joint venture with a completely new business model to adapt and move the technology into new market domains. We propose the concept of techno-organizational speciation to delineate this phenomenon. Competing perspectives on speciation (compatibility, niche and lineage approaches) are found to illuminate the evidence, while complementarities between these conceptual dimensions are revealed by the case. Causal processes uncovered include the following: (1) Techno-organizational speciation through spin-off may be needed to launch a dominant technical standard, compatible with multiple applications. (2) This can be achieved through niche creation from which develops a new business ecosystem. (3) Inherited knowledge together with organizationally based learning foster the branching and renewal of technological lineages.

© 2007 Elsevier B.V. All rights reserved.

Keywords: Spin-off; Technological speciation; Parent–progeny; Technological innovation

1. Introduction

The branching and diversification of related technologies is a feature of technological advance. The firms that incubate and carry innovations also branch and diversify as new firms are spun off from old (Klepper and Sleeper, 2005). The idea that these two processes are closely connected is intuitive, but the association has not been explored in detail in the literature on innovation. This study uses the concept of speciation to explain a case

where the spin-off process stimulated the branching and advance of technologies. The evidence informed theory by delineating the concept of techno-organizational speciation and illuminating its complementary dimensions.

In ecology, speciation describes the process through which a new natural species may emerge as a sub-population adapts to new ecological conditions (Dupré, 2001). Technological speciation refers to a new technology that emerges as an existing technological form is adapted to a new selection environment (Levinthal, 1998). For example, when the Internet expanded its domain from military and academic applications to the world of consumers in the mid-1990s, it was transformed into the World Wide Web (enabled by new standards) reflecting the very different features and

* Corresponding author.

E-mail addresses: ewg11@cam.ac.uk, ewg@eng.cam.ac.uk (E. Garnsey), gianni.lorenzoni@unibo.it (G. Lorenzoni), simone.ferriani@unibo.it (S. Ferriani).

attributes demanded by consumers and firms in the new markets. The shift in domain of application allowed a niche technology to become a global phenomenon and stimulated a host of ancillary technologies.

The concept of speciation can be used to trace continuity alongside discontinuity. In the study of technological innovation, continuity has been depicted in terms of path dependence, the cumulative influence of the past on developments (Arthur, 1990). In contrast, discontinuities in technology are highlighted by the concept of the technological paradigm, which points to cognitive and practical disjunctures that set off the path-breaking trajectories in a new technological paradigm (Dosi, 1984). Technological speciation addresses a spectrum rather than disjuncture: in the lineage of a new technological species there is continuity, but application to a new domain results in discontinuity. Over the last 10 years research on technological speciation has provided several accounts of innovations stemming from the transfer of specific technological know-how to a new domain (Levinthal, 1998; Adner and Levinthal, 2002; Cattani, 2006). Little is known, however, about the actual processes that underlie the transfer of existing know-how into a new domain and allow subsequent adaptation to the selection forces operating there. What micro-developments and decisions prompt the branching of an existing technical lineage? What transformations are required in order for the existing technological know-how to be adapted to new selection forces? How does this process unfold over time?

In this study we address these questions by moving beyond speciation in the incumbent firm, addressed in the literature, to examine an incumbent company that spun out a new venture into a new domain, where different market forces operate. We found that the inherited technology mutated into a distinctive combination of new technology and business capability. We propose the concept of techno-organizational speciation to depict the emergence of a new species of technology and the concurrent crafting of organizational arrangements that allow its successful exploitation in the new market environment. We investigate this dynamic through the exemplar of Acorn Computers and its offshoot ARM, one of the most successful spin-offs in the history of European technology-based industry. The RISC chip (Reduced Instruction Set Computer Chip) launched by ARM has had a major impact in the semiconductor industry, but its core technology was developed in Acorn Computers as a microprocessor for its PC products. At ARM, this microprocessor was licensed as a core adapted to design needs in new market niches, and came to be a new platform technology.

The paper is organized as follows. After an introduction to relevant concepts and literature, we describe the design of our inquiry and go on to outline our case study, in which we present the antecedents to the spin-off of ARM and its outcome. In the interpretation of the evidence we use the concept of speciation as a pattern recognition device to identify generic issues raised by the evidence. We offer an explanation of this instance of technological branching and diversification, and identify organizational conditions conducive to the process of speciation through spin-off that are revealed by the case.

2. Speciation, technological innovation and entrepreneurial spin-offs

The richness of the idea of speciation is not fortuitous but reflects longstanding research using this concept in biology and ecology (Ayala and Fitch, 1997). Darwin's evidence from the Galapagos Islands fed understanding of the detailed process by which one species can give rise to others through natural selection operating in different habitats. Darwin viewed a species not as an entity but as a category to aid classification of the varieties of life forms (Darwin, 1887). There are inevitable differences of perspective on how best to classify living forms, which has resulted in controversy on species boundaries. These differences have outlived Darwin and are reflected in three main (and to some extent competing) approaches to 'species' in the natural world, and corresponding perspectives on the speciation process (Dupré, 2001). Assigning an empirical instance to a category is an endemic classification problem. Judgment is involved in setting such boundaries, whether of natural species or of technological trajectories (Dosi, 1984). We found that three major approaches to identifying natural species also provided relevant criteria for drawing boundaries between types or species of technology.¹

(1) Incompatibilities prevent members of a species' population from inter-breeding with those of other

¹ While we apply the biological framework to understand the nature of the selection environment acting on possible technologies and, in particular, the niche structure of the resource space, we are not assuming a process of blind variation generation. Indeed, the role of intentionality and choice in technology development clearly distinguishes it from processes of biological change. Unlike the blind determinism of natural selection described by Darwin, technology selection processes, when understood by participants, give rise to learning on the part of actors and deliberate efforts to change their selection or opportunity space.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات