Identity dynamics in emerging interstitial fields. The case of the Italian civil drone industry (2013-2018)

Andrea Carlo Lo Verso

University of Bologna

andreacarlo.loverso2@unibo.it

Abstract

The paper explores the process of identity formation in emerging interstitial fields. Interstices are generated when already existing fields happen to overlap, and out of this intersection entirely new fields may spawn. The fragmented and heterogeneous structure of these interstitial fields may pose relevant challenges in the formation of a shared field identity which provides field members with legitimacy. By exploring the role that field level discourse plays in the identity construction process enacted by the organizations populating the field, the paper shows that interstices may be characterized by different thrusts such as symbolic isomorphism and boundary demarcation. The civil drone industry provides adequate empirical materials for exploring these processes, and it allows to shed light on the increasing relevance of professionalism and on the creation of field-specific meanings as key mechanisms to the formation of field identity.

INTRODUCTION

Technological progress is always associated with concerns and debate on the positive and negative

potential effects that innovations may bring about. The introduction of technological novelties is in

fact likely to spur the emergence of organizational fields, namely sets of diverse organizations

which partake in a common meaning system and whose activities often revolve around some

specific issue (DiMaggio & Powell, 1983; Hoffman, 1999; Scott, 1994; Wooten & Hoffman, 2008).

Typically, the emergence of new fields entails the intersection of disparate social world whose

interests and main activities have happen to, at least partially, overlap. Research in fact converges

around the idea that fields emerge at the interstice between other, already existing, fields (Fligstein & McAdam, 2012; Furnari, 2014; Morrill, 2001; Zietsma, Groenewegen, Logue, & Hinings, 2017). The main purpose of the present paper is to shed light on some puzzling factors underlying interstitial emergence. Interstitial emergence is defined here as the process through which new fields may spawn out of windows of social and symbolic interactions originated between two (or more) institutional fields. Thus, in interstitial spaces (Furnari, 2014) a multiplicity of actors, organizational forms and worldviews got blend and may eventually coalesce in a more or less coherent whole. However, because of such multiplicity, a newly formed interstitial field has some major challenge to cope with in order to become an established domain of human activity. Most importantly, new fields need to gain legitimacy (Aldrich & Fiol, 1994), and for this purpose the formation of field-level and organizational identities is key (Clegg, Rhodes, & Kornberger, 2007; Navis & Glynn, 2010). Research, in fact, suggests that organizational and collective identities evolve in tandem during the earliest stage of field emergence (Patvardhan, Gioia, & Hamilton, 2015), and this identity work has a crucial role in enabling the new field to be created and exploited (Clegg et al., 2007). In particular, if in mature fields individual organizations strive for distinctiveness, in emerging fields the identity work enacted by organizations aims to consolidate the new category to which they belong (Navis & Glynn, 2010), so that their identities may tend to be quite similar to one another. This process is highly complicated when the field is emerging from the intersection of existing fields, which are already characterized by well-defined identities. Interstitial emergence therefore may entail rather complex tensions between the need to create a shared identity which gives legitimacy to the new field and the multiple institutional domains which may provide different and even contrasting cultural resources for the definition of such identity. These puzzling dynamics are explored in the emerging field of civil drones, a novel technology which gather many different actors and which has thereby generated an interstice between already existing fields. In particular, the analysis shall show how organizational identity formation during interstitial emergence reverberates with the main issues debated at the field level.

2

INTERSTITIAL EMERGENCE, IDENTITY AND DISCOURSE

New organizational fields often emerge out of interstices between already existing fields. These interstices are generated when the activities, interests and problems of one field spill over into another (Morrill, 2001). The interstitial space so created is a crucible where diverse actors meet and interact with the purpose of establishing practices to deal with their common issues; eventually, once such practices have been negotiated and experimented, an entirely new field may emerge (Furnari, 2014). In short, interstitial fields revolve around newly emerged problems or opportunities concerning a heterogeneous set of actors. Such heterogeneity is a potential source of contention in the ongoing process of defining shared meanings and understandings. Thus, interstitial fields present a highly fragmented institutional infrastructure, characterized by multiple logics and weak isomorphic forces (Zietsma et al., 2017). In fact, organizations and other actors joining a nascent field will bring into it the logics, practices and meaning systems of rather disparate institutional domains. It is therefore likely that these constituencies compose, within the emerging interstitial field, distinct groups or organizational communities, each of which is involved in particular issues and activities. Although such complexity may thwart field coalescence, these organizational communities populating interstitial fields have access to multiple cultural resources which can be recombined, integrated or differentiated in the construction of one amalgamated discourse (Korff, Oberg, & Powell, 2015, 2017; Oberg, Korff, & Powell, 2017).

One central challenge that emerging fields face is the lack of a legitimate and socially accepted identity. Research has put much emphasis on the effort of institutional entrepreneurs and social movements in building one coherent collective identity which acts as a catalyzer of field emergence, and to which organizations joining the field are likely to adhere (Lounsbury, Ventresca, & Hirsch, 2003; Weber, Heinze, & Desoucey, 2008; Wry, Lounsbury, & Glynn, 2011). Alternatively, market categories and organizational forms may emerge more organically from a bottom-up process and represent the focal points for organizations joining a new field to anchor

their self-representations, i.e. their claims on "who are we" and "what we do", to social codes and rules defining the features they are expected to possess (Hsu & Hannan, 2005; Navis & Glynn, 2010).

This means that organizational identities, though aiming to attain some degree of distinctiveness, are subject to a certain level of symbolic isomorphism (Glynn & Abzug, 2002) exerted through those institutional meanings which "provide the raw material from which organizational identities are constructed" (Glynn, 2008, p.420). Organizational fields are the arenas where these raw materials are produced through actors' mutual engagement. Organizational identities are in fact defined in relation to others: through continuous narrations meant to self-present, organizations construct their identities "through comparisons with, references to, and imitation of others" (Sahlin-Anderson, 1996, p.73). However, as explained above, interstitial fields are characterized by rather disconnected or loosely coupled organizational communities which are likely to leverage multiple cultural resources coming from different institutional realms in their identity construction process. This entails an important complication for the formation of a more or less unitary and coherent market category or organizational form that may shape organizational identities. In fact, in such case we may have that some organizations construct their identities by strictly adhering to the institutionalized understandings of other established fields, while other organizations may try to intermingle and reshape these heterogeneous elements. In short, before any organizational form and identity is institutionalized, the embryo of a field is constituted by "amorphously bounded" communities of practice, that just in a subsequent phase may become a recognized similarity cluster (Fiol & Romanelli, 2012). But in the case of interstitial field, there may be contrasting thrusts to identity construction that hamper the formation of one monolithic similarity cluster. Grodal (2018) has shown that in the emerging nanotechnology field core communities, whose identity is strictly dependent on field's meaning system, and peripheral communities, who mostly derive their identity from somewhere else, engaged in a political struggle to expand or contract the social and symbolic boundaries of the field, according to their, possibly conflicting, most pressing interests. What is still

left unanswered is how communities not strictly identified with the core field activities may exert some influence on the identity formation process of the core community specific to the new field. Accordingly, the first research question addressed in the present study is: *How do different groups of organizations populating the emerging interstitial field are engaged with one another in the construction of a field-specific identity?*

Although processes of symbolic isomorphism may be at play, so that organizations may tend to craft their identities to be more or less similar to other actors in the field, organizational fields are not uniquely composed by constituting members (i.e. the organizational population), but also by the discourse which these actors enact. Interstitial fields, because of their emerging nature, are often considered to be issue fields (Zietsma et al., 2017) or centers of debate (Hoffman, 1999; Wooten & Hoffman, 2008). In fact, the emerging problems and opportunities that characterize them draw different members to interact and take each other into account, resulting in ongoing negotiations and in the unfolding of a broader field discourse. Such discursive activities represent the primary source of cultural resources to be deployed, recombined or opposed to one another in order to construct a meaning system of the interstitial field. The role of language, storytelling and the co-creation of an overall discourse (a story world) have therefore been recognized as primary factors in the construction process of organizational identities in emerging fields (Fiol & Romanelli, 2012). In Bourdesian terms, the accumulation of symbolic capital determined by such production, dissemination and consumption of field discourse is crucial for defining the vocabularies of motive needed to construct organizational identities (Oakes, Townley, & Cooper, 1998). Discourse in interstitial fields, being the expression of a varied set of interests and concerns, may be constituted by a number of different issues. Each different kind of actors populating the interstice may therefore be relatively more engaged with some of these issues and accordingly be more influenced by them for the construction of their identities. A thorough exploration of identity construction in interstitial fields must therefore take into account these multifaceted aspects of discourse. The second research

question addressed here is therefore: *How do the issues composing field discourse affect the organizational identities construction process during interstitial emergence?*

DATA & METHODS

Empirical Setting

Civil drones are small pilotless flying vehicles usually equipped with a camera and employed to collect aerial data in a cost-efficient way. This technology has experienced an upsurge in recent years thanks to the increased availability of low-cost sophisticated electronic component. The pioneering phase of this technology was led by hobbyists and aero-modeling enthusiasts who started to assemble these devices, sharing their advancement through open-source communities, and who typically define themselves as *makers* (Anderson, 2012). The commercial exploitability of these objects has subsequently caused a rapid increment in the number of individuals and firms producing or employing drones. Importantly, because of their intrinsic versatility, drones attract a highly heterogeneous set of potential users ranging from video-makers and photographers to surveyors, farmers and construction companies. At some point, the diffusion of this technology has raised the concern of aviation authorities because these small aircrafts started to occupy the airspace in unprecedented ways, entailing non-negligible safety, security, and privacy issues. In 2011, the International Civil Aviation Organization (ICAO) has therefore issued a document which defined civil drones as proper *aircrafts* and delegated national aviation authorities to design specific regulations regarding their employment; the Italian aviation authority (ENAC) has started this regulatory path in 2013, requiring among other things drone users to undergo a registration procedure to be certified as regular operators. The introduction of these rules (issued in 2014), written with an aeronautic language, has flared a rather contentious discursive activity among all the stakeholders connected with the drone industry who are, for the most part, subjects that never had to interact with the aviation domain. Subsequently, the field has evolved through the formation of industry associations whose aim is to mediate between industrial players and the aviation authority;

additionally, specific training programs and flight schools for drone pilots have been formed with the purpose of professionalizing the field and diffusing aeronautic competences.

The origin of the field among communities of hobbyists, the presence of very disparate users coming from already existing fields (e.g. photography and topography), and the heterogeneity of languages and meaning systems which permeate field's discourse, are all straightforward signs of the interstitial nature of the drone field (Furnari, 2014), that give confidence in the appropriateness of this empirical setting for addressing the research questions.

Data collection

The empirical analysis is built on a corpus of textual data composed by two distinct kinds of documents: to chart field level discourse I rely on articles from two most renowned online magazines specific to the Italian drone industry – Quadricottero news (quadricottero.com) and Dronezine (dronezine.it) – that play the role of specialized trade publications; to track the identity dynamics of the field I use organizational identity claims extracted from the websites of organizations regularly registered as drone operators, and listed in the official ENAC database. More specifically, I have scraped the complete collection of posts of the two drone-specific web magazines for a total of 7694 articles, quite evenly distributed between the two (4209 from Dronezine.it and 3485 from quadricottero.com). These articles cover a period between March 2013 and December 2018, reporting news, reviews, editorials, interviews connected to the world of civil drones. They therefore offer a fairly broad view on main issues typically debated in the field, and on what most concerns field participants.

Organizational identity claims are collected by downloading mission statements, and "about us" sections from drone operators' organizational websites. The drone operators' database[1] includes all those organizations and individuals that, from April 2014, intend to use drones for specialized (i.e.

---

[1] openly retrievable from http://moduliweb.enac.gov.it/applicazioni/SAPR/APR_ReportOperatori.asp

non-recreational) purposes. Up to date (December 2018) the database contains about 5000

operators. A random sample of 496 of such operators has been drawn to collect organizational

identity claims representing approximately the 10% of the entire population. The operators'

database also indicates the exact moment in time when each organization has registered to it,

allowing to track with precision the compositional changes of the field through time. In order to

capture the temporal variation of the identity formation process of the field, I have considered that

the field grew in time accumulatively. Therefore, in the following analysis whenever there will be

references to the set of organizations inhabiting the field at time t, I am considering the sum of all

the organizations that were registered as drone operators (i.e. entered the field) at time t, t-1,…, t_0;

for example, the full sample of 496 drone operators is assumed to represent the field composition in

the year 2018. In short, this implies the assumption that over the 5 years that this study embraces,

there have not been exits from the field. Although it appears as a strong assumption, this is justified,

not only by the lack of data on exits, but also by the fact that these identity claims have been

collected over the year 2018: thus, all the organizations included in the sample, even if early

entrants of the field, had their website active in 2018, suggesting that they did not ceased to exist

during the period covered by this study. Furthermore, even if the actual population of drone

operators grew exponentially in these 5 years (see figure 1a below), the growth trajectory of the

sample follows a more arithmetic progression (see figure 1b). This was necessary to have enough

data relative to the first years of the field and provide well-founded insights on those initial

moments.

---FIGURE 1 ABOUT HERE---

Data analysis

The overall analytical approach adopted in the present study is based on vocabulary analysis

(Loewenstein, Ocasio, & Jones, 2012). Vocabularies, through the occurrence and co-occurrence of

keywords, signal the adherence of certain textual materials to the meaning systems underlying

institutions. Concretely, vocabulary analysis may illuminate how, in the construction of their own identities, organizational actors deploy certain sets of symbolic resources revealing the extent to which identity claims refer to certain logics and issue frames; mission statements, in this regards, have already been used as particularly apt data to capture the interrelation between organizational identities and broader societal and institutional discourses (Jha & Beckman, 2017; Ran & Duimering, 2007; Swales & Rogers, 1995). The approach to vocabulary analysis advanced here is articulated in a number of distinct stages and makes use of different text analytical techniques to combine the textual data and to properly address research questions of this study.

Phase 0: Pre-processing. In order to apply text analytical methodologies of any kind it is important to clean up the text corpora. This is done first by eliminating highly frequent words such as articles, conjunctions, modal verbs (e.g. "the", "and", "therefore", "would", etc.[2]). In particular, I also eliminated the word "drone(s)" because its frequent appearance in the texts analyzed here undermines the interpretability of the results. Additionally, also punctuation, short words (less than 3 characters), and very infrequent words (occurring less than 3 times) are eliminated because may add noise to the analysis. This cleaning procedure yielded a data corpus composed by ~ 91000 analyzable words coming from organizational identity claims and a data corpus composed by ~ 1.5 million analyzable words coming from the two webzines.

Phase 1. Identifying organizational groups: cluster analysis. In order to analyze the relative proximities between organizational identity claims data, I first computed cosin similarities measuring on a scale between zero and one how similar the lexicon used in different identity claims is. Then I computed the overall symmetric matrix aggregating all these pairwise similarities, and I applied clustering analysis to it in order to distinguish semantically differentiated groups, conceptually corresponding to distinct organizational communities. Hierarchical clustering evidences that the population of drone operators (represented here by the full sample) is

---

[2] The textual materials in this study are written in Italian, but the exactly the same procedure applies.

characterized by three groups differentiated on the basis of the language they use for defining themselves. Figure 2 shows the dendogram derived through hierarchical clustering, and the three groups that this technique evidences. These three groups have been subsequently classified by extrapolating the most used words in the three clusters derived through hierarchical clustering (see below). Table 1 below shows these word lists. Finally these relative proximities between identity claims are mapped on a 2 dimensional chart, similarly to what already done by Oberg, Korff, & Powell (2017), in order to visualize how the three groups overlap with one another.

---FIGURE 2 ABOUT HERE---

---TABLE 1 ABOUT HERE---

Phase 2. Identifying discourse and issues: topic modeling. In order to understand what the most debated issues at the field level are, I apply a topic modeling procedure to webzines' text corpus that allows to identify latent semantic structures in the large amount of data to analyze, avoiding to be influenced by any prior (Dimaggio, Nag, & Blei, 2013). Topic modeling belongs to the class of unsupervised text analysis techniques: it allows to identify the set of latent topics composing the documents of a corpus through generative probabilistic process, the most used of which is the *latent Dirichilet allocation* (LDA) (Blei, Ng, & Jordan, 2003). The basic intuition behind LDA is that each document is considered as a bag of words that convey certain topics (the number of which is selected by the analyst) and each topic is a distribution over all observed words in the corpus, such that words that refer to documents' core topics have a higher chance of being selected and placed in the document bag (Mohr & Bogdanov, 2013, p. 547). The output of the model thus comprises a matrix listing the most relevant words that compose each topic, and the proportions of how much each topic is present in each document.

Following Nelson (2017), the purely computational procedure of topic modeling is combined with interpretative efforts. This serves to refine the patterns of meaning detected through LDA, by assigning meaningful label to each topic and, through deep reading of part of the textual data, check whether the interpretation of those labeled patterns fits with a more intuitive understanding of the

empirical material. The list of topics' labels can then be used as first order concepts to be grouped in broader second order themes as done in Croidieu and Kim (2018).

After having run several models with 20, 30, 40, 50, 60 and 70 topics, I choose the 60 topics model since it is the one that present less redundant and more fine-grained lists of keywords, easily interpretable as distinguishable topics. Among these 60 topics I choose to focus my analysis on those topics that correspond to issues entailing some level of contention or debate. In fact, these issues are the most relevant in the definition of field identity. I have therefore excluded from analysis topics evidently related with reviews on drone models recognizable because composed by keywords associated with popular brands and companies producing drones. Table 2 below shows the data structure used to derive from those 60 fine-grained topics 6 major issues.

<div align="center">---TABLE 2 ABOUT HERE---</div>

Phase 3. Combining identities and issues: correspondence analysis. In order to understand how the issues identified in the previous phase influence the identity construction process in the drone field, I adopt correspondence analysis that has been used as an effective methodological too to map the interrelations and relative positions between actors populating a field and the discursive elements of the same field (Meyer & Höllerer, 2010). More precisely, the correspondence analysis implemented here is inspired by vocabulary approach (Loewenstein et al., 2012), according to which the reference to given keywords, and the co-occurrence of these keywords in a certain textual unit, can be considered as a proxy to the deployment of specific cultural resources aiming, in this case, at the projection of organizational identity.

This procedure is applied by combining the results of the two previous phases of analysis. In particular, topic modeling allows to extract lists of keywords or dictionaries associated to each issue. In order to do that I have first grouped together the top 50 most used words in each 1st order topic associated to a given 2nd order issue. Then I have eliminated duplicate keywords occurring in more than one topic. Subsequently, in order to avoid overlap among dictionaries, I have eliminated words with generic meaning not clearly referable to a certain issue (e.g. use, activity, possible,

Italian), and if there were words recurring in more than one dictionary I placed those words to the dictionary related to the issue in which the word appears with higher frequency. The result of this procedure is a set of 6 different dictionaries reflecting the keywords connected to the 6 second order issues. All these keywords were subsequently searched throughout the companies' identity claims, and by applying the autocode function of MaxQDA18 (using the paragraph as unit of coding) it has been possible to count the number of times each identity claim makes reference to specific issues. The contingency tables (see Appendix 1) used for implementing correspondence analysis have been created by grouping the identity claims according to the three main organizational groups identified through the clustering analysis outlined above and by plotting them against the issues debated at the field level. Table 3 below illustrates some excerpts from identity claims, showing how certain words (in bold characters), being included in one of the dictionaries, indicate the reference to specific issues (in square brackets).

---TABLE 3 ABOUT HERE---

FINDINGS

Discourse evolution

One of the advantages of topic modeling is that it allows to explore with precision how the relative importance of topics may change through time. In order to appreciate this temporal evolution I have first aggregated 1st order topics belonging to the same 2nd order issue, then I have averaged the weight of these topics and normalized this average by the number of articles published every year, not to have a bias depending on the fact that in some years there were more articles than in other years. The results of this analysis are shown in figure 3 below which evidences a number of worth-remarking temporal patterns.

It first appears clear that in 2013, before any regulation was introduced, drones were mostly considered as technological devices that were useful for some reason. This is clear because the

issues of technology and solution are the most relevant one at that time. The extracts below are quite representative of the kind of issues that were mostly debated in the field before 2014:

One of the crucial components that guarantees the promptness of the response is the speed variator, or ESC (electronic speed control) that is the electronics that receives the input from the radio and based on this controls the speed of the electric motor [Dronzine 2013/July].

Connecting together the many wires of the ESC regulators is often problematic because of the large diameter of the connection which, by dissipating the heat of the tip of the welder, does not allow a correct welding, risking to "cold" weld with catastrophic consequences in the event that the welding breaks up in flight [Quadricottero news 2013 / April].

Multirotor drones are an ideal tool for performing monitoring and surveying landslides and for geological studies in general [Quadricottero news 2013 / April].

Things changed dramatically in 2014 when ENAC introduced the first regulation. For the first time drone users found themselves forced to deal with a set of rules, norms, and requirement inspired by civil aviation even if most of these users were not acquainted at all with aeronautic language. Among other things, the first regulation introduced an entry barrier in the field by requiring drone operators to undergo a formal training on the rules of the air. This this was an impulse for the establishment of a large number of schools (typically aero clubs) that were in charge of providing anyone who wanted to use drones professionally with basic aviation knowledge needed to obtain the certification of drone operator. This is clearly reflected in the prominence that the issues of rules and training gained in the years 2014 and 2015. The extracts below show the kind of discursive activity that was generated around these issues:

The Regulation sets the safety level requirements on all what regards operations, starting from the objective of establishing requirements that allow to carry out operations that do not entail any risk for third parties on the ground and in the air higher than what has been hitherto accepted for traditional aviation operations [Quadricottero news 2014 / April].

The BNUC-S course not only provides the theoretical knowledge necessary for pilots of small drones, but also enables

them to compile the operation manual, an essential prerequisite for any relations with ENAC and the insurance companies. [Dronezine 2014 / November].

From 2016 onwards, the issues related with rules and training started to decline in their importance. this can be explained by the fact that, after an initial period in which the regulator issued two different regulations and a number of amendments to those regulations, entering the drone field for companies or individuals had become easier: for example, a rule introduced in 2016 allowed drone operator using drones lighter than 300 grams to obtain their certification without undergoing formal training and without being compelled to draft certain documents. In that same period, the whole procedure to obtain a certification has been simplified since the regulator launched an online application for submitting the formal request to become drone operators. Additionally, the regulator introduced the so-called standard scenarios namely standardized classes of risk that aimed to further speed up the process of certification release. These and others regulatory changes determined an upsurge in the number of certified operators from 2016 onward (see figure 1a), and a consequent relative disengagement of those new operators from the issues related with regulation and training. These changes are represented in the extracts below:

The new integrative note by ENAC describes how it is possible to reduce or even omit the practical training only for non-critical operations at the sole discretion of the Training Centers. Other facilitations are provided for those in possession of aeronautical or equivalent qualifications [Dronezine 2016 / November].

ENAC is developing a standard reporting system that goes beyond the NOTAM[3] approach. The release times of the NOTAMs appear to be incompatible with the operation of small drones and it is therefore necessary to set up an ad-hoc airspace management system. [Quadricottero news 2016 / October].

---

[3] NOTAM stands for NOtice To Air Men, a standard aeronautic procedure needed to signal any potential hazard in flight routes, that have to be filed by the regulator whenever drone operators want to work in portions of the airspace subject to some restriction.

To sum up, the discursive evolution in the drone field has been greatly marked by the activities of the regulator who first introduced entry barriers, not simply deriving from some legal requirement, but critically connected with an entire meaning system, the aviation one, that was superimposed over the entire field. Importantly, after an initial period of turmoil, these rules became less and less strict consenting an increasing number of actors to join the field. This is reflected in the fact that issues related with rules and trainings reduced their importance while other issues maintained their relative weight or, as in the case of business, even increased it.

<div align="center">---FIGURE 3 ABOUT HERE---</div>

Mapping clusters' identities

The clustering analysis outlined above allows to identify three different groups of organizations populating the drone field. In order to understand the differences between these three groups I have extracted the most frequent words used in the identity claims of organizations belonging to them. These sets of keywords, listed in table 1 below, present some crucial differences. In fact, it is possible to identify a first group of organizations which I labeled as *drone-specific*. In this group some of the most frequent words are related with piloting, ENAC, flights, and so on, which are semantic elements strictly related with the object drone and its implications. In other words, it is possible to conceptualize this first group as encompassing all the organizations and companies whose core business and activities are primarily based on drones. The second group of organizations instead has been labeled *technical-service* because its distinguishing keywords are related with surveys, design, research, i.e. with specialized activities that can be performed through drones. However, it is very likely that these organizations, at least in part, are not native in the drone field since they probably come from adjacent fields such as topography, engineering and architecture who happened to use drone has one additional tool for their core activities. The third group of organizations has been labeled *video-communication* because its keywords hint that their main activities are related with filming, photography, web marketing, and so on. Even in this case it

<div align="center">15</div>

is likely that the organizations belonging to this group are not native in the drone field; they are in fact in most cases photographic studios, video makers, and other actors whose existence is independent of drones.

For this reason, in the following analysis I will take the drone-specific group as the focal organizational community, so that the identity dynamics described below will mostly refer to this group. Figure 4 below shows the overlaps between the three groups populating the drone field across time: the ellipses represent the area within which organizations belonging to a specific group are included with a 95% confidence interval. What emerges distinctively from a visual inspection of figure 4 is that initially (especially in the years 2014-2015) the overlap between the 3 different groups was very relevant suggesting that, even if the main activities performed by these organizations probably differed with one another, the lexicon and semantic elements used to describe themselves did not change dramatically across organizational groups. In the following years instead, a different trend is evidenced: in the years 2016-2018 there is an increasing disconnection between the drone-specific and the video-communication groups, while the overlap between the drone-specific and the technical-service groups remains more or less constant.

This result can be interpreted in a twofold way. First, drone-specific organizations increasingly distanced themselves from companies providing services related with photography, video making, communication. This is probably due to the fact that the use of drones for making photos and videos has been very often associated with possible invasions of privacy, lack of professionalism, and ignorance of the rules. This is epitomized in the many articles from the 2 blogs reporting news of inadvertent wedding photographers or tourists that caused accidents and posed potential risks by using drones as flying cameras in scenarios that were not safe and rule compliant. Contrariwise, applications related with professionalized activities such as topography, technical inspections, surveys, have often been promoted at the field level discourse as the most legitimate and potentially beneficial use of drones.

Second, it is also the case that the new entrants in the drone field interested in video making and communication, from a certain point onward, strikingly after that the legal and semantic entry barriers were lowered, ceased to adopt a lexicon and a vocabulary that emphasized the typical features of drone-related activities. In short, these trends suggest the presence of a mechanism in the field-specific identity dynamics that we may label *engagement with professionalism*, because actors in the drone-specific group nurtured a relevant overlap with the semantic categories distinctive of those organizations that provide highly specialized services. This mechanism is also evident in the field level discourse as the excerpts below show:

The use of remotely piloted aircraft in Geomatics is growing exponentially thanks to the advantages that these vehicles present precisely in land survey. The technology of RPA (drones) and of the sensors used allows today Engineers, Surveyors, Architects, Geologists and Agronomists to carry out measurements and surveys of great precision and with absolutely affordable costs. This particular sector of aerial work is surely one of the most important among those that can be carried out with the RPAS [Dronezine 2015 / October]

Aero-photogrammetry is one of the most important techniques that is benefiting from the technological development of remotely piloted aircraft systems, as well as one of the business niches on which many professional drone manufacturers are directing their investments in terms of research and development. [Quadricottero news 2016/October]

---FIGURE 4 ABOUT HERE---

Mapping identities vs. issues.

The previous set of results highlights how different communities and organizational groups populating the drone field resemble to each other in the use of language for defining themselves and building their identity. In order to answer the second research question of this study it is necessary to go more in depth with the meanings associated to those words that organizations in the drone field use to define themselves. This is accomplished by taking advantage of what found through topic modeling, that is, a set of dictionaries specific to certain relevant issues debated in the field. This is done by applying correspondence analysis which consents to map how different classes of

actors are more proximate than others to specific issues. Correspondence analysis allows to compare on a two-dimensional plane the relationships between categorical variables which may take on many different values. In our case the variables are groups' identities and field issues, and the entries of the two-way tables (see appendix 1) represent the number of times a certain issue is mentioned in the identity claims of each organizational group. Some caution is needed in the interpretation of these maps: in correspondence analysis the relative proximity between two points is not per se a correct criterion to infer an association but what matters is the scalar product of the vectors connecting the two points with the origin of the x and y axes. In other words, two points are more strongly related the acuter is the angle between the lines connecting them with the center of the map and the greater is the distance of those points from the center of the map (Greenacre, 2007). Additionally, it must be highlighted that correspondence analysis, differently from standard statistical techniques such as regression analysis, does not presuppose a causation path through which independent variables impact a dependent variable. On the contrary, this technique is very well-suited to analyze social dualities whereby two discrete domains are intermingled in a co-constitutive process (Mohr, 2013). In the present case therefore, field's identities are defined by their association with discourse issues, and issues are defined by their relationship to identities. The correspondence analysis performed here, and displayed in figure 5 below, evidences that organizations in the drone specific community increasingly made reference to the issues associated with rules, definition, and training. On the other hand, the community of technical service organizations is always strictly associated with technology and business, while the community of video communication organizations appears to be consistently associated with the issues of solution and business. Clearly these 2 latter communities, not primarily engaged with drones and their implications, build their identities by leveraging strictly pragmatic issues. The increasing association of drone specific identity with the issues of rules, training and definition signals the impact that the aviation sector had on the meaning system of the emerging drone field. However, making reference to the fact that an organization is compliant with the regulation on drones issued

by ENAC, that its pilots are trained, and that the flying objects that they use are often defined as remotely piloted aircrafts, indicates that the drone-specific community is increasingly concerned about emphasizing those conceptual elements that distinguishes it from other kinds of organizations that may use drones as just another piece of work equipment or as a flying camera. Again, since correspondence analysis shows the relative positioning of issues and actors, this process can also be interpreted by considering the fact that organizations not primarily involved in the drone business, after a certain point in time, started to enter the field without necessarily being strongly engaged with the issues dictated by aviation authority. In any case, it is evident that the drone-specific community always makes intensive use of those meanings deriving from the aviation authority to define themselves. For these reasons this identity formation process can be labeled as a mechanism of *conceptual sharpening*: by strengthening the association with issues that pertains to what is the definition of a drone, to how drone pilots and users have to be trained, and to what are the rules applied to the drone operations, the drone specific group builds its identity by increasingly leveraging the concepts meant to develop a knowledge system sustaining field's core meanings. This process is also visible from the increasing disassociation of drone specific identity from the "solutions" issue, that signals a loss of grip of pragmatic issues in the definition of field's focal identity: the different activities that can be performed with a drone progressively became a less relevant identity marker as the field evolved.

---FIGURE 5 ABOUT HERE---

DISCUSSION

The idea that innovations come from novel combination of already existing elements is well established since Schumpeter's seminal works. Analogously, institutional and social innovations derive from the encounter of diverse constituencies which get mutually engaged in a dialectical process that gives rise to novel meanings and beliefs (Hargrave & Van de Ven, 2006). Interstitial field emergence is a rather neglected, but theoretically generative research area (Hinings, Logue, &

Zietsma, 2017) which sheds light on the process through which new organizational field are generated at the intersection of already existing fields. Organizational identity construction plays a crucial role in the legitimation of emerging fields (Clegg et al., 2007; Navis & Glynn, 2010; Patvardhan et al., 2015), but the heterogeneity of interstitial spaces surely represents a puzzling factor affecting this process. The present study therefore tried to further our understanding of interstitial emergence, by emphasizing the role of field discourse as the source of cultural resources that different actors may deploy in forging and projecting their identities. The present study complements and expands results of previous research on the identity formation process of emerging fields. Core organizational groups in emerging fields have been found to strive for being legitimized through a professionalization process (Croidieu & Kim, 2018), and to be engaged in the manipulation of symbolic resources shaping field boundaries (Grodal, 2018). The findings reported above show that these processes can be driven by actors' use of language and reference to certain issues debated in field's discourse for their self-definition. In particular, this process of identity construction appears to be shaped by two fundamental mechanisms: engagement with professionalism and conceptual sharpening. On one hand, drone specific organizations are observed to adopt a linguistic register proximate to organizations providing technical and specialized services, on the other hand they also make use of keywords that resonate with conceptual issues. The joint working of these two mechanisms outlines a complex interstitial emergence process through which field-specific organizations in their identity construction are influenced by already existing field (such as topography) but they also strive for gaining some distinctiveness from these already existing fields, by leveraging cultural resources which are meant to create a field-specific body of knowledge. This is not a problem of optimal distinctiveness though, first because such process takes place at the field level, not a the organizational one; second, because organizations belonging to an emerging interstitial field do not have a well-formed category of reference the conformity to which may somehow counterbalance their need for uniqueness. In such situation, in fact, those very meanings that define the category are still largely to be institutionalized. In this

sense the identity construction process of organizations populating an interstitial field is driven both by symbolic isomorphism (Glynn & Abzug, 2002) and by a more agentic process of discursive meaning-making.

These considerations may help to further shed light on a puzzle concerning emerging fields. It is generally accepted that in emerging fields isomorphic pressures are weak (Zietsma et al., 2017). However, it is also the case that the identity dynamics in emerging fields aims primarily at building some critical mass to create consensus around the new organizational form and provide legitimacy to the whole field. This implies that even in early stages of field development there may be an overall tendency to conform to one another. Research has recently shown in fact how isomorphism can be a highly relevant factor in emerging fields and industries that need to gain some minimal level of consensus to flourish (Mezias & Schloderer, 2017). The results of the paper seem to provide some more clarification on this process thanks to the particular focus on the interstitial nature of emerging fields. Interstitial fields are in fact populated by organizations coming from already existing fields (e.g. topography and photography), which have well-formed identities and institutional meanings that organizations specific to the new field may glean, imitate or recombine to construct their own identity. Therefore, it may well be the case that a certain level of symbolic isomorphism acts to forge field-specific identities that somehow resemble, in the linguistic register adopted, the identities of the other fields whose interests and activities overlap in the interstice. The results of the paper (which are surely affected by the specificity of the empirical setting) suggest that the strongest isomorphic influence is exerted by those communities characterized by a higher degree of professionalism.

The second set of results instead points to a different process. Shifting the attention from the linguistic register to the meaning of the keywords used to project organizational identities, it appears that the communities populating the interstitial field act quite differently from one another. In particular the drone-specific group has a unique, and increasing through time, tendency to make reference to keywords associated to conceptual themes that are related to the creation of a field-

specific body of knowledge and to the demarcation of symbolic boundaries. On the other hand, communities connected to other existing fields, who have therefore well-formed symbolic boundaries and field-specific knowledge, build their identities by leveraging more pragmatic issues. This process, which has been named conceptual sharpening, is very different from the former mechanism of isomorphic engagement with a professionalized group. In this case in fact the construction of identity is driven by the discourse ongoing at the field level. Thanks to this discourse, field-specific meanings are generated and these meanings are then incorporated into field-specific identity. Although the results are aggregate and can give just a sense of the broad processes involved, the important conclusion that can be drawn from them is that interstitial emergence implies the construction of field identities which are both strongly affected by other existing field (and their already existing identities), and also by meanings generated *de-novo* through discourse, which are conveyed in identity claims.

REFERENCES

Aldrich, H. E., & Fiol, C. M. (1994). Fools rush in? The institutional context of industry creation. *Academy of Management Review*, *19*(4), 645–670.

Anderson, C. (2012). *Makers. The new industrial revolution*. New York: Crown Business.

Blei, D. M., Ng, A. Y., & Jordan, M. I. (2003). Latent Dirichlet allocation. *Journal of Machine Learning Research*, *3*(Jan), 993–1022.

Clegg, S. R., Rhodes, C., & Kornberger, M. (2007). Desperately seeking legitimacy: Organizational identity and emerging industries. *Organization Studies*, *28*(4), 495–513.

Croidieu, G., & Kim, P. H. (2018). Labor of love: Amateurs and lay-expertise legitimation in the early U.S. radio field. *Administrative Science Quarterly*, *63*(1), 1–42.

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, *48*(2), 147–160.

Dimaggio, P., Nag, M., & Blei, D. (2013). Exploiting affinities between topic modeling and the sociological perspective on culture: Application to newspaper coverage of U . S . government arts funding. *Poetics*, *41*(6), 570–606. https://doi.org/10.1016/j.poetic.2013.08.004

Fiol, C. M., & Romanelli, E. (2012). Before identity: The emergence of new organizational forms. *Organization Science*, *23*(3), 597–611.

Fligstein, N., & McAdam, D. (2012). *A theory of fields*. New York: Oxford University Press.

Furnari, S. (2014). Interstitial spaces: Microinteraction settings and the genesis of new practices between institutional fields. *Academy of Management Review*, *39*(4), 439–462.

Glynn, M. A. (2008). Beyond constraint: How institutions enable identity. In R. Greenwood, C. Oliver, K. Sahlin, & R. Suddaby (Eds.), *The Sage Handbook of Organizational Institutionalism* (pp. 413–430). Thousand Oaks, CA: Sage Publications.

Glynn, M. A., & Abzug, R. (2002). Institutionalizing identity: Symbolic isomorphism and organizational names. *Academy of Management Journal*, *45*(1), 267–280.

Greenacre, M. (2007). *Correspondence analysis in practice* (2nd ed.). Boca Raton: Chapman & Hall/CRC.

Grodal, S. (2018). Field expansion and contraction: How communities shape social and symbolic boundaries. *Administrative Science Quarterly*, *63*(4), 783–818.

Hargrave, T. J., & Van de Ven, A. H. (2006). A collective action model of institutional innovation. *Academy of Management Review*, *31*(4), 864–888.

Hinings, C. R. B., Logue, D., & Zietsma, C. (2017). Fields, institutional infrastructure and governance. In R. Greenwood, C. Oliver, T. B. Lawrence, & R. E. Meyer (Eds.), *The Sage Handbook of Organizational Institutionalism* (2nd ed., pp. 170–197). Thousand Oaks, CA: Sage Publications.

Hoffman, A. J. (1999). Institutional evolution and change: Environmentalism and the U.S. chemical industry. *Academy of Management Journal*, *42*(4), 351–371.

Hsu, G., & Hannan, M. T. (2005). Identities, genres, and organizational forms. *Organization*

Science, *16*(5), 474–490.

Jha, H. K., & Beckman, C. M. (2017). A patchwork of identities: Emergence of charter schools as a new organizational form. *Research in the Sociology of Organizations*, *50*(Emergence), 69–107.

Korff, V. P., Oberg, A., & Powell, W. W. (2015). Interstitial organizations as conversational bridges. *Bullettin of the Association for Information Science and Technology*, *41*(2), 34–38.

Korff, V. P., Oberg, A., & Powell, W. W. (2017). Governing the crossroads: Interstitial communities and the fate of nonprofit evaluation. In B. Hollstein, W. Matiaske, & K.-U. Schnapp (Eds.), *Networked governance* (pp. 85–105). Berlin: Springer.

Loewenstein, J., Ocasio, W., & Jones, C. (2012). Vocabularies and vocabulary structure: A new approach linking categories, practices, and institutions. *Academy of Management Annals*, *6*(1), 41–86.

Lounsbury, M., Ventresca, M., & Hirsch, P. M. (2003). Social movements, field frames and industry emergence: A cultural-political perspective on US recycling. *Socio-Economic Review*, *1*(1), 71–104.

Meyer, R. E., & Höllerer, M. A. (2010). Meaning structures in a contested issue field: A topographic map of shareholder value in Austria. *Academy of Management Journal*, *53*(6), 1241–1262.

Mezias, S. J., & Schloderer, F. (2017). Achieving minimal consensus for new industries: Bringing isomorphism back in. *Research in Organizational Behavior*, *48B*(How Institutions Matter!), 145–171.

Mohr, J. W. (2013). Bourdieu's relational method in theory and in practice: From fields and capitals to networks and institutions (and back again). In *Applying Relational Sociology* (pp. 101–135). https://doi.org/10.1057/9781137407009_5

Mohr, J. W., & Bogdanov, P. (2013). Introduction-Topic models: What they are and why they matter. *Poetics*, *41*(6), 545–569. https://doi.org/10.1016/j.poetic.2013.10.001

Morrill, C. (2001). *Institutional change through interstitial emergence: The growth of alternative*

dispute resolution in American law, 1965-1995.

Navis, C., & Glynn, M. A. (2010). How new market categories emerge: Temporal dynamics of legitimacy, identity, and entrepreneurship in satellite radio, 1990-2005. *Administrative Science Quarterly*, *55*(3), 439–471.

Nelson, L. K. (2017). Computational grounded theory: A methodological framework. *Sociological Methods & Research*, 004912411772970. https://doi.org/10.1177/0049124117729703

Oakes, L. S., Townley, B., & Cooper, D. J. (1998). Business planning as pedagogy: Language and control in a changing institutional field. *Administrative Science Quarterly*, *43*(2), 257–292.

Oberg, A., Korff, V. P., & Powell, W. W. (2017). Culture and connectivity intertwined: Visualising organizational fields as relational structures and meaning systems. *Research in the Sociology of Organizations*, *53*(Structure, Content and Meaning of Organizational Networks), 17–47.

Patvardhan, S. D., Gioia, D. A., & Hamilton, A. L. (2015). Weathering a meta-level identity crisis: Forging a coherent collective identity for an emerging field. *Academy of Management Journal*, *58*(2), 405–435.

Ran, B., & Duimering, P. R. (2007). Imaging the organization. Language use in organizational identity claims. *Journal of Business and Technical Communication*, *21*(2), 155–187.

Sahlin-Anderson, K. (1996). Imitating by editing success: The construction of organizational fields. In B. Czarniawska & G. Sevón (Eds.), *Translating Organizational Change* (pp. 69–92). Berlin - New York: de Gruyter.

Scott, W. R. (1994). Conceptualizing organizational fields: Linking organizations and societal systems. In H. U. Derlien, U. Gerhardt, & F. W. Scharpf (Eds.), *Systemrationalitat und partialinteresse* (pp. 203–221). Baden Baden, Germany: Nomos Verlagsgesellschaft.

Swales, J. M., & Rogers, P. S. (1995). Discourse and the projection of corporate culture: The Mission Statement. *Discourse & Society*, *6*(2), 223–242.

Weber, K., Heinze, K. L., & Desoucey, M. (2008). Forage for thought: Mobilizing codes in the movement for grass-fed meat and diary products. *Administrative Science Quarterly*, *53*(3),

529–567.

Wooten, M., & Hoffman, A. J. (2008). Organizational fields: Past, present and future. In R.

Greenwood, C. Oliver, R. Suddaby, & K. Sahlin (Eds.), *The Sage Handbook of Organizational*

Institutionalism (pp. 130–147). London: SAGE.

Wry, T., Lounsbury, M., & Glynn, M. A. (2011). Legitimating nascent collective identities:

Coordinating cultural entrepreneurship. *Organization Science*, *22*(2), 449–463.

Zietsma, C., Groenewegen, P., Logue, D., & Hinings, C. R. (Bob). (2017). Field or fields? Building

the scaffolding for cumulation of research on institutional fields. *Academy of Management*

Annals, *11*(1), 391–450.

TABLES AND FIGURES

Table 1: top 20 most frequent words in the 3 organizational groups

| DRONE-SPECIFIC	TECHNICAL-SERVICE	VIDEO-COMMUNICATION
aerial	service	video
video	technical	production
footage	sector	service
ENAC	system	web
service	activity	footage
fly	studio	create
pilot	company	customer
professional	customer	studio
system	survey	communication
inspection	design	aerial
use	experience	company
survey	offer	photographic
monitoring	firm	event
remote	year	photography
sector	develop	site
activity	operate	produce
rpas	safety	image
offer	research	professional
safety	new	photo
high	work	work

Table 2: Data structure

| ILLUSTRATIVE TOPIC VOCABULARIES	FIRST ORDER TOPIC LABEL (derived from topic vocabularies)	SECOND ORDER ISSUE	SHORT DESCRIPTION
Topic #46 dollars project thousand company millions kickstarter crowdfunding lily projects funds idea startup platform campaign	Funding	BUSINESS	Business and market opportunities deriving from drones
Topic #59 market sector company development years world companies services year production firm growth business products	Market		
Topic #3 remote piloting aerial aircrafts civil vehicles aircraft small systems aviation use multirotor scope	RPAS	DEFINITION	Defining features of a drone, distinguishing it from traditional aircrafts or RC models
Topic #4 fixed wing autonomy meters minutes speed about take-off uav aircraft landing helicopter ground weight	Drone-type		
Topic #17 regulation enac grams category people weight pilot limit rules italy draft meters fly easa	Regulation	RULES	Regulations, certification procedures, and all what regards the regulatory activities on drones
Topic #21 enac operations apr critical regulation rpas operator pilot authorization activity scenarios must specialized vehicles	Certification		
Topic #35 territory survey university photogrammetry data analysis surveys information software systems image points techniques management	Mapping analysis	SOLUTIONS	All the possible applications for which drones are useful
Topic #50 inspections inspection bridges structures bridge monitoring possible traditional time thanks infrastructure maintenance costs inspect	Inspections		
Topic #7 video footage aerial images photos high world photography photo photographs taken credit film rai	Video/photo		
Topic #37 engines coils multirotor motor battery parachute esc weight multirotors electronic chassis components control	Hardware	TECHNOLOGY	Technological components constituting drones and the implications of these technologies
Topic #38 flight control autopilot open apm source multirotors bit gps software card arducopter code hardware	Arduino/ open source		
Topic #39 app version firmware mode new update automatic gps possibility android problem ios function possible	Software		
Topic #33 hours university use workshop territory technologies program collaboration study course applications event order engineers	Professional workshop	TRAINING	All what regards educational programs, pilot training, and the development of drone-related knowledge
Topic #25 course pilots enac courses sapr pilot school schools training license education rpa hours practice	Pilot training		

Table 3: Reference to issues in identity claims (companies' names are fictious)

Organizational group	year of entrance	Excerpt of illustrative identity claims
Drone-specific	2015	*DocSys is a team made up of **ENAC** [RULES] qualified **pilots** [TRAINING]and equipped with **aircrafts** [DEFINITION]certified for flight operations, uses the most innovative **technologies** [TECHNOLOGY], is qualified to perform all the operations, services and activities required! The capability to fly over variable heights, the possibility to **shoot** [SOLUTIONS] or perform interventions, make **RPAs** [DEFINITION] an innovative tool with a truly remarkable potential for use.*
	2018	*DopServ was born from the **idea** [BUSINESS] of three friends, engineering students, united by a passion for drones and industrial structures. The **company** [BUSINESS] was awarded with state financing and was selected and recognized as a particularly innovative and interesting **start-up** [BUSINESS]. The company can boast a team of expert **pilots** [TRAINING] qualified by **ENAC** [RULES] for basic and critical operations, industrial and process engineers and experts in 3D modeling and **data** [TECHNOLOGY] processing.*
Technical-service	2016	*TrotterCo is made up of a group of professional geologists and engineers who over the years have **developed** [SOLUTIONS], in different fields, considerable experience and that today can offer a wide range of knowledge regarding interventions in the territory, according to a **technical** [TECHNOLOGY]and engineering perspective. Professionalism, quality of the **projects** [BUSINESS], a continuous tendency to improvement, in synergy with the continuous **technological** [TECHNOLOGY] innovation, are the strengths of our activity.*
	2018	*The **technological** [TECHNOLOGY] evolution applicable to the archaeological analysis was implemented using all the modern **survey** [SOLUTION]and documentation **techniques** [TECHNOLOGY]. Tools that complement the now traditional optical levels and total station, are the differential **GPS** [TECHNOLOGY] and the drone for aerial **photography** [SOLUTIONS]and **photogrammetry** [SOLUTIONS] that allow a fast and precise collection of measurements on the ground.*
Video-communication	2015	*Vivocam is a **company** [BUSINESS] specialized in **film** [SOLUTIONS], advertising, television and documentary **video recordings** [SOLUTIONS] for which it uses, in addition to the traditional instruments, also the latest innovative image stabilization **technologies** [TECHNOLOGY] used on **RPAS** [DEFINITION] (Remotely Piloted Aircraft System), better known as Drones.*
	2017	*Since 2001, VicCelery Studio has been operating in the **photography** [SOLUTIONS] **industry** [BUSINESS], paying particular attention to the constant search for innovative solutions. We work with top-level instruments aiming at an optimal **result** [SOLUTIONS] in every situation, because photographs tell an important part of your story!*

Figure 1: Number of registered drone operators
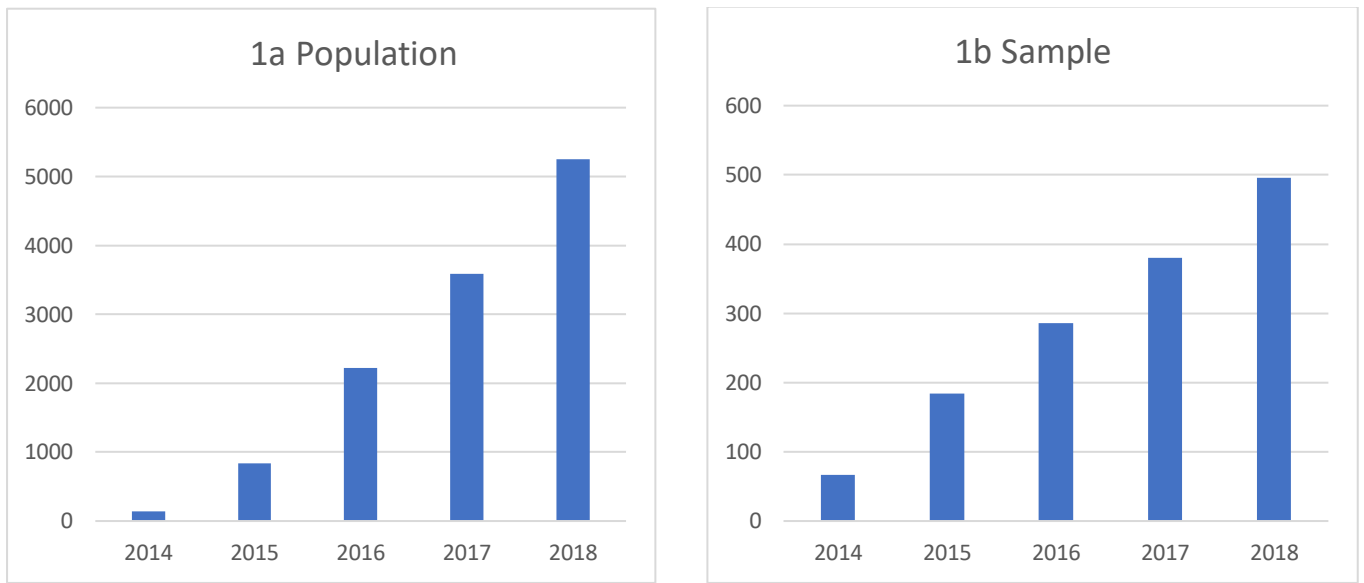
Figure 2: Hierarchical clustering groups identification
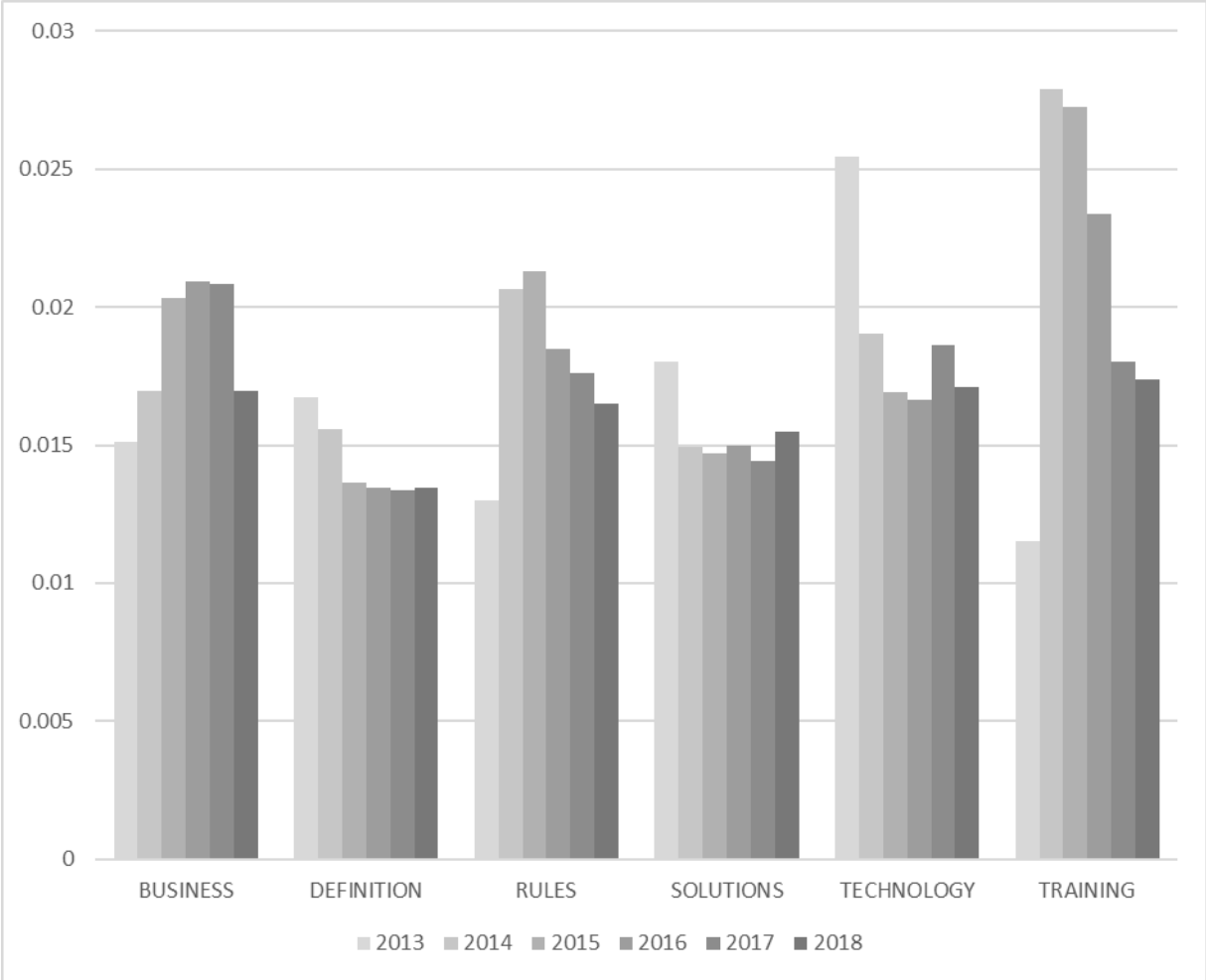

Cluster Dendrogram
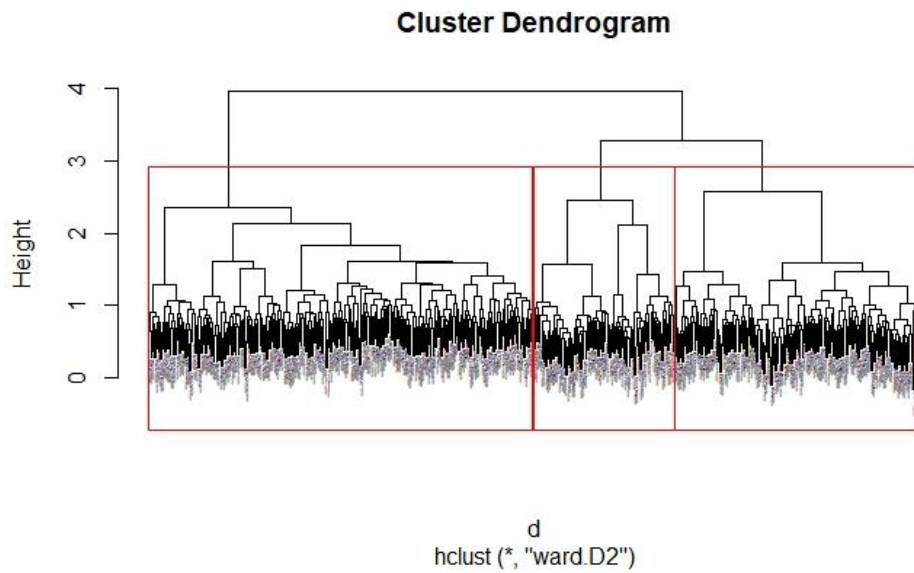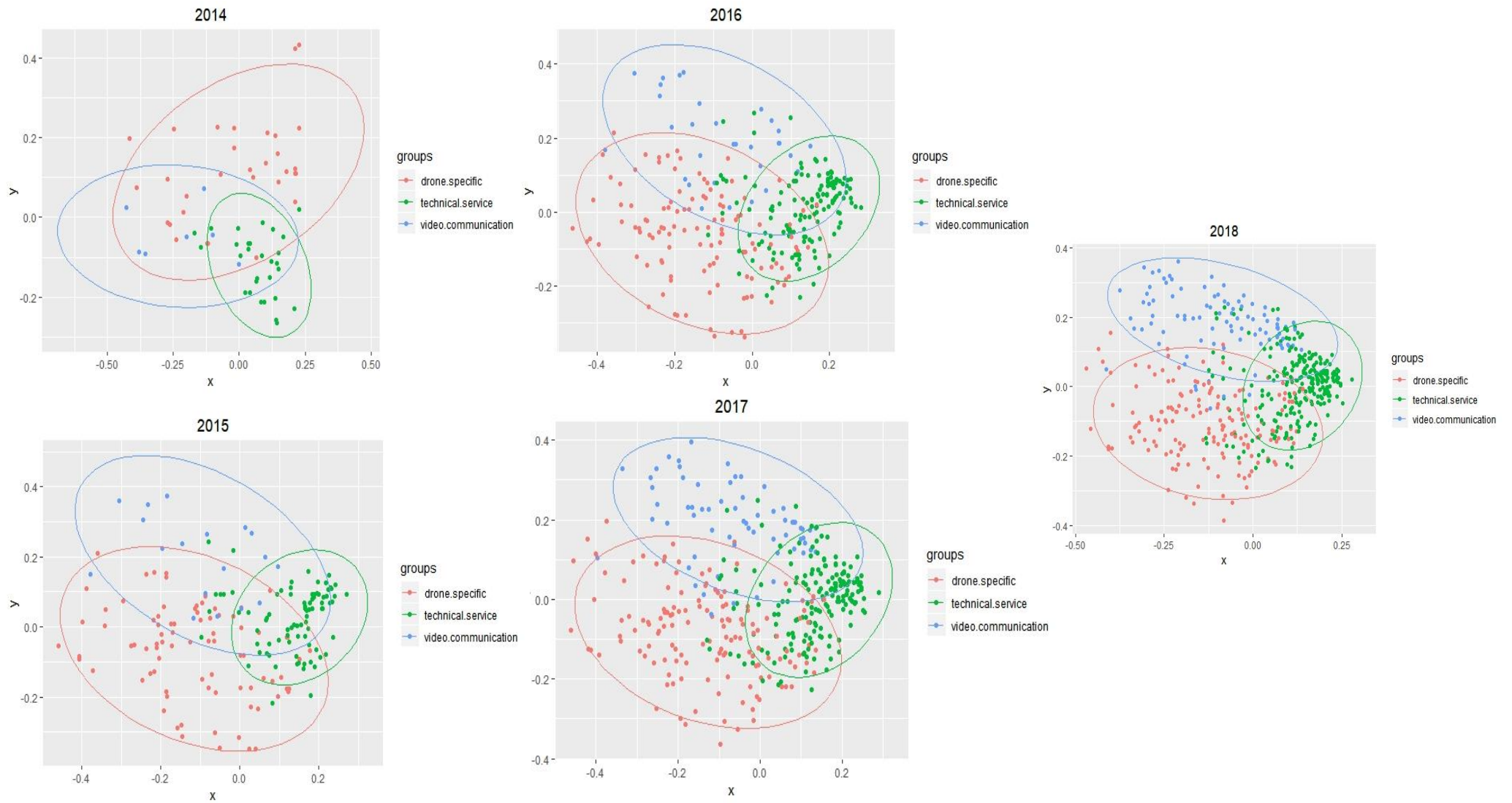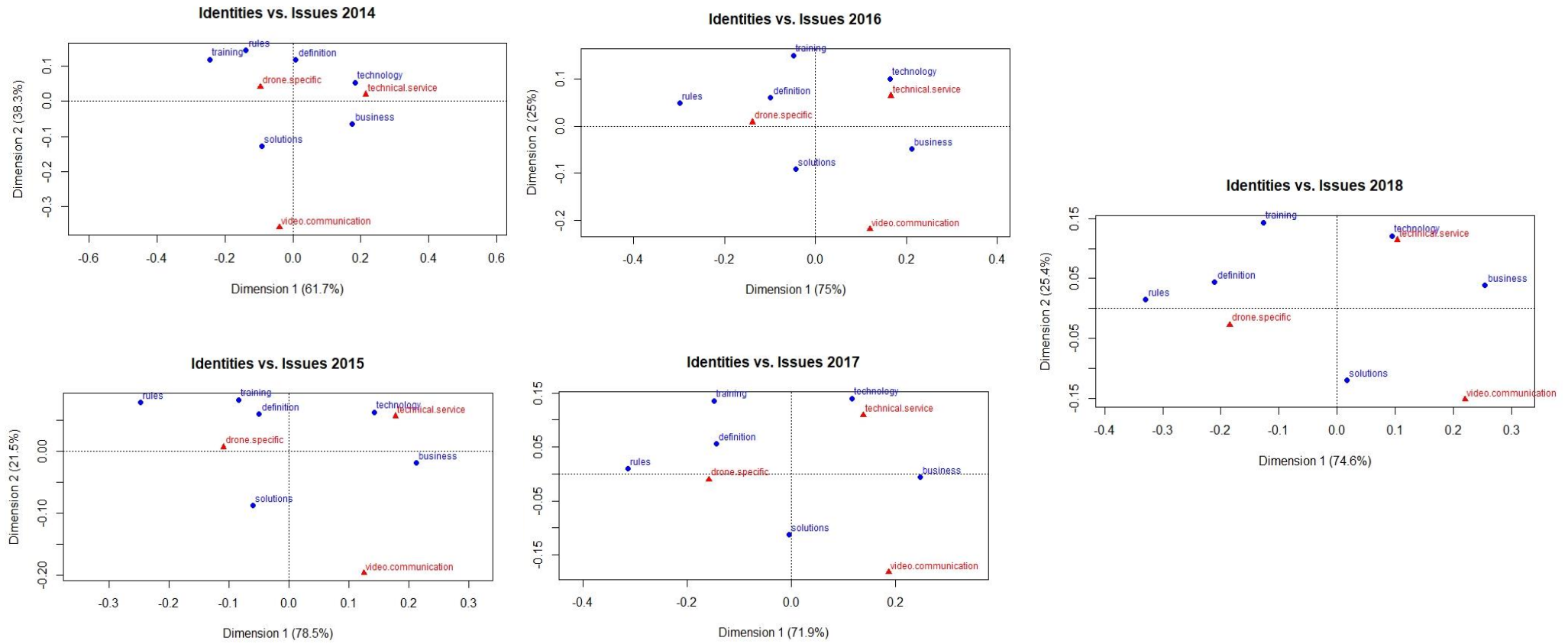
Figure 3: Issues importance variation in time

Figure 4: Communities' semantic overlaps

Figure 5: Correspondence analysis output

Identities vs. Issues 2014

Identities vs. Issues 2016

Identities vs. Issues 2018

Identities vs. Issues 2015

Identities vs. Issues 2017

APPENDIX 1: Contingency tables used for correspondence analysis

2018	video-communication	technical-service	drone-specific
definition	200	524	829
rules	90	252	501
technology	348	831	716
solutions	937	1266	1763
business	436	768	544
training	80	265	320

2017	video-communication	technical-service	drone-specific
definition	163	414	745
rules	73	174	459
technology	223	624	638
solutions	640	911	1570
business	297	540	497
training	51	178	293

2016	video-communication	technical-service	drone-specific
definition	100	359	631
rules	43	140	385
technology	120	506	513
solutions	343	741	1294
business	157	427	422
training	27	145	217

2015	video-communication	technical-service	drone-specific
definition	64	229	494
rules	24	92	306
technology	78	289	421
solutions	197	404	1001
business	93	269	356
training	20	79	180

2014	video-communication	technical-service	drone-specific
definition	17	100	213
rules	9	45	135
technology	21	122	179
solutions	75	151	390
business	29	109	157
training	7	23	92