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Hybrid forums, knowledge deficits and the multiple uncertainties of resource extraction: Negotiating the local governance of shale gas in Poland

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ABSTRACT

The paper examines shale gas development as a situation of resource exploration loaded with multiple uncertainties stemming not only from technology-generated unknowns but mainly from the unknowns about the volume of exploitable resource and about the ways in which shale gas industry will exist 'locally'. By examining first information meetings organized by NGOs, companies and local authorities in Poland: Przywidz, Mikołajki Pomorskie and Żurawłów, the paper shows that uncertainty is built around three dimensions that are to be shared by communities and companies if exploration takes place: knowledge, space and time. Discussions around these three issues reveal knowledge deficits on all sides, contributing to the emergence of new areas of uncertainty and making any agreement difficult. By referring to the concept of 'hybrid forums', the analysis also shows how a gathering that is initially framed by the organizers as an 'information meeting' transforms into a 'hybrid forum' where new facts, values and identities emerge due to the confrontation of perspectives represented by heterogeneous stakeholders.

1. Introduction

Despite the fact that shale gas exploration proved to be successful in the USA or Canada, it sparked fervent worldwide discussions about its environmental and social impacts, as well as local protests in some extraction sites. The main trigger for discussion and contestation is a relatively new technology that is essential to the process – hydraulic fracturing – popularly called 'fracking'. Public perceptions of fracking attracted attention of social scientists who applied various methods, such as discourse analysis [1–5]; public opinion surveys [6–8] and deliberative focus groups [9,10] in order to better understand how the debate on shale gas is framed in different countries and how opinions of elite groups or mainstream media differ from attitudes of general publics. Some survey work on shale gas perceptions and communication has included embedded intricate message testing experiments; other surveys have included a great deal of variables that allow researchers to control for situational, group membership, and demographic variation between respondents (see an extensive review of the U.S. research on public perceptions of shale gas in [11]). Additionally, some studies focused on the role of a documentary movie 'Gasland' in mobilizing an anti-fracking movement [12], others on mechanisms of stirring resistance in social media [13,14], helping to understand how anti-fracking attitudes gained a global outreach. These approaches

brought many valuable findings and provided nuanced and contextualized analysis of attitudes towards shale gas projects, interactions with industries and helped us understand the dynamics of shale gas development on the ground.

Still, most of the existing studies collect opinions expressed in situations created and controlled by researchers (focus groups, surveys and interviews) or mediated by media accounts (public discourse analysis). The issue is also addressed by a growing number of qualitative studies, relying on interviews with key informants [15,16] or ethnography [17]. However, probably due to difficulties with documenting 'in-vivo' meetings, gatherings and interactions, that take place in local communities without researchers' intervention, there has not been much material collected and analyzed from such occasions so far. Therefore, we argue that having had an opportunity to get access to recordings of local meetings in Poland, we can offer some new and interesting insights into how shale gas development plays out in such specific contexts. Another added value of our analysis is that while most of the recent contributions about actual interactions between industries and communities in specific sites rely on the data from the UK and the USA [18,11], we contribute with data from Poland which, among the European countries, has so far seen the highest number of shale gas exploration operations on the ground. Moreover, the focus on the USA, where industry has already gained a relatively good understanding of

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local geology, leads to the situation when current studies from the USA are not that much interested in investigating how uncertainty around *resource-to-be-extracted* (*resource-yet-to-be-found*) plays out locally and how it manifests itself and is constructed through knowledge deficits faced by different stakeholders gathered at a specific site. Therefore, our data from Poland, the case studies that we examine, allow us to make and illustrate an important point that shale gas exploration is as a situation that is loaded with many more uncertainties [19–21] than just those stemming from the use of a controversial technology – “fracking”.

Through this analysis, we aim to broaden the discussion on public perceptions of shale gas methodologically and conceptually. First, we study the actual, ‘in-vivo’ interactions between local communities, industries, state representatives, experts and activists in specific localities during local information meetings in Poland: Przywidz, Mikołajki Pomorskie and Żurawłów. After Callon et al. [22]. We conceptualize these information meetings as ‘hybrid forums’: organized collectives of heterogeneous actors engaged in solving a socio-technical controversy that generate new facts, values and matters of concerns. Through the prism of this concept, we examine how the gatherings of stakeholders become sites for exploring uncertainties around shale gas projects and how they bringing into discussions new dimensions that have not been planned to be discussed in the first place, such as the validity and relevance of knowledge and well as temporal and spatial dimensions.

Second, we conceive of shale gas development as a situation of resource exploration loaded with multiple uncertainties stemming not only from technology-generated unknowns but mainly from the unknowns about the volume of the exploitable resource and about the ways in which the industry will exist locally. Our goal is to show how multiple uncertainties and knowledge deficits pose challenge to communication and negotiation of a common future between industries and local communities, and by doing it, redefine the meaning of ‘knowledge deficit’, usually attributed to lay public as opposed to the experts (cf. [23–25]).

The article is constructed as follows. In the next part, we present our theoretical framework which allows us to examine shale gas development as a situation saturated with multiple uncertainties and burdened with knowledge deficits on all side. We also show how we apply and contribute to the concept of hybrid forums. Then we lay out development of shale gas industry in Poland along with changes in state regulations which shaped relations between the state, citizens and the industry. Next, after presenting the research methodology, we proceed with the analyzes of how various uncertainties and knowledge deficits were revealed when negotiating legitimate knowledge on shale gas as well as temporal and spatial conditions of its local development during information meetings in the selected locations. The last part discusses the politics of creating a common future with shale gas industry locally, in Poland.

2. Hybrid forums, knowledge deficits and multiple uncertainties of resource extraction

The concept of ‘hybrid forums’ [22] has been used to analyse how controversies emerge and develop around complex technoscientific projects, such as nuclear waste disposals, new drugs research or food safety procedures. Technoscientific projects are known for being saturated with uncertainty about their outcomes [26,27,19], which means that the involved stakeholders often have to act in “a situation where not only the result of their action is uncertain, but it is also not possible to create the exhaustive list of conceivable scenarios” ([22] [22]: 26) of possible developments and risks [28]. Callon et al. claim that in situation of uncertainty, controversies – often wrongly perceived as a mere obstacle for an effective action and as a problem to be quickly solved – may actually offer cognitive and practical gains. When heterogeneous groups of actors engage in exploring a controversy, new issues, questions and perspectives can be generated and explored

“through the game of confrontations” ([22][22]: 26). As a result, a much better understanding of possible risks and of possible ways of handling a project may be achieved. Such a gathering may be seen as a hybrid forum: a participatory setting formed around a controversial issue, which provides space in which, through interactions in heterogeneous groups, new issues are revealed and explicated. Thus, a hybrid forum should not be understood as a new, distinct tool for public engagement, next to citizens’ panels, consensus conferences, informational meetings, or on-line communities (cf. [29,30]), but it should rather be understood as an analytical lens through which a researcher can discover new dimensions of a controversy as they emerge in interactions around a controversial issue.

Deficits of knowledge, new dimensions of a controversy and a plurality of perspectives revealed in a hybrid forum could easily be overlooked in a non-participatory, less interactive setting. Their emergence may ultimately lead to establishing new relations of power, new political agencies and new scales at which actions are possible. The result of interactions within a hybrid forum may provide actors with resources to cope with emerging uncertainties: both through a better understanding of the issues at stake and through a formation of new networks. Hybrid forums generate a political process of (re)composing the world that actors live in [31,22]. This process is essentially coupled with the emergence of new groups, values, identities, agencies and knowledge claims, and as such, it is highly political. Importantly, the (re)composition of a common world, which results from a controversy, may not necessarily bring about a coherent vision of a common future. The negotiation may end up with conflicts, struggles, mistrust or indifference.

Our contribution to the concept of hybrid forums is thus twofold. First, we apply it to a situation of resource exploration which we conceptualize as highly political and saturated with multiple uncertainties and deficits of knowledge shared by all sides. We show how uncertainties related to facts, space and time emerge through the confrontation of different stakeholders’ perspective, revealing the impossibility of drawing the single future scenario. Second, we point to the fact that hybrid forums are not only a practical contribution to the enrichments of the procedures of democracy, as Callon et al. [22] would like to see it. We want to draw more strongly on the observation that they are organized in specific political and economic contexts of state politics and global markets.

3. Polish state, citizens and the oil & gas industry

The first important source of uncertainty – which actually stands behind the very decision to start shale gas prospecting – is the lack of data about the quality, quantity and the location of the resource itself. This could be seen in expert discussions where different agencies were giving estimates of the recoverable shale gas resources in Poland that varied greatly. Assessments ranged between 5.3 billion cubic meters (EIA, 2011), through 346–768 million cubic meters [32,33], to 1–3 billion cubic; the last figures being published in the reports by Rynstad Energy, Wood MacKenzie and Advance Research Institute [34]. All these assessments were based on archival geological data. According to the Polish Supreme Audit Office report (NIK, 2013), in order to reliably assess shale gas resources in Poland more data from about 300 wells are needed. Even though many oil & gas companies started to drill in Poland as they wanted to know whether they should stay and invest more money in exploitation or whether to they should leave, by December 2016, only around 72 wells had been drilled and not even half of them fracked. This has not changed much ever since, and thus, the process of assessing shale gas resources in Poland has still not been completed. Licenses for shale gas exploration in Poland have been issued since 2007, reaching its peak in 2012 (over 100), to drop to only 27 in December 2016. According to the data provided on-line by the Ministry of Environment, the highest number of drills was performed in 2012 (24) but then it dropped to 4 in 2015. Later on, when the global

oil and gas prices sunk in 2015, shale gas exploration became economically not attractive for companies leading to its disappearance from the companies' project portfolios. Despite this downward trend, the number of wells is still higher in Poland than in any other European country. By 2016 only one well was fractured in the UK [35].

Generally, shale gas earned favorable publicity in Poland. All important political parties endorsed this project [2,36]. In the mainstream media, shale gas was heralded as a game changer bringing economic gains, stronger geopolitical position against Russia and budget revenues for the Norwegian-style pension fund or a national wealth fund [37–39]. The general public eagerly bought into this discourse giving shale gas an 80% level of support noted in various surveys [40,38]. At the same time, environmental risks, stressed by local actors and civil society groups, were silenced in the national debate [36]. In this relatively positive climate for shale gas, a nationwide anti-fracking protest movement did not emerge in Poland. The opposition against 'fracking' evolved on the level of local communities, networked among themselves and with civil society groups nationally and internationally [41]. However, protests were contained to some particular localities where shale gas exploration was planned with scares solidarity actions organised in some of the major cities in Poland.

Along the activities of shale gas companies, the Polish government have worked to shape legal conditions for shale gas development. A long regulatory process and a radical change of concepts – from exploration of 'the Polish shale' controlled by the state administration to creating favorable tax conditions for foreign companies [36] – created a situation where the share of profits between main stakeholders, including local communities, was difficult to calculate. With the intention of speeding up the process of shale gas exploration, the government limited possibilities for public participation in the environmental impact assessment (EIA). Until 2013, according to the Polish law, companies had to apply for an environmental decision before each drilling operation. Such a decision was issued by a local authority and based on the analysis and the public review of an environmental impact assessment (EIA) study. EIAs are prepared by private companies with relevant expertise, presented to the public for 3 weeks (21 days) and subjected to consultation of individual and organized citizen groups granted with the right to comment and pose questions. However, since August 2013, exploration drilling operations above five thousand meters underground were exempted from a full environmental impact assessment [42]. It is important to note, that shale formations in Poland usually lie above five thousand meters underground. This change in legislation limited the possibilities for local publics to engage in the dialog over the consequences of shale gas development. The EU sued Poland for the defiance of the EIA in 2015.

To sum up, a prolonging situation with little data on shale gas deposits, the contradictory assessments, and the unstable regulatory conditions created uncertainty both about the existence of the resource and the mode of its existence as being exploitable and economically viable or useless in the state of technological development and the market situation of that time. In case of the Polish shale gas development project, state politics, changing governmental regulations as well as low global commodity prices played a destabilizing role also for the local negotiations. Local communities wanted to know whether the resources are there, under their homes and land, and they also want to know how its exploitation is going to be regulated by the state. However, in the unstable regulatory conditions, it was difficult to translate a general enthusiasm for shale gas noted in public opinion poll into a similar enthusiasm of local community members. The residents faced with a limited possibility to participate in the process of making decisions about where, under what conditions and whether at all shale gas should be explored in a specific location started to ask questions. This led to an emergence of many ad-hoc institutions aimed at addressing the desire to understand what shale gas means locally. We propose to analyse them as hybrid forums, in order to understand what new issues and new group identities emerged around local shale gas

exploration.

4. Methodological approach and selection of cases

In order to show how multiple uncertainties and knowledge deficits pose challenge to communication and negotiation of a common future between industries and local communities, we examined the first local meetings which gathered heterogeneous stakeholders held in three selected sites: Przywidz, Żurawlow and Mikołajki Pomorskie.¹

As the situation of shale gas prospecting in Poland was new for all engaged stakeholders, standard procedures for communication about shale gas development were not in place. Some *ad hoc* solutions to this challenge had to be established and a common practice was to organize "information meetings" for various stakeholder: local governments, local publics, representatives of companies, administration and activists. Such meetings were usually organized by village mayors to ease a growing tension around the issue. However, with time, experts specializing in public participation together with local governments developed a more pro-active approach and organized meetings before the gas company entered the area [43]. For both cases, we conceptualize temporary effects of such institutional experiments, where facts and concerns are co-created through discussion and confrontation, turning "information meetings" into hybrid forums.

First information meetings constitute a sensitive moment, when all sides start to confront their thoughts and guesses about shale gas and start to discover knowledge deficits on all sides. Additionally, especially for local residents, it is an important point in the process of decision-making whether or not to act upon local shale gas development as a threat or as an opportunity. Thus, it is a moment of a collective sense-making and decision-making when different, and to some extent contradictory, expectations and demands are voiced and confronted. We analysed three public meetings in order to identify patterns of interaction that go beyond a single, unique event. As the selected cases cannot be representative in a statistical sense, we applied heterogeneous purposive sampling [44] in order to identify repetitive key themes. We selected three locations with different dynamics of interaction and social mobilization. Despite the fact that our analysis focuses on the very exchange taking place during informational meetings, it is important to understand the context and variation between the cases.

The first analysed meeting took place in April 2012 in the village Przywidz located in Northern Poland, relatively close to the main city in the region. The meeting, organized by the village mayor as a space for exchange between companies responsible for seismic research and oil and gas company having license for drilling and local residents followed a few-months-long period of grass-root mobilization in the municipality.

The second informational meeting took place in the initial stage of the longest protest in Poland provoked by plans of shale gas prospecting: the Occupy Chevron! action in the village of Żurawlow in Eastern Poland. The local protest in the form of a blockade lasted from June 2013 to July 2014 and attracted attention of international anti-fracking activists. The informational meeting took place in the initial stage of the conflict, in January 2012, and it clearly shows that apart from local residents, protest leaders were able to mobilize environmental and other activists from different regions of the country as well as one of TV stations. Participation of such a large and diversified group came as a surprise for the company's representatives, and even led to the withdrawal of the Chevron's director for Poland from the meeting place. However, the meeting was not cancelled but took place without the participation of Chevron representatives.

The last meeting was called up in a different context. In Mikołajki Pomorskie, at the time when the public meeting took place, the

¹ The authors thank Piotr Stankiewicz for sharing recordings of public meetings for the purpose of this analysis.

company holding the exploration license had not started to operate yet. The meeting was organized in May 2013 as a pilot for a participatory program named “Together about Shale Gas”. According to the program’s assumptions, the lack of an early engagement and dialog was an important reason of local conflicts [45]. The examined meeting was organized to test the extent to which the proposed formula would meet stakeholders’ expectations. Thus, unlike in preceding examples, it was not called up in order to respond to the needs expressed by the residents, but to anticipate the rise of a potential controversy.

In two out of three analysed cases the main goal of the meeting was defined by the organizers as a knowledge transfer from the experts/industry representatives to communities’ members, who among other concerns voiced the problem of not being adequately informed about the course of action and potential consequences of the investment. This understanding puts us very closely to the knowledge deficit framework [23–25], often used as a common sense heuristic by representatives of investors, experts and decision-makers: as the sources of local unrest are seen in the lack of information transfer, education brings an answer [36]. However, in the investigated cases, what was intended by organizers as a smooth educational meeting, transformed into a fierce dispute over the nature of space, time and knowledge which should be shared and stabilized before any action is taken.

The study relies on a close analysis of audio and/or video recordings and transcripts of the first public meetings held in three selected locations. Authors of the articles were not present at the very meetings. As that may be read as a drawback since some subtle aspects of the on-site interactions could not be observed, we also see advantages of this technology-mediated, non-participant observations, as researchers’ presence did not alter the dynamics of the meetings in any way. In comparison with the analysis of deliberative events set up by research institutions, the analysis of transcripts based on the video and/or audio recordings of the meetings, eliminates researchers’ influence on the course of action on the site. To better understand the context of communication, the researchers conducted complementary investigation in each of the sites, including short visits and a number of interviews with key informants. These studies were conducted after the recorded meetings. However, in this paper, we will focus on interactions during information meetings only.

The author got access to the audio and/or video recordings of the meeting, lasting between two and two and a half hours. They were transcribed and coded by two authors in Computer Assisted Qualitative Data Analysis Software (CAQDAS) in order to identify main repetitive themes and cross-verified afterwards. In the coding process, we identified repetitive reference to three dimensions of possible co-existence between companies and local communities in the context of resource exploration: negotiation regarding understanding of facts, space and time. Quotations presented in the following result part were originally in Polish, translated by the authors.

In comparison to other, more commonly selected methodological approaches, we see the following advantages of this method of analysis. As opposed to surveys-based studies, our qualitative, process-oriented approach gives more insights into the collective processes of knowledge and opinion exchange which is an outcome of multilateral, complex interactions. Focus on interactions allows us to acknowledge that attitudes toward shale gas development are part and parcel of comprehensive narrations about possible futures of individuals and communities.

Additionally, due to the fact that all engaged actors knew that “it’s not a drill” – not a discussion group called up by academics, but a real political event with actual consequences – we were able to observe active participation of different kinds of people than those who come to attend participatory workshops or focus group interviews. No matter how focus groups’ participants may be engaged in the discussion, motivation of local meetings’ participants is different: not to discuss an issue and share their views but keep some control over their lives. It has multiple effects on the dynamics of a meeting, including the fact that

participants may be less eager to look for consensus and more to lock themselves in their own strategic positions. We were thus able to observe the process of collective opinion shaping in local communities as a political process, inseparable from actors’ shared histories, interests, and identities.

5. In search of common facts: redefining knowledge deficit

Uncertainty about the volume of shale gas resources in Poland – shared by most respected geological agencies, multinational corporations and ordinary residents – has had a crucial impact on the dynamics of the discussion held in the local communities. Having based their assessment on a preliminary analysis of geophysical data, companies’ representatives were unable to give precise answers to the most basic – and most important – questions asked at the information meetings:

Meeting Participants (later: MP): The next question and the most important one for us is whether, and in which place exactly the drilling is planned to be carried out in our municipality? Please, give me a specific answer.

Geologist: Unfortunately I cannot answer//rumblings in the room//. Wait a second... I cannot answer whether and when the drilling will take place because Geofizyka has just finished to collect data. Don’t expect us to make decisions before we interpret these data. (Przywidz)

This uncertainty has an enormous impact on the dynamics of local debates. First, representatives of oil & gas companies and geologists tended to speak of the activities of drilling companies in the residents’ neighborhood as of an almost purely epistemic endeavor and tried to stop other participants from analysing potential social and political consequences of this endeavor [31]. As without knowledge about the deposit any visions of the future of shale gas industry in the given location were extremely difficult to build, technology’s proponents were very eager to focus only on the current step, and postpone a more holistic discussion about the cooperation of shale gas industry and local communities to the next stages when more promises could be made.

At the same time, during each of the analysed meetings, participants raised concerns that after the deposit will have been located with a great financial cost, their negotiation position would be much weaker and they would be forced to accept whatever conditions would be proposed by the company. Meeting participants expressed a conviction that the current moment of uncertainty is the only one when they were able to exert any impact on the whole situation: they assumed that a successful localization of a rich deposit by the company would greatly reduce their bargaining power. Thus, they were reluctant to limit the discussion only to the nearest future, feeling that at the next stage, their space for maneuvering would be limited. In consequence, some of them wanted to maintain the gaps in knowledge about local geological deposits as a meaningful political strategy. They decided not to allow knowledge about the local deposit to be produced by denying a ‘social license to operate’ and by starting long-lasting protests, as it happened in Żurawłów.

However, lack of knowledge about local geology also made it impossible to prepare and discuss a reliable list of potential benefits for local communities, understood e.g. in terms of income from taxation. Thus, the postulate of some of the meeting participants to base the decision about letting the industry in or not on the simulation of losses and benefits were impossible to meet:

MP: What financial incomes, incomes from taxation do you expect from this investment? How much does the community already get? Have you made any financial simulations?

CR: At this moment we don’t know if we will produce any gas at all, and how much of it. It is impossible to assess this what you ask us

about.” (Żurawlów)

In such a situation, an important need of the meeting participants – to be able to imagine the future of their community with shale gas – was impossible to satisfy. Company representatives, instead of answering specific queries, presented general knowledge about the nature of the geological resource or applied technology. Following a conventional ‘knowledge deficit’ frame, they usually assumed that any reservations expressed by the meeting participants were coming from the lack of understanding of what fracking is about. However, participants’ questions clearly indicate that an abstract notion of the fracking technology was not their main problem, but rather uncertainty about the way of applying it in a specific location and its consequences:

MP: Now it is time for our questions, as we are not interested in technologies. You presented how it works, but we are neither scientists nor geologists. We don’t know how to ask inquisitive questions. We are interested in our safety, our security, our future. You said that the company already has an agreement with two residents in our village; if something wrong happens, what can we do? To whom should we go? Which door should we knock on to make them check if everything is all right. (Żurawlów)

As the lack of knowledge about the deposit is the first and crucial source of uncertainty, it is accompanied by other sources of uncertainty of different nature, which made communication and negotiation particularly difficult. One of these problems is the lack of knowledge about regulations which are going to be applied to the process of shale gas production. The 2011–2014 ongoing discussion about the necessary changes in regulations with multiple, evolving propositions raised by (or leaked from) the government puzzled industries, communities, and environmental activists. Despite the fact that representatives of the oil and gas business had presumably better access to decision-makers than residents of the given local communities, they were also subjected to this source of uncertainty: changes in regulations are considered to be one of most important business risk factors in the upstream oil and gas business. Changes in taxation, royalties for local communities, licensing process and rights of the public to take part in public consultation of the environmental impact assessment, made it virtually impossible to offer a valid vision of the future ‘terms of cooperation’ between industry and local communities, as each party was aware that to a great extent it will be regulated by a body which they cannot influence. The above-quoted voices calling for decision-making based on precise calculations of the foreseen losses and benefits were impossible to be answered not only because the amount of shale gas remained unknown, but also because a formula to calculate the share due to municipality did not exist. Thus, here again the experts from the industry were unable to provide residents with reliable answers, sharing the same situation of a deficit of knowledge.

In Mikołajki Pomorskie, the participatory approach proposed by NGO representatives assumed that bilateral negotiation between company representatives and volunteers from the community may, to some extent, substitute for the regulations; however, none of participants seemed to be fully convinced that it would work [43]. To become a vigilant and demanding partner to corporation representatives, residents had to acquire specialized knowledge not only about technology, but also about regulations from such domains as mining law and water and environmental protection. Most active among them choose this path, often formulating allies with non-governmental organizations.

6. In search of common space

In Poland both the surface and the subsurface are regulated by the state. People gathered at the meetings referred to the existing regulations in order to imagine what the future cohabitation of the local space with shale gas industry might look like. Their concerns about spatial arrangements were immanently linked with concerns about their ability

to maintain control over their lives in the local community. First of all, community members were upset that they had no choice but to let the companies into their territory to look for shale gas. It was also not clear, for example, whether the borough leader has had a final say in this matter or not (Przywidz).

In Żurawlów, meeting participants realized that not every member of the community is equal against the company when it comes to the use of space: “Ladies and gentlemen, the law says clearly that only those can be a party in a dispute with the company who have a drilling rig on their territory. The rest of us is not a party in this case” (MP, Żurawlów). And then someone in the room shouted out: “Try to win with a global company, good luck!”; “If something happens, where shall we go? To Chicago? Nobody will insure us against an environmental damage and nobody will compensate us for it”. People did not trust the Polish state and they were worried that once a transnational corporation enters their territory they will lose control over their land, and thus also over their lives. With the development of shale gas industry, control over bounded spaces of local communities would become distributed across national and transnational scales and the scale at which power of local residents could be exercised became uncertain and contingent on processes taking place outside of their specific locality.

Company representatives used different strategies to overcome this uncertainty but when challenged by the meeting participants, new knowledge deficits appeared. In Przywidz, a company representative used a map to show the scale of shale gas exploration in the Polish context and to relate Przywidz to a global phenomenon of shale gas industry. It was a strategy to familiarize meeting participants with the scale of the phenomenon and to put their individual experience in the ‘right perspective’. The map showed plenty of other similar companies and activities in other regions in Poland all over the world. A company representative said: “We concentrate on the Pomeranian Region and Lubelszczyzna but there are many more companies like ours. (...) We are doing geological tests all around the world, irrespective of whether we search for shale gas or conventional gas”. But local residents were disinterested in what happened elsewhere: “We are interested in our territory!”

The distrust toward oil and gas companies substantiated into a fear of expropriation of people’s land. This could be a very material consequence of having shale gas industry in place which would change the spatial organization of villages and towns along with the ownership relations. In Przywidz, the company representatives assured that they signed contracts with landowners and entered their land in the light of law. But people wanted to know whether their private land will gain a status of a mining territory:

“We have a right to private property. Nobody will throw me out from here just because we will become a mining village. I did not buy the land in a mining village but I bought it in a beautiful village and I want to live here in peace, and my children and my grandchildren. That’s why it would be best if you [the company, A.L. & A.S.] just moved out from here.” (Przywidz)

References to the status of the land and a faint trust in the state capacity to control global corporations show that the state institutions with their laws and regulations destabilized rather than stabilized the vision of a common future with shale gas industry.

Concerns with spatial arrangements of shale gas industry manifested itself also in questions about the exact location of the future commercial exploitation of shale gas. Answers given by company representatives and geologists, often referring to some probabilistic measures, raised more uncertainty among residents. Community representatives in Mikołajki Pomorskie nagged about a precise answer:

MP: I have a question and I would like to get a concrete answer. If it turned out that there is a chance for commercial exploitation of shale gas here, what is the possible scale of this? How many drills

would be made and what would be the distance between the wells?

CR: If we found something here we would make another exploration round of 5–10 wells in one locality but this is complicated.

MP: But what does it look like in practice? Do you drill every 2 km or every 200 m?

CR: It all depends on the efficiency of the rock. We do not know it yet.

MP: Can we expect a mine every 6 km?

CR: I am not able to tell you that!

Mod: When can we get an answer for that?

CR: In the United States they drill every 5 km or 20 km. There will be no mine. On this photo you can see a drilling rig which works for around 2 months and is later replaced by small gas devices. In Poland, we made around 44 drills on 112 concession areas. Based on this amount of drills we cannot tell how much gas we have and whether it pays off to exploit it commercially”.

The lack of knowledge about the nature of shale rock located beneath the community made it also impossible to map out the installations on the surface. The invisible and the undescribed resource could not be translated into specific spatial arrangements. And even though the meeting participants used the same metrics as the company representatives – meters – a common effort of mapping out the rigs had to be postponed until some data about the resources would have been available and until the invisible resource could have been made visible through numbers, parameters, models or other visual tools.

However, the metrics used by the meeting participants and company representatives was not always compatible. The immediate experience of the local space, through living in households, cultivating gardens and occupying space in different mundane ways, fueled new questions and uncertainty: “I would like to know if the drilling rig is going to be in my backyard or in the neighbor’s backyard or maybe we are all going to have it in our backyards.” (Mikołajki Pomorskie). And since the company representatives were not able to respond to these questions either, the inability to spatially map out the common future with shale gas industry transformed into a feeling of helplessness, lack of control and power over one’s own fate. “In 30 or 40 years you will leave and we will stay here, just like Indians in America, with polluted environment, closed in our houses and with holes in the ground.” (Mikołajki Pomorskie)

7. In search of common time

As the information meetings turned into hybrid forums, various actors started to identify different ‘types of time’ which concerned them: the underground time of shale gas formations, of knowledge production on shale gas as a resource and of communities’ existence. In other words, what seemed to be shared in a completely unproblematic way – time – became problematized during the meetings and divided into various ‘types of time’, which often were difficult to relate to one another. It soon became clear that there was a lot of uncertainty about what might happen in a given time and about the impact of some temporal orders on each other. Company representatives and geologists liked to point to the fact that shale gas and oil resources had been identified in a given area decades ago. For example, in Żurawłów, first exploration drills were carried out at the end of 1970s and 1980s:

“We had known that hydrocarbons, gas and oil have been located here for around forty years, that is from the time when wells were drilled here in 1970s and 1980s. Thanks to geological works supervised mainly by the Polish Geological Institute (PIG), we have discovered coal here. (...) Already then geologists found out that beneath coal seams we can find shale rocks which give off a very

particular smell of hydrocarbons when you drill through them. In some places we could even see drops of oil when we drilled. Geologists made notes about the existence of hydrocarbons there but they also noted that the gas and oil were not able to freely flow out of the drilled wells. And based on the geological maps, scientific articles and archival data, the Americans got interested in Polish shales. Americans have technology for shale gas exploration, we did not have one at the time when we discovered shale gas and oil in Poland. The American assessments about the volume of Polish shale gas resources are very optimistic but we cannot really say how much of shale gas there is underground unless we drill wells on the ground to physically check it.” (Geologist, Żurawłów)

According to the narrative of the geologist in Żurawłów, shale oil and gas were patiently waiting underground for several decades, beneath the village of Żurawłów, for the American technology to come and release it from the deep rock formations. Now the time has come ripe for the exploration. Through this narrative, shale gas and oil were presented as objects which constitute part of a longer history of that place – of Żurawłów. However, representatives of the community saw the history differently. One man said: “the village of Żurawłów is one of the oldest documented villages in the region. My stay here has also been documented for a long period of time, and thus, me and all of us have a right to decide about what is going on in this place”. The question arises, which presence is more legitimate – of shale gas and oil or of generations living in Żurawłów? Both histories have been meticulously documented and inscribed.

Communities wanted primarily to know what shale gas industry may bring to their lives. Some did not want it at all and were not able to imagine this coexistence on any terms. This was the case in Mikołajki Pomorskie where community representatives asked about the time of the first trial drill. This was also the case in Przywidz where the company gave a vague answer:

“It is very difficult to give precise dates of drilling. Weather conditions are not always favorable for geological works. It is very difficult for us to give a precise date when we are going to start our work and to give any information about the results”

Conditionality and uncertainty of the future drill were opposed by the residents to an unconditional vision of the community as a touristic place. “We are a touristic community!”, they exclaimed in Przywidz. This identification, in that very moment, was expressed with a lot of certainty and with a conviction that tourism cannot be reconciled with shale gas industry.

In Mikołajki Pomorskie, the company representatives admitted that the exploration phase is the most difficult one, characterized with uncertainty and it takes a long time to give reliable results. “After five years it may turn out that there is nothing down there and that’s it!”. The room shouted back in reaction to these statement: “We might not live by then anymore!”. In an ironic and a bit exaggerated way, the time of the exploration was related to the lifetime of those living in Mikołajki Pomorskie. The time of developing shale gas industry was hardly compatible with the time of people’s lives. To overcome this challenge, an industry representative tried to reach beyond the generation present at the meeting to persuade that the cause is trans-generational in its nature: “Shale gas is a great chance for us. It would be sinful not to use this opportunity. It is a chance for our children and grandchildren. I would like you to understand that in the long term perspective it is worth and wise to use this opportunity now”. But what if no gas is found: “If you don’t find shale gas here you will move out and that’s it. We will stay here. That’s why we have so many doubts and questions”.

8. Discussion

To sum up, contrary to a simplified scenario of an ‘information meeting’, local gatherings transformed into hybrid forums. Questions

turned out to be too complex to be answered with a short lecture on geology. What was demanded by the meeting participants instead, was a holistic approach that would address social, political, environmental and technological sources of uncertainty in a close reference to the specific situation of a particular site. Thus, to address this need, local meetings spontaneously transformed into hybrid forums, spaces of exploration where both society and nature prove to be ‘uncertain and unpredictable’. Interactions at the examined local meetings generated new matters of concern about organization of space, time, distribution of power and legitimacy of knowledge, and thus they (re)defined the technoscientific project of shale gas exploration into a political one [22].

With this analysis, we also wanted to draw attention to the fact that uncertainty does not only mark the future of complex technoscientific projects but that it also characterizes any situation of resource exploration. In the reading proposed in this paper, the main uncertainty related to resource exploration stems from the fact that neither companies, nor scientists, state administration, activists or local communities know if an exploitable shale gas deposit is actually located underground in a particular site. This uncertainty is thus both about existence of the resource and the mode of its existence as being exploitable and economically viable or rather useless. This situation of uncertainty is also a situation of a shared ‘knowledge deficit’ which is distributed, even though unevenly, among experts, administration and lay publics. Knowledge deficits push actors to produce knowledge which may grant them with a more ‘certain’ vision of the future and a possibility to act upon it. Assessment of the resource volume is what companies do in order to know whether to stay in a specific site, whether to invest more money in exploitation or whether to leave.

The nagging question at the examined meetings was thus not about how hydraulic fracturing is carried out, but how the potential investment may change the community. When gathered together, experts, local residents, administration, they all started to draw attention to particular aspects which mattered most for them. Some asked about the space, others about the time, yet someone else was interested in power relations and responsibilities. In the course of these exchanges, it became clear that the situation of knowledge deficit applied to a similar extent to all parties and that sometimes answers were extremely hard to find because different sources of uncertainty amplify each other. For example, spatial arrangement of shale gas extraction caused uncertainty about mundane arrangements of people’s lives, their use of local land, gardens and houses. The time horizon of fracking operations may go beyond people’s expectations about the duration of their life in the community, raising questions about ‘what comes after us?’. Even though these discrepancies may seem trivial, they show how the industry, local communities, geologists and local authorities need to work out and sustain a common world, a common understanding and vision of that world, in which they want to operate and how difficult it is due to the lack of knowledge about many things related the resource itself. An ‘information meeting’ may thus generate new uncertainties around shale gas projects through which a common world is difficult to achieve.

This understanding of the concept of ‘hybrid forums’ allows us to speak in a new way to the literature on public engagement [30,46,25], public perception of technologies [47,48] and risk studies [49,50] in order to explore what hybrid forums are and how they work in the context of resource exploration. In particular, we draw on the distinction made in risk studies between systemic risks and simple risks [49,51] to see what aspects of shale gas extraction are explored when the industry meets the community. While for the simple risks the causes are known, the uncertainty is low and there is not much ambiguity, the systemic risks are embedded in the contexts of complex societal processes ([49][49]: 234). As a result, while simple risks are calculable, systemic risks cannot be calculated with any probability. Instead, systemic risks need to be analyzed in a more holistic way, in relation to and in the context of “interdependencies and ripple and spillover

effects that initiate impact cascades between otherwise unrelated risk clusters” ([49][49]: 234). The concept of systemic risks is close to our thinking about shale gas exploration as a situation loaded with so many unknowns going beyond quantifiable technological or environmental parameters that locally it is difficult to even start a discussion about it. These uncertainties are played around legitimate knowledge, as well as temporal and spatial aspects of shale gas extraction and become explicated in hybrid forums.

The analysis has thus shown that uncertainty is generated in multiple ways but the perceived ‘novelty of technology’ and its impact on the environment is just ‘the top of an iceberg’. Residents and activists were aware of the complex and hybrid nature of uncertainty: they simultaneously brought up issues of regulations, technology, environment, economy, (mis)trust and agency. They refused to discuss ‘technological aspects’ only. Companies’ representatives, not having enough knowledge themselves, were unable to play the role of experts that would have an answer for each and every question. Moreover, inhabitants, companies and experts operate on different temporal and spatial scales which becomes apparent in the course of interactions among them.

By studying interactions between various actors within hybrid forums we can also see the stabilizing and destabilizing role of state politics and regulations. In many respects, the Polish state was not able to grant any certainty to the local future with shale gas industry. The laws on taxation and royalties were in the process of negotiation and constant change, citizens’ participation in siting of shale gas projects was being limited and decisions of particular companies operating in Poland were, to a large extent, beyond state’s control. However, the final say in the Polish history of shale gas development so far belongs to the global commodity markets. Shale gas revolution elsewhere, in the United States, brought the price of oil and gas to such low levels that the expensive exploration activities in Poland became economically not viable for the companies. The price of gas was so low that it did not even pay to stay a bit longer in Poland and to complete this ‘epistemic endeavor’ of collecting data about the resource to know it better, map it better and be ready for a future increase in global commodity prices. And this way, the global market, which was fairly invisible and not explicated in the narratives of any of the meeting participants, company representatives and experts, entered the local scene. It became an unexpected ally of many local communities, an enemy of others, and stabilized the vision of the future at least for a while. The future of the studied communities, as of February 2017, is a vision without shale gas industry.

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