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BIO MAPPING AS A TOOL FOR URBAN LOGISTICS PROJECTS

Introduction

Implementing urban logistics projects requires sets of certain conditions to be fulfilled, so that a measure most suitable for increasing accessibility of a given location – usually within a social space – would be chosen. Such measure also has to be accepted by groups of interest. Stringent terms and conditions are particularly important if limited funding and disruptions are considered. The latter are often caused by reorganised flows, e.g. of traffic during implementation of a project. Project initiators strive to get groups of interest on their side and support their ideas. They approach the matter in variety of ways (using concepts) – starting from conventional lobbying, to end with manipulation[*]. One of the most novel and in opinion of authors of this paper promising, is bio mapping or in other words – emotion maps, which help to designate places and tasks of urban projects including urban logistics related ones.

1. Definition of a city for purposes of Bio Mapping

Modern urban studies put particular emphasis on their interdisciplinary character. Broadening their horizons about the city are sociologists, social and economic geographers, economists, city planners and anthropologists. Recently, socially oriented logisticians have taken interest in the matter. Bearing in mind the multiplicity of test stands, concepts and theories on urban issues, it can create an impression of over-abundant and chaotic knowledge. Nevertheless, to make the discussion clear – what applies to this paper as well – definition elements have to be defined which would justify using the tool investigated in these deliberations for addressing the needs of modern cities.

1.1. Real and virtual city space

"Urban fetishism" which relates to traditional urbanism (process concerning characteristic lifestyle of city dwellers), is inherent to all attempts to delve into the very essence of the city, made by people of science (and practitioners). They all find the notion of covering space challenging. Parting the potential buyer from goods and services in the city space gives a pretext for discussion revolving around ways of covering that distance. Moreover, in doing so many efforts have to be undertaken, thus affecting how satisfied or dissatisfied the buyer is. Shaping the time-space relations lies not only with transport planners

[*] This subject has been discussed to a broader extent in: (Szołtysek, 2011).

or logisticians. A discussion on the subject could be initiated among all the aforementioned specialists, who take great interest in urban issues.

When the city is defined for purposes of logistics, its spatial nature is brought to the fore. Hence, the most suitable here seems the statement that the city is a collective space belonging to all who live in it. These have the right to conditions which allow their own political, social and ecological development but at the same time accepting a commitment to solidarity[*].

Many city researchers take notice of the process of city space virtualisation. That trend might have developed as the consequence of the concept of an intelligent city – allowing modern cities to position themselves within the real and virtual world – gaining ground. That kind of city could develop owing to IT advances and the *high tech* architecture, which uses computer and audiovisual technologies. An intelligent city is created in three dimensions. First is the "media extension of traditional *polis*", which has its reflection in e.g. networks of cashpoints or CCTV cameras. The second dimension is the city developed in the electronic space – the virtual city. Examples of those cities are urban simulations and 3D building projections as well as city websites on the Internet. Worth mentioning are also virtual cities in computer games, where gamers live parallel virtual lives in unreal cities using fake identities. The last of elements composing an intelligent city are dematerialisation and dislocation of space. Dematerialisation of city space became an evident process when reflective building components (primarily architectural glass) were first used to erect building walls. It rendered buildings more material and created a *sui generis* mirror spectacle, reflecting the neighbouring environment. The virtual world makes its presence felt in city centres of the biggest metropolises through LED displays and interactive sensors placed on buildings and tremendous billboards. Locations and structures traditionally associated with symbolic and historic values are gradually being penetrated by the digital world, which abandons the notion of locality to replace it with celebrated transnational media noise. It is the same across world capitols and takes place in the same time, thus dislocating urban spaces (Miciukiewicz, 2002, pp. 53-64). Ewa Rewers formulated the concept of an "urban screen", which refers to city space congested with glass buildings. Their glass surfaces reflect the structures themselves, pedestrians, strollers and bus passengers. The ensuing elusive space, created through repetition guests spectators-pedestrians disorientated by that incoherent and fragmented area. The author makes a reference to the myth of Narcissus admiring his own reflection in glass panels as if they were the surface of the water (Rewers, 1997, pp. 41-50). The

[*] Definition The European Charter for the Safeguarding of Human Rights in the City adopting the stance of the European Charter of Local Autonomy, after: (Szołtysek, 2011, p. 28).

magical quality of glass and steel is no longer overruling a modern cityscape. Now an LED screen became centrepiece, allowing multimedia world to permeate urban metropolises. Interweaving real and virtual spheres have captured the imagination of Japanese architects, with Kenzo Tange Metabolists leading the way. They made sure their buildings were lined with state-of-the-art technologies (Melvin, 2006, pp. 126-127).

Hence, virtualisation of city space is – owing to modern technologies – not only a current trend observable in modern cities, but also transformation of how urban spaces are perceived. The virtual space expands and enriches the city. At the same time it distorts its perception as an obstacle, thus satisfying the buyers' needs.

1.2. Humanism and space

The specific character of bio mapping offers, however, a different perspective on the city – concerned more with space and humanities, thus emphasises intimacy shared by residents and isolating them from ominous spaces. That approach to the city identifies as opposing forces the place and the space, familiar and unfamiliar areas, allied and foreign. Czesław S. Bartnik holds an opinion, that a city represents overcoming the distance between people, space-time continuum, resistance of matter and finally the savage and sinister faith. It is a bastion of life, sound foundation, a fixed point among the common transience (Bartnik, 1993, p. 53). Hence, the people are the fundamental value sustaining a city, and at the same time they determine the urbanity, are the implementer and beneficiary of all those function the city has. Consequently it is the people who are moving to the fore, whilst space becomes only a background, a scene where individual and communal lives play out – where the city itself lives. Every human resides some spaces, brushes shoulders with certain values embedded in those spaces, and thus is allowed – in other words is entitled to live and breathe certain values. That thought was formulated by Florian Znaniecki – an outstanding Polish sociologist who died over half a century ago. Florian Znaniecki made the observation, that people despite inhabiting urban area and therefore perceiving themselves as "(…) «city dwellers» (...); do not surrender to the thought of being pinned down to an area, as houses and trams are. That is because they are not only the bodies, but also experiences and above all active entities, so in that sense they are not in the city, but (...) it is the city which happens to be located within the sphere of their intertwined experiences and actions" (Znaniecki, 2003, p. 90). In that way he emphasised that city needs to be analysed in the exact way each of its residence values it. That postulate can be reduced to recommendation: to study each city in its residents' consciousness. According to F. Znaniec-

ki, cultural facts take place in personal experiences and they could not to be studied without studying people. He made the assumption that the cultural reality – urban space in other words – does not have a universal character. Humanistic city study is based on the assumption that there is no objective, constant, qualityless space. There could only be space experienced and valued by people. "They are being dictated by various experiences <<spaces>>, of different qualities, confined, indivisible, variable and above all positively and negatively viewed. The word <<space>> should be used by a humanist exclusively in generic contexts, in order to demarcate entire classes of particular and individual <<spaces>>" (Znaniecki, 1999, p. 123). F. Znaniecki did even propose to create the term "spatial values" replacing "space", to underline the fact that a hollow, geometrical space does not exist.

1.3. Images created in the mind

An American city planner, Kevin Lynch in his book *The image of the city* (1960) discussed the way people perceive and use information they stumbled across in the space whilst strolling through the city. He introduced the concept of mental maps to enable every city resident to describe his immediate surrounding and urban routes he takes. They clearly show different central points for individual residents and their hierarchy in the city, tranquil places and hostile spaces, familiar areas and uncharted territory i.e. a complete picture of urban reality perceived by single individuals. Jacek Wódz makes an observation, that in individual consciousnesses and social interactions an image is created of a twofold space. First is the image of physical space, the actually existing space which consists of real buildings and items. Second is the image of imaginary space, which exists solely in the observer's mind. Over the course of perceiving the real space, its image is intentionally created, which comprises content of symbolic character (Wódz, 1989, pp. 19-23). Hence, two elements composing symbols describing the space can be referred to during urban space studies. First is the place of interest. It is an element actually featured in the urban development plans. Those are e.g. government departments, cemeteries, squares, single trees, etc. The second element is symbolic. Thus, at best it can exist as a concept, an idea which could not be represented. Functions of city images created in peoples' minds are particularly important for city researchers. Modern metropolises seem to work within a network setup, where they become nodes of that network. Intense flows are taking place between those nodes, listed by Manuell Castells in the following fashion: flow of capital, information, technology, organisational interactions, images, sounds, and symbols (Susser, ed., 2002, pp. 314-366). „Wi-

th cities, it is as with dreams: everything imaginable can be dreamed, but even the most unexpected dream is a rebus that conceals a desire or, its reverse, a fear. Cities, like dreams, are made of desires and fears, even if the thread of their discourse is secret, their rules are absurd, their perspectives deceitful, and everything conceals something else" (Calvino, 1997, p. 44). In that impressional manner Marco Polo characterises cities by pointing towards their transitory image. „Cities also believe they are work of mindor of chance, but neither the one nor the other suffices to hold up their walls. You take delight not in a city's seven or seventy wonders, but the answer it gives to a question of yours" (Calvino, 1997, p. 44). The city owing to its mysticism does not have to attract attention of artistic deliberations only, but it can also serve to strengthen positive image thereby bringing residents closer together and filling them with pride. J.R. Logan and H.L. Molotch make the point, that citizens pride of their cities are a factor favourable to its development and can even convert into celebration of local development. The awareness of local communal identity is a pro-growth factor at the root of citizen attitude. The objective of this particularly social ideology is to emphasise the relationship between development goals set by a city and improving living standards, so that residents would depart from conservative attitudes and the fear of unknown. Citizen pride, in turn, can legitimatise the undertaken development efforts (Logan, Molotch, 1987).

2. City development

City development is a result of synergistic effect of multiple social-economic factors and administrative decisions. The impact of factors related to economic and social considerations on dynamics of city and regional transformations has become the main focus of many sociological and economic studies. One of innovative concepts is the "3T" regional development model (talent, technology, tolerance), which was devised by the American researcher Richard Florida (2005). The author proves, that converging factors concerning the following areas: social tolerance, creative occupations and high level of technological development fuels the dynamics of regional growth. Metropolises showing high levels of tolerance, talent and technology seem to attract highly qualified workforce, world of art representatives and investors thereby becoming the most developed cities in the process.

Determining the order of implementing directions and development undertakings are to be implemented in the city is an integrated answer to the question: *When? What?* and *Where?* Source of all criteria and restrictions for building answers to those questions are:

– long-term regional policy – municipality level,
– resources available to foster development,
– forecasted economic outlook for given period of spatial development,
– national and regional policy – regional level, concerning a city in question, as well as regional policy of neighbouring municipalities and pre-established rules of collaboration with other municipalities,
– local community's perspective on planned undertakings (Ossowicz, 2003, p. 14).

The above-mentioned criteria concern all development undertakings, including projects whose nature and character qualifies them as logistics projects (undertakings). Implementation of development tasks entails getting support of important groups of city users. The greater the number of users accepting development plans, the greater the chance of successful implementation. Often development projects envisage allocating urban spaces to various objectives. Such use of space does not only influence the city's capacity to effectively deliver its internal and external functions, but also alters the cityscape – both the physical and held in minds. Changing the intended use of urban space can shape those images, whereas subsequent evaluation of those images can have advantageous (or disadvantageous) impact on future development opportunities with which a city is presented. W. Firey proved, that cultural aspects (symbolic, aesthetic and emotional) are also vital to the process of utilising a space. Location of tranquil residential areas, although seemingly divergent with economic realities, is justified by the regional history and cultural heritage. Particular choices make sense solely for residents, to whom those areas are saturated with symbolism, "sacred" places of own history. W. Firey made an assumption, that not only market situation, but cultural values as well can have a significant impact on selecting particular urban spaces (Firey, 2005, pp. 89-96).

3. Bio Mapping in city management

3.1. Perception of space as an argument for using Bio Mapping

City management is an activity, intended to assure efficient operation and sustainable development of a city through influencing people to execute certain tasks and use available city resources in line with relevant objectives. In also involves – according to L. Kowalczyk – exerting influence over hierarchies and systems of values, vested interests, aspirations, attitudes and organisational behaviours of local governments (Brol, ed., 2004, p. 169). Urban logistics management to a certain extent depends on local authorities' decisions, thus it becomes an element of city management. At this point, let us briefly go back to the

process of creating and developing cities, which is one of overarching objectives of the management in question. Marian Malikowski emphasises the importance of urbanisation in changing the cityscape. "I would describe urbanisation – M. Malikowski writes – as a set of processes spatially concentrating people and centralising activities, accompanied by spatial conversion processes, creating in result spatial units (systems) of enriched social life reproduction, capable of developing" (Malikowski, 1992, p. 22). Reverting to the issue of space has been dictated not only by the nature of urban logistics – which in essence deals with covering space to reap benefits of physical availability of goods and services at a specific, planned time – but also by the issue of evaluating urban spaces by city users. We are talking here about creating or (and) developing "spatial units (systems) of enriched social life reproduction", which should make decision makers weary of circumstances and methods involved in developmental decision making – especially in case of forming urban spaces – both the physical and virtual.

Prof. Wojciech Bonenberg (2010, p. 34), an architect and lecturer at the Institute of Architecture and Spatial Planning points out that traditional urban-landscape analyses have been extended with:

1. Public space perceived as scenery (public space as stenography for an urban spectacle). This angle on public space explores the experience of motion, dynamically changing situation. This is a type of relationship similar to the phenomenological theory by Maurice Merleau-Ponty (2001), where he defines it as an expressive action, shaping human approach to space. Taking part in the spectacle, whose stenography is set by public space of Poznań city, is a specific conformation of urbanity, especially in relation to suburban residents (neighbouring municipalities).
2. Aesthetic perception of public space (public space as city's decorative element). This approach relates to Don Mitchell's (2003) research. He observes the tendency to convert public spaces into postcards intended to attract the consumer (tourists, customers, investors). Wolfgang Welsch (2005) draws attention to the so called public space styling, which became the leading theme of urban lifestyle.
3. Behavioural perception of public space (public space as an element shaping regional behaviours). In this approach territoriality means interdependency between the space and the resident. It refers to ground rules for using public spaces and bestowing personal qualities on them. Environmental psychology draws attention to cultural and emotional aspects of environmental perception i.e. the sense of identity, image and prestige development, transparency and sense of community (Bonenberg, 2007).
4. Economic perception of public space. It is the analysis of relationships between the standard of public space, its equipment, visual appeal, location and

the economic value. This approach has been developed by Charles Landry (2000) and Richard Florida (2005) through cultural theory of economic development of cities.

Space in a different form perceived in a different manner gives it a different, new value. In order to re-evaluate the space post-changes – a city's developmental effort should head in that direction – its initial pre-changes value has to be evaluated as well. Material value is relatively easy to evaluate, because there are adequate methods backed by substantial experience. However, evaluating the non-material value is a completely different ball game altogether, especially if the sentimental value is concerned. Even experiences are complicated to evaluate and often invaluable. Such state of affairs probably owes to the lack of relevant experience and consequently – no methods and procedures. Usefulness of such urban space evaluation also remains unfounded. It could though (apart from pinning down the financial value), give grounds (or just facilitate) making a decision about the purpose (or changing it) of particular part of space.

3.2. The essence of Bio Mapping

One of methods to evaluate non-material urban spaces is Bio Mapping, which generates emotion maps of cities. Bio Mapping functions as a total inversion of the lie-detector, which supposes that the body tells the truth, while we lie with our spoken words. With Bio Mapping, people's interpretation and public discussion of their own data becomes the true and meaningful record of their experience. Talking about their body data in this way, they are generating a new type of knowledge combining "objective" biometric data and geographical position, with the "subjective story" as a new kind of psychogeography. In the case of Bio Mapping, the participants are vocalizing their intimate internal mental life as well as public behavior to a communal group. In effect, the participants are carrying out a type of co-storytelling with the technology, that allows them to creatively disclose, or omit, as much as they like of what happened during their walks. The Bio Mapping tool therefore acts as "performative technology" which shoulders the burden of having to hold the public's attention, while offering a safe distance from public exposure to the "interpreter". Used in this way, the tool allows people who have never met each other to tell elaborate descriptions of their own experiences, as well their opinions on the local neighborhood, in a way that they would have never done otherwise (Nold, 2011a, pp. 5-6).

Common everyday maps typically show static architecture and exclude the people who inhabit and create the place. Emotion maps attempt to remedy this by mapping the space of human perception and experience. Participants take part

in Emotion Map Project usually commissioned and hosted by non-profit, artist-run organizations. The following is the experience of San Francisco Emotion Map creation, described by Christian Nold (2011b). A series of weekly workshops take place whereby the participants are invited to walk around the area using Bio Mapping device. The device combine a finger cuff sensor which records the wearer's Galvanic Skin Response (GSR), and index of emotional response, with a Global Positioning System (GPS) which locate the wearer's position on the earth. Derived from the polygraph, a system used by law enforcement agencies to identify when a person is lying, the finger cuff sensor is used in a more diplomatic way. The participant is asked to interpret their body's response allowing for a more subtle understanding of their experience (see Figure 1). Starting at one place each participant walks for up to one hour through the established district and surrounding areas. Upon returning to the meeting place the collected data is downloading to a computer where each participant can view their personal "emotion map" as series of high and low peaks (represented on the map as dots of varying colors). The arousal response recorded by the device can be positive or negative and require active interpretation to make sense of. In the workshop each participant study their own track and then tell with the group about their "emotion map" in relation to their experiences on the walk. As a result of this reflection, they add annotations to points along their track that they consider memorable or important. All together individuals' annotated tracks are gathered, combined and overlaid in order to create the communal Emotional Map of the city. On the map, the overall pattern of dots shows where the participants walked. The color of the dots represents the combined emotional data of all the participants with red signifying high arousal, and black signifying low arousal. When looking at the entire map, there is a general arousal gradient from high in the center to low near the edges. The density of red dots and annotations indicate hotspots of communal arousal, while the darker dots show areas of communal calm (see Figure 2).

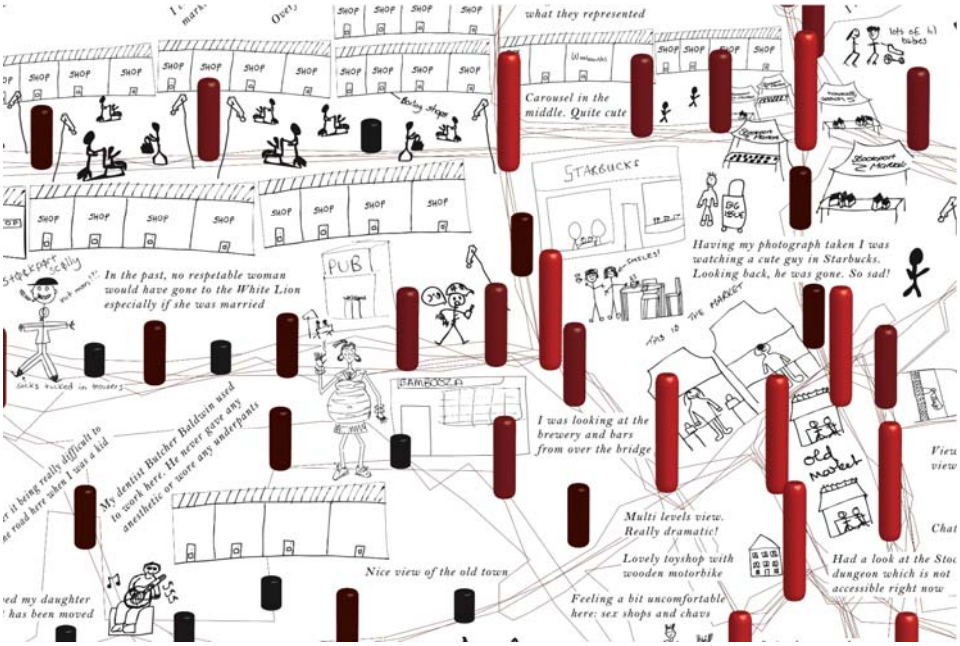

Figure 1. Emotion map created using emotion metering equipment, with added interpretations

Source: (Nold, 2011, p. 32).

Figure 2. Part of San Francisco emotion map

Source: (Nold, 2011, p. 23).

Execution of activities which ultimately will create an emotion map, as well as the presentation and description of emotions can diverge from the above-discussed methodology, which requires participants to be equipped with the purpose-built devices. The easier method involves drawing the route and tracking emotions in any way. Figure 3 illustrates that methodology of work usefulness of emotion maps created in that fashion does not differ in essence from map created using specialist equipment. The problem boils down to selecting volunteers and their training. Diligence in describing experiences and emotions is also important.

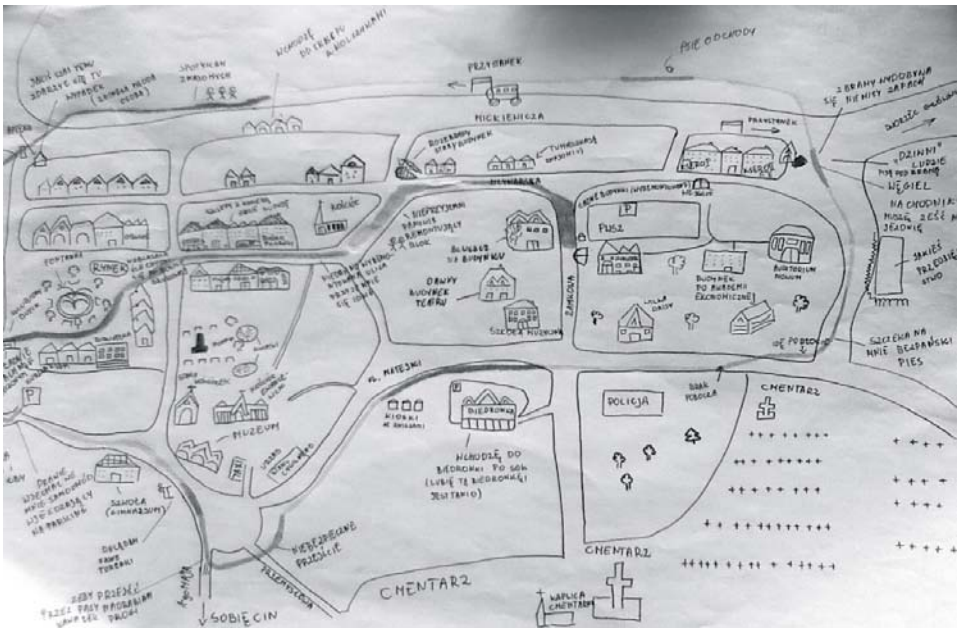

Figure 3. Emotion map created without the specialist equipment

Source: Map created under the project aimed at creating the emotion map of Walbrzych city centre in November 2011.

The research identifies and measures certain emotional states of people who use the public space. It is possible to distil generally positive and negative emotions related to particular places in a given space or positive and negative sentiment towards various aspects of urban space perception. Other forms of emotional states can also be studied. During pilot research at Poznań the following types of space have been distinguished, which were connected with prevailing emotional states:

1. Space which evokes fear.
2. Space which evokes anger.
3. Space which evokes disgust, aversion.

4. Space which evokes depression.
5. Space which evokes pleasant feelings and happiness.
6. Space which evokes admiration (exciting space).
7. Space which evokes hope (optimism).
8. Space which calms down.
9. Space which evokes boredom.
10. Space which awakes curiosity (Bonenberg, 2010, p. 37).

The rules for division and level of detail depend on concrete research objectives and the impact of research accuracy on results and their interpretation, expected workload and usefulness of results.

Conclusions

The ground rules and procedures of creating emotion maps as a tool useful in executive decision making are based on the following:

1. The city in its essence is not only a physical space (apart from different qualities listed in numerous definitions), which is easy to define, describe and measure, but also a virtual space.
2. The virtual space confronted with the residents, transforms and shapes perception of the city – it stimulates imagination, senses, and emotions. It might even create new values, previously absent in context of the city.
3. Perceived and experienced urban space creates images in peoples' minds, which in turn influence city users' valorising actions. Converging good evaluations can cause (co-create) the sense of pride and satisfaction with the city. That, in turn, can legitimise the undertaken development efforts.
4. Bearing in mind how individual opinions are important in terms of emotions, attempts to obtain them should be justified. Based on those emotions development strategies for cities can be drawn up, especially as far as urban space transformations are concerned.
5. The tool which enables emotions to be explored – based on emotional cartography – is Bio Mapping. An emotion map created through recording feelings and their interpretation, can be created by either using specialist equipment, which measures biochemical reactions of organism confronted with an urban space or over the course of recording evaluations and their interpretation during exploration of relevant spaces.
6. Negative emotions hotspots in urban space are related to circumstances and events directly and indirectly linked to urban logistics tasks. Hence, it seems that creating emotion maps should be considered mandatory during investment decision making.

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