Internet Connectivity, Community Participation, and Place Attachment: A longitudinal Study

Gustavo S. Mesch
Department of Sociology and Anthropology
University of Haifa, Israel (*)

Ilan Talmud
Department of Sociology and Anthropology

Direct all correspondence to Gustavo S. Mesch, Department of Sociology and Anthropology, University of Haifa, Israel. Email:gustavo@soc.haifa.ac.il.
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Abstract

The effect of Internet connectivity on social involvement, civic participation, and community sentiments has recently received research attention. Mostly, previous studies have been limited in that they did not account for the mechanism that might link Internet connectivity and community participation. This study uses a longitudinal design to examine the effects of Internet connectivity and participation in a local electronic bulletin board on local community involvement and participation. It is hypothesized that Intenet connectivity affects community involvement and positive sentiments attached to the locale. Data from a longitudinal survey of two suburban communities in Israel are used to test the hypothesis. The results show that Internet connectivity and attitudes toward technology provide more channels for local civic participation. But, it is the active participation in locally based electronic forums over and above other forms of social capital (such as: face to face neighborhood meetings, talking with friends, and membership in local organizations) which is associated with multiple measures of community participation. The formation and active participation in local community electronic networks not only adds, but also amplifies civic participation and elevated sense of community attachment.

A Longitudinal Study on Internet Connectivity and Participation Hypothesis on Community Participation and Attachment

Introduction

The concept of "Community Networks" (CN) refers to a digital tool, serving as a local medium for a "proximate" or geographical community, responding to the needs of the community and its residents. This concept emphasizes the geographic aspect of a shared place of residence, and refers to an electronic space of information and communication operating within a geographically-based community (Wellman et al, 2001; Shah et al, 2004; Kavanaugh et al, 2005).

In recent years, there has been a rising interest in community social capital. Social capital is defined as all those resources, real or virtual, accessible through direct and indirect social connections (Lin, 2001: 43). Community social capital includes social networks which are active in the local community, including the material or symbolic resources flowing in those networks (Nahapiet and Goshal, 1998; Putnam, 2000; Brown, 2002). One important manifestation of social capital in the community is participatory social capital, referring to participation in locally based organizations that conserve and promote the quality of life (Mesch and Schwirian, 1996). As the Internet provides an electronic space for accessing information and social interaction, the role of the Internet in the creation and access to community social capital requires research attention.

The rapid adoption of the Internet has resulted in academic interest in the role of the use of digital technology in the development of a sense of community (Mesch and Levanon, 2003; Borgida, Sullivan, Osendine, Jackson & Riedel, 2002; Matei & Ball-Rokeach, 2003; Carroll & Rosson, 2003; Hampton, 2007). Comparing major

attributes and implications of face to face and virtual communities, Etzioni and Etzioni (1999) argue that the proper combination of both face to face (FTF) community and online community holds out more promise in meeting the requirements of a community than each of them could separately. While others believe that online communities providing the potential for revitalizing community by dramatically reducing the costs of distance and time, thus allowing individuals to exchange more views with many more others (Cleveland, 1985; Doheny-Farina, 1996; Hague and Loader, 1999)

A key distinction between online communities and a community network is that the former is based entirely on computer mediated communication, transcending geographic boundaries and based on narrow shared personal interests. A community network, by contrast, is embedded in proximate geographic relations, members are already part of the same locally based community, having also face to face interaction and membership is based on shared local concerns (Kavanaugh et al, 2005).
This paper examines the impact of participation in locally-based electronic networks in two Israeli communities on community civic engagement and on community sense of belonging among the residents. More specifically, we use a longitudinal design to decompose the causal effect of Internet use and other forms of community social capital on community involvement and community attachment.

Contributions of Community Networks

Two of the major potential contributions of Community Networks (CN) for proximate communities are (1) increasing community social capital, as community networks promote membership in civic organizations, locally based activities and

social interactions among citizens; and (2) enhancing residents attachment to their local communities and neighbors through these collective actions.

Most of the studies of community networks have focused on how the Internet affects local and community social integration and involvement in local activities and networks. One line of research is based on a media perspective, in which the Internet is seen as part of the community media system supplementing existing sources of information (such as newspapers and television). In this perspective, the role of the media is to provide an infrastructure of "story telling". Institutions, newspapers, networks and the Internet provide stories about the place and these stories activate neighbors' narratives, serving as a bridge between macro social institutions, community networks, and individuals. According to this "connectivity hypothesis", when people read the newspaper, talk with their neighbors, watch television, or use the Internet, they tend to do more than merely acquire local information for personal use, but connect to a community that is larger than the sum of its parts (Matei & Ball-Rokeach, 2003).

This perspective is based on the concept of "media complementarity", implying that media use reflects existing social patterns. At the community level, the implication is that the Internet is an additional channel of communication which is used together with newspapers and television to search for non-local and local information. Thus, individuals who are interested in local issues use media (including the Internet) for community related purposes. The expectation is that Internet use will be positively associated with participation and attachment because the Internet is used as a resource of local information (Dutta-Bergman, 2006). Internet connection is viewed as an integral part of media consumption, molding residents into a community

through shared exposure to local and non-local information that translates into connectedness to the local community.

However, the empirical evidence for this connectivity hypothesis is mixed. Studies that compared differences in community involvement of citizens with and without access to the Internet found small, positive effects. A cross sectional study of seven ethnic neighborhoods in Los Angeles found that residents having an Internet connection were more likely to be members of community organizations, and reported a higher perception of community belonging (Matei & Ball-Rokeach, 2003). Nevertheless, it seems that the integration of the new media in community life was conditional. The effect of the Internet on community belonging among ethnic minorities was found to be connected with community disengagement. More to the point, the positive effect of the internet effect on community belonging was restricted only for those having already resources in the mainstream community (Matei & Ball-Rokeach, 2003).

In another study, Hampton and Wellman (2003) found that Internet connection was mainly used for local communication and that those residents who had Internet connection reported knowing more neighbors than those who did not . Kang and Kwak (2003) conducted a multi-level analysis of communication variables on civic-related citizenship, controlling for neighborhood characteristics such as residential stability. They found that media use (in particular reading newspapers and watching television) was positively related to participation in civic activities. Yet, among those living in a neighborhood with lower residential mobility, and time spent watching television tends to be negatively related to civic engagement among those whose residence in a community is shorter. Additionally, the effect of Internet connection

on civic participation was much smaller that the impact of print and broadcasting media. The influence of communication variable on civic community participation had interactive effects with community-level and individual-level variables. More specifically, the effect of communication variables on civic-related behavior was affected by community variables, such as residential stability, and on individual residential length.

In the same vein, a longitudinal study of a small sample of residents in Blacksburg Electronic Village tested the effect of internet connection on individuals' involvement in the local community (Kavanaugh, Reese, Carroll & Rosson, 2003). The results of this study showed that the Internet served as a tool of enhancing social relations, information exchange and increasing face to face interaction. This is especially valid for individuals with higher levels of education, extroversion and age. More important, social capital variables, sense of collective political efficacy, organizational membership and community belonging were significant mediating variables, explaining variance in community activism and in using the Internet for social purposes. The study also found that community activism and social internet use were significant in explaining variance in the overall community involvement (Kavanaugh, Reese, Carroll & Rosson, 2003).

From these studies it is difficult to conclude that there is an Internet effect on civic engagement and community attatchment. An alternative explanation is that residents involved in local activities are also the first to get connected to the Internet. After being connected, these early adopters are most likely to use the Internet for accessing local information and participating in locally based activities (Dutta-Bergman, 2006). Furthermore, it is very likely that Internet effects are conditional on

the type of Internet use (Shah, McLeod and Yoon, 2001; Kavanaugh et al, 2005). Another study which compared the effect of print, broadcast and Internet effects on interpersonal trust and civic participation reached the conclusion that only informational uses of media are positively related to the production of community social capital, whereas recreational uses are negatively associated with community social integration (Shah, McLeod & Yoon, 2001; Shah, Kwak& Holber, 2001).

It is very likely that the mixed results are the result of conceptualizing the Internet access as a binary variable: individuals are either connected or disconnected from the Web. The assumption of the connectivity perspective, i.e., connection to the Internet in itself and by itself increases the likelihood communication and community participation, is insufficient for explaining observed results, since it does not directly measure the mechanism that links Internet use to community involvement and participation. Thus, what is missing from these studies is an investigation of the linking mechanisms between Internet connectivity and local participation.

Some residents might use the technology for non-local uses such as searching for non-local information and connecting to non-local significant others. While the ones using media for acquiring local information and connections might be the ones to acquire local social capital. Thus, to the extent that the Internet is associated with "local effects", it could be an intervening mechanism.

In our study, we had the opportunity to directly test a participation hypothesis, in which we assume that Internet connection is a pre-condition for online participation in community life. In doing this, we had purposely gathered data from residents of two communities that have a local bulletin board, allowing to us to compare the ones using the Internet for local purposes with the ones that do not (and are not members of the bulletin board).

According to our ***participation hypothesis***, Internet connectivity provides access to the opportunity structure for acquiring local information and for participation. For example those who are interested in mobilizing collective action, petition, or organizational meeting would find it much easier and cheaper to mobilize attention and individual in the Internet. Local community network serves as a public virtual arena. Moreover, those seeking information and assistance in everyday community life may find it easier to exchange information and experience in chats and virtual forums on other collective issues. Using the local community network as a communicative platform may encourage spillover of multiple issues of discussion in community public life. Surely, social interaction is a precondition to translate this potential effect of the electronic space to community involvement.

Overtime, the effect of local internet use on civic participation and local attachment will be positive.

Recently, the E-neighbors project started addressing some of the research limitations noted above. Hampton (2007) conducted a study of four neighborhoods in the Boston area in which not only was an Internet connection provided but also participation in a local neighborhood discussion list, a neighborhood website, and two systems that provided online infrastructure for local interaction, communication and story telling. Participants in the neighborhood websites reported, over time, an increase in the size of their local social networks, although changes in the number of their close ties were not observed. The Internet connection provided the structural conditions for participation with the result that residents who participated increased their number of weak tie contacts (Hampton, 2007).

Our study follows and expands this line of research. Using a longitudinal survey of suburban residents in Israel we investigate the "connectivity hypothesis"

and the "participation hypothesis". Following previous studies, we expect that Internet connectivity is not enough for the enhancement of local participation. Internet connection provides the opportunity for participation in local electronic boards and it is this participation the one that enhances participation in locally based activities and community attachment.

The following section describes the design, variables, methodology and findings of the study.

Data and Methods:

This study presents the results of a longitudinal study conducted in two suburban communities in Israel. The suburban communities were chosen after we identified the existence in both of them of an electronic bulletin board that was created by the residents. Both electronic bulletin boards are very active, and residents post information on community activities, requests for help and services, opinions on the community. The existence of the bulletin boards is known to the residents and their membership is quite high. In a previous study the characteristics of the suburban communities and bulletin boards have been described in detail (see Mesch and Levanon, 2003).

K, wanted context, So I copy this from the paper, revise this as you like:

Ramat Beit-Shemesh and Modiin are both relatively new communities built in the last ten years, located in the Jerusalem periphery. The population of Ramat Beit Shemesh is homogeneous, composed mainly of recent immigrants from English speaking countries who maintain an orthodox religious lifestyle and have families with young children. The Modiin population likewise includes families with young children, and they conduct secular or religious lifestyles. The mailing lists in both places were established around 1995, at the initiative of a few residents, without the help or involvement of any external agency, including the local government. Both produce 20 messages a day on average. Their purposes were defined as: sharing information among residents, providing information to prospective residents on the location of facilities in the community, and supporting local businesses and community services. Messages in both lists are posted in English.

In both communities, a sample framework was created. Using the list of electronic board members, interviewers were sent to conduct a face to face interview with board members and to randomly choose one neighborhood member whowas not a member of the electronic bulletin board, thus matching a member of the electronic board with one of the neighbors. Data were collected at two points in time. The first wave of data collection took place during the months January to July 2005. Interviews were conducted face to face at the respondent residence and a total of 450 individuals participated. The second wave a data collection took place during the months of May to August 2007. In the second wave of data collection only 225 individuals from the original study participated for an attrition rate of 50 percent.

In a panel study sample attrition can bias the results. In this study, attrition rate between waves 1 and 2 was 50% (a decrease from 450 to 225 respondents). We conducted two widely accepted tests (Miller & Wright, 1995) to detect attrition bias. A method for detecting differences in respondent characteristics is Logit analysis (Miller & Wright, 1995). A Logit equation was conducted to estimate the probability that every first-wave respondent would participate in the second wave. In this model we created a dummy dependent variable indicating the individual's participation in the second wave (0=non-participation, 1=participation). The results provide an estimate of the effect of each independent variable on the likelihood of participation in the second wave, with statistically significant parameter estimates for any of the central variables in this study indicating the presence of attrition bias. The Logit analysis revealed no statistical significance for any of the study. We concluded that the second wave of data collection was not affected by attrition bias.

We used a conditional change panel model to test the hypotheses. The model included lagged dependent and independent variables and controlled for previous

levels of the independent variables. The inclusion of the lagged dependent variable as a predictor of the values of the dependent variable controlled for the original levels and took into consideration the regression to the mean effects (Kessler & Greenberg, 1981; Finkel, 1995)[1].

Variables Definition

List member was measured with an item that asked the respondent if he/she is a member of the electronic bulletin board. A positive response was coded 1 and a negative was coded 0.

Internet access is a question in which respondents were asked whether they have an internet connection at home. A positive response was coded 1 and a negative one was coded 0.

Attitudes to technology were measured with a scale that included six items. Respondents were asked the extent of agreement with the following items " I am very skilled at using computers", "Using computers is fun", "Computers can help bring the local community together", "Having a computer gets me in touch with people ". Responses were indicated on a Likert scale, where 1 was complete disagreement and 5 high agreement. A factor analysis (varimax rotation) found that the items represent a single dimension. Items were combined in a single scale by adding the responses to the items. (α=.82)

Norms of Generalized Reciprocity is a scale that was measured using 9 items. The items measured the extent that respondents report listening to their neighbors

[1] Introducing raw and the lagged values of the independent variables has proven appropriate for studying individuals' psychological well-being (Kessler & Greenberg, 1981) because it is reasonable to assume that stressful events can have an effect on the individual's well-being and that events such as discrimination may have some lingering direct effects on psychological health and well-being (Finkel, 1995).

problems and providing help as well as being listened to by their neighbors and getting help from them in different areas such as shopping and watching the house. Answers were in a five point Likert scale from “not at all” to “ many times”. In an explorative factor analysis, the items resulted in one dimension and were combined, summing up the responses into a single scale. (α=.76)

Neighboring was measured with a single item that asked the respondents how many neighbors they have talked to in the last week.

Community activities: Individuals were asked whether they participated in the activities of 18 different local organizations such as Parent Teacher Association, local synagogue, crime prevention group, local political groups. Responses for each item were coded 1 for yes and 0 for no. A scale was built summing the answers to all the items for each respondent.

Organizational membership: From a list of 18 different local organizations individuals were asked to indicate if they were active members. Responses for each item were coded 1 for yes and 0 for no. A scale was built summing the answers to all the items for each respondent.

Community attachment was measured using four items that asked about the extent of agreement or disagreement with the following statements: “I'm proud to live in this locality”, “I feel an obligation to make a contribution to my locality”,
“If others in my locality wanted to do something to improve our place, I will be willing to work with them”, “I will be sorry to leave the locality”. Responses were given on a Likert scale when 1 indicated lack of agreement and 5 high agreement. The items were found to represent a single dimension using a factor analysis and were combined into a single scale. (α=.75)

All the variables were measured in both waves of data collections, thus we have a baseline and change score for each measure.

Results

Demographics:

In the study 74 percent of the respondents were women and on average respondents were 37.41 years old; 91 percent were currently married, 85 percent were homeowners, and the mean length of residence in the community was 6.7 years.

[INSERT TABLE 1 ABOUT HERE]

Internet access was slightly above the national average:79 percent reported access to the Internet, compared to the national level of 72 percent. An important finding from the descriptive statistics is that while 79 percent have internet access only 52 percent report being a member of the locally-based electronic forum.

<heading>

Given the central interest of this study on the effect of participation in the local bulletin board, the next step of the analysis was directed to identifying the characteristics that predict change in list membership over time.

[INSERT TABLE 2 ABOUT HERE]

Table 2 present the results of a logistic regression analysis predicting changes in the likelihood of membership in the community electronic forum. The findings highlight the importance of technological factors over residential factors. Internet connectivity represents an exposure factor, and, not surprisingly, it is associated with membership in the electronic forum. But exposure by itself is not enough, and positive attitudes to technology have an important effect. Thus, the results show that the combination of connectivity and attitudes increases the likelihood of being a member in the electronic forum. At the same time, it is important to note that socio-

demographic variables were found not to be related to membership in the forum. It is very likely that age, gender and, educational level are associated with Internet access, but once individuals have access and positive attitudes to technology, socio-demographic variables do not have an effect.

Connectivity and Civic Engagement

What are consequences of participation in the electronic bulletin board? In the next section of the analysis, we present the results for the effect of internet connectivity and membership in the local bulletin board on community involvement and engagement, namely membership in local organizations, participation in community activities and attachment to place. Table 3 presents the results for organizational membership. According to the findings, it is not Internet connectivity per se, but membership in the locally based electronic board which is positively associated with membership in local community organizations.

[INSERT TABLE 3 ABOUT HERE]

Membership in locally based organizations appears to be dependent on other aspects of social involvement. Having reciprocal relationships with neighbors and talking with neighbors are important in becoming a member of a locally based organization. In that sense, it seems that Internet connectivity is an important condition for being a member of an electronic forum, yet the structural factors conducive to community involvement by being a member of organizations is, in turn, associated with neighboring and with being a member of the electronic bulletin. It seems that membership in the electronic forum is just a form of reinforcing previous neighboring relationships.

[INSERT TABLE 4 ABOUT HERE]

Table 4 present the results for participation in locally based activities. The only statistically significant variable is membership in the community electronic forum. Socio-demographic characteristics are not statistically significant. In addition, having internet access and relations with neighbors did not result in statistical significance. The results indicate that membership in the local bulletin board <is .. [missing the end of this sentence]]

[INSERT TABLE 5]

Table 5 presents the results for community attachment. The outcomes clearly show that membership in the electronic bulleting board increases the sense of attachment to the community. In addition, neighboring and norms of reciprocity are positively associated with attachment to place. Internet access and attitudes to technology are not. Community attachment was found associated with family life cycle (as indicated by number of children), and education.

Discussion:

This study was designed to examine the effect of connectivity and electronic participation on community involvement and attachment. Previous studies on the effect of the Internet on community participation and sentiments have been limited as they have typically used a cross-sectional methodology, and measured only the effect of connectivity. The use of cross-sectional methodologies cannot control for the possibility of sample selection bias, in which highly educated, community active individuals are also more likely to have Internet access.In some aspects, this is the central assumption of media complementarity that, taking a social constructivist perspective, understands the use of local media as reflecting previous community commitments. Our longitudinal study allows to us to empirically test this assumption, modifying it to testable hypothesis, and our results imply that controlling for previous

community variables, membership in the locally based electronic space has a statistically significant effect on community involvement and place attachment. It is precisely because this study utilized a longitudinal methodology that it was possible to control for initial levels and to disentangle the directionality of the effects, overcoming sample selection bias which had prevailed in previous studies.

Local Internet use is a guard against privatization of community life. Yet, this hedge is not technologically deterministic. Our findings strongly support our argument that it is not Internet connectivity *per se* that increases community involvement but, rather, a new venue of community participation, as connectivity facilitates participation in locally based bulletin boards. In other words, connectivity provides the opportunity for local participation, but the membership in the bulletin board provides the most important effect on community participation and attachment. In return, the effect of Internet connectivity on community social capital is affected by the initial stock of residents' social capital.

The results indicate that Internet access and positive attitudes to technology are a critical factor in the understanding of membership in the electronic bulletin board. This result demonstrates the importance of promoting locally based electronic boards as a public space of community information exchange, social support and sociability. Furthermore, the results show that community participation requires intervention, designed for decreasing the still persisting digital divide, as residents lacking internet connection are deprived from part of the local opportunity structure for participation.

Additionally, the findings' consistency indicates that once residents have access, it is membership in the bulletin board which increases the likelihood of association with locally based organizations and higher levels of community

attachment. As we did not measure the extent of actual online activity carried out by electronic board's members, the effects we have presented here are conservative. Thus, they indicate that the mere enrollment in the bulletin board becomes a source of formation and extension of social capital; apparently increasing the size of locally based social networks and norms of reciprocity.

Our findings have implications for understanding of community social capital in the information society. As the Internet is integrated in everyday life of individuals, and is adopted as a community system of information and communication, it has a role in access to community social capital. Future studies should be directed to understanding of this mechanism. In other words, studies should examine the extent that active versus passive participation in the locally based electronic bulletins has on the formation of social capital at the local level. For example, studies could explore the question of whether "lurkers" enjoy access to social capital more, less or the same as active participants requires more attention. Additionally, future studies should carefully examine the linkage between digital community, online participation, social networks and social capital at the individual and community levels of analysis.

Table 1. Descriptive Statistics of Participants in the study

	Average	Range
Age	37.41 (9.85)	18-80
Gender (male=1)	.26 (.44)	0-1
Number of Children under 18	3.09 (1.94)	0-11
Length of Residence	6.70 (6.21)	1-50
Home Ownership	.85 (.36)	0-1
Household Income	6.0.	1-10
Educational Level	4.86	1-8
Marital Status (1=married)	.91 (.27)	0-1
Internet Access	.79 (.40)	0-1
Local electronic bulletin board membership	.52 (.50)	0-1
Number of Neighbors talk last week	7.20 (6.83)	0-50
Membership in local organizations	2.11 (1.60)	0-8
Activities in local organizations	5.35 (2.92)	0-15
Norms of reciprocity	17.12 (4.00)	4-30

Table 2 Results from a logistic regression predicting membership in the list

Odds Ratio	Standard Error	Beta	
.969	.026	-.032	Age
1.42	.47	.35	Male
3.07	.86	1.12	Married
1.42	.21	.35	Educational level
1/04	.06	.04	Length of residence
.41	.65	-.88	Internet access t1
2.32*	1.44	3.14	Internet access t2
.98	.04	-.01	Attitudes to Technology1
1.10*	.04	.09	Attitudes to technology3
12.9*	.56	2.56	List member1
.02	2.16	-6.11	Constant
		.32	Neglerke Rsquare
		146.39	-2 log likelihood

*p<.01, **p<.05

Table 3. OLS membership in local organizations

Beta	SE	B	
.16**	.006	.020	Age
-.07	.13	-.20	Male
-.05	.21	-.23	Married
.02	.03	.01	Children under 18
.01	.05	.01	Education
-.01	.00	-.01	Length of residence
.08	.15	.25	Internet access t1
-.01	.37	-.09	Internet access t2
.04	.01	.01	Reciprocity t1
.13**	.02	.07	Reciprocity t3
.05	.01	.01	Talking with neighbors t1
.07+	.01	.01	Talking with neighbors t2
.02	.01	.06	Attitudes to Technology t1
.02	.01	-.05	Attitudes to Technology t3
.10+	.14	.26	List member1
.22**	.19	.89	List member2
	.88	-1.30	Constant
		.186	Adj R Square

*p<.01, **p<.05, +p<.10

Table 4. OLS regression predicting participation in community activities.

	B	S.E.	Beta
Age	.002	.009	.013
Male	-.149	.174	-.042
Married	.057	.292	.010
Number of children	.021	.040	.026
Education	.116	.073	.084
member1	.137	.185	.044
member3	.707	.260	.142*
Internet access1	.079	.210	.020
Internet Access 3	.188	.516	.019
Talking with neighbors t1	-.004	.013	-.016
Talking with neighbors t2	.009	.007	.061
Attitudes to Technology t1	-.07	.02	.01
Attitudes to Technology t2	.02	.03	.03
Constant	3.024	.73	
Rsqure	.05		

*p<.01, **p<.05, +p<.10

Table 5. OLS regression predicting community attachment

Beta	SE	B	
.097	.024	.044	Age
.46	..75	.076	Gender (1=male)
.080	.778 .	1.276	Married
.03	.02	.015	Length of Residence
.10 *	.225	.099	Number of children
195*	.375 .	.096	Education
.09	.49	.86	member1
.09*	.69	1.36	member3
.55	.722	.066	Internet access1
.0127	1.37	.473	Internet Access 3
.03	.03	.02	Neighbors talk1
.12**	.01	.05	Neighbors talk3
-.06	.04	-.04	Attitudes to technology 1
.25	.06	.01	Attitudes to technology 2
.18*	.03	.13	Attach1
	.19**	27.8	Constant
.13			Adj r square

*p<.01, **p<.05, +p<.10

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