

Changing trends and approaches in human and computer modelling for social housing policies

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ABSTRACT

The paper discusses conceptual issues, goals and preliminary results of an on-going research which aims at building a Decision Support System for public housing environmental oriented maintenance and management in a city in Southern Italy, Bari.

Traditional post-war Italian housing policies are compared with more recent approaches in the field, pointing out the change from quantitative, aggregated, more simple building problems and related approaches to qualitative, differentiated, complex ones integrating social, economic and environmental dimensions with the aim of regenerating deteriorated residential areas. The paper claims for the need shift, both in the human and computer areas, from traditional quantitative models to new approaches able to manage also qualitative variables, temporal dynamics, emergencies, and intentionality, since they appear key aspects of the real world to be modelled.

The housing estate of Bari and its needs of maintenance and management are examined, eliciting essential related knowledge using the interview technique. The clear orientation towards sustainable policies for urban regeneration, at a local, national, and Community level, is also considered. The innovative and collaborative nature of such policies and the attention to be paid to the social aspects of the problem require a complex DSS, integrating various kind of hypertexts, information systems and case-based fuzzy expert systems, whose main aims, functions, software and general organisation are outlined in the paper.

1. THE MAINSTREAM OF PUBLIC POLICIES FOR HOUSING IN ITALY

From the post-war period until recently, the emphasis of public policies for housing in Italy has clearly focused on quantitative issues, the main goal being that of guaranteeing a dwelling for each household: implemented measures have privileged increasing supply of dwellings affordable by low income households or give households, essentially middle-class owners, access to the market. This continued despite the fact that since the 1971 census and increasingly in 1981 and 1991 it has become clear that such a policy was creating great distortions in the housing market and reducing the effectiveness of public intervention, at the same time giving rise to new and more complex problems than those they were supposed to be solving both from the social and the environmental point of view. In 1971 there were 15.3 million occupied units with 56.2 million rooms compared to 16.0 million families and a population of 54.1 million, and in the period 1971-1991 there was a total increase of housing occupied units of about 4.4 million (total amount 7.5 million) with 29.0 million

rooms. The 1991 Census revealed also that 75% of the occupied units were owned by their occupants, compared to the 1981 figure of 65% and the 1971 figure of 51%, corresponding to an entrance of 6.9 householders into the property market and a parallel subtraction of 2.6 dwellings from the rental market.

As regards social housing, here defined as the whole residential field that benefits from different forms of public aid, while considering public housing the part of it wholly subsidised by the State, and built and managed by public agencies, i.e. IACP (Autonomous Institute for Low-Income Housing) and Municipalities, the above mentioned quantitative approach is also at the origin of two main effects. On the one hand, it led to the growth, in particular on the periphery of large towns, of residential areas characterised by the predominance of social and/or public multi-storey buildings, lack of services and generally of functions other than residence, with serious economic, social, crime problems and of the progressive deterioration of the public housing settlements in the absence of integrated maintenance programmes; on the other hand, to the reduction to a minimum of the rental sector, due to the periodical conversion of public rental housing into owner-occupancy through redemption or sale.

The field of social housing in Italy is a complex one and includes a number of policies and institutions responsible for them: they range from direct provision of housing at public expense for rent or concession, to aids to families mainly in the form of low credit, reserved to households included in special lists, with particular requisites (low income, high number of children, bad housing conditions etc.). The main involved institutions are the State, Regions, Municipalities and the IACP.

While the State is responsible for producing general legislation and defining the amount of financial resources to be allocated in the sector and criteria for their spatial (between Regions and types of cities) and sectoral (new building and rehabilitation programmes) distribution, and Regions carry out programmes for distributing the financial resources and give credit support to families, Municipalities play a crucial role both in residential land allocation by means of Master plans and Plans for economic and low income, and in selecting families to whom public benefits are to be given; recently IACP, together with Municipalities, are responsible for producing, rehabilitating and managing public housing.

The incidence of public housing on the total production changes greatly according to periods and areas. It is worth mentioning that both social housing production, and within it, the public segment, were up to the 70s concentrated in large cities, as these were the most dynamic areas for job creation and population growth. This has happened even more recently, despite demographic reduction, since these areas are more affected than other areas by socio-economic tensions in the housing market due to a number of reasons ranging from the lower level of owner-occupancy and the rigidity of rental market to the general higher levels of housing costs and to the new demand and new needs increasingly linked to creating weaker social groups. During the 80s the percentage respectively of social housing over the total housing production was, for example, around fifty percent in large towns such as Milan (49.80), Genoa (54.14), Naples (43.52), Bari (49.81) and Palermo (43.6), while between about 20% and 30% in the respective regions (22.55 in Lombardia, 31.59 in

Liguria, 26.72 in Campania, 26.32 in Apulia, 27.16 in Sicilia). For Bologna the corresponding percentages are even 68.77 and 23.08. The figures for public housing do not differ substantially from the above mentioned ones: more than 20% in the majority of the metropolitan cities, less than 10% in other parts of the regions (CRESME-Credito Fondiario, 1991).

The total number of dwellings owned by public authorities was 1.28 million, out of almost 17.5 million occupied dwellings in 1981, and 1.46 million, out of almost 19.7 million in 1991. The limited difference in the public housing stock between 1981 and 1991 is to be explained by the above mentioned policy of redemption and sale.

2. THE INERTIA OF OLD APPROACHES FACING NEW TRENDS AND NEEDS

Housing in Italy has been affected by profound modifications in the last decades: new problems and issues have emerged, needing new approaches both from analytical and policy viewpoints. Here we concentrate on two crucial issues for public policies: (i) new emerging social needs; (ii) progressive decay and marginalisation of public housing neighbourhoods.

Housing needs increasingly concentrate in large cities, where new social demands are developing: elderly, disabled people, young people living alone with children, recent immigrants, young people or workers needing temporary housing. Part of these categories are not only poor but suffer from exclusion and marginalisation processes, thus requiring integrated socio-economic and environmental policies. Moreover, some of them differ from the traditional public housing users also because they need high flexibility in the use of the housing stock, which greatly contrasts with current management 'rules' of public housing.

Notwithstanding this change, plans, programmes and specific measures seem to remain anchored to old conceptualisations and approaches: when new approaches are practised, they do not replace the old ones, but are added to them, often assuming residual roles and dimensions.

2.1 From New Building to Rehabilitation and Regeneration Programmes

Even if by the 70s the need to shift the focus of housing policies from new building to housing rehabilitation was clear and a new State law was approved in 1978 in keeping with such an idea, followed by a number of related regional laws, the prevailing approach for public housing for long time, particularly during the 80s, was based on the idea that its main problems consisted in poor management and maintenance by IACP and municipalities and in the low-rent philosophy, and thus improving the former and adjusting the latter was thought to be sufficient. The corporate orientation of such a position seems clear. Positions stressing the need for housing and environmental initiatives to be closely linked to other measures designed to improve local social and economic conditions and to break the marginalisation of public housing settlements were a minority or were unable to turn ideas into practice. The narrow residential

orientation of that law, both from financial and procedural viewpoints, failing to take into account the complexity of rehabilitation issues, made the situation worse as new public housing prevailed again over rehabilitation and funds compulsorily destined for it were mostly used for repairs responding to emergency situations.

Moreover, peripheral social housing areas were largely neglected within urban rehabilitation strategies of local agencies: the attention of municipal programmes was mainly directed to the historical parts of the towns and the new plans for rehabilitation introduced by the above mentioned State and regional laws were mostly implemented in the old parts, often corresponding to the city centre. Financial resources too assigned for rehabilitation were mostly used to promote rehabilitation of historical buildings.

Starting from the 1990s, in face of new emerging problems of decline, deterioration, and low quality of life of large parts of the cities, especially in the public residential peripheries built in the post-war period and in the areas involved in industrial abandon, a new philosophy in housing intervention is developing, based on the concept of “complex programmes”. These programmes focus on neighbourhoods and their relations with the whole city rather than on single buildings, and aim at integrating not only intervention on housing with specific measures and projects for public services and infrastructures, functions and forms of interventions (new buildings, rehabilitation, redevelopment), but also public and private financing, and housing organisations and other public agencies.

Even if the experimental stage of these programmes does not allow for final judgements on it, some limits have already emerged, mainly concerning the risk that seeking convenience in favour of private operators implies a decrease in social orientation of the interventions and that the consideration of financial benefits prevail over other environmental and social benefits in the total evaluation of the effects of the programmes. The problem of constructing meaningful indicators on the base of which programmes are to be selected not only for financial support, but also for ex-post evaluation, is really crucial in this case (Innes, 1994).

Emphasis on public/private integration often implies selection, within the possible intervention locations, of those more attractive for private investments, and often the role of public agencies consisted in responding to the market demand, and so the outcomes are not always successful, as the ability of the market to deliver the objectives of urban policy is likely to vary greatly in time and place (Healey *et al.*, 1992). In order to favour private investments two main tools are used by public agencies, in particular by municipalities: private developers are allowed to derogate from the permitted building types, uses and parameters such as height, density and so on, according to the master plans in force, and simplified procedures, originally quite long, complex and even far from rational are applied. Densification of urban settlements is an already visible result of such a strategy to capture the interest of private developers in less-attractive areas, which often adds negative impacts, at least in terms of environmental and physical quality, to the old ones.

At this stage of “complex programmes” implementation, local people seem to have a rather marginal role in directing the investment, as goals and specific

interventions appear essentially addressed to improve the quality of the physical space. The issue of inhabitants comes into play only in the form of inserting different household types (mainly middle-class) within contexts strongly affected by low-income predominance, if not by marginalisation and criminality: regeneration is intended more in terms of changing the nature of the medium profile of population living in the area than of improving economic and life opportunities of those already there. Risk of missing the goal of urban regeneration is high, due to a lack of measures aiming at improving socio-economic conditions of the living community and to the neglecting of the well-known fundamental role of community involvement for program effectiveness (Alterman and Cars, 1991).

Moreover, the limited amount of resources destined for these kinds of programmes, compared with their operational complexity and with the total funds for public housing, may lead regions and municipalities, after a period of experimentation, to move back to traditional forms of interventions also due to the pressure they are subjected to by households on special lists who have been waiting for a long time for a public dwelling: altogether almost 5.000 billion lire were destined in the early 90s to finance rehabilitation projects and programmes, urban redevelopment and complex programmes as well as rental housing construction, with respect to 12.000 billion lire globally available for social housing, and only a few Regions went beyond the 30% indicated as a reserve for the renewal of existing housing stock and the 15% destined by law to urban rehabilitation (Ministero dei Lavori Pubblici, Comitato per l'Edilizia Residenziale, 1996).

A clearer focus on social, economic and environmental development objectives characterises the so-called Urban Program, a four-year program promoted and co-financed by the European Community, thus inspired by long-term experience in urban regeneration carried out in some North-European countries (Alterman and Cars, 1991). The projects proposed by sixteen large-medium sized Italian towns were selected by a specific European Commission and are now on-going. Yet documented material shows a vast array of places involved (historical centres again prevail, some post-war public housing peripheral areas are included, and only one city, Genoa, selected dismissed industrial sites), approaches adopted (with a top-down or bottom-up orientation) and actors directly or indirectly involved (ranging from landowners, financiers, builders, business-firms, to voluntary associations, pressure groups, unemployed organisations, co-operatives of old and young people) (Laino et al., 1998). Co-operation is encouraged through the participation in the program of a number of private and public partners at local and governmental levels, but emerging procedural and time-based problems of co-ordination risk making these co-operation efforts fruitless.

Entrepreneurial approaches to urban policy, and the related emphasis on urban image, on attractive places for consumption and leisure (Harvey, 1989), are combined with community-based initiatives which entrust primarily local human resources with the task of reversing trends of decline and finding new bases for development and well-being, thus reflecting a very different attitude towards urban regeneration. At the moment, the implementation of physical measures (especially infrastructures and

building rehabilitation) is at more advanced stages, while the scarce experience of Italian cities in urban regeneration is reflected in the delays associated with the implementation of the social and economic measures. The 'climate' itself seems fairly differentiated in the various contexts, ranging from a great trust in the perspective of physical rehabilitation and local economy development and enthusiasm for the innovative, bottom-up, experimental character of interventions, to the preoccupation of risk of failure in particular as far as social recovery and economic development is concerned, due also to the lack of well-defined and feasible goals and to the episodic nature of the program on the political agenda.

2.2 Decision Support for Housing

We can single out two main fields of decision support in the housing sector, both at regional and municipal level: (i) the prediction of housing needs (or housing demand) and (ii) the analysis, monitoring, management of housing stock, its current and possible users, and the financial resources available for new buildings and rehabilitation programmes for social housing.

Almost all Master plans and Plans for economic and low income housing in force in Italian municipalities are based on some kinds of prediction of housing needs, the best established one assuming population forecast, eventually disaggregated by age and sex (e.g. applying the cohort survival method), and household forecasts, on the one hand, and a number of assumptions concerning the use and transformation of the building stock, on the other (vacancy and clearance rates, in particular). The models in use are not particularly sophisticated, and in Italy they are rarely designed as user-friendly systems providing what-if and scenario-generating test-beds, helping decision-makers to examine the impact of alternative assumptions, data inputs and modelling methodologies (King, 1991). It is to be remembered that this quantitative approach is rarely questioned by the public at large in planning practice even if - as we know very well - high levels of uncertainty accompany all steps of the procedure and that the resulting housing needs are rarely met by rehabilitation policies, since typically at this stage of the procedure, uncertainty and implementation difficulties affecting rehabilitation policies are called into question by agents interested in new housing, i.e. landowners and house-builders (Rainford and Masser, 1987). In this field innovation of concepts and approach seems scarce; for example, it emerges from documentation that no attention has been given to modules devoted to the problem of housing needs in Italian municipal GISs (Barbanente and Maiellaro, 1993; Craglia, 1994).

As for management and monitoring systems, complex relations and constraints affecting decision-making in the housing sector, involving State, regional and local levels, made it difficult to give strategic orientation to Data-Base Management Systems that have been designed and occasionally constructed both by IACP and Regions in the housing field. Their principal purpose, also in the most recent approaches, is generally defined as "data collection to support planning, operational and management activity" (CIDS-CRESME, 1994).

The prevailing model adopted by the Regions, but also by some IACP and

municipalities which have implemented them, is that of the so-called Registry of “public housing users” following the definition given by the law passed in 1978 which assigned the task of organising and managing it to the Regions (ANIACAP, 1979). Most interesting monitoring systems were constructed during the 80s by research institutions linked to Regions and have really more an informational attitude than a management and operational one (see Canepa et al., 1987, about the Liguria experience and Consorzio Regionale tra gli IACP del Veneto - Daest, 1983, about Veneto).

Recently too, a top-down approach seems to be privileged, giving major tasks to the national and regional levels, and neglecting the municipal level and the crucial issue of end-users involvement (CIDS-CRESME, 1994). Some interesting municipal Monitoring Systems (Indovina, 1983), similar in purpose and formulation to projects and realisation developed in Britain some years earlier (Horn et al., 1977), have been designed by research institutions without having significant operational results.

Anyway, if the housing problem is a complex one, increasingly affecting economic and social problems rather than mere building ones, and the urban quality and the image of the neighbourhoods rather than single factors related to the housing aspect, these systems, being sectoral, business-management oriented, and “detached” from the citizens’ problems and expectations, were far from being adequate to the problem.

3. RETHINKING HOUSING MANAGEMENT FROM A SUSTAINABLE POINT OF VIEW

In a sustainability perspective the ways of thinking about the management of public housing, as seen from the previous analysis, require to be redefined for various reasons.

Although there are no comparative studies through which differences and effects pertaining to diverse approaches and styles to social housing management may be identified, it is possible to try to indicate some typical and recurrent conceptual frameworks underlying them.

Considering management as a specialised sector of action two main aspects emerge: on the one hand the persisting of a traditional reactive approach to buildings maintenance; on the other the more recent main role played by “performance culture” which has emphasised the efficiency of the service provided, in the absence of an adequate reflection about its effectiveness in a specific context (Kemp, 1995).

In the broad field of housing policy, management appears as a strategy: (i) based on a control oriented approach, requiring the monitoring of buildings and users (see par. 2.2); (ii) “limited” by the difficulty of linking national policies to local action and programmes due to the multilevel character of housing policy (Elander, 1995); (iii) lack of integration between housing provision and housing quality (Lawrence, 1995) and between housing and urban environment. In the latter case the lack of integration is mainly marked by the interpretation of management as a technological, typological

and functional building rehabilitation (Gelsomino, 1984). Housing management seen as “rehabilitation pieces of city“ (Barbarossa and Poggi, 1989) has received less attention if compared to that paid to the more urgent problem of designing rehabilitation of deteriorated urban areas. It poses problems about the complexity of strategies required, but it does not connect urban quality to its environmental compatibility.

These conceptual frameworks are inconsistent with sustainability both for the values underlying them and for strategies consequently adopted. The inconsistency is even deeper if sustainability, defined as “process of change in which the exploitation of the resources, the direction of the investment and institutional change are made consistent with future and present needs” (WCED, 1987), is linked to an ecocentric point of view and strongly based on equity principles.

The request for assuring people’s and ecological systems’ health and for considering cultural and social diversity, makes it clear that the traditional meaning of management does not have a complex, multidimensional, variable concept of housing quality, either static or absolute (Lawrence, 1995).

From this point of view housing quality challenges housing management to produce differences and to create a sense of identity in urban areas which are currently characterised as a ‘great’ store of inconsistent objects produced in a context of bureaucratic laws ignoring differences of social groups, which were held together in artificially uniform and clearly recognisable environmental pictures (Secchi, 1984). In this respect sustainability forces to find the possible actual ways to construct communities.

As far as building level is concerned, on the one hand the challenge consists in the possibility to carry out building maintenance and rehabilitation aimed at reducing environmental impact using green materials and technologies; on the other hand it refers to the possibility to adjust building types to the changing user needs (see par. 2.1) in a way that makes it difficult to standardise them since they are now considered individual subjects. The possibility is to be measured against the well-known technological and performance criteria and choices adopted in post-war public residential design. These neighbourhoods have represented more and more a formal and technological experimental field often carried out by unskilled workmen and using low quality materials (Molinari, 1989).

From an urban perspective “urban unfinished space” and more in general open spaces are potential resources for social and environmental rehabilitation as planning experiences have showed.

More problematic is to identify starting points for improving neighbourhood development. This is due not only to the differentiated nature of their economic features but also to the lack of knowledge regarding, as far as the main focus of this paper is concerned, the reciprocal connections between housing and regeneration (Maclannan and Bannister, 1995), in particular as regards its economic and social effects.

The challenges sketched above delineate a basis for tracing strategies able to merge what remains in consolidated approaches with sustainable oriented innovations. Reactive and the control-oriented approaches should be rearranged in a more flexible

and adaptive housing management. It may be seen as a meta-strategy aimed at rehabilitating public housing in a sustainable way, but articulated into specific strategies rooted in the individual context. Moreover, strategies should be conceived not only as oriented towards change using different methods to face uncertainty but also towards learning and discovering innovative/appropriate ways for facing complex problems and emerging opportunities (Morin, 1990).

Operational considerations outline that housing management depends on: (i) strategic choices which will be carried out for housing policy and (ii) on the suitability of organisational structures, information used in decision processes, laws and funds, (iii) the capability to change organisational culture (Schein, 1997).

In the preliminary phase of the research interviews were carried out with key people working in the main organisations for public housing in order to trace a map of problems needing solutions, before thinking of and implementing environmental strategies. The problems are: social decline, primary needs still unresolved such as overcrowdedness, lack of updated register of building and users, building conformity to legal requirements, continuously insurgent emergencies requiring quick remedies.

Is it possible to design effective strategies for housing management in administrative contexts characterised by emergency? what are the tools which can lead to adopting sustainable strategies?

4. THE CASE STUDY

With the object of supposing the organisational structural frame of a DSS for an innovative urban management with a sustainable approach, the authors have used their own territorial reality, better known a priori, easier to deal with from an operational viewpoint, and meaningful in the national area for town dimension and places condition.

Research was carried out on the public housing estates in Bari. Bari, a city in the Region of Apulia, in Southern Italy, is one of the eleven Italian cities with more than 300,000 citizens. The owner organisations of the residential buildings are the Bari Municipality and the IACP of the Province of Bari: both of them are in charge of building activities as well as the maintenance and management of housing; the Municipality also has the task to single out households entitled for dwelling assignments.

The interviews were carried out not so much for knowledge acquisition, traditionally intended to build automatic knowledge-based systems, as for a reasoned recognition of the housing estate at hand, based on a historical memory and expertise matured in the organisations during the many years' work, and in the light of organisational expectations concerning urban requalification.

Accordingly, the people interviewed were: (i) the person responsible for the Public Housing Department of the Municipality –a technician-architect, male–, (ii) the person responsible for the Housing Maintenance Department of the Municipality –a technician-architect, male–, (iii) the ex-Managing Director of IACP –an administrative

official, with a degree in law, female–, retired about three years ago after a twenty-five years' work in the organisation, (iv) the present Managing Director of IACP –a technician-engineer, male–, (v) the President of IACP –a politician-architect, male–.

4.1 Public Housing Estate Main Features

The public housing estates at hand amount to more than 20,000 dwellings owned by IACP, most of them built between the Seventies and the Eighties, and only a few of them built before the Second World War, and about 2000 dwellings owned by the Municipality, mostly built from the Eighties on. Multilevel buildings clearly prevail, with a line or tower type; the less recent and also smaller neighbourhoods are located on the outskirts of the historical centre of the town, by now incorporated into its dense centre fabric; the more recent and also larger neighbourhoods are located on the extreme outskirts of the urban area, sometimes beyond a wide interruption of the built area and often without sufficient services, or on satellite districts where services are no better than in the previous case, but which are better integrated with the existing built-up area.

The assignment of these dwellings is to the less well-off and the have-nots, in some cases including delinquency and criminal fringes. Rents are entirely supported by the public organisation for the have-nots and, for the others, estimated on the basis of their incomes; but in every case they are always “social” rents, very low compared to rents required for private housing with the same extension and localisation (the ratio is about 1/5), and ridiculously low if compared to those required for other localisations in the city (the ratio is about 1/10).

The decay status of these housing estates is caused by numerous factors connected to each other, two of them being the most significant: the low environmental quality, both of buildings and urban context where they are built, and the lack of a social consciousness for common property. Because it is a question of low-income housing, the criterion which often prevailed in its realisation was that of committing works to the building contractor who proposed the lowest estimation discount, but this cannot coincide with the best choice if it does not go with an appropriate mechanism for controlling the quality of building. Consequently, the initial economic saving on average turned out a gross mistake, since it caused a low initial quality of buildings, formally, technologically, and constructively, a huge waste of economic resources for maintenance during the life-cycle of the buildings, a considerable operational drawback conditioning any management strategy. Some of the oldest buildings have been saved from this process, since ‘natural’ materials were utilised and the execution was ‘properly’ done, thanks to the experience and the tradition of workmen which made up for other deficiencies due to cost economies. But, from another point of view, these buildings suffer functional obsolescence owing to their age, and consequent non-appropriateness or lack of plants, hygienic-sanitary fittings, lift and heating, all necessary to ensure the inhabitants comfort according to up-to-date criteria.

Parallel to the building quality, there is also the urban quality, unfortunately

very low too in the case study at hand. It is necessary to say that normative tools, regulating the construction of low-income housing as years went by, often ignored any kind of reference to the environmental context where the buildings were realised, and somehow encouraged the inconsistency of the design process referring the realisation of infrastructures and non residential buildings to organisations and subjects different from those building houses. Consequently, building areas were hardly ever chosen, but emerged from those non-attractive for private people; this not only conditioned localisation of settlements in unsuitable areas, but also made the realisation of net infrastructures and services, both those inside the neighbourhoods and those linking them to the city centre more difficult. And then, the social dimension strongly influences decay: out of ignorance or negligence, people living in these houses have not so far shown a sense of the public good and its conservation, although it is assigned to them. Thus, even when the single house is clean and well looked after, common parts are neglected, or even devastated, subjected to vandalistic actions and stealing; thus not allowing these services to survive their users. In this process, physical marginalisation and social alienation play a decisive role, and therefore political choices governing the realisation of these buildings and the dwelling-assignment criteria was extremely important. Thus, a vicious circle was created between the physical-environmental deterioration and social-economic decline, which often makes tenants not pay the rent, almost as a revenge attitude towards the maintenance organisation, which, on the other hand, cannot afford maintenance works if does not draw the right rent. Among other consequences, this situation has also led to the illegal appropriation of some houses by some criminal families, who expel the legitimate assignees, at times on payment, and control areas of the neighbourhood, with no real possibility for the organisation to intervene to put the situation right.

4.2 Emerging requirements for a DSS

The key people interviewed expressed the following attitudes towards sustainability requests. If environmental concern is to be considered an important reference for action, the chronic emergency situation brings people working in public housing organisation towards a generalised distrust in the real possibility of acting in a sustainable perspective over a short time. This is due to the low funds for maintenance, to few people in charge of this task, and to the lack of information systems.

These problematic situations are not new; they reflect typical and recurrent issues on the one hand emerging from the traditional analysis of urban peripheries and on the other posed by the challenges which public administrations must face to construct scenarios for sustainable urban development.

They utilise the concept of public goods, as obvious, referring to the traditional notion of public administration property. Education to respect public goods is seen as a fundamental instrument to reverse the relevant component of building degradation associated with vandalism and to promote an effective management. Without these actions any attempt to reset the minimal standard level of housing quality is bound to fail. They never use the word community to define citizens, but rather conceptualise

people living in public housing as a whole, compact social class, the poor.

They consider users' involvement only limited to condominium management and critically mediated by an external administrator able to effectively function as interface with both the organisation and the neighbourhood inhabitants. They perceive the need for a new definition of "the social" and recognise a plurality of differentiated needs and problems.

Also in the experimental project implemented for the ecological rehabilitation of a small area, the citizens' involvement, together with other activities, is committed to an external ad hoc agency. One of the goals of these projects is to promote economic development, by training young people to rehabilitate the buildings. Thus starting from the experience in their neighbourhoods, they are likely to improve their chances of finding a job.

All the key people interviewed consider sustainable building a practice linked to the use of green technologies and separate from the social aspect even from a technocentric point of view on environmental questions (Bhatti, 1993). It recalls the classical separation of domain and skill between housing and social action and emphasises a vision of housing as a building problem.

They underline the need for an information system. It is always connected with a database seen as one of the most important strategical resources as a means to avoid the emergency situation and effectively manage public housing estates. Integration linked to more interactive decision processes (regarding, for example, the location choice) among agencies is another crucial change contributing to make the provided service increasingly effective.

The importance of the role played by the public in public/private partnership is weighed differently, judgement being based on the social concern to assure availability and affordability of housing provision. When asked to propose an environmental strategy for housing management they looked for well-structured actions to be implemented on the basis of the existing statistical information. The technocentric approach is detectable not only in the way of dealing with the environmental question but it permeates the whole field of the building design process as was made clear when they showed a project of a new settlement. In this field technicians think they have complete knowledge and decision capacities.

In general the proposed strategies are reactive and/or of control and co-ordinated with a top-down approach. Something changes when the social dimension is absorbed and the political dimension of management complicates the horizons. A "muddling through" behaviour linked to a diffuse use of rules of thumb reveals itself as a more effective way for facing complexity. This explains the difficulties met in seeking a clear conceptual framework underlying the strategies on the basis of interviews to key people belonging to such an organisational environment. The only possibility seems to consist in collecting pieces of strategies used to solve specific problems.

The crucial missing point is the perception of sustainability as an opportunity. This is due to the prevailing way of thinking about emergency situations as a limiting factor, rather than as a challenge aimed, on the one hand, at detecting (if not at changing) local opportunities for a sustainable housing management and, on the other,

at innovating organisational culture towards more effective strategies for facing complex problems. Starting from interviews, but considering sustainability as an opportunity and emergency also as a challenge, some main requirements for a building decision support system emerge.

In this organisational context an expert vision on housing management could only partially address the problems which emerge from the interviews even if experts' problem solving routines are necessary to support decisions in specific domains. In a sustainable perspective public housing management has to face unstructured problems and uncertainty in order to construct actions which cohere with differentiated individual contexts and support a "what if" reasoning. Moreover, the shift from reactive and control strategies, which typically use information in passive way, to adaptive strategies leads towards a more "interactive" way to use information.

What emerges is a decision support which meets the informational requirements brought about through interviews and at same time uses different tools aimed at knowledge diffusion, seeking opportunities, and developing creative solutions.

4.3 Management Policy

Finding sustainable solutions for housing problems and creating the tools to achieve them is increasingly important, due not only to the threshold level reached by the social-physical-environmental system at hand, but also to other stimuli requiring such solutions. Among them, a strong incentive comes from the European Community, which reflects a common attitude in the field of sustainable planning and building among the most industrialised and advanced countries. Last October 1997, the Economic and Social Committee of European Communities (ESC) drew up an own-initiative opinion on "sustainable development in building and housing in Europe" (ESC Bulletin, 1997), in which the basic factors to be considered and the approach to be used are described, and objectives and leading criteria aiming at developing a model for sustainable building and housing are recommended. According to this, integration of economic, social, and ecological dimensions must be promoted, the last one including the cultural aspect, which is extremely important for building and housing. For a sustainable and environmentally respectful development, it is necessary to play on the collective and individual sense of responsibility, also towards future generations. It is stated that experts agree on the economic and ecological advantages of preserving existing building compared to the ex novo building, remembering, however, that sustainable building is transversal in nature and should be interpreted as an integrative component of an up-to-date urban and spatial management. An intelligent and innovative building management is reputed necessary, mainly addressed towards refurbishing and renewing existing buildings. This approach must be innovative both from a technical and users' point of view; with this aim, developing a model of sustainable building and housing requires to plan user needs, to spread information, and to stimulate new behaviour more than mere technical innovations. The model cannot be formulated yet, but it must be continuously pursued in a co-operative, co-ordinated manner between all the Member States, considering the transnational

dimension of this subject: a sound data base should be implemented, allowing appropriate political decisions to be made. As is easily notable, the key expressions in the document -collective and individual sense of responsibility, up-to-date urban and spatial management, intelligent and innovative building management, spreading of information, new behaviour, appropriate political decisions- are all oriented towards strategy criteria and active and passive social participation.

On the other hand, processes of environmental awakening of citizens have been going on for years, even if communities living in low-income housing neighbourhoods are traditionally more difficult to involve in these processes, since daily pressed by urgent needs, culturally less trained, and also less assisted and stimulated by associations and initiatives which are environmentally oriented. But, where some initiatives in that direction were carried out, the resident community positively reacted, showing that the right stimulus, the right interlocutors, and achieving valuable results can succeed in overcoming the historical tenant-landlord wariness and actively involving citizens, making them potential promoters of other initiatives of awakening, disseminators of information, educators of other citizens, and mediators of conflicts.

Moreover, an operational tool permitting an innovative and sustainable strategy to be put into practice is essential; two factors, normative dispositions and information technology, are very important for making it practicable and they are both available and evolving. As regards the former, there are different levels of action: for example, at an European level, the EC promotes and economically supports pilot projects of an innovative nature aimed at sustainable urban regeneration; at a national level, Italy promotes complex programmes support experimental activity run by municipalities, having a valuable and controllable social and economic relevance, and pushing private participation as much as possible (Moscatto and Segnalini, 1997); at a local level, some Italian Regions have reformed their own IACP in more flexible, dynamic and managerial Agencies, aiming at supporting Municipalities in a context of autonomous and decentralised local governance (Milan, 1997). As for the second aspect, information technology is ready to supply intelligent operational tools suitable for implementing automatic decision support systems in the domain, and where they prove to be inadequate, emerging areas of study and research in the field of Artificial Intelligence can be experimented.

5. THE DSS

On the basis of what has been said so far, an automatic DSS for the problems under consideration should be thought as consisting in two basic parts: one for maintenance aspects of management, more technical and operational, with a prevailing diagnostic nature; the other for policy aspects of the management, more conflicting and uncertain, with a prevailing strategic nature.

The maintenance DSS, in its turn, should consist of at least three modules: (i) an information system of the housing estate (Housing Information System, HIS), (ii) an information system of local, national, and Community regulations, for the aspects

concerning the building system (Technical Legislation Information System, TeLIS), (iii) a diagnostic expert system for making technical decisions and planning maintenance actions (Technical Expert System, TES).

Also the policy DSS should consist of at least three modules: (i) a, so to say, social information system (Social Information System, SIS); (ii) an information system of local, national, and Community regulations, for the aspects concerning strategies of actions and financing (General Legislation Information System, GeLIS), (iii) a strategic expert system for making innovative policy decisions and planning regeneration actions (Policy Expert System, PES).

5.1 The Maintenance DSS

The HIS must include all the useful data for a register of dwellings and resident families, and a filing of the decay status of buildings and their component parts. Thus arranged, there is the risk that the amount of data to handle is so large that the implementation of the data base would be expensive and extremely difficult to update. A lot of attention, therefore, must be paid to the designing phase of HIS, to prepare files/questionnaires differentiated for dwellings, buildings, and resident families, which assure a standard format (Genre and Faist, 1997) and include synthetic but specific data for acquiring the necessary information. Such a census must be initially managed by an in-situ data survey that the organisation could commit outside since enough human resources are not available inside, and must then evolve in a sort of permanent auto-updated observatory, when citizens, having matured the right feeling for the problem, will need an intermediary subject (the human surveyor) less and less and will have the desire and ability to directly interact with HIS to update the data base more and more. Moreover, this information should be integrated with a graphic data base of the housing estates (plans, front and section views, detailed drawings of components and building solutions): this should be surely an exact operational logic so the organisation can have an entire file lasting more than the paper archives; but, since in the case study at hand the amount of the housing estate is substantial and the graphic files need to be implemented ex novo, such an operation is not reputed a precondition; it can be managed by the organisation in time, even with internal resources.

The HIS can be managed by an Intelligent Data Base (IDB) software, which assures an exportable format completely compatible with the TES and makes it possible to design a friendly interface for consultation from the outside, as much as possible like the one of the SIS, so that the citizen who interacts with the two systems can learn more rapidly and does not suffer any confusion. The graphic data base can be managed by a CAD software, which assures that the graphic information can be associated with a description codified in a format compatible for import/export operations with the IDB software.

The TeLIS must include at least all the regulations concerning the building system in force, locally (municipalities, provinces, regions), nationally, and the Community; in a second phase, regulations from other European and non-European countries can be added, useful both for the human-technician and the TES to

hypothesise a scenario of possible technical solutions in cases where maintenance action under consideration is not completely framed by the legislation system in force. The updating of TeLIS must be continue, and can take advantage of similar works being produced in some local Italian realities, nation-wide in Italy, in the EC, and in many other countries.

Therefore, TeLIS would be better managed by a software in accordance with these external experiences, designing direct links to the systems without overloading the internal data base. An hypertext software can fit these requirements, since it is extremely versatile in the organisation, user friendly, prepared for integrating information different from the descriptive one, transportable in Internet for the right links to Web sites. The compatibility of the export data format has to be checked for the TES needs.

The TES must include the technical knowledge necessary for deciding the maintenance action, both in emergency and non-emergency conditions. It has to get data from HIS for knowledge about the condition of sites and from TeLIS for a legislative framing of the action to suggest. The strategy by which the system may be able to suggest a decision must be based on both expert knowledge and innovative criteria in the light of environmentally sound actions, on which an expert knowledge has not matured yet and for which the links between TeLIS and external data bases of places where this kind of experimentation is advanced are seen to be very important. The so-called more traditional technical expert knowledge can be elicited through the interview technique by operators in public organisations who for years, even decades, have been working in public housing maintenance. So their knowledge would be not only purely technical, but would also have a historical memory of cases and personal experiences on buildings which would be really helpful for defining an appropriate action. Besides, storing this knowledge in TES should produce an enormous training advantage inside the organisation, where there is a strong working mobility and thus it is not possible to accumulate a historical expertise.

The information tool required for building TES is an ES shell, better if it has a backward-chaining inferential engine given the diagnostic nature of the goal to be achieved. The shell has to be rightly interfaceable with external software of IDB and Hypertext, for correlated requirements of HIS and TeLIS. Moreover, the shell should include the possibility of a fuzzy handling of the knowledge base, so as to be able to consider uncertainty and fuzzy nature of knowledge, particularly the most recent with an experimental dimension, that can characterise the action in an innovative manner. Finally, it is essential that the shell allows diffusion of TES outputs in Internet, so as to start a process of reciprocal information and training among interlocutors dealing with the same problem.

5.2 The Policy DSS

The SIS must be designed to work as a container rather than containing something at the start: essentially, it has to be an automatic intermediary between the organisation and the citizen, and between citizens, so they can virtually, but also realistically,

communicate among each other. The SIS must function as a mail box continuously accessible through which communications can be exchanged, letters mailed, complaints set out, intentions described, wishes made explicit, and much more; in short, it has to spread information but with a particular attention to social problems. Beyond the immediate benefit, that is to build an information data base, even if prevalently composed of desiderata and intentionality, SIS must have the aim to promote a process of citizens' acculturation, as solicited by the Community too, so as to induce new approaches of users towards housing estates, with no more excuse for ignorance of behavioural rules and trying to defeat an attitude of negligence more and more.

The software for building SIS will vary, for example an IDB for storing data, an Hypertext for sharing information, etc.; but a software agent able to globally manage this kind of data becomes the crucial point of the system: it should be able to recognise key words and the real meaning of messages, in other words to select and sort information, addressing it to other software, in order to avoid the risk that the more the messages are, the less they can be understood. At present, it seems very likely that this software agent must be specifically designed and updated for the case study under consideration, since it has to consider the physical-social peculiarities of the site. It can be supposed that the software agent will run on totem PCs, some of them located in each neighbourhood; for this, a really user-friendly interface, easy to use, must be assured, but even more it must be very attractive to citizens and encourage them to use the tool.

The GeLIS looks very similar to TeLIS, but its content must concern the normative aspects, at all levels, which affect behaviours and strategies more than solutions. It must include all documents and opinions, also in draft, expressed by various commissions and work teams in the world involved in studying the same problems.

Considering the similarities, the software to use to build GeLIS can be the same as that used for TeLIS, thus raising the internal information consistency of the whole DSS. But, it would be useful to heighten transportability in Internet, so as to activate a co-operative process in the network to build innovative strategies, already shared from their birth, and which can be based on a collective experimentation.

The PES must include the strategic knowledge that the inference engine can use to build an action policy. At the moment, this is the most interesting module of the whole DSS, but also the least defined and as such the most complex to design; however, it is possible to attempt to outline its main features. Though investigating more in depth into the available expert knowledge and into the international experiences being carried out is essential, it can be expected that acquirable knowledge will be uncertain, fuzzy; at first it cannot make use of cases histories and expertise, and above all it will have an intense auto-generative nature of strategies, adaptive to the context and with time, thus just denoting the intelligence of the system.

Consequently, it is not correct to refer to a traditional ES shell, even if advanced; instead there are the premises for experimenting an application in an emerging field of research in the AI sphere, particularly a so-called "hybrid" technology (for an up-to-date reading on this matter, see Yeung, 1997). Only with the

intention of launching an operational idea, moreover useful within the work team presenting this paper, a central core of the PES built by a fuzzy neural net can be thought of. A neural net can prove to be particularly suitable for finding paths and features not previously known: it can handle quantitative and qualitative information; it can be tested with imprecise and noisy data (Goh, 1995). It would be better to have a fuzzy ability to face the fuzzy nature of knowledge and problem at hand.

6 CONCLUSIONS

The complex social, economic and environmental, rather than mere building oriented nature of the public housing problems as they emerge in the Italian context in this period and in particular in Bari as highlighted by the interviews, directed the research illustrated in this paper towards an automatic DSS with the following essential features: being articulated in a technical and operational module dealing with maintenance, in which the diagnostic nature prevails, and in a module dealing with the more conflicting and uncertain policy aspects of management, in which the strategic nature dominates.

Notwithstanding the introductory stage of the present work, the conceptual and operational frame for building the complex automatic DSS illustrated above seems to point to a fruitful research direction, since the system can be very helpful in managing a lot of quantitative and qualitative data, can guarantee high flexibility, and above all can really and effectively support a decision process, in particular an innovative and collaborative one. The social aspect of the problem is very crucial and will thus require special attention in human and computer processes. In the immediate future the authors will concentrate on developing the modules of such a DSS, working in the field using a bottom-up, social-oriented approach, exchanging intentions and sharing objectives as much as possible both with people in the organisations and the communities involved.

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