

RESEARCH ARTICLE

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# Towards a new school's role in the Italian contemporary city

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## Abstract

In Italy there is a considerable amount of experience in school constructions from the 60s that have anticipated the Italian national school's standards with a fair level of quality. Like in other countries this historical patrimony is now obsolete for several reasons of which: prefabrication, asbestos-containing materials, artificial glass fibres. The paper examines the activities carried out by the Italian Mission Structure for School Buildings *Struttura di Missione per l'Edilizia Scolastica (SMES)* for the coordination and boost in the implementation of the school buildings' regeneration projects. The SMES was an office led by the Presidency of the Council of Ministers, engaged in regenerating and improving school building's safety between 2014 and 2018.

**Keywords:** School, School's standards, Obsolete school, Successful school design, Public building, Contemporary city, Education policies

## Obsolete Italian school patrimony and the Mission Structure for school buildings (SMES)

In Italy there is a considerable amount of experience in school constructions, accrued in the demographic boom years (1960s and 1970s). During this period structures were built on the rationalist type-project pattern that, while within the limits of dedicated resources and limited realisation times often anticipating the 1975 Italian national technical standards (D.M. 18.12.75) with a fair level of quality. This historical patrimony is now obsolete for many reasons: a large number of the schools were built with prefabricated parts that now are more than a 30-years old, the structures often contain materials that have been found to be harmful to health over the years (asbestos, artificial glass fibres,...) and the overall maintenance of the buildings is becoming less and less sustainable.

To deal with this problem the Mission Structure for school buildings (SMES) was established in order to coordinate and boost the implementation of the school

buildings' regeneration projects. The SMES was an office led by the Presidency of the Council of Ministers, engaged in regenerating and improving school building's safety between 2014 and 2018. The structure was established by the Renzi Government and renewed in 2017 by the Gentiloni Government until 2018. Its members were five Public Administration employees, three young experts and two technicians that have supported the connection with the School Building Task Force's activities, within the protocol with the Agency for Cohesion. In 2018 the structure was closed and the competences returned to the Ministry of Education, University and Research MIUR. The MIUR is supported in its work by an Observatory for school building engaged in coordination and monitoring tasks and by a Task Force for school building, a structure which is part of the Agency for Territorial Cohesion, supporting local authorities for the activation of interventions and the implementation of the Registry created in collaboration with the dissolved mission structure.

The structure's main tasks were:

- to coordinate the competent facilities in order to lead the management of school buildings' regeneration projects. The referring bodies were: the Ministry of

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Education, University and Research MIUR, the Ministry of Infrastructure and Transports MIT, the Ministry of Environment and Sea and Land Protection MATTM, the Ministry of Economic Development MISE; territorial administrations (regions, metropolitan area, provinces, municipalities);

- To activate the School Building Register's Office and monitor data update development;
- To locate and acknowledge the funding sources and sponsored projects within the framework of school building and to monitor the projects' evolution;
- To detect all the problems related to the failure in completing certain sponsored projects, to monitor the projects' implementation and to carry out technical-operational support services for local administrations, also through on-site investigation;
- To assess and check on the use of funds thanks to the technic task force for evaluation;
- To detect special procedures for the projects' swift execution and to process regulation proposals to encourage sustainable design for school building;
- To communicate and spread the information regarding data mapping and monitoring.

Between 2014 and 2018 more than 9.5 billion Euros have been allocated in order to fund more than 11,000 building sites, 6,000 of which already completed in 2018. Record time, considering they're public works. The office has been able to channel funding from different sources, succeeding in avoiding scattering. In supporting the local administrations, a fundamental role was played by the School Building Task Force, which, thanks to a protocol signed with the Agency for territorial cohesion, has seen teams of experts directly on site where critical issues have been reported. During these years (2014–2018) SMES has created a direct link with over 590 local administrations that have gained visibility thanks to the daily update regarding set-off projects in the "Cantiere del Giorno—construction site of the day" column.

### **The data comes out from the school buildings' Register Office**

In planning the SMES work, it was fundamental to have the school building's real estate picture-framed, a task that has been carried out by the school buildings' Register Office which, established in 1996, and actually activated by MIUR in 2015. The Register Office has conducted a census on school buildings and has prepared a form containing the following information: building code, construction year, dimensions, certifications, energetic efficiency, but also urban connections. It is up to the single Regions and local administration to update the data. Up to now there is still some information missing.

There is some interesting information on the building stock revealed by the Register Office. In Italy we have approximately 42,500 school buildings for 8 million students, data retrieved by applicative cooperation with ARES regional systems (Fig. 1). The region with the largest amount of school buildings is Lombardia (6,000), followed by Sicilia and Veneto. Most of the buildings are owned by the Town Hall. The majority of the building stock was built between 1961 and 1975 (approximately 10,766 buildings). Certain territorial areas are lacking the amount of school buildings necessary to meet student numbers. Well underway is data processing regarding the quantity of surface area per student (m<sup>2</sup> per student).

The comparison between the number of students and the number of school buildings involved, shows a frequent overlapping of operations on the same building: this implies poor planning capability and especially incoherent design. Due to this mismatch it will be impossible for town halls, starting from 2018, to ask for the same kind of funding more than once for the same school building. This has occurred thanks to the #sbloccascuole funding channel for which it was possible for local administrations to repeal to the budget balances for operations on school buildings.

In September 2018 the update census was published by MIUR. In Italy there are 40,151 active buildings, of which 22,000 built before 1970, 53.2% have a static test certificate, 59.5% do not have a fire prevention certificate, 53.8% do not have building usability/inhabitability, 78.6% have an emergency plan, 57.5% are equipped with systems to reduce energy consumption. Architectural barriers have been removed in 74.5% of the heritage.

### **The geography related to funding sources and activated projects on the territory**

It is possible to reconstruct the geography of the received funds and the activated projects on national scale (n. of projects and n. of buildings involved) consulting the #Italiasicura/Scuole webgis. This was constantly updated thanks to the applicative cooperation with the School Buildings' Register Office, in order to picture the progressive evolution of every school building's state of art. The portal's update was originally carried out in the SMES offices, applying a real monitoring on the funding lines run by the Council of Ministers. The other funding lines were collected by the competent Ministers: the MIUR, the MIT, the MATTM, the MISE. There is also an applicative cooperation with the Unique Project Code CUP (CUP, that uniquely identifies a public investment project for each site thanks to data crossing. Up to this day there are 12,000 mapped building sites and there are over 7000 building involved. With the closure of the SMES, monitoring will be transferred to a new regional data acquisition information system.

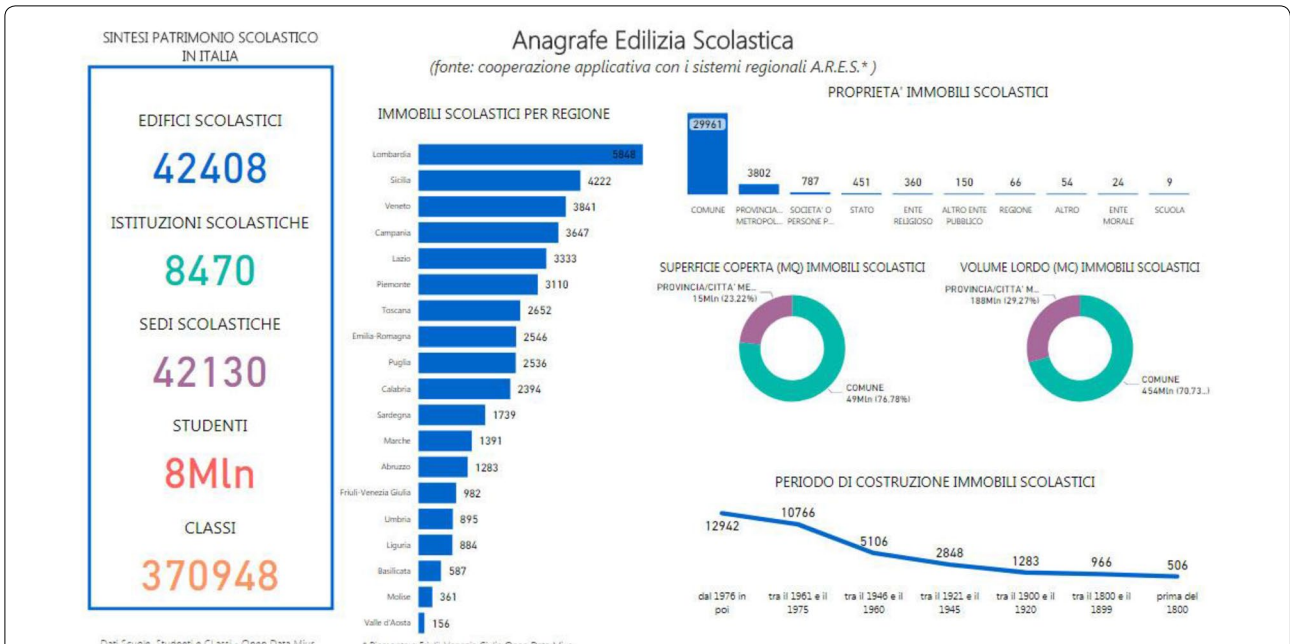


Fig. 1 The school building's real estate in Italy. (Source: Governo. ItaliaSicura Scuole. <http://www.cantieriscuole.it/bei.html> Accessed 10 January 2018, the site has not been updated since the SMES closure, since January 2019 no longer available online)

The mapped projects on the webgis provide information searching by funding source or single administration, whether regional or local (Figs. 2, 3, 4).

The search by funding source shows that the projects have been financed from various funding bodies (11, from Ministers, Presidency of Council, special Office for reconstruction, Regions) and funding sources (7 different

ones). The European Investment Bank (Bei), for example, has distributed 905 million Euros to local administrations to start up 1.215 projects. The “Piano edilizia scolastica BEI” Plan has granted the funding in exchange of a tight monitoring of the projects and the commitment from Italy of direct funding of local administrations. The funding delivered through the Cassa Depositi e Prestiti (Cdp)

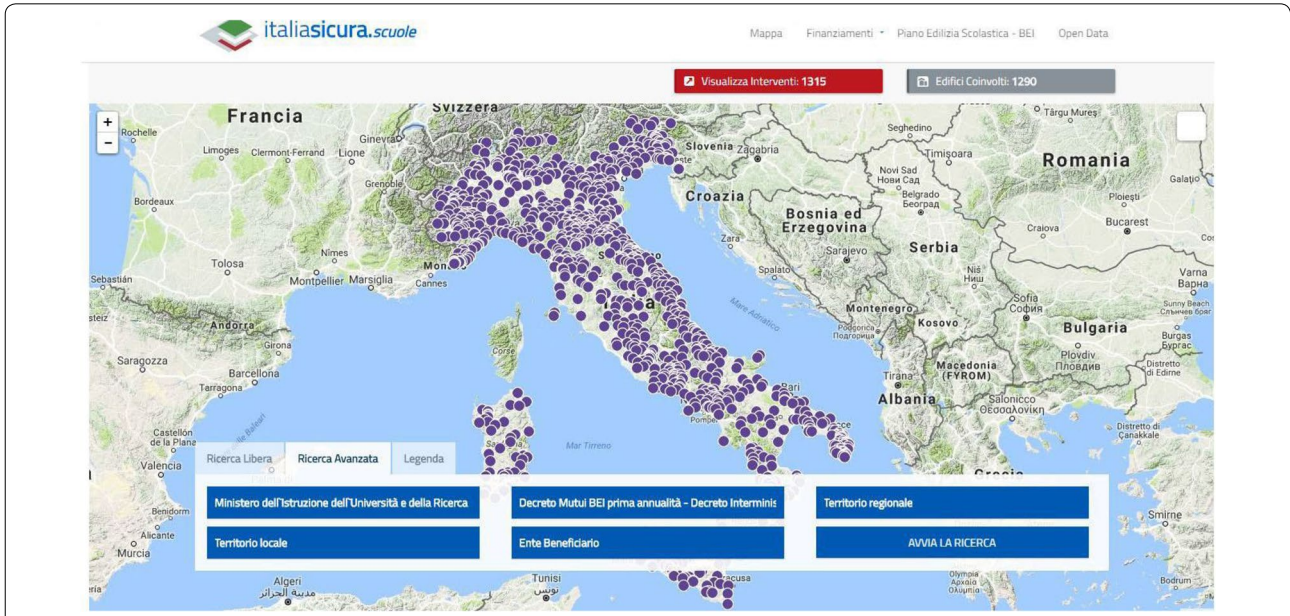
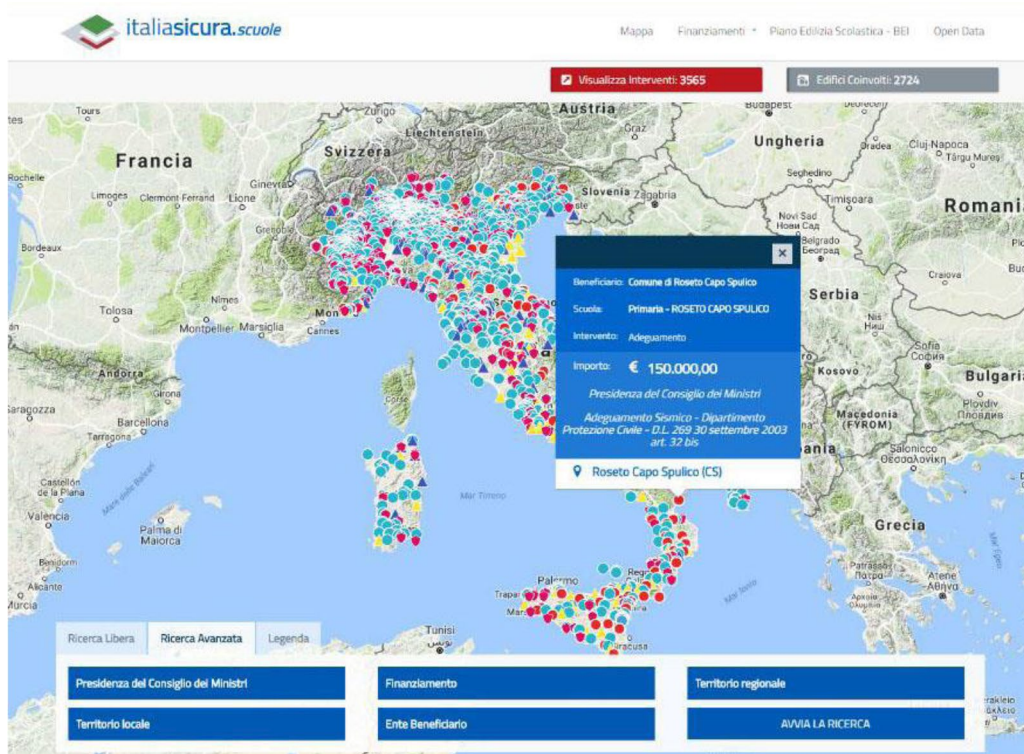
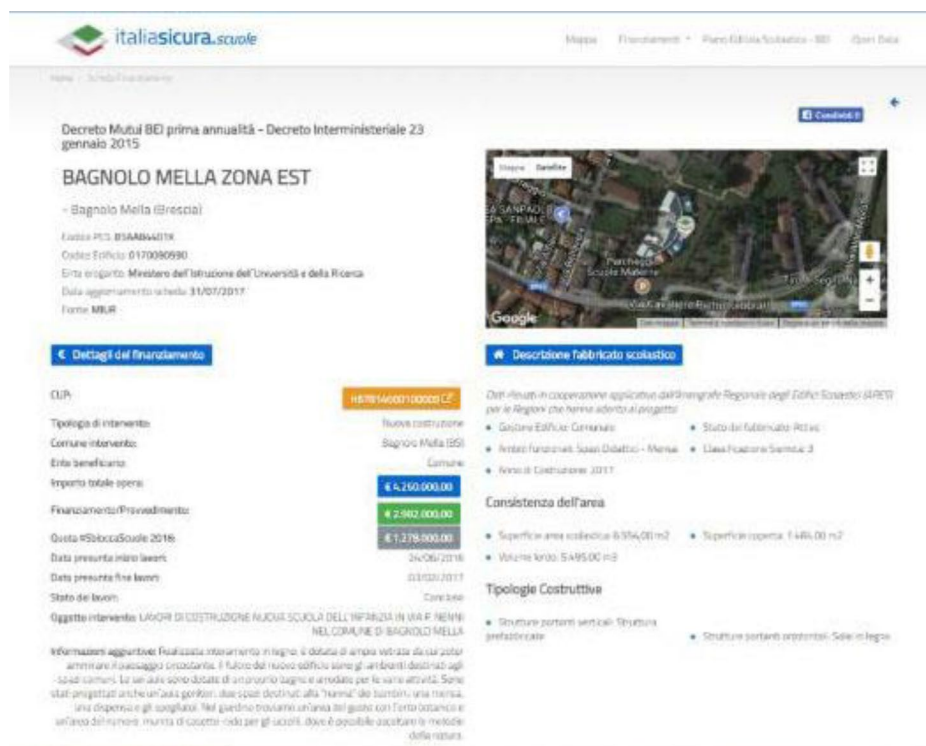


Fig. 2 ItaliaSicura Scuole, Schools with funding source or single administration, regional or local. (Source: Governo. ItaliaSicura Scuole. <http://www.cantieriscuole.it> Accessed 10 January 2018, the site has not been updated since the SMES closure, since January 2019 no longer available online)





**Fig. 3** ItaliaSicura Scuole, Schools with project search. (Source: Governo. ItaliaSicura Scuole. <http://www.cantieriscuole.it> Accessed 10 January 2018, the site has not been updated since the SMES closure, since January 2019 no longer available online)



**Fig. 4** Form for single project. (Source: Governo. ItaliaSicura Scuole. <http://www.cantieriscuole.it> Accessed 10 January 2018, the site has not been updated since the SMES closure, since January 2019 no longer available online)

foresees a 32 billion refund from the government spread over 30 years. Furthermore, the unlocking of the Stability Pact has allowed to grant municipalities with 244 million Euros, operation #Scuolenuove of which art. 48 DL 66/2014 and Dpcm 24.12.2014 for 801 projects, 794 of which already completed. The funding of Scuole Sicure—Safe Schools has made possible to have 550 million Euros, Operation #Scuolesicure in particular 150 million euros come from DL 69/2013 and 400 million euros from the Cipe act 22 on 30.06.2014, for 2.709 monitored projects by MIUR. From 2014 to 2018 funding for 5.245 million Euros has been distributed, for a total of 11,511 projects, and to this we must add 4.276 million Euros already allocated. The overall funding is worth 9521 million Euros (Fig. 5).

The northern regions show a wider use of the tools called “sblocco patto” or “deroghe equilibri di bilancio” having a greater spending capability granted by balance surplus and debt possibility (Fig. 6, MIUR 2017), while the southern ones show a significant contribution of European funding for regional development FESR and Social and Cohesion Funds FSC.

### **The #Scuoleinnovative ideas competition and an integrated approach with the surrounding territory**

The ideas competition for innovative schools launched by Miur in 2016 and terminated on the 22nd of November 2017 with the winners’ announcement and the exhibition, was spread over 51 areas in the various Italian regions (Fig. 7). It was an international competition. For each area the local authorities provided useful design information and documentation. Participants were asked to imagine a school that would be open to the city, in actual fact a civic centre, landmark for the neighbourhood and the city: we’re talking about school institutions open to the territory, whose spaces favour not only didactics but the use of public space for the whole town. All of the 1.238 projects have answered to the innovation criteria explicitly requested by the call for entries (Box no. 1, MIUR 2018), in order to promote a new idea of school buildings. The new architectures can be a decisive mark in the landscape or integrate in it with a domestic and intimate feel. Transparency, both indoors and outwards, is a qualifying aspect of the projects, as is the ability to foster relations, in pathways, relaxing spots, activity areas. The relationship with nature is essential: gardens, vegetable gardens, green roofs but also actual greenhouses. It seemed interesting to start off with 51 examples in different Italian regions, with the aim of replicating a new school model, safe and innovative also thanks to the cooperation of the most farsighted local administrations and through the ideas competition tool, an innovative approach for the Public Administration.

#### **Box no. 1 Design criteria proposed by the ideas competition**

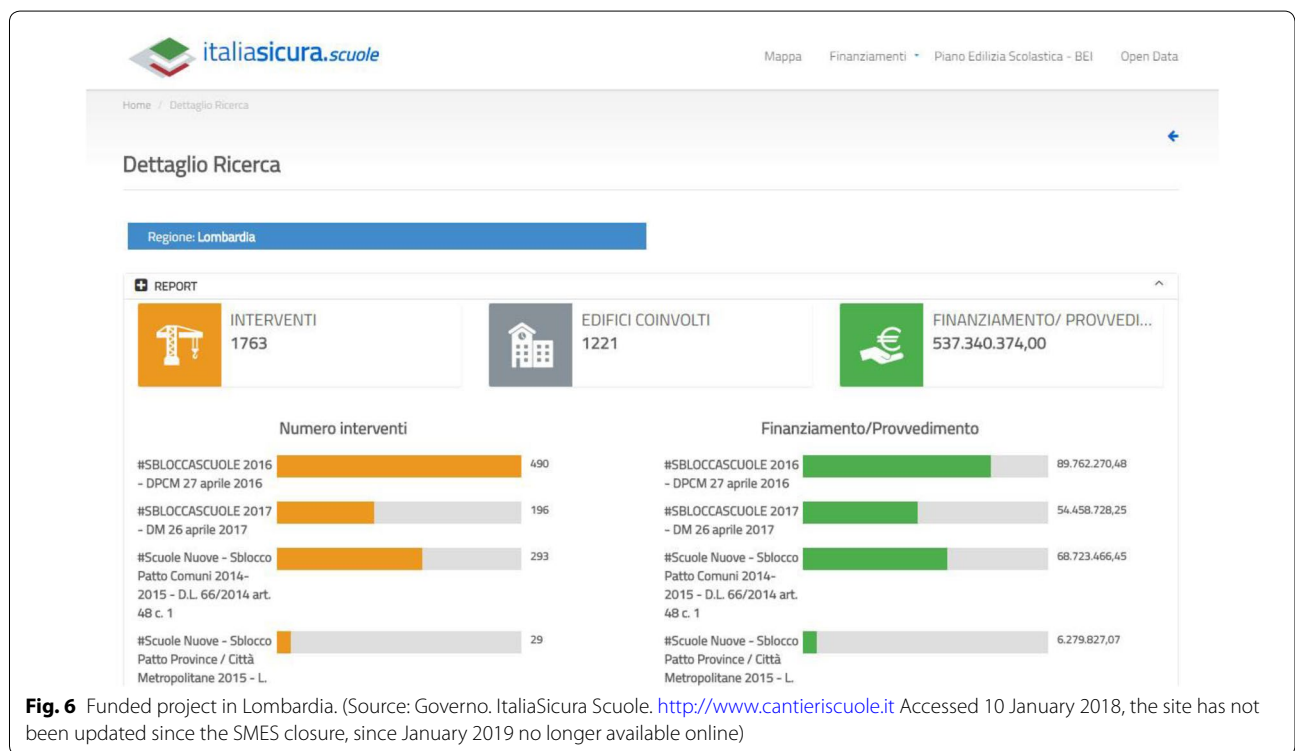
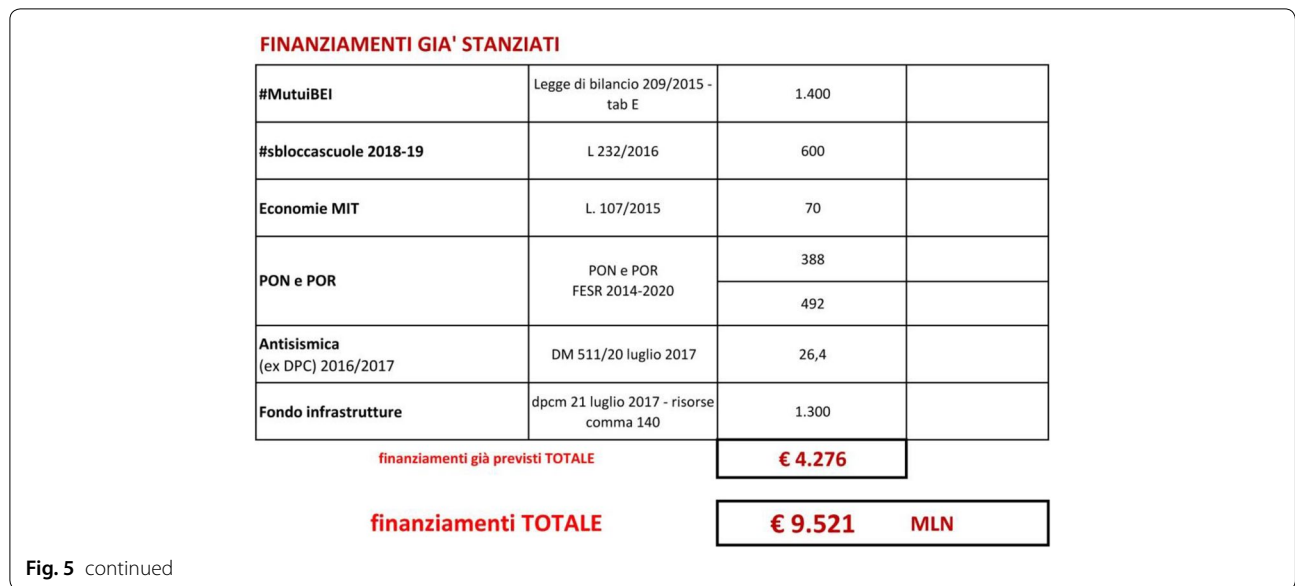
The design proposal had to take into account the following objectives:

- School open to the territory: the school as a community reference hub;
- Conception and design of spaces with the aim of individual and society wealth, foreseeing social and informal spots where the school community can meet and participate in school activities or the ones open to the territory;
- Design proposal’s relationship with the natural environment, landscape and reference context related to its didactic function. In particular, the green spaces and the natural environment will be a continuation of or easily accessible from the everyday learning spaces, creating therefore a clearly integrated and available extension of the school;
- Presence of accessible green areas that enrich the place’s possibilities of interaction;
- Involvement of interested stakeholders and their active participation;
- Permeability and flexibility of spaces, potential use of all rooms;
- Aesthetic appeal of the spaces also to contrast the phenomena of school dropout;
- Conception of the building as of a learning tool finalized at the development of the capabilities, both technical and sensorial;
- Construction of innovative didactic rooms, starting from the pedagogic and didactic needs and their relation with the design of spaces that enable group or individual work and the carrying out to workshop activities;
- Attention towards the presence of spaces for professional cooperation and the teachers’ individual work;
- Presence of research, reading and documentation spaces, with particular regard to their optimization in relation to the possibility to use individual or group Information and Communications Technology ICT devices and the potential offered by widespread connectivity;
- Environmental, energetic and economic sustainability: construction speed, recycling potential of the building elements and base materials, high energetic performance, use of renewable energy, low maintenance levels.

## RISORSE GOVERNO EDILIZIA SCOLASTICA

FINANZIAMENTI	NORMATIVA	RISORSE AVVIATE DAL 2014 (in mln)	numero interventi finanziati
<b>FINANZIAMENTI GIA' DISPONIBILI PER GLI ENTI LOCALI (RISORSE AVVIATE)</b>			
#sbloccopatto 2014-15 COMUNI	DL 66/2014 DPCM 24/12/2014	314	801
#sbloccopatto 2014-15 PROVINCE E CITTA' METROPOLITANE	L 190/2014 DPCM 17/07/2015		284
#sbloccascuole 2016	L. 208/2015 DPCM 27/04/2016	480	1.670
#sbloccascuole 2017	L 232/2016	402	1.346
#scuolesicure MIUR	DL 69/2013	150	2.709
	CIPE 30/06/2014	400	
#MutuiBEI MIUR	DL 104/2013 art. 10 DM 23/01/2015	739	1.215
	DM 07/12/2016	166	367
	L. 107/2015 rifi naziamento DL 104 art.10	238	292
Fondo Protezione Civile DL 696/2003 art.32 bis	DPCM 15/9/2015 DPC	46	86
	DM 943 23/12/2015 MIUR	37,5	50
FondoKyoto MATTM	DL 91/2014	350	335
Patti per lo Sviluppo risorse x edilizia scolastica	FSC 2014-20 CIPE 26/2016 CIPE 56/2016	423	281
Accordo di programma Emilia-Romagna/città metr. di Bologna	FSC 2014-2020 CIPE 75/2017	57	n.d.
#scuoleinnovative investimenti Inail canone Miur	L. 107/2015	350	51
PON e POR a compimento 2013/16	PON e POR 2007-2013	604	1.385
Interventi per l'agibilità Miur	DDG 332 del 10/12/2014	10,2	75
Alluvione Sardegna Miur	L 190/2014	5	24
Ricostruz sisma 2016 Commissario straordinario	Ordinanza 14/2017	97	21
Cantieri in Comune MIT	Delibera CIPE 38/2015	19	18
Programma Straordinario Province e Città Metropolitane MIUR	DL 50/2017 risorse comma 140 Legge bilancio	321	452
Bando Periferie PCM	L 208/2015 DPCM 25/05/2016	36	49
<b>finanziamenti già distribuiti TOTALE</b>		<b>€ 5.245</b>	<b>11.511</b>

**Fig. 5** Funding source. (Source: Governo. ItaliaSicura Scuole. <http://www.cantieriscuole.it> Accessed 10 January 2018, the site has not been updated since the SMES closure, since January 2019 no longer available online)

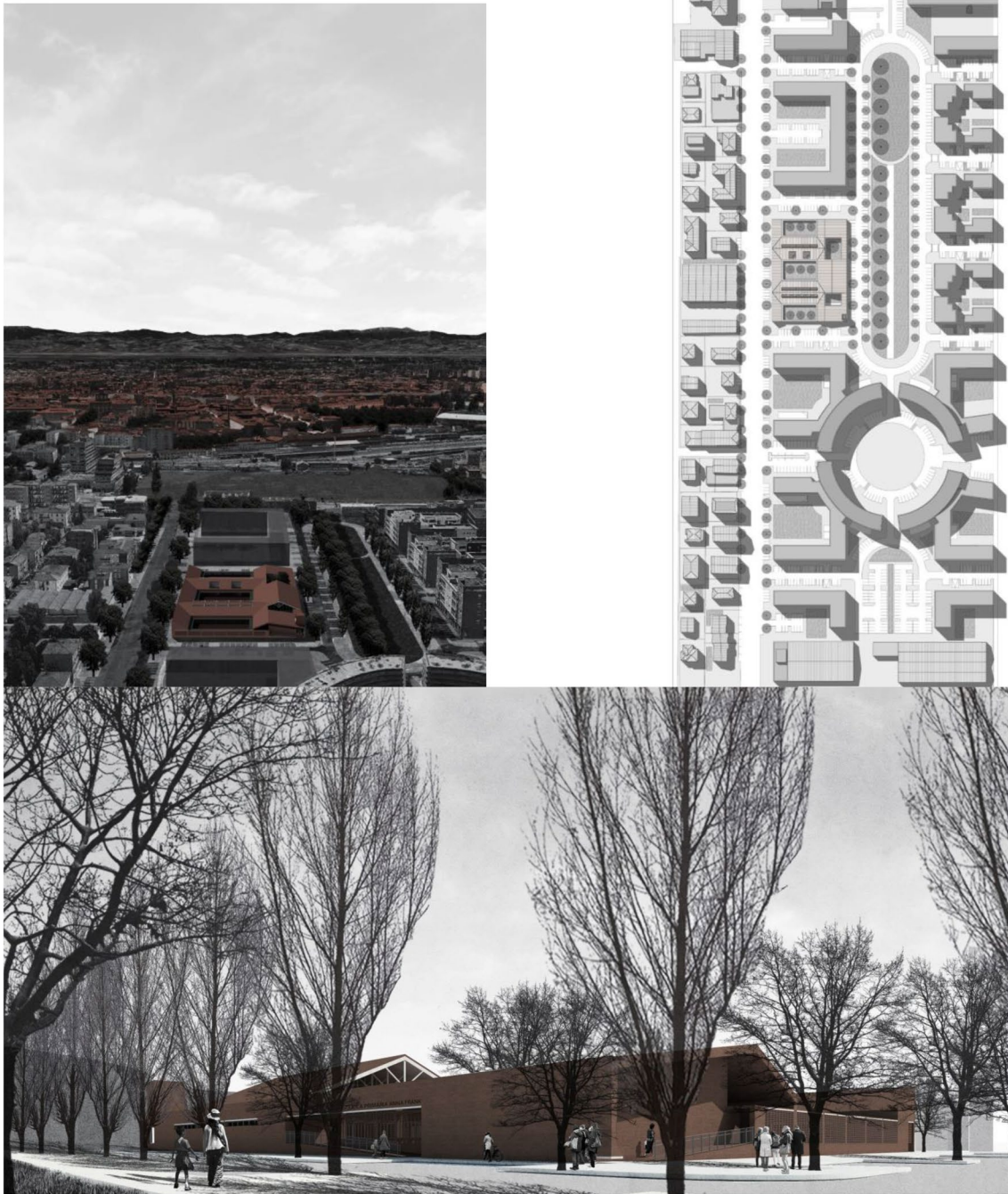


**The new school's role in the Italian contemporary city**

Let's imagine a modern, safe, cutting-edge school, able to combine spaces for innovative academics and places open to the surroundings. Buildings used, conceived and lived as relationship spaces at any time of the day: real civic centres. Open spaces for the area where the

environments become educations and welcoming for the youngest citizens. It is at school that both younger and older children spend most of their daytime, like in a second home. That is why these buildings must be safe, practical and beautiful. Beauty is inherent to education. Piano (2015) has more than once emphasized the importance of





**Fig. 7** The new La Madonnina school in Modena designed by L. Franciosini, C. Casadei, N. Canulli, B. Taliani de Marchio, G. Bellingeri, U. Carusi. (Copyright L. Franciosini, C. Casadei, N. Canulli, B. Taliani de Marchio, G. Bellingeri, U. Carusi)

school buildings, stating that “working on school buildings is a social mending before it is an environmental one. A positive city is one in which we sleep, work, have fun and especially have children going to school. I say especially because while one can decide to avoid visiting a museum, every single person has to pass by the school

desk”. The school it is a nucleus around which the life of the whole collectivity orbits (De Carlo 1947), so that education become an omnipresent pattern, capable of penetrating everywhere and of being continually penetrated by the happenings of society (De Carlo 1969). The new school is the instrument by which those differences come



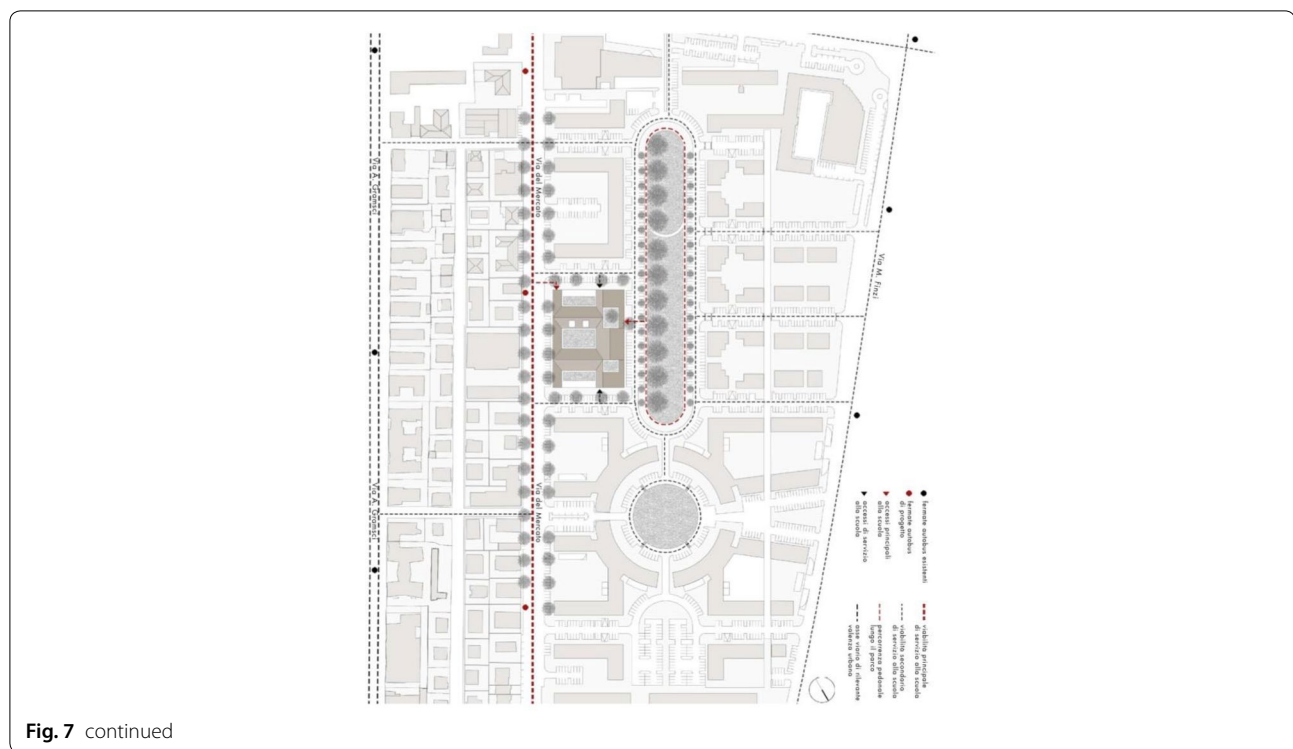


Fig. 7 continued

to be valued with the aim of creating a richer and more articulated society. It is important to integrate it in a socio-cultural complex, a community school with before and after school support and other community welfare facilities (Hertzberger 2008).

In Rome, the new “Mazzacurati” school (Fig. 8), designed by TStudio G. Salimei an architectural office based in Rome, is destined to enhance the level of services of the renowned Corviale housing scheme in the south-western periphery of the capital. The building will be completed thanks to the funds granted within the Government’s Piano Periferie, that has enabled the new construction or the completion of many school buildings all over Italy. The project has also taken into account the resident’s requests and transforms nearly one hectare of green spaces into an equipped urban park. The school’s ambition is to be the heart of the neighbourhood, with a theatre, socialization spaces and sport facilities, in order to offer activities to youngsters in such a complex reality.

The projects for school buildings restoration in Turin are linked with the functional recovery of some of their outside proximity spaces: re-paving of sidewalks, new planting schemes and green areas, instalment of equipment and ludic areas. These spaces can become exchange places between inside and outside, a filter between school and surrounding urban context, even more so because of their accessibility and utility to every single neighbourhood and its residents. Another aim of the projects is to

strengthen the right to play for children and teenagers; ludic and sports hubs will be able to foster multi-ethnic integration. Within the planned actions in the regional capital of Piemonte, there is also the renewal to guarantee safe and secure access to schools, to promote sustainable urban transport with cycling and pedestrian paths, a public transport network with stops next to schools and a reduced vehicle speed. The expected results are safer streets and environments for pedestrians, a revitalization of neighbourhoods and a wider territorial control, other than encouraging school children’s independence on going to school on their own.

All over Italy there are other built examples of best-practices for sustainability and integration with the surrounding environment: the primary school in Calcinaia (Pisa), the new Sapri Comprehensive Institute (Salerno) as well as the one in Cernusco Sul Naviglio (Milano).

Recently Milan City Council has launched two international design competitions to replace obsolete school buildings in Via Scialoia (Comune di Milano 2019a) and Via Pizzigoni (Comune di Milano 2019b) to respond to the growing demand for schools in two neighbourhoods that face deep socio-demographic transformations.

The direction taken by the SMES was to demolish all obsolete buildings, instead of providing school extension using up public and green areas of the city, aiming at the reconstruction of modern and efficient schools on the same building site: it is often the best solution from



**Fig. 8** The new Mazzacurati school in Rome designed by TStudio-G. Salimei. (Copyright TStudio—G. Salimei, photos L. Filetici)

both an economic and functional point of view, considering that the majority of these buildings were constructed between the 60s and 70s and aren't worth to be restored. A new kindergarten can be built for 2 million Euros or less, the comprehensive and secondary institutes instead are a more expensive typology. In 2017 the National Anti-corruption Authority *Autorità Nazionale Anticorruzione ANAC* engaged in a round table, also joined by the *Italia-Sicura Mission Structure*, in order to detect the standard costs for school buildings on a national basis. An indication of costs, even if not binding, is extremely useful for the planning of both funding and local administrations. It has been tried many times in the past. Many administrations have independently taken care of setting own reference costs. The “*Ufficio Speciale per la Ricostruzione dei Comuni del Cratere*” (L'Aquila) has set a basis cost for school buildings projects of 1.350 Euro/sqm for new construction, 1040 Euro/m<sup>2</sup> for seismic retrofit and 850 Euro/m<sup>2</sup> for renovation; costs are subject to variation in function of seismicity and specificity of each place. These are amounts that can't surely be applied nation-wide and are affected by today's critical situation. The conception of a general methodology would enable the definition of reference values and a quick assessment of the overall costs for the different projects.

In general, the work set up by the SMES opens new university research possibilities on the role of school building within the contemporary city, in line with the most progressive European and worldwide debate: the activities carried out by OCSE's Centre for Effective Learning Environments (CELE) and the European Investment Bank's (EIB) with the manual for best practices in school building investments (OECD 2011); the research conducted by the group of national experts GNE, which processes support tools looking at innovation in the field

of educational spaces (OECD 2011); the school design publications to create well-designed learning environment launched by Cabe the UK government's advisor on architecture, urban design and public space sponsored by the Department for Culture, Media and Sport; the research made by policymakers and reformers on the renewed interest in place-based education strategies that connect schools and local communities (Green 2018; Woldoff 2011; Horsford and Heilig 2014; Warren 2005; Pacchi and Ranci Ortigosa 2017), the promise neighborhood initiative (PNI), launched by the U.S. Department of Education on place-based education effort to eliminate poverty in urban and rural communities (Horsford and Sampson 2014).

The goals of the new school for the Italian contemporary city are to transform the school's area into an identity-creating and aggregating location open to local inhabitants, with the aim of expanding opportunities and occasions for the use of public spaces at various times of the day and therefore increasing the level of safety for those living in the neighbourhood.

For the new school's role in the Italian contemporary city to prepare the way for change the three core issues are: the school as a public building in an urban context, a nucleus around which the collectivity orbits, the quality of the spaces, the building's technological performance (Fig. 9).

The role of the school as a public building, a tiny city, in an urban context deserves special attention enhancing: the school's presence in the community along the street frontage in order to strengthen the image of education in the neighbourhood; grounds and buildings that are welcoming (public space in front of the building), well-designed external spaces offering a variety of different settings with suitable outdoor and indoor spaces for





**Fig. 9** The extension of the Ariosto high school in Ferrara designed by C. Melograni, G. Fumagalli, F. Masotti, G. Serrao, R. Valli. (Copyright C. Melograni, G. Fumagalli, F. Masotti, G. Serrao, R. Valli)



social relations, such as an auditorium, library, training and information spaces, adding a new dimension to the quality of the communal public place, open spaces, play and sports areas, with an orientation that creates a successful relationship to adjacent properties, outdoor area as part of the public domain, open spaces and sports fields; a scheme that link local pedestrian routes with the other educational and institutional areas and avoids the school being dominated by either car parking or the service access routes.

The quality of the spaces can be traced to a new pedagogical approach aimed at making the school a living environment first and foremost, the educating community location, a learning environment that is open to changes in teaching models (flexibility, adaptability,...) also for using the structures for experimental and extra scholastic activities (sports hall, library, school of music, cultural appointments,...) and able to encounter personal development processes, so that each student feels acknowledged, supported and valued for their uniqueness. So it is important to encourage the greatest number and variety of places where you can work alone, in pairs or in a larger group, attentively and without being unduly distracted. The educational building calls for a spatial order that works as a structure of streets and squares together forming a small city where everything is geared to the greatest possible number of social contacts, confrontations, meetings, adventures and discoveries. Corridors become streets, interior lighting becomes street lighting (Hertzberger 2008). The social and physical environment must provide a setting which encourages rather than discourages individuality and freedom of thought, which encourages the students to see himself which ideas make sense (Alexander 1977). Furnishing these new environments to aid relational conviviality and flexibility of use for these spaces are elements that can drive new teachings styles, consistently with the most indications, including those from MIUR. If we don't transform space, changes in teaching and research tend not to become evident and this visible evidence is necessary for change to expand and open up new perspectives (De Carlo and Buncuga, 2014).

As part of the technological performance, we expect innovation in good environmental conditions (optimum levels of natural light, ventilation for the different activities within the buildings,...), in the energy field (zero energy building), in structure safety (earthquake resistance) and maintenance (building management system), in its choice of materials.

The new school project can be an opportunity to identify a model replicable in other urban contexts all over the world, which require similar substitution-redevelopment interventions.

#### Abbreviations

CDP: Cassa Depositi e Prestiti; CELE: Centre for Effective Learning Environments; CIPE: Comitato interministeriale per la programmazione economica; CABE: Commission for Architecture and Build Environment; FESR: European funding for regional development; BEI: European Investment Bank EIB Banca Europea degli Investimenti; GNE: group of national experts; MISE: Ministry of Economic Development; MIUR: Ministry of Education, University and Research; MATTM: Ministry of Environment and Sea and Land Protection; MIT: Ministry of Infrastructure and Transports; ANAC: National Anticorruption Authority Autorità Nazionale Anticorruzione; OECD: Organisation for Economic Co-operation and Development; OCSE: Organizzazione per la cooperazione e lo sviluppo economico; PNI: promise neighborhood initiative; FSC: Social and Cohesion Funds SCF Fondi di Coesione Sociale; SMES: Struttura di Missione per l'Edilizia Scolastica.

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Not applicable in this section.

Based on content analysis, this study identifies and discusses some national goals to boost a new school's role in the Italian contemporary city as: the public building in an urban context, the quality of the spaces, the building's technological performance.

#### Authors' contributions

The individual contributions of authors to the manuscript are: The Italian school patrimony obsolete and the Mission Structure for school buildings (SMES) LN. The data comes out from the school buildings' Register Office LN and LG. The geography related to funding sources and activated projects on the territory LN and LG. The #Scuoleinnovative ideas competition and an integrated approach with the surrounding territory LN and LG. The new school's role in the Italian contemporary city LN. Both authors read and approved the final manuscript.

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#### Availability of data and materials

"The datasets generated and analysed during the current study, with all references in the webpage list, are publicly available online or available from the corresponding author".

#### Ethics approval and consent to participate

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#### Consent for publication

Not applicable in this section.

#### Competing interests

The authors declare that they have no competing interests.

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