

Realizing Healthful Housing: Devices for Data Travel in Public Health and Urban Redevelopment in the Twentieth Century United States



Edmund Ramsden

Abstract The field of housing is dependent upon data from a wide range of sources, as issues of architecture, engineering, finance, sanitation, public health and social relations must all be considered in policy, planning and design. This chapter documents the efforts of housing and public health experts in mobilizing housing data across different disciplinary and social spaces in the 1930s and 40s. To overcome the immense challenge of making such extensive and diverse information available and useful, we will explore how *actionability* was built into the very methods of collecting, processing, and circulating information. New standards and appraisal techniques were devised by the Committee on the Hygiene of Housing of the American Public Health Association that would shape and determine housing data journeys in critically important ways. It was by devising new ways to simultaneously collect, organize, package and translate data in a way that was meaningful for planners and policy-makers, that led to healthful housing surveys and public health ideals playing a critical role in a period of intensive urban redevelopment and renewal in the mid-twentieth century United States.

1 The Problem of Data in Housing

Huntington Williams, Baltimore's Commissioner of Health, described the improvement of housing as the health officer's "real opportunity" (Williams 1942, 1001). Williams was becoming a leading figure in the rapidly expanding movement to realize public health goals through urban redevelopment. While the focus on housing offered unmatched potential for preventing physical and mental disease, for planners and architects, the subject of health legitimated their expanding role in the construction and design of urban environments. The growth of this health and housing nexus was, in turn, critically dependent on data. They needed information on

E. Ramsden (✉)

School of History, Queen Mary University of London, London, UK

e-mail: e.ramsden@qmul.ac.uk

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housing quantity and quality to identify shortages, specify problem areas, predict future needs, establish housing standards and promote new designs. They needed data on the relationship between health and housing that could travel from the laboratory and field studies of the physical, medical and social sciences to the planning offices of federal, state and municipal government.

Data was of critical importance but also generated serious problems. The data required for housing reform and urban redevelopment was extraordinarily complex, involving such areas as child development, home economics, loans and finance, social relations, engineering and construction, architectural design, sanitation, mental health and disease transmission. Data from a wide range of sources, such as physiological and engineering laboratories and social and epidemiological surveys, needed to be organized, condensed, and translated for use in the field by public health workers, builders and architects. A critical issue was, therefore, that of travel, of finding ways of transforming a highly heterogeneous mass of data into an evidence-base that would prove useful for policy and planning. In the building industry, James Baldwin of Armstrong Cork Company declared: “We must know what is going on, what has been done, and particularly what has been proven good or bad. Thus we product researchers have as our greatest problem---information. The problem is twofold.... first, how to find data, second, lack of data.”¹

This chapter documents the efforts involved in mobilizing housing data across different disciplinary and social spaces. It takes the reconstruction of housing data journeys as a window into the intertwined roles played by research, public services, and policy demands in shaping American public health interventions and building developments in the 1930s and 40s. For data to travel it needed to be useful, transmitted a way that would allow it to be applied to housing problems by a range of professionals such as James Baldwin and his fellow builders, planners, engineers and architects. This necessity of ensuring policy usefulness was an immense challenge and allows us to explore just how *actionability* was built into the very methods of data collection, processing, packaging and circulation, and would thus shape and determine housing data journeys in important ways.²

The chapter first examines attempts by public housing activists in the 1930s to integrate data from a variety of surveys carried out for different purposes. After building composite data on the consequences of housing quantity and quality for health, this was then circulated through public health and housing reports, newsletters, manuals and memoranda. However, this approach was soon recognized as insufficient. The most serious problem was that of travel. The data presented in city-wide surveys could not be interpreted in a way that served the practical purposes of government agencies. It was too scattered, raw, imprecise, incomparable and

¹Building Research Advisory Board, BRAB Notes, February 5, 1954, E&IR: Building Res Adv Bd, 1950–1954, National Research Council, Archives of the National Academy of Sciences, Washington DC. Emphasis in original.

²This parallels Alberto Cambrosio et al., emphasis on the specific infrastructures set up to make biomedical data *actionable* by clinical researchers: they remark that this generated all sorts of interesting differences in the ways data are treated.

general.³ The paper will then turn to focus on the work of the Committee on the Hygiene of Housing (CHH) of the American Public Health Association (APHA), established in 1937 to address this problem.

Drawing on evidence provided through a variety of laboratory and field studies, the CHH generated a series of “principles” that would need to be met for housing to be considered “healthful” – to prevent mental and physical disease, rooms needed to be of a certain size and be sanitary, ventilated and heated to a certain temperature. Data was collected, codified, and published as a more specific set of “standards” for healthful housing. Standards systematized data and conferred the credibility, validity, and authority necessary to build consensus over the healthy home. But to travel successfully, data also needed to be presented in a way that was actionable by planning agencies in relation to local contexts.⁴ To this end, the Committee created an “appraisal technique”, a new survey technology that put their principles into practice. It was a device that generated, processed and applied data, making it comparable across time and space. Its detailed statistical maps of urban environments served to transfer evidence on the relationship between housing and health, generated in the laboratories and field studies of medical, physical and social scientists, into the plans and designs of municipal governments.

The paper will argue that it was the CHH’s success in devising ways to simultaneously collect, process, package and translate data in a way that was meaningful for planners and policy-makers, that led to healthful housing surveys playing a critical role in a period of intensive urban redevelopment in the mid-twentieth century United States. In making data that travels into the realm of policy, ensuring that it is acted upon in particular ways and in accordance with pre-defined goals or principles, a key issue is that of control. In order to encourage and enable agencies to regulate housing in accordance with the principles of public health, the CHH also needed to determine what kind of data was being acted upon and ensure that it was consistent with their interests. Thus, rather than producing repositories of data that could be applied by local agencies in various ways and to their own ends, the series of tools constructed by the CHH, most notably their standards and appraisals, allowed them to continue to exert control over key stages of data journeys from production to application. Further, these tools were mutually reinforcing, ensuring that once local agencies availed themselves of CHH information and instruments, they were encouraged to understand the city and its problems in terms of physical measures and classifications of “healthful” housing and neighborhood environments.

³Term “raw” will be used throughout as an actor’s category. In this case it is seen as data that is unprocessed for a particular use and hence not “actionable” in a specific context (although for another actor, this data may well have been sufficiently organized for the task at hand). See [“Overcoming the bottleneck’: Knowledge architectures for genomic data interpretation in the oncology domain”](#), this volume.

⁴On this point of actionability see [Cambrosio et al.](#) They also note the distinction between “raw” and “action-oriented” data made by their actors in accordance with the processing of data for use.

2 Re-considering Housing Data

At the height of the Depression, President Herbert Hoover addressed the pressing problem of housing the Republic's rapidly growing population. The family, he declared, was "the social unit of the nation", and the home essential for its "greater happiness", a source of comfort, health, education, and morality. To provide homes for those of moderate to low-income, they needed "adequate investigation and study on a nation-wide scale".⁵ In 1930 Hoover announced the President's Conference on Home Building and Home Ownership, marking the entry of the federal government into the housing field. Civic leaders, administrators, planners, architects, lawyers, social scientists and medical experts were brought together and organized into 25 sub-committees focused on issues such as slums, planning, finance, building types and homemaking. Six smaller "correlating committees" worked to pull together shared information, aims and methods regarding research, education, technology, legislation and administration.

A key member of the "correlating" Committee on Research was Edith Elmer Wood, a pioneer in the movement to realize public housing for the poorer sections of society. Wood had long argued for more objective research on which to build more successful housing policies. The organization and circulation of data identifying the housing shortage and its consequences for mental and physical health would, she believed, generate social and political support for the clearance of slums and the construction of affordable dwellings. The Committee on Research duly reviewed the work carried out by the other sub-committees and made an inventory of past studies on housing problems. Its conclusions were damning. In its examination of the "best" housing research and literature, its members were struck both by the "large mass of material" and its "inadequacy".⁶ Unjustifiable assumptions had been made from the thin census data that existed and while there were some small scale studies on topics such as housing and tuberculosis, these were too localized, uneven in quality, and not comparable. It was the "fragmentary nature" of the data that was the most "outstanding revelation", and one that prevented adequate policies being devised.⁷ They needed a more centralized organization of statistical data and a carefully annotated inventory of all past researches – those containing good methods and evidence stored, circulated and replicated, and those lacking merit or out of date, discarded. They also needed to find ways of ensuring that findings were utilized, as "many a housing survey revealing most undesirable conditions of living has resulted in no improvement of those conditions."⁸

⁵Preliminary Outline of the President's Conference on Home Building and Home Ownership. Edith Elmer Wood Papers, Avery Drawings & Archives Collections, Columbia University Libraries, Box 2, Folder 8.

⁶Preliminary Draft of Report of Committee on Research, Correlating Committee B, November 18, 1931, Wood Papers, Box 2, Folder 14.

⁷Ibid.

⁸Ibid.

Committee members felt that their overview contributed a more realistic “big objective”: to “stimulate interest in research and then determine what research should be done.”⁹ Wood’s role was critical in this regard. She had drawn up a list of the “basic facts which we need to know”. This included the extent of poor housing in the nation, how many of these could be reconditioned and how many required demolition, the most effective methods of rebuilding and rehousing, and the distribution of income that determined what families could afford.¹⁰ She suggested a “special national census of housing and income”, or, at the very least, sample surveys supported by foundations.¹¹ While she had pushed, unsuccessfully, for a census of housing to be included in the decennial census of 1930, Wood’s advancing knowledge and activism was rewarded with a string of advisory posts in federal and municipal government committees, as housing became one of leading policy concerns of the 1930s.¹²

First employed by the Housing Division of the Federal Emergency Administration of Public Works, Wood’s role was to pull together, process and circulate the wide range of available data, “gathering together and interpreting material already in existence, either uninterpreted or differently interpreted”.¹³ In effect, Wood was gathering what would now be called “big data”: she drew on a wide range of statistics from various social, economic, and public health surveys to quantify the extent of poor housing in the United States and correlate it with measures of various social and physical pathologies, such as juvenile delinquency, a focus of the quantitatively-minded Chicago sociologists.¹⁴ Most significant and original was her building of data composites focused on specific cities, a means of compensating for the fragmentary nature of the data available. Prominent in these composites was data provided through a new survey technology, the Real Property Inventory (RPI) in 1932. This had been promoted by the real estate industry and was “drafted by officials who were somewhat commercially-minded.”¹⁵ The RPI, devised by the statistician Howard Whipple Green in Cleveland, was organized around the census tract, rigid

⁹ Mr. Gow (James Steele, Falk Foundation), First Meeting of Correlating Committee B on Research, September 11, 1931, Wood Papers, Box 2, Folder 12.

¹⁰ Committee on Research, Basic Facts Which We Need to Know, (Suggestions from Mrs. E. E. Wood), October 5, 1931, Wood Papers, Box 2, Folder 13.

¹¹ *Ibid.*

¹² The census of 1930 carried only 2 questions dealing with housing, namely, “home owned or rented” and “value of home, of owned; monthly rental, if rented”.

¹³ Wood to James Ford, Director, Research on Slums and Housing Policy, August 7, 1935, Wood Papers, Box 23, Folder 8. The Federal Emergency Administration of Public Works, later the Public Works Administration, was a construction agency established in 1933 to build in response to the Great Depression, stimulating the economy through employment and investment opportunities.

¹⁴ Particularly important for Wood was the work of Clifford Shaw in the late 1920s and 30s which, in privileging an ecological understanding of delinquency, suggested to Wood a “relationship between congestion and bad conduct” - Wood, “What do delinquency areas prove?”, Wood Papers, Box 69, Folder. 1 See Shaw et al. (1929).

¹⁵ Report of Central District, State of New Jersey, State Housing Authority, Arthur J. Quinn, Central District Manager, 1935, Wood Papers, Box 15, Folder 17.

geographic units which allowed for the scientific mapping of urban areas and establishing disparities in health, wealth and social well-being.¹⁶ From 1934 to 1936, the RPI was applied to 64 cities in 48 states under the direction of the Department of Commerce as part of the New Deal work relief program.¹⁷ Comprising what was essentially a market survey in real estate, construction, and household equipment, the RPI collected and processed reams of data to generate a statistical portrait of a city. It carefully avoided analysis and left interpretation to individual users, the introduction to a New York City RPI declaring the uses of its data to be “probably as many as those of the Federal census.”¹⁸ The RPI included data on housing quality, defining a “substandard” dwelling to be one in need of major repairs or unfit for use, lacking in private flush toilet, bathing unit, running water, installed heating and electricity or gas for lighting. It also collected and published information on rent and occupancy. Wood promoted the RPI as the standard source of urban housing statistics, while reworking its data which had originally been generated in the interests of “hard-boiled” and unsentimental businessmen, to show just how bad things were.¹⁹

Wood’s resulting volume, *Slums and Blighted Areas in the United States*, published in 1936, provided one of the most comprehensive overviews of the housing problem across the nation. It proved very successful, the go-to source for housing information. It was reissued in 1938 by the newly founded United States Housing Authority (USHA), an organization focused on the provision of public housing following the landmark Housing Act of 1937. Wood was then invited by the USHA to bring the volume “up-to-date and present additional graphic material.”²⁰ In *Introduction to Housing: Facts and Principles*, Wood used the RPI as a base map on which to build a narrative that illustrated the threat posed by poor housing to American society and democracy. She adapted an earlier technique devised by Whipple Green of using transparent maps that spotted cases of disease, crime, vice, or delinquency, overlying a color map of monthly rentals by census tract.²¹ Carefully selecting a series of “statistically minded” cities, Wood constructed rate and spot

¹⁶Originally defined as “sanitary areas”, census tracts were a method developed by public health services in several cities and incorporated into the census in 1910s. By the 1930s, largely through the work of Whipple Green, they became more widely established and used by an increasing number of agencies to compare health statistics with a broad range of socioeconomic data. See Krieger (2006).

¹⁷RPI employed architects and engineers for enumeration and tabulation with federal funds, who would otherwise be unemployed during the Depression.

¹⁸Thomas S. Holden, “Foreword”, in *Real Property Inventory, City of New York. Volume 4* (New York City Housing Authority, 1934), p. vii.

¹⁹The origins of the RPI were very significant for Wood, allowing them to counter common accusations of “sentimental bias” and for having exaggerated the failure of private enterprise to supply decent housing to unskilled labor. Wood, “Existing housing conditions in the United States”, Prepared for annual meeting of Milbank Memorial Fund (MMF), April 1937, Wood Papers, Box 23, Folder 3.

²⁰Catherine Bauer to Wood, May 20, 1938, Wood Papers, Box 11, Folder 14.

²¹See Wood (1936), for a discussion of this earlier method. She corresponded with numerous researchers and housing agencies to gather this statistical data.

maps, illustrating graphically through dots and crosshatching the relationship between low rental areas and disease (tuberculosis) and delinquency (criminal convictions) (Wood 1936, 1940).²²

Wood demonstrated how to adapt, combine and circulate data from a variety of different sources. Her work was, as she noted, “quoted constantly” in the push for policies of slum clearance and public housing.²³ Wood’s many facts and her identification of important information sources, helped secure a housing census for 1940.²⁴ As the planner Warren J. Vinton declared, a complete record of the nation’s homes, “like a mariner’s chart, will enable us to steer our programs safely and accomplish the results which the Congress expects of us.”²⁵ They would now have nationwide, unified and comparable information on the characteristics of residential structures, occupancy status, rental and home value, the unit’s equipment, facilities, furniture and utilities, and home finance. Once the housing data was processed and published in a series of bulletins, it could be cross tabulated with data on family size, composition, economic status from the regular population census schedule.²⁶

While housing reformers celebrated this advance from scattered local surveys, to the RPI, to a census of housing, there remained limits to use of this information. The census and RPI provided, as the urban planner Anatole Solow noted, “gross not precise data”.²⁷ Only a few items were covered and categories such as “minor repairs needed” or “unfit for use” were general and loosely defined. As a member of the RPI unit in Washington admitted to Wood, the data on housing quality served merely to “roughly classify the buildings as to their need for repairs and demolition”.²⁸ This data could be used to identify shortages and establish the approximate size of housing problem to politicians and the public, but it could not be used to specify how that problem was best resolved on the ground. It was useful for making a case

²²The choice of Richmond was due to the quality of data available and the size of the city. By using a small city, they could “illustrate the principle of spot maps to show the correlation between slum areas and unfavorable social conditions.” Bauer to Dr. Kimball Young, University of Wisconsin, December 26, 1938, Wood Papers, Box 11, Folder 15.

²³Memorandum, Wood to Administrator, January 16, 1941, Wood Papers, Box 14, Folder 1.

²⁴Particularly popular was her off-cited estimate that one third of the population was ill-housed, see Wood, “Existing housing conditions”, *ibid*.

²⁵Testimony of Warren Jay Vinton Before Census Committee of the House, July 13, 1939, Warren Jay Vinton Papers, Division of Rare and Manuscript Collections, Cornell University Library, Box 1, Folder: Census of housing.

²⁶The Census Bureau sponsored a series of housing bulletin’s that presented interrelationships between certain housing characteristics and other census data, such as characteristics of families or households occupying dwelling units. It also sponsored the production of analytical maps presenting these various housing characteristics by blocks to aid the location of problem areas and areas with inadequate housing.

²⁷Anatole A. Solow, *The Measurement of Housing Quality and Need: Public Health Gives a Practical Tool for Planning Action*, May 1, 1947, Charles-Edward Amory Winslow Papers, Manuscripts and Archives, Yale University Library, Box 54, Folder 517.

²⁸Daniel Casey, Real Property Inventory Unit, Department of Commerce, to Wood, August 18, 1934, Wood Papers, Box 5, Folder 6.

for action; much less so for the mode of action itself. What was critical, therefore, was the need for data that could be transmitted and mobilized in a way that was actionable, data that served the practical purposes of planners, architects and public health workers employed by local government agencies.

3 Public Health and Housing Standards: The Committee on the Hygiene of Housing

It was in the interest of generating more practical data which would travel into the plans and designs of municipal governments, that the CHH was founded in 1937. The Committee was organized by one of the nation's leading figures in public health and the founder of Yale's Department of Public Health, Charles-Edward A. Winslow.²⁹ Winslow described the home as an "instrument of health... in the wide sense of emotional and social as well as physical well-being."³⁰ The CHH functioned as the "technical housing body" of the APHA, conducting research in aspects of housing design, construction and occupancy which affected mental and physical health.³¹ It also served as "national clearing agency", sifting through and distributing information from existing studies (Solow and Twichell 1947, 22). By bringing these "results... to administrators and technicians in the fields of public health and housing", the CHH was establishing itself as an important intermediary agency and was, in effect, bringing public health officials into the "national housing program".³²

The evidence generated by the CHH would travel from the experiments and surveys of physical, social, biological and medical scientists to housing administrators and planners by means of a series of standards promulgated through its published reports. Standards covering occupancy, sanitation, light and air, had long played a central role in housing reform, a way of establishing and enforcing clear and workable codes to improve tenement living and defend against the unscrupulous operations of landlords and speculative builders. But, influenced by cultural norms and social interests, they had also been very inconsistent across the nation.³³ The CHH would work to develop an extensive series of standards on which "comprehensive housing regulations" could be built, as was desired by health, building and housing

²⁹The Committee was organized on the request of Housing Commission of the Health Organization of the League of Nations, in which Winslow played a leading role, and as one of the national committees corresponding with that Commission. Winslow founded the Yale Department of Public Health in 1915.

³⁰Winslow, *The Physiology of Shelter*, June 22, 1948, Winslow Papers, Box 129, Folder 731.

³¹Committee on the Hygiene of Housing, *Statement of program*, 1939, Wood Papers, Box 22, Folder 16.

³²*Ibid.*

³³Dread diseases were critical to the cause of early housing reform; the threat of tuberculosis and cholera demanded clean water and light and air – see Lubove (1962).

officials.³⁴ They would also be objective, and thus irrefutable, based as they were on rigorous scientific inquiry.

In 1938, the CHH published the first of a series of influential documents, one that would help place health at the heart of the housing problem. Their pamphlet, “Basic Principles of Healthful Housing”, was described as a “preliminary attempt” to formulate the basic health needs to be served through housing. Its principles were defined as “fundamental minima required for the promotion of physical, mental, and social health”, which were, in turn, based upon “fundamental biological requirements” (CHH 1938, 354). Thirty principles were then divided into four sections - physiological and psychological needs and protection against contagion and accidents. Discussion of the requirements needed to realize each principle consisted of a careful and deliberate exposition of the relevant facts, such as the need for an air change of 10 cu. ft. per person per minute to dilute atmospheric impurities. The standards proposed were tentative at this point, based on existing data that was drawn from a wide range of studies and agencies. But they noted that this data was incomplete in many areas. While the National Health Survey supplied epidemiological data on household accidents, for example, the relationship between housing and disease could not be shown through “the usual lines of investigation.”³⁵ To successfully translate their principles for health into “concrete standards of performance for the home of the future”, they needed new forms of interdisciplinary research (Winslow 1945, 20). Such ongoing studies would, in turn, continually modify such standards, making them more “precise and scientific.”³⁶

The CHH established a series of research committees focused on specific problems, on which appointed members were leading experts. These included physical and engineering aspects, such as building construction and household equipment, administrative and legal problems, and social and human uses. For example, a subcommittee on standards of occupancy, on which Wood served, focused on space requirements and the maximum number of individuals to be housed in each type of dwelling. They submitted ongoing reports, published in the *American Journal of Public Health* and printed as individual pamphlets by the U. S. Public Health Service, which were circulated, reviewed and abstracted by leading public health, construction, real estate and housing associations. The work of each subcommittee culminated in a detailed report that was published as part of a series on “standards for healthful housing”. Winslow commented on the concluding volume on standards for occupancy published in 1950, they had presented “for the first time actual

³⁴The CHH began its work with a canvassing of opinions from officials and agencies as to the most feasible types of housing control. Thirteenth Meeting of the Committee on the Hygiene of Housing, American Public Health Association, Tentative Report of the Subcommittee on Housing Legislation and Administration, February 2, 1942, Wood Papers, Box 22, Folder 16.

³⁵Woods reported in Minutes of Meeting of Sanitation Advisory Committee, Washington DC, June 5, 1939, p. 6, Winslow Papers, Box 19, Folder 482.

³⁶Winslow, Report of the Round table on the Hygienic Aspects of Housing, MMF, 1937, Wood Papers, Box 23, Folder 5.

concrete data on the space needed for families of various sizes.”³⁷ The minimum space requirements were stipulated in relation to the number of individuals – 400 square feet for one person, 750 for two, 1000 for three, and so on – based on laboratory studies that measured, for example, the “atmospheric impurities” that resulted from cooking, heat sources and the human body. Yet they were also concerned to move beyond such absolute standards and grapple with the “actual conditions of occupancy”, that is, how space was used by a family in its day-to-day life (CHH 1950, vi). To achieve this, they gathered together observational data on family life provided by the Swedish sociologist and subcommittee member Svend Riemer and their long-standing collaborators, the John B. Pierce Foundation’s research laboratory in New Haven, a center for the study of physiological regulatory systems.³⁸ The result was a much more practical series of requirements that stipulated floor space in relation to family needs and activities rather than merely relying on floor area or cubic content as had been the norm in earlier housing regulations which had left “space -- the most valuable commodity housing has to offer -- ... poorly designed or wholly insufficient.”³⁹ Through their detailed examination of livability they delivered an extremely detailed list of specifications, from room sizes and their design, to floor space in relation to furniture, the placement of the bed relative to windows, the distances between cots, and the dimensions of closets and work-spaces.

The volumes were packed with research data. This gave the standards credibility, showing them to be based on the best scientific information available. It also provided a degree of flexibility. While CHH members agreed with the provision of absolute standards regarding space, such as the 400 cu ft. minimum, they also expressed concern that these could too easily become rigid, static and fixed, “not only... frozen in the minds of the designers but... made unalterable in the form of permanent buildings.”⁴⁰ Modern family needs did not remain stationary and, with the growing recognition of the need for optimum space for psycho-social well-being, such crystallized standards would “likely to prove a drag upon progress

³⁷ Winslow to Frank Boudreau of the Milbank Memorial Fund, one of the main financial supporters of the CHH, April 27, 1950, Winslow papers, Box 54, Folder 513. The work the subcommittee was suspended during the war, as the work of other subcommittees was considered more relevant to federal agencies during the emergency, hence the delay in this final publication.

³⁸ Notes of Report for Dr. Maxcy to the Governing Council, 1941, Winslow Papers, Box 54, Folder 515; CHH, APHA, *Essentials of Space Planning and Space Organization in Dwelling Units*, Report of Subcommittee in Standards of Occupancy, March 1942, Wood Papers, Box 22, Folder 16. The CHH also worked with a wide range of agencies across the United States, carrying out field studies into conditions of heating, ventilation, lighting, and noise in summer and winter in New York City, New Haven, and Charleston, Oklahoma City, and Tennessee Valley. APHA, CHH, *Statement of program*, 1939, Wood Papers, Box 22, Folder 16.

³⁹ CHH, APHA, *Essentials of Space Planning*, *ibid*.

⁴⁰ CHH, APHA, Subcommittee on Standards of Occupancy, *Principles of Space Planning and Space Organization for Low-rent Dwelling Units*, Revised Draft Submitted for Criticism of the Subcommittee, prepared by Anatole Solow in cooperation with Allan A. Twichell and Harold Sandbank, March 28, 1941, Wood Papers, Box 23, Folder 1.

rather than a stimulus to progress.”⁴¹ By including such a wide-range of data, the CHH reports enabled local authorities to adapt the standards, mobilizing the data contained within them to suit their own particular requirements in terms of climate, building materials and equipment, costs and rental value, and the housing needs of particular types of families: “Local building agencies must have some leeway; otherwise there can be no variety, no adaptation to regional needs, no experiments, and therefore no real progress.”⁴² Consistent with features deemed to characterize successful databases, the volumes or manuals constructed by the CHH needed to be general and robust enough to encourage circulation, but also adaptable to local demands and situations.⁴³

In this way, standards served as the conduit or vehicle for the movement of data from laboratory and field studies and into the plans and designs of the numerous housing associations that oversaw the mass construction of new dwellings following the 1937 Housing Act and the regulatory bodies that controlled existing housing, usually overseen by local departments of health. The CHH had worked through, simplified and condensed masses of complex data, ranging from the physical issues of construction and sanitation, to the social, addressing the dual needs for individual privacy and the opportunity for family life through design. This tidying and organizing of data is comparable to the processes of “cleaning” data so that it is amenable to analysis that is discussed by Boumans and Leonelli in [this volume](#).⁴⁴ Drawing from Mary Douglas, Boumans and Leonelli argue that cleaning does not involve the removal of dirt, but is about ordering and classifying. In their studies of economic and plant science, this was achieved through “clustering” data into larger units of interrelated objects. The CHH similarly established groupings of data according to use by establishing standards relative to various aspects of housing, be it circulation, ventilation or occupancy. But here the categories were organized with an explicit emphasis on policy-usefulness, those relating to more fundamental problems of building structure clearly distinguished from those of building occupancy which could be attended to by local law enforcement or public health workers, for example. These were then communicated to the reader through the series of circulated reports or manuals which neatly divided and labelled the relevant information and contained clear and usable tables and charts to apply to a wide range of housing issues.

The CHH standards had considerable influence, demonstrated in new building code requirements of the National Bureau of Standards of the US Department of Commerce, the housing codes promoted by the National Association of Housing Officials (NAHO) with whom the CHH worked closely, and also regionally and

⁴¹Letter, Winslow to Bleecker Marquette, April 25, 1941, Wood Papers, Box 23, Folder 1. It is worth noting that Winslow argued that the public health department should have the role of adapting and improving space standards, rather than a housing agency.

⁴²A Housing Program for Now and Later, February 1948, National Public Housing Conference (NPHC), Vinton Papers, Box 2, NPHC-Releases.

⁴³On this point, see [Cambrosio et al.](#) who draw in turn on Leonelli (2013).

⁴⁴M. Boumans and S. Leonelli, [this volume](#).

locally, in committees of planning and housing regulation such as in New York City.⁴⁵ The CHH also pushed aggressively for improved standards in federal agencies charged with housing construction, declaring the lack of standards in many of the homes built for the defense industries during the war to be “shocking” and to constitute a “national scandal.”⁴⁶ At the request of the USHA, they reviewed the government housing and occupancy standards for public housing, urging them to increase their room size specifications, lest they “produce a nation of neurasthenics.”⁴⁷ The work of the CHH also stimulated further housing investigation and the sharing of data between experts and agencies, as Allan Pond, a public health expert and CHH member proclaimed: “Interest in housing standards and building code requirements currently is widespread and feverish. On every hand there is evidence that house design and construction standards and methods are subjects that attract the imagination of technicians and the public alike. Laboratories are humming with research activities designed to shed further light on new materials and modes of construction.”⁴⁸

4 The Appraisal Method: Transforming Standards Back into Data that Travels

The standards generated by the CHH expert committees had another important potential use. Whereas the RPI and census had provided rather crude measures of housing quality, planners and policymakers now had the means of clearly distinguishing good housing from bad, of identifying precise faults and their patterns. The CHH now sought to translate standards into a yardstick for measuring housing conditions, as public health and housing officials requested further help in ensuring their policies were “better guided” (CHH 1942, 285). The CHH now set itself a new task: “developing a method of data analysis whereby final results could be readily summarized and interpreted by local health departments and various other agencies as a guide for their policy and practice.” This would supplement census and city-wide housing surveys which were useful in identifying general problem areas, but, with their breadth and generality, the “collected data do not readily lend themselves to a variety of purposes for local government agencies concerned with housing”(CHH 1942, 286).

⁴⁵Densities in New York City: A Report to the Citizen’s Housing Council, by The Committee on City Planning and Zoning, May 1944, Henry S. Churchill Papers, Division of Rare and Manuscript Collections, Cornell University Library, Box 2, Folder 24.

⁴⁶Vinton to Administrator, United States Housing Authority (USHA), September 23, 1941, Vinton Papers, Box 28, Defense Housing Program.

⁴⁷Wood to A. C. Shire of the USHA, November 3, 1941, Wood Papers, Box 1, Folder 21. It was this lengthy debate among and between members of the CHH and USHA that helped stimulate the CHH inquiries into family living habits and their use of space in the home. Minutes of Fourth Meeting of the Subcommittee on Standards of Occupancy, March 28, 1941, Wood Papers, Box 23, Folder 1.

⁴⁸Pond, The application of health standards to house construction, to Annual Meeting, Connecticut Society of Civil Engineers, March 17, 1948, Martin Allan Pond Papers, Yale University Library, Box 13, Folder 229.

In order to transform standards into a workable survey technology, the complex of specifications needed to be simplified, as to conform precisely, surveys would become so large and data-laden they would lose their practical value. The solution was a “screening method”: an index consisting of a limited number of factors selected as indicators or proxies for a multitude of housing characteristics.⁴⁹ For example, the presence of an inside flush toilet was not selected as an item simply because of an intense interest in the facility being present, “but because of its assumed intrinsic meaning as one element in an index of hygienic housing” (CHH 1942, 287). Index items were also selected according to the degree to which they lent themselves to precise and objective measurement, as identical information needed to be collected by different enumerators. The result was a series of items that established the quality of the building itself, its structural integrity, sanitary and heating facilities, housekeeping and facilities, its occupancy, such as area per person and number of persons per room, and its surrounding neighborhood environment, considering specific industrial nuisances, the density of land coverage, usability of open spaces, public utilities and community facilities, and specific hazards, such as heavy traffic and noxious odors.

The second innovation of the new survey method was its scoring system that generated a new dataset. A series of penalty points were scored on a scale which captured any departures from the standards of acceptability as derived from the basic principles of healthful housing. These points were weighted: very serious issues, such as the lack of a safe water supply, granted 30 points, more minor deficiencies, 1 or 2 [see Fig. 1]. These were then added together to give an overall score, and the building then placed into one of a series of quality classifications ranging from good, A, to bad, E. This method provided a more detailed and accurate analysis of housing quality and removed bias through short standardized schedules “which call for practically no subjective judgment”.⁵⁰ The enumerator could move quickly and only a few days training in the technique were necessary, Winslow noting: “It’s very simple.”⁵¹ The schedules were then processed by a skilled clerk who did not need to see the dwellings. Using scoring templates and summary appraisal forms, the clerk could quickly translate the data on the field schedules into numerical scores. This was then transferred to cards of the marginal punch type, allowing “rapid sorting and tabulation. The data obtained is readily analyzed and yields a measurement of housing deficiencies on a valid quantitative basis.”⁵² Further, by mapping out these classified buildings over an area, tabular data could be used in a

⁴⁹For a detailed analysis of the relationship between a larger body of data and the selection of indicators to help make sense of a more complex set of phenomena and their ease of travel, see Mary Morgan’s analysis of data and datum in [this volume](#). Unlike Morgan’s case, the set of indicators developed by the CHH were, necessarily for actionability, tightly bound together.

⁵⁰E. R. Krumbiegel, “An appraisal method for housing conditions and needs: Milwaukee enforces a new housing code”, Reprinted from *The Municipality*, December 1945, Pond papers, Box 13, Folder 230.

⁵¹Winslow, *Housing Principles*, May 3, 1944, Winslow Papers, Box 110, Folder 198.

⁵²Krumbiegel, “An appraisal method”, *ibid.*

*Selected Deficiencies of Dwellings and Neighborhood Environment
Sample Areas Grouped by Quality Grade
Southwest District, New Haven, Conn.*

Scoring Item Number	Deficiency	Qualifying Range of Score: Penalty Points ¹	Quality Grade of Sample Area		
			A and B Combined	C	D and E Combined
			Per cent of Dwelling Units Incurring Penalty Scores within the Qualifying Range (preceding column)		
FACILITIES					
I. DWELLINGS					
2	Public Hall Daylight: Grossly Inadequate ^{2, 3}	5-10	0	0	10
5	Daylight Obstruction by Adjacent Structures: Serious ²	5-15	18	28	44
8	Piped Water: Cold Only or None in Unit...	7-15	4	20	42
9	Bathing Facilities: None, Shared, or No Hot Water	7-23	6	22	44
10	Toilet Facilities: Shared, Outside Unit, or Non-flush	10-40	2	1	9
12	Windowless Rooms: One or More	15-20	0	0	6
13	Installed Heating: None in at Least One-half of Rooms	10-18	7	60	64
15	Room Sizes: Area of One or More Rooms Substandard ²	5-10	19	17	37
MAINTENANCE					
16	Yard Condition: Grossly Insanitary ²	10-15	0	15	26
18	Structural Deterioration: Extreme ²	20-30	3	15	37
OCCUPANCY					
21	Persons per Room: One and One-half or More	10-25	10	18	22
22	Area per Person: Substandard ²	10-25	1	4	13
II. NEIGHBORHOOD ENVIRONMENT					
<i>Per cent of Blocks or Street Frontages Incurring Penalty Scores within the Qualifying Range</i>					
E 1	Land Coverage by Buildings: Excessive ²	10-24	0	10	17
E 5	Land Use: 30 Per cent or More of Block Area in Industrial, Commercial or Mixed Residential Use	10-13	2	38	58
E 7	Specific Nuisances and Hazards from Non-residential Sources: High Incidence ²	18-30	6	21	44
E 8	Moral Hazards: Considerable in the Area ²	6-10	0	15	24
E 10	Hazards and Nuisances from Adjacent Streets: Considerable ²	15-20	2	26	25
E 21	Public Playgrounds: Beyond Reasonable Distance ²	8	4	44	69

1. For most of the deficiencies the range of possible scores begins with 1 or 2 penalty points. In order to show here only the really significant defects, those dwellings or street frontages with slight penalties for any item have been excluded.
2. Space limitations preclude an accurate statement here of the criteria on which this item is scored. As noted in the text, all deficiencies are reported in terms of objective characteristics, not in such loosely descriptive terms as are necessary here. Scoring is done from precise rating tables.
3. Applicable only to tenements with public halls.

Fig. 1 A table showing the scoring and classification of dwellings according to the appraisal method. From CHH (1943)

geographical form, creating a “sketch portrait of the slum block” (CHH 1942, 292). As the CHH demonstrated in a pilot survey in New Haven, by sampling every seventh dwelling in a problem area of city, they could map the quality of individual blocks or individual sections within blocks.⁵³ The maps provided a graphic representation of the data collected, identifying which areas were beyond saving and needed to be torn down, or areas which could be rehabilitated through some treatment to prevent further deterioration. The housing assets and liabilities of a city could now be accurately mapped to identify what problems existed and where they were concentrated: “It becomes possible to report objectively to the municipal administration the state of housing in any problem area.”⁵⁴

The technology therefore simultaneously produced data while processing and packaging it for travel into the policies and plans of local authorities.⁵⁵ The series of reports on the new “appraisal method” published by the CHH from 1942, and its three final volumes from 1945, were well received by housing and public health authorities, and even more so in the postwar era, a period of so-called urban renewal, whereby the large-scale building of new housing was to be tied to the mass clearance of slums dwellings across the nation. Programs of urban redevelopment intensified following the 1949 Housing Act which increased federal funding, but also intensified government oversight regarding the kinds of housing to be removed, renovated, and rebuilt. As a health officer in Milwaukee observed, the appraisal method was particularly well-suited to this new and more expansive approach, the objective and sharp demarcation of problematic urban areas providing for systematic and long-term programs of rehabilitation, demolition and reconstruction, replacing the “futile patch-work” of laws and regulations focused on individual dwellings on a case-by-case basis.⁵⁶ Following Milwaukee’s adoption of the appraisal technique in its program of redevelopment, its city officials encouraged Philadelphia to follow suit, David Walker of the city’s Redevelopment Authority declaring the CHH’s yardstick to be “a most scientific method”.⁵⁷ Decisions were not left to the personal judgment of the inspector, but scored objectively and “the mechanical brains of a punch card rate the quality and quantity of blight and give us an adequate appraisal of the neighborhood” (Walker 1947, 70).

The technology also encouraged closer working relationships among agencies in the city. In Milwaukee, Philadelphia, and soon Los Angeles, St. Louis, Washington DC, Baltimore, Boston, and Portland, Maine, Anatole Solow saw “the beautiful words” of “integration and cooperation”, so often used in planning literature, now

⁵³ Winslow, “Housing Principles”, *ibid.* The CHH carried out survey trials in 3 cities in Connecticut, New Haven, Waterbury and Stamford, testing the items and rating technique and identifying their uses for local authorities.

⁵⁴ Solow, “The measurement of housing quality”, *ibid.*

⁵⁵ As Sabina Leonelli (2015) argues “Packaging happens at several stages of data travel and is often implemented already at the point of data production”.

⁵⁶ E. R. Krumbiegel, “An appraisal method”, *ibid.*

⁵⁷ Milwaukee was the first city to adopt the appraisal technique, outside of trial studies, completing a survey of a 16-block standard area of the city in 1945. The field secretary of the CHH, Emil A. Tiboni, instructed the city’s Health Department and Land Commission personnel in the use of the method (reported in City News in Brief, *Journal of Housing*, November, 1945, p. 204).

being realized, the police, health, building, and fire departments all using the relevant punch card data to fulfill their specific roles in the problem areas as demarcated by the appraisal method.⁵⁸ By providing a continuous record of local housing and neighborhood conditions, over time the method could generate the unity essential for successful policy. The diverse range of actors and agencies involved in housing could now visualize and interpret housing data in consistent and actionable ways. Solow described the survey as a “skeleton which gives strength to the body of planning programs. In the field of housing, a type of skeleton is now available which should permit more action than the mere rattling of bones.”⁵⁹

But in doing so the survey privileged a public health perspective in the resolution of urban problems. The data that had been used to create and legitimate standards of healthful housing, was now stripped down and simplified for travel through translating those standards into index items to map urban areas. Further, once an area had been classified, its faults dissected and listed in the local authority’s survey report, the most effective means of correcting these failings, by either rehabilitating the housing that could be saved or demolishing and rebuilding in a way that would prevent future obsolescence, were to be found by turning back to the CHH standards for healthful housing. The result, therefore, were two powerful and mutually reinforcing technologies that encouraged urban agencies to understand housing in terms of preventing physical illness and accidents, disease transmission, and emotional disorder.

Finally, the appraisal method served a useful research tool. Committee members had long sought firmer evidence that better housing improved health and well-being. While the CHH publications were strong on physical illness, disease and accidents, mental health and social well-being were much harder things to measure. In their early reports they had, like Wood, relied on correlations between poor housing areas and data on delinquency and mental hospital admissions, as well as the statements of psychiatrists and social workers. In 1945, a new Joint Committee on Housing and Health was established, bringing together the CHH and NAHO; its purpose “to study the actual results of the provision of good housing” and then “translate” this information into “into the administrative practice of operating housing agencies”.⁶⁰ The culmination of this committee’s work was a further collaborative study with the Johns Hopkins School of Public Health and Hygiene in Baltimore.⁶¹ The work of the Johns Hopkins Longitudinal Study of the Effects of Housing on Health and Social Adjustment began in 1954, its director, the social psychologist, Daniel Wilner, describing it as the first systematic survey that analyzed “a discrete quite measurable change in physical environment on behavior and health.” It compared the mental and physical health of those in “very bad slums” of Baltimore with those relocated to new “very good housing”, a

⁵⁸ Solow, “The Measurement of Housing Quality”, *ibid.*

⁵⁹ Solow, “The Measurement of Housing Quality”, *ibid.*

⁶⁰ Association News, Initial meeting of Joint Committee on Housing and Health, *Journal of Housing*, July 1945, p. 119.

⁶¹ The selection of Baltimore was largely the result of the active role played by Huntington Williams in the CHH. The study was housed at the Baltimore City Health Department and funded by the APHA. See George Huntington Williams Collection, Alan Mason Chesney Medical Archives of the Johns Hopkins Medical Institutions, Box 505.

modern high-rise project for black Americans.⁶² In this survey, the CHH appraisal method allowed them to first divide up areas of the city into ecological units or experimental zones of good and bad housing, and second, by using the precise appraisal data, relate specific features of the housing to specific social and psychological factors collected through a series of “psychosocial scales.” Wilner’s study duly showed how improved housing had led to lower rates of sickness, improved rates of school attendance, and emotional well-being (Wilner et al. 1962). By turning the appraisal method into a research tool, the CHH was able to generate and integrate data that further promoted the value of its principles for healthful housing, using the very environments that its standards and surveys had created as laboratories for testing and legitimating the principles that had helped give them birth.

5 Conclusion

By the 1960s, CHH’s standards and appraisal technique were used across urban America and endorsed by national and federal associations of construction, public health, architecture and urban planning.⁶³ The “mariner’s chart” desired in the 1930s had not been provided through a census database, but through the careful processes of curation, presentation, and packaging that made data actionable in local contexts. The striking success of the CHH can be attributed first, to its ability to make data travel; second, its ability to continue exert control over the data being produced, circulated, analyzed and acted upon. Through a series of phases, information moved by means of the vehicles constructed by the CHH and into the practices of local authorities in urban planning, health and design. First, a sequence of principles brought together existing data on a wide variety of topics to construct an argument for the necessity of healthful housing. Second, these principles were detailed by formalizing them into standards. These worked to translate a mass of complex information from a wide range of sources into clear and accessible manuals which tidied, organized and labeled data and provided flexible guidelines that allowed it to be applied to local situations. Third, the appraisal technique then translated these standards into a workable diagnostic tool that generated simple and concise information while simultaneously suggesting policy solutions. Finally, the appraisal functioned as a research tool, a means of generating further data that gave credibility to the original principles of healthful housing. We have, therefore, a certain circularity in

⁶²Daniel Wilner in transcripts of Conference on the Physical Environment as a Determinant of Mental Health, Washington DC, May 28–29, 1956, John B. Calhoun Papers, National Library of Medicine, Box 63.

⁶³Where they were not used, they were often in some way adapted and simplified. One of the most common complaints was that, in spite of the emphasis on simplicity, the surveys were in fact complex and expensive to complete. In Philadelphia, rather than redoing the appraisal when they needed more updated information, they devised their own version which simplified the CHH index making it less costly. Planning Division, Redevelopment Authority of the City of Philadelphia, Summary Report on the Central Urban Renewal Areas (CURA), March 1956, Churchill Papers, Box 3, Folder 27. On the CHH appraisal method and urban renewal, see Abramson (2016).

movement and a reinforcing relationship between the tools devised by the Committee. Through these technologies, the CHH was able to control data at each critical phase of movement, from identifying and circulating the problems of poor housing to generating actionable evidence for local agencies. Both the standards and appraisal technique offered authorities instruments of regulation over housing and occupancy, powers that were in turn dependent on CHH's designation, in hierarchical, tabular and cartographic forms, of the data that mattered.

The ingenuity and creativity of the CHH in making masses of complex data retrievable and actionable by a wide range of disciplines and professions ensured the centrality of the public health field in urban redevelopment from the 1940s, so much so that one official observed: "It is becoming increasingly difficult to know whether health is ancillary to housing or housing is ancillary to health."⁶⁴ When the National Commission on Urban Problems was appointed by President Johnson to address the crisis of urban unrest and violence in the late 1960s, they turned to the issue housing standards. In their report of 1969, the CHH was credited for its role in the birth of the first "modern housing code" and for showing that so many cities in the United States were failing to provide the quality of housing so critical to the health and wellbeing of their citizens (Mood et al. 1969, 10). The infrastructure generated by the CHH was sound, the Commission declared, but now needed to be updated and strengthened with more research into health and housing as there was a "paucity of valid data" (Mood et al. 1969, 33).

However, for a growing number of critics, it was precisely this entrenched and uncritical acceptance of quantitative data, housing codes and standards that was the problem. Some social scientists and activists saw the CHH as having been far too successful. While Committee members had urged flexibility and regular revision, worried that minimum standards could become obstacles to future progress, for critics it was the entire infrastructure developed by the CHH that was problematic.⁶⁵ Local governments and agencies were trying to resolve social problems through instruments that simply could not account for the complexity, variety and dynamism of urban life however regularly they might be informed by new data. In Boston the appraisal method had been put to work in the West End, designating most of the housing in a 48-acre site obsolete and beyond rehabilitation. The West End project report described the buildings as "dilapidated" and the area as "overcrowded" with a "severe lack of any open space."⁶⁶ On the basis of these findings, the Boston Redevelopment Authority razed the site, displacing some 2700 families, to make

⁶⁴ John C. Leukhardt, "Health centers and health services in housing programs", 18th Annual Conference, Milbank Memorial Fund, April 2-3, 1940, Wood Papers, Box 23, Folder 6.

⁶⁵ As the editors have suggested, Bowker and Star's notion of "infrastructural inversion" is a useful way of conceiving of the growing challenges to urban planning in this period emanating from the social sciences, as critics began to question the long held assumptions that advances in housing quality were to come from ever stronger and more precise housing codes and standards to which home-owners, landlords and tenants would be forced to comply. See Bowker and Star (2000, 34-46).

⁶⁶ West End Project Report: A Preliminary Redevelopment Study of the West End of Boston, March 1953, Urban Redevelopment Division, Boston Housing Authority, Herbert Gans papers, Rare Book & Manuscript Library, Columbia University, Box 2, Folder 3. See also O'Connor (1993).

way for five residential high-rise (and high-rent) apartment complexes that fulfilled the CHH specifications. The case of the West End became celebrated by opponents of urban renewal thanks largely to a research project carried out under the direction of Erich Lindemann, Chief of the Psychiatry Service at the nearby Massachusetts General Hospital. The West End project, titled “Relocation and Mental Health: Adaptation under Stress,” sought to devise new methods of understanding how individuals and communities adapted to severe stresses, such as the loss of home, and build a more effective social and psychiatric support network (Ramsden and Smith 2018). The project’s publications, based on in-depth interviews and participant observation, documented the devastating effects of urban renewal on a community and criticized the CHH methods of classification (Fried and Gleicher 1961; Gans 1962). The appraisal method relied on a series of items that could be objectively measured and translated into action and hence, they were straightforward, physical and quantitative. They allowed large sections of the city to be mapped and classified for demolition. While the CHH had enabled the clearance of slums and the building of new and better housing throughout the United States, with this attention to the physical, it could not hope to capture the complex social lives and varied need of different communities in the city. The portability of data had come at the cost of its detachment from the lived experiences of city dwellers and the social meanings of shared urban spaces. While the West End was crowded, its buildings dilapidated, it was a healthy and mutually supportive working-class community.

Having witnessed the power of the CHH’s technologies in the West End and using this experience as an exemplar to contest and critique methods of data processing and application, social and behavioral scientists began to demand, collect and circulate new kinds of data. They devised questionnaires, surveys and observational studies that could better capture, organize and translate how people experienced space and how it could be better designed in accordance with the interests of the users. While the APHA would continue to update its guidelines on healthy housing through to the 1980s (Mood 1986), long after the CHH had disbanded, the unity between planning, design, construction, medicine and the social sciences, contributed to in no small part by the Committee’s technologies, began to break down. With the CHH having played a critical intermediary role, there was now little to link together the large housing databases generated by the census and smaller user-oriented surveys of environmental quality applied by independent agencies. The influence of the CHH had waned gradually, and in the wider social and political climate of the 1960s and 70s, this was hastened by growing criticism of large-scale urban renewal and public housing development from a wide range of sources, not only fiscal conservatives and neo-liberal policymakers, but liberal critics of the “urban bulldozer” that appeared to demolish communities as well as slums, and simply served to shift poverty to other parts of the city (Anderson 1964; Jacobs 1961).

In this study, we have seen how the CHH functioned very successfully as an intermediary organization that helped generate and circulate data that was credible, authoritative, easily transferred and acted upon. In the various cases brought together in this volume, patterns of data journeys have been examined and critical issues, conditions, and practices of configuration, visualization, transformation and linkage explored. In the case of housing data, with its explicit practical role in planning and

designing the built environment, grounding physical interventions in the world, we have had an opportunity to examine just how accountability and actionability can be built strategically into data journeys. We have seen how public health and planning experts, housing activists, and policymakers were attracted by the promise of big and open data which would grant authority, credibility and power to housing reform. Yet they also wanted to ensure that data was usable in specific contexts. The CHH managed to combine elements of universality in terms of the objective facts of the healthy home and the minimum standards required to construct and it, with local demands for usefulness, adaptability and actionability. By virtue of its role in the development of a centralizing infrastructure of new technologies that could simultaneously generate, process, standardize, organize and circulate data, and further, make these technologies available to local authorities, the CHH was able to determine the kind of data that was put to work in planning, building and design, and thereby secure the public health perspective in housing policy throughout the nation.

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Edmund Ramsden is a Wellcome Trust University Award Lecturer in the history of science and medicine in the School of History, Queen Mary University of London. His current research is focused on the history of experimental animals in psychology and psychiatry and on the influence of the social and behavioural sciences on urban planning, architecture and design in the twentieth-century United States with a particular interest in public housing.

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