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Rethinking health workforce planning: Capturing health system social and power interactions through actor analysis

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ABSTRACT

Future health systems will be required to accommodate changing social and treatment environments along with new and not-before-contemplated health care roles. Thus, health workforce planning is likely to benefit from improved problem identification, response formulation and data and methods that provide deeper understandings of socially influenced systems. Actor analysis is able to facilitate this through its examination of actor goals, interactions, and influences. We explore the use of this infrequently reported method in the context of health workforce planning. Through an embedded mixed methods design, we draw on data from inductive document analysis, deductively coded semi-structured interview responses from two separate but interconnected health sub sectors and numerically transform these to comply with the selected actor analysis software's input requirements. Our findings underline the importance of actor analysis as an investigative resource for delineating actor positions on a range of strategic issues pertinent to health workforce futures to reveal a different perspective of the system's evolution than that derived from conventional health workforce forecasting methods. A hierarchy of critical issues and the influential actors that hold sway over the workforce discourse are found, providing some insight into why conventional workforce plans can provide less than expected results.

1. Introduction

It is proposed that health care is becoming increasingly associated with self-care and prevention (Gille & Houy, 2014; Inayatullah, 2010; Longley & Warner, 1995). As such health systems will need to not only accommodate and innovation, quality improvement, new non-communicable and preventable diseases, but also respond to financial constraint (Costa Font & Sato, 2012). With this will come new and not-before-contemplated health care roles (Gauthier & Wac, 2015). As with the present, planning for these will continue to occur in an environment of considerable uncertainty (Gorman, 2012).

Coping with this uncertainty is as much complicated by how these problems are approached (Mason & Mitroff, 1981) as it is by the present health system's organisation (Bloom & Standing, 2008), highlighting two interconnected issues. Firstly, many of the challenges facing health policy makers are wicked in nature; problems with no optimal solution, involve a variety of constituent parties and require behaviour or values' change (Rittel & Webber, 1973). Health workforce planning is considered to be wicked as it

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struggles to achieve right or optimal solutions (Gorman, 2015), involves multiple constituents who exhibit various states of rivalry and tensions (Gorman & Brooks, 2009) and requires behavioural or values change from system actors or beneficiaries (McIntosh, 2007). Secondly, there is a mismatch between the problem's nature and the approaches commonly applied to the task. Conventional health workforce planning relies largely on quantitative forecasting or modelling for its principal data (Ono, Lafortune, & Schoenstein, 2013). These approaches are more suited to a problem that can be comprehensively defined or modelled mathematically, such as straight forward short-run economic or financial decisions (Gordon, 2010; Slaughter, 2002). However, predictive models tend to lose their forecast efficacy over longer timeframes (Fye, Charbonneau, Hay, & Mullins, 2013) and cope poorly with more complex or socially influenced situations (Bijl, 1992). Predicting outcomes in social systems is difficult for quantitative forecasting due to variable relationships, discontinuities, interactions and the effects of time (Gordon, 2010). The failure of the predictive forecast in these situations is not due to poor execution, but rather because it is attempting the impossible, as it tries to represent a system's complexities and contradictory interdependencies, while redacting the influence of human agency (Slaughter, 2002). As a result, many health workforce predictive forecasts are unreliable, reinforce the system status quo and limit innovation, combining to produce fragile planning outcomes (Gorman, 2015).

Thus, health workforce planning, supported as it is by extensive mathematical modelling, tends toward a simplified and narrowed perspective that neglects alternative views or options resulting in limited policy prescriptions (Saltelli & Giampietro, 2017). These perspectives promote policies that offer solutions such as incentives or information campaigns, which neglect the socio-technological configurations in which the actors' behaviours are embedded (Wangel, 2011b). To reduce these limitations and balance planning perspectives requires an explicit inclusion of social objects and change agents, along with an analysis of the corresponding power structures and political landscapes from which futures will be derived (Saltelli & Giampietro, 2017; Wangel, 2011b). In line with these suggestions, Gorman (2015) proposes that health workforce planning requires rethinking, to embrace new sources of data and methods of evidence gathering to truly meet the futures' needs. Though examples of this rethinking are rare, with the health workforce literature more likely to be discussing how to fortify conventional planning approaches or systems (Amorim Lopes, Santos Almeida, & Almada-Lobo, 2015; Tomblin Murphy, Birch, MacKenzie, Bradish, & Rose, 2016).

Given that the aim of workforce planning is to meet the health system's needs with a sustainable and fit-for-purpose workforce (Gorman, 2012), the absence of accounting for social interaction within the health workforce planning literature is a shortcoming. We aim to begin to fill the gap by asking the following two part question: What are the main health workforce issues facing New Zealand; and to what extent are these influenced by interactions between the different workforce actors? This article, therefore, identifies New Zealand's health workforce issues, its actors and their critical issues with respect to future health workforces in the context of two New Zealand health workforce sub sectors. We chose these two topical areas in New Zealand's health policy, Primary Health Care (PHC) and Older Persons Health (OPH), as they are predicted to be impacted by the trends of the aging population and chronic illnesses and that they are beginning to experience workforce volatility (Ministry of Health, 2016). The resultant issue and actor data are transformed, and then analysed, using LIPSOR's actor analysis software MACTOR to produce a range of outputs, which provide details on actor power, interactions, influences and reveal partially obscured system structures.

As the respondents for this study are time poor senior doctors, nurses, executives and experts, we discounted gathering actor data by workshop as scheduling group meetings would prove difficult, be complicated by the professional divisions and tensions that mark the health sector (Gorman & Brooks, 2009; Hinings, 2004) and suffer from a potential reluctance to share sensitive information (Godet, 1991). We respond to these data collection challenges through a novel approach to data gathering where we interview each respondent using a semi structured protocol and then aggregate these results for the purposes of analysis.

The remainder of this paper is organized in four main sections. A theoretical overview in Section two provides the social context of health systems, leading into a discussion on the role of actor analysis in futures studies. Section three briefly explains the procedures of the study's methodology, the results of which are presented in Section four. A concluding discussion covering practical applications, methodological lessons and issues for further research is presented in Section five.

2. Theoretical overview

Health systems are complex interactive constructs consisting of all of the "organisations, people and actions whose primary intent is to promote, restore or maintain health" (de Savigny & Adam, 2009, p. 30). To effect change, intervention must occur at appropriate levels, being mindful that health systems behaviours are complex and generally difficult to predict (Atun & Menabde, 2008). People are considered to be central to a health system's conceptualisation as they are the system's mediators and beneficiaries and drive the system as its professional workforce, managers, policy makers and consumers (Gilson, 2012). These roles are in positions to enable or resist system change through their multiple social interactions within this professionally-based industry (Hinings, 2004).

2.1. The social context of health systems and health workforce planning

Capturing and processing data about the interactions between health system actors is difficult and, therefore, these data are frequently absent from health workforce planning and forecasting models (Bloor & Maynard, 2003; National Health Workforce Planning and Research Collaboration, 2011). This bias of variable inclusion effects forecast accuracy, scope and impact (Roth & Kaivo-oja, 2016). Even so, many workforce plans solely focus on workforce numbers or stocks and flows, predicting volumes using quantitative models (Roberfroid, Leonard, & Stordeur, 2009). Change is, therefore, focussed at a system's less effective parameters, rather than at the system's more effective organising and goal levels (Meadows, 1997). Higher level system interventions may involve changes to a system's design, to its governance or to its organising, forming structures that are more viable responses to wicked

problems (Ferlie, Fitzgerald, McGivern, Dopson, & Bennett, 2011). Such networked structures may act to reconnect fragmented services, focus on wider performance measures and respond across organisational boundaries to better connect system actors for common purposes and concerns (Ferlie et al., 2011; Ferlie, Fitzgerald, McGivern, Dopson, & Bennett, 2013). As change takes place, intermediate or hybrid-types may form from existing workforce structures where its members are able to learn to work together and benefit from mutual self-interest (Health Workforce Advisory Committee, 2005). This transitional process is supported by Marchais-Roubelat & Roubelat's (2008) observation that actors will tend to navigate shifts in a system's rules that delineate future states rather than oppose them.

Although threatening a stable system risks a rise of actor rivalry (Reay & Hinings, 2005), it can promote future actor interactions that feature, simultaneously, common purpose and conflict (DiMaggio, 1983); for in the context of a wicked problem, a solution for one actor is liable to generate a problem for another (Rittel & Webber, 1973). Such tensions between actors in health workforce planning are found variously between the government, health managers, clinicians and other health professionals, underpinned by the themes of: authority, collegiality and accountability; business-as-usual; and flair, innovation and development (Health Workforce Advisory Committee, 2005). As such, accounting for these socially derived perspectives is becoming increasingly relevant for health planning and for understanding policy dimensions and the ramifications of change (Araujo, Evans, & Maeda, 2016).

2.2. Actor analyses in futures studies

Social perspectives of actors are helpful when considering how a future may unfold (Godet, 2000) by including how actors may be affected and also how actors may affect matters (Schoemaker, 1993). A means of adding social perspectives and change agency to futures studies is actor analysis (Wangel, 2011a). Actor analysis is a method to understand how a system's development is socially influenced: gathering data on actor goals, interactions and sway (Godet, 1991); mapping various actors' power, interests and influences for a particular issue or issues (Brugha & Varvasovszky, 2000); and determining their importance, strengths, weaknesses, stances and points of agreement or disagreement, using the tools of social science (Garrett, 1999).

An actor analysis therefore provides a means to engage and assess "the needs for change and in devising strategies to achieve those changes" (Dussault, Buchan, Sermeus, & Padaiga, 2010, p. iv) and to more than merely determine the opinions of those that have some interest in a sector or system. Rather, it seeks to engage and gather data from those who play a major role, who are public deciders and leaders of public opinion, who have some recognised authority, who are influential in the present or take decisions with future impact and are not those with historic importance who have lost their influence (Masini & Medina Vasquez, 2000). Putting this into practice usually involves some respondent identification and selection processes and data gathering through workshops, seminars, questionnaires or interviews, or by in-depth engagement with experts (Garrett, 1999; Godet, 1991), helping to broaden issues being addressed and creating ownership of the process (Kunseler, Tuinstra, Vasileiadou, & Petersen, 2015).

Not all futures studies gather a multiplicity of perspectives nor involve actors effectively. This has been attributed to how a study is framed (Wangel, 2011a), cultural or traditional decision making processes or by relying on powerful lobby groups (Sisto, van Vliet, & Prosperi, 2016). In addition, effective contributions from the selected respondents can be hampered by their time to engage (Cairns, Wright, & Fairbrother, 2016; Pincombe, Blunden, Pincombe, & Dexter, 2013). To overcome these barriers to actor involvement and engagement authors suggest applying structured and purposeful inclusion strategies (Sisto et al., 2016) and following principles for stakeholder involvement (Gimenez, Labaka, & Hernantes, 2017). The conduct of the contact, engagement and involvement of actors has been suggested to be improved by designing short but focussed workshops (Cairns et al., 2016), conducting detailed questionnaires in the place of workshops (Berg, Rogers, & Mineau, 2016), preceding actor workshops with online questionnaires (Sisto et al., 2016) or utilising an appropriate mix of these (Cairns, Ahmed, Mullett, & Wright, 2013) as means to ensure the inclusion of a broad range of perspectives (Bradfield, Cairns, & Wright, 2015).

Even with the employment of these suggestions there is no guarantee that actor input is utilised or has an effect on future policy. This has been attributed to the lack of short-term follow up and actor collaboration (Cairns et al., 2013), expectational differences (Budde, Alkemade, & Weber, 2012) or behavioural bias or inertia (Gazheli, Antal, & van den Bergh, 2015). None the less, the active inclusion of actors and their participation through considered processes does lead to outputs that are able to articulated into action amongst groups of diverse actors (Cairns et al., 2016), although when actor frames do not align, actors may respond negatively to the official policy (van Wijck & Niemeijer, 2016). However, by acknowledging input diversity these dilemmas are allowed to surface and policy makers may begin to reconcile the realised opposites (Matos Castaño, van Amstel, Hartmann, & Dewulf, 2017). Similarly, a better understanding of the mediating role that actors play in regard to the co-evolution of institutions aids our understanding of purposeful actor action (Fuenfschilling & Truffer, 2016), which along with an improved appreciation of the relative dominance or power of actors and their ranges of influence, contributes to improving the quality of foreseeing a system's evolution (Marchais-Roubelat & Roubelat, 2016).

3. Methodological approach

3.1. Study context

A nascent actor-centric approach is present in New Zealand's workforce planning, through a health intelligence and clinically-led scenario-based planning approach to supplement quantitative modelling (Gorman, 2012). This approach emerged at a time of serious health workforce shortages (Gauld, 2012), being implemented by a new body established to provide national leadership for New Zealand's health and disability workforce. This body, Health Workforce New Zealand, (HWNZ), has the overall responsibility for

health workforce's planning and policy development (Ministry of Health, 2017). The approach emphasises forecasts of future possible models of care, developed by interdisciplinary groups of professionals using new ways of thinking about service development and workforce planning (Naccarella, Greenstock, & Wraight, 2013). The engagement of clinical experts and thought leaders has led to sector visions viewed as more credible and accepted across the health sector (Gorman, 2015). While the envisaged models of care imagine new workforce roles and skill mixes, New Zealand's health workforce policy and planning continues to be frustrated by what Gorman, Horsburgh, and Abbott (2009) referred to as an historically slow pace of change, deficient diffusion of innovation and a poor recognition of new roles or practices.

3.2. Study design

The study takes a Mixed Methods (MM) approach. MM is a methodology that utilises multiple methods by intentionally integrating or combining them (Creswell, Klassen, Plano Clark, & Clegg Smith, 2011). Thus, the application of MMs makes it possible to offset Kaivo-oja's (2017) criticism of monological foresight approaches, enabling the use of both deductive and inductive research logics to capture reality's social and psychological dimensions. Data transformation is another feature of MM, where the conversion of quantitative (QUAN) types into narrative form and qualitatively analysed; or conversion of qualitative (QUAL) types into numbers so that statistical analysis may be performed (Teddlie & Tashakkori, 2003). Thus, MM provides health care researchers with a reliable and valid way to derive, combine and analyse data, through the procedures of: (i) analysing two types of data separately and integrating these at analysis; (ii) building on the findings of one approach with the application of another; or (iii) embedding the analysis of one data type within the analysis of another (Zhang & Creswell, 2013). A such MM is being used more in health care research, drawing from the strengths of different methodological traditions, to provide a means of triangulation and to enable a better understanding of the links between theory and study findings (Östlund, Kidd, Wengström, & Rowa-Dewar, 2011). This said, there are challenges when reporting and sharing a MM health care study's results, which has led to the suggestion that a study's constituent methods need to be clearly and transparently presented to improve the visibility of MM's unique insights (O'Cathain, Murphy, & Nicholl, 2007; Wisdom, Cavaleri, Onwuegbuzie, & Green, 2012).

Reflecting an integrative approach, we operationalize Kaivo-oja's (2017) method multiplicity advice to derive and combine workforce themes and actor perspectives and to transform and analyse these data, in turn, producing an actor influence and power analysis using an embedded MM design (Creswell et al., 2011). The two principal methods we apply are qualitative content analysis and quantitative actor analysis, embedding the former within the latter to produce the study's results (see Fig. 1).

Inductive content analysis is used as the means to determine the range of workforce issues from documents found through a rapid evidence assessment. Deductive content analysis is used to code actor interview data with these inductively derived codes. These content outputs are transformed from text into a numerical form and aggregated using sets of specifically developed conventions to comply with actor analysis software's input requirements, producing the final results. Table 1 provides presents the study's five stages, summarising each stages' inputs and outputs and integration. Before proceeding with the study, we applied for and received University Ethics Committee approval.

Content analysis is a method to make replicable and valid inferences from texts (Weber, 1990). Inductive content analysis is used to generalise themes when little is known about the phenomenon, whereas deductive content analysis is used when the structure is known (Elo & Kyngäs, 2008). While content analysis receives criticism for being too simple, strong studies apply validity and reliability measures such as coding procedures, coder agreement assessment and meticulous record keeping to enhance study confidence (Elo & Kyngäs, 2008).

We chose LIPSOR's actor analysis module, MACTOR, to perform the actor analysis due to its versatility (Godet, Monti, Meunier, & Roubelat, 2009), although it does have some drawbacks. Firstly, actor data can be confidential, creating access or verification problems (Godet et al., 2009), although actors are likely to be candid about their rivals producing additional data and triangulation − assuming the actors are consistent with their expressed positions (Godet, 1991). Data sensitivity is thought to be a reason for few comprehensive actor analysis examples appearing in the literature (Godet et al., 2009). Its data input consists of prescribed scale data depicting the actors' aims, issue perceptions, means of action and relationships, with results presented as various maps, charts and tables, revealing actor positioning and power relations (Arcade, Godet, Meunier, & Roubelat, 2009). Secondly, this copious output

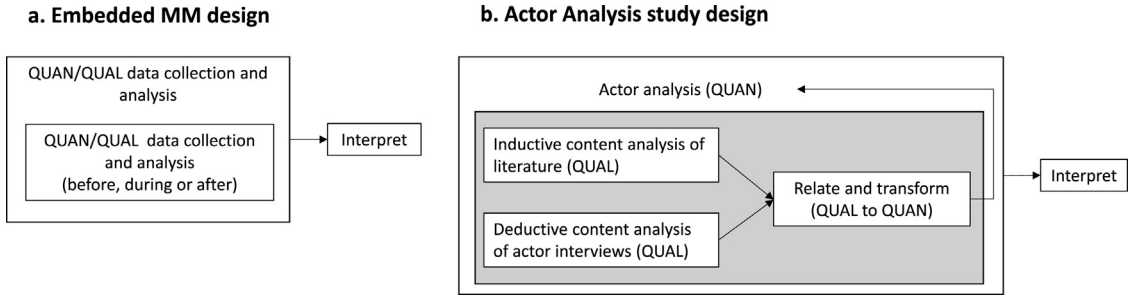

Fig. 1. Design of this Actor Analysis Study.
Note: QUAN is quantitative data, QUAL is qualitative data
Source: Adapted from Creswell et al. (2011).

Table 1
Study design Input-Output table.

Stage	Key actions	Data source – Input	Output
Inductive content analysis	Content analysis of NZ HWP literature to identify key issues	18 NZ health workforce documents	15 key issues derived from 18 key documents
Actor identification	Structured actor identification Interview protocol design and preparation	18 NZ health workforce documents	From 54 identified actor constituents, 35 interview respondents
Actor data collection	Interviews conducted Interview data transcribed in situ	35 health sector respondents	34 actor interview transcripts
Deductive content analysis	15 inductively derived key issues used to deductively code interview transcripts	34 actor interview transcripts	Coded data of actor critical issues, positions and influences Hierarchy of actor critical issues
Data aggregation	Transformation and aggregation of actor and critical issue data for software input	Coded data from 34 actor interview transcripts arranged into 7 actor groups	Software produces actor power and interaction data for 7 health workforce actors

data may divert the researcher's attention from the most important results (Godet, Durance, & Gerber, 2008), encouraging the planning of the data's collection to ensure that data produces the best quality results (Godet, 1991). For comprehensive examples and instructions on how to collect, code and enter data and interpret MACTOR's results see Arcade et al. (2009), Godet (1991) and Godet et al. (2008).

3.3. Inductive content analysis

As little is known of the workforce actors' perspectives and strategic workforce issues, we used document analysis, an inductive form content analysis to review sector document content, messages and use (Prior, 2008) to map a wide range of social, economic and political variables (Roth & Kaivo-oja, 2016). We analysed eighteen documents, identified through a rapid evidence assessment, that were produced between 1975 and 2014 by government, regulatory and health sector representative bodies. Further data about these health workforce documents are provided in Table 2. We applied Thomas' (2006) generalised analysis procedures, by deeply reading each document to identify and categorise their themes, reviewing these categories and progressively reduced these into fifteen code labels. Table 3 provides a summary of these fifteen codes' frequencies across the examined documents. Code agreement testing was undertaken by an independent party guided by the code criteria, using a sample of the texts and comparing these to the results. This revealed seven from the nine cases to be in agreement with no category changes deemed necessary.

3.4. Actor identification and interviews

Our data collection strategy aims to interact with as wide range of actor constituents as possible and to conduct separate interviews with each. Following desk research on New Zealand's health workforce, the actor constituents were identified from New Zealand's health workforce peak bodies and core institutions (Pullon & McKinlay, 2010). Levels of participation, sector influence and involvement were assessed to ensure the actor constituents were current, effective and influential. The final list contained 51 actor constituents, which we arranged into seven actor groups using common functions and workforce system roles. Table 4 details numbers of constituents in the actor groups.

As sensitive data were to be collected, we were constantly mindful of respondent and organisational confidentiality, especially since one respondent declined participation for this reason. Ogden (2008) suggests that sensitive data issues can be overcome through

Table 2
Summary Data from the New Zealand Health Workforce Texts.

Period	Number	Document type (#)	Sector Focus (#)	Publisher (#)
1975–1979	1	Review	Whole of system (1)	Government
1980–1984	0			
1985–1989	0			
1990–1994	0			
1995–1999	1	Discussion Document	Whole of system (1)	Government
2000–2004	1	Discussion Document	Older Persons Health (1)	Government
2005–2009	6	Discussion Document (2) Report (2) Review (2)	Whole of system (6)	Government (6)
2010–2014	9	Evaluation (4) Discussion Document (1) Report (2) Review (1) Submission (1)	Older Persons Health (1) Primary Health Care (2) Secondary (Hospital) Care (1) Whole of system (5)	Government (6) Regulatory Body (1) Representative Body (2)

Table 3
Category codes for New Zealand's Health Workforce critical issues.

Code	Issue Descriptor	Document Count (n = 18)[a]	Frequency (n = 168)[b]
SI01	Aging Population	4	6
SI02	Aging workforce	5	7
SI03	Costs and Funding	5	8
SI04	Dependence on International Graduates (IMG & IQN)	3	6
SI05	Health Workforce Training and Undergraduate Curricula	8	22
SI06	Leadership	2	6
SI07	New Models of Care	5	7
SI08	New or Extended Roles	11	15
SI09	Postgraduate Training and Professional Development	6	9
SI10	Recruitment	6	10
SI11	Retention	7	12
SI12	Shortages of Medical Workforces	13	23
SI13	Structure of Health Workforce (Mix of Professionals)	10	24
SI14	Workforce Data and Modelling	7	8
SI15	Workforce profile (Demographics)	4	5

[a] The total number of documents in the sample is 18.
[b] The total number of occurrences for all categories is 168.

Table 4
Numbers of identified actor constituents.

Actor	Number of constituents
Consumer	13
Education Provider	4
Government	5
Health Provider	6
Professional Body	5
Regulatory Body	6
Representative Body	12
Total	**51**

trust building, by providing information in advance and explaining how harms and respondent identification can avoided when research is presented and publicised. We included these suggestions in the study's information and consent materials and reiterated these in interviews by re-stating the confidentiality and anonymity procedures.

We collected data through semi-structured interviews governed by a five-stage interview protocol, where each stage aligns with one of MACTOR's input data requirements to facilitate the next-step data conversions and data set comparisons (Sandelowski, Voils, & Knafl, 2009). We recorded responses on pre-prepared data collection forms, enabling open recording and data confirmation to reduce qualitative data subjectivity and enhance quantitative data accuracy (Sandelowski et al., 2009). While we digitally recorded the interviews we decided not to transcribe them due to the in situ partial numerical transformation, storing the recordings should they be needed later (Godet et al., 2009). Lastly, we assigned each actor an alphanumeric label, an additional contribution towards respondent confidentiality.

3.5. Deductive content analysis

We deductively applied Table 3's codes to the interview data, reducing these raw data into a small set of clear, unambiguous and representative issues. The coded interview question aimed to elicit the issues that the actors' believe to be critical to a future health workforce, which resulted a range of distinct perspectives, descriptions and contexts. Many responses were similar to the code labels, enabling easy assignment. For the less explicit responses, we applied the code criteria definitions as interpretative guidance and reviewed data collection notations (Zhang & Wildemuth, 2009). During coding, we identified a further code category, Future Industry Environment, reflecting the iterative nature of content analysis and coding (Weber, 1990; Zhang & Wildemuth, 2009).

We tested these codes' reliabilities by providing an independent person with a ten per cent sample of the coding volume, with these results uploaded to an online inter-rater calculator to find five common agreement statistics (Freelon, 2010). A reliability statistic's acceptability value is contextual and interpretable, with academic studies tending to lower values (Krippendorff, 2004). For an interpretative qualitative content analysis, Julien (2008) suggests that 0.60 to be an acceptable reliability coefficient. Our results provided clear agreements for seventy eight per cent of the sample, with mutual agreement reached over the deviations. With this relatively high rate of code agreement and satisfactory statistics, we considered the coding reliability to be acceptable. Before preparing the data for the MACTOR software, we also analysed these data using frequency analysis (Julien, 2008), a form of bibliometric analysis that infers and measures patterns from counting key words or phrases (Kabanoff, Waldersee, & Cohen, 1995). Word frequency is a simple and impartial measure of importance (Kloumann, Danforth, Harris, Bliss, & Dodds, 2012) and these results are

reported as part of Section 4.

3.6. Data transformation

As the interview data were drawn from thirty five respondents, we required a process to convert these data to fairly represent the seven workforce actors, while retaining data integrity and conforming to MACTOR's input requirements. To achieve this, we developed a systematic method of interview data aggregation, starting by arranging the interview data into their respective sub sectors. We then aggregated each sub sector's data following the respective data entry table's convention procedures. This procedure centralises the data to produce single integer values and valence labels to complete the required input form. These aggregation conventions provide an innovative solution for the problem of collecting data from a diverse range of time-poor informants across a number of rival constituencies to represent the seven actor groups. It also retains these data's integrity and contributes to the study's reliability and validity through procedural thoroughness (Rees & MacDonell, 2017) and is a means to ensure high quality input data (Godet et al., 2009).

3.7. Actor analysis

We entered these aggregated actor data into the software, producing a selection of tables and charts for each sub sector. To avoid results overload, we only retrieved the output specifically related to the areas of interest: (i) the actors' positions and influences; and (ii) the relative importance of strategic issues, which indicate those most likely to cause conflict and potential for cooperation.

4. Results

From 51 invitations, 43 replied; and of those, 35 agreed to participate providing an initial participation rate of sixty nine per cent. Too few respondents for one actor necessitated the invitation of a suitably qualified expert to ensure sufficient data were gathered, resulting in 34 interviews being conducted, as some consumer actor constituents were interviewed together.

4.1. Frequency of strategic issues

The decision to investigate two areas of New Zealand's health system was found to be justified through the results of frequency analyses for the two sub sectors revealing differences between the cardinal ordering of the strategic workforce issues, although groupings of similar issues appear. Table 5's summary of the frequency analyses results also shows that the actors' perspectives over issue criticality vary greatly from the document analysis frequencies enumerated in Table 2. For example, those issues classified as most important by the actors (group one's issues of Costs and Funding and New Models of Care with frequencies greater than 70 and 50% respectively) have corresponding document analysis frequencies of less than five per cent.

Following this first issue group, the frequency differences between the sub sectors become apparent. The second issue groups' frequencies differ by the order of the same seven issues representing the themes of workforce structure, sufficiency and organising. Thus, the actors seem to be indicating the importance of how the workforce will be led, trained, skilled and deployed within a future model of care structure. The third group of issues represent workforce operations and are reminiscent of traditional workforce planning and policy's attempts to influence the numbers, stocks and flows of personnel.

Table 5
Frequency analysis of the Strategic Issues by sub sector.

Group	Strategic Issue	Total			PHC			OPH		
		Code	Freq (n = 34)	%	Code	Freq (n = 26)	%	Code	Freq (n = 25)	%
1	Costs and Funding	SI03	24	71	SI03	18	69	SI03	19	76
	New Models of Care	SI07	17	50	SI07	17	65	SI07	13	52
2	Leadership	SI06	14	41	SI06	11	42	SI05	11	44
	Shortages of Medical Workforces	SI12	12	35	SI02	10	38	SI01	10	40
	Aging Population	SI01	11	32	SI12	10	38	SI06	10	40
	Postgraduate Training and Professional Development	SI09	11	32	SI09	9	35	SI12	9	36
	Structure of Health Workforce (Mix of Professionals)	SI13	11	32	SI13	9	35	SI02	8	32
	Aging Workforce	SI02	10	29	SI05	8	31	SI09	8	32
	Health Workforce Training and Undergraduate Curricula	SI05	10	29	SI01	7	27	SI13	8	32
3	New or Extended Roles	SI08	7	21	SI04	6	23	SI04	6	24
	Dependence on International Graduates (IMG & IQN)	SI04	6	18	SI08	6	23	SI15	5	20
	Workforce Data and Modelling	SI14	6	18	SI10	5	19	SI08	3	12
	Workforce profile (Demographics)	SI15	6	18	SI15	5	19	SI10	3	12
	Recruitment	SI10	5	15	SI11	4	15	SI14	3	12
	Retention	SI11	4	12	SI14	4	15	SI11	2	8
	Future industrial environment	SI16	2	6	SI16	1	4	SI16	1	4

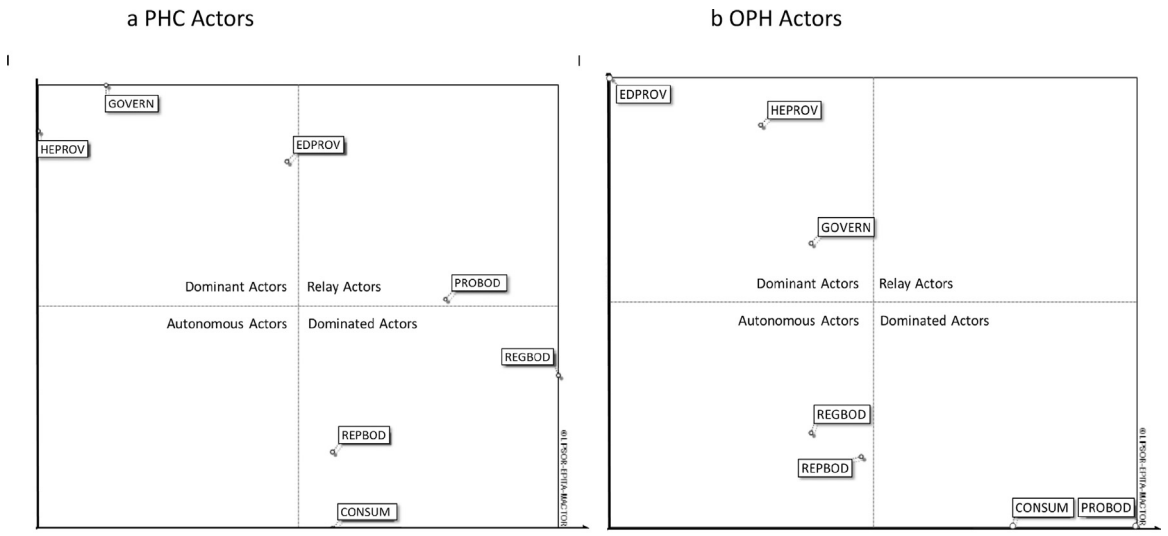

Fig. 2. Actor Influence-Dependence Maps. (a) PHC Actors. (b) OPH Actors.

4.2. Actor positioning and influence

The next results are the first of the MACTOR output. This output provides data on the actors according their relative influence. Provided as a chart of four quadrants, the influence-dependence map reveals those actors: (i) that dominate the system and are capable of exerting strong pressures on the others; (ii) relay actors, which are those with significant influence, but also are subject to pressure; (iii) dominated, or those which have little influence and subject to pressure from others; and (iv) autonomous, which possess little influence and are without pressure from others. Fig. 2 provides the sub sectors' maps.

These maps reveal some similarities and differences. Both have the same dominant actors, with the Consumer actor equally without influence. The Professional Body actor, a group comprising professional colleges and guilds, is indicated to be a relay actor in the PHC sub sector, while the OPH sub sector has two autonomous actors. These, the Regulatory Body and Representative Body actors, has constituents that provide public relations, labour market advocacy and government lobbying services for their memberships. The OPH map also shows two actors in extreme positions. A review of the data revealed that in the case of Professional Body, while their members are influential in their own right, New Zealand's OPH sub sector has a substantial unregistered workforce operating in a wide variety of care environments. Thus, the members of these professional guilds or colleges may be a minority or have limited presence in the workforce, which provides some explanation of its limited influence. In the case of Education Provider's positioning, while it is expected education to be of significant influence, due to New Zealand operating a primarily government-payer system for vocational and university education, perhaps the government and employers would provide a moderating influence. A review of the data reveals that the applied aggregation conventions may have desensitised the raw data's moderating effects. Thus, it is likely in this case the resulting central value has somewhat overstated this actor's influence. Nevertheless, the maps reveal helpful distinctions between the actors, their influences and signal which actors are likely to dominate interactions to achieve their aims and influence the system's evolution.

4.3. Identifying the strategic issues most likely to cause conflict

This third set of results utilises the actors' perceptions of attraction (comfort) or adversity (challenge) the actor has for the strategic issue to meet their aims. These valences (+or −) are used in conjunction with rating data to provide ratios, which give some insight into how the issue may affect the actors. Ratios close to 50:50 or 0.50 are considered to be divisive and indicate conflict, with equal numbers of actors in support and opposition, though the more asymmetric ratios (for example those between 0.60 and 0.80) may also be sources of conflict, particularly if the strategic issues imply changes to system structure, leadership or organisation. As actors have the ability to influence the system either directly or through other actors and this can be factored into results to take account of the role of actor power with respect to conflict causing issues We use these data to indicate the divisive strategic issues for each sub sector (see Table 6).

Table 6 shows that the OPH divisive issues strongly align with the frequency analysis results, indicating similar actor perceptions over these issues. This is not the case for PHC, where the divisive issues emanate from Table 5's second group. To better understand this result, we analysed the actors' balance of power that reveal the effects of the influential actors and the instances where the dominant actors are in conflict. In these situations, influential actors will attempt to manoeuvre above the other system actors, trying to dominate the discourse, to control agendas, to suborn or project their aims and objectives through the other actors to achieve prominence. Similarly, analysis of the OPH set of divisive strategic issues found that the most influential actor, Education Provider provides a counter-weight to the influence of the other two OPH dominant actors, while in taking a similar position over the issues

Table 6
Identified Divisive Issues.

PHC			OPH		
Code	Strategic Issue	Ratio	Code	Strategic Issue	Ratio
SI13	Structure of Health Workforce	0.53	SI03	Costs and Funding	0.54
SI06	Leadership	0.55	SI07	New Models of Care	0.57
SI12	Shortages of Medical Workforces	0.56			

with the largely ineffectual Consumer actor. These results strongly suggest that many workforce policy interventions or the solutions devised to address workforce system symptoms will be contested by actors and that actor cooperation will broadly be necessary.

4.4. Indicators of actor cooperation

While the above results show the dominant actors maintain control of the workforce landscape, there are opportunities for actors to put their conflicts aside and agree on issues important to both. These issues is can be demonstrated using pair-wise analysis of the actors' positions using pictorial depiction of actor convergence and divergence charts. Such output assists to identify actor pairs with coherent positions, which are signified by strong convergences and corresponding weak divergences; a position from which co-operation may develop through the actors' common objectives. A pattern of poor coherency indicates less dependability for actor cooperation. Our analysis reveals that actor coherency is mixed, for some actor pairs coherency is quite marked, while for others moderate convergence is countered by strong divergences. These relations show that even with this level of detail predicting co-operative behaviour is difficult, verifying and demonstrating the solution-for-one problem-for-another characteristic of wicked problems.

5. Discussion

The results presented here underline the importance of the actor analysis as an analytic resource. Through the examination of actor positions over health workforce strategic issues we have identified how a range of actor's perspectives can be analysed and understood. This provides some insight into why particular workforce interventions may fail and emphasises the interventions that may find more favour from the actors themselves (Saltelli & Giampietro, 2017). This infers that, by not including actor data, prevailing views are likely to dominate and the social and power perspectives of system evolution are liable to be discounted. Our findings show distinct patterns of power, which identifies those whom are able to influence others and dominate workforce discourses. The analysis also reveals the weak position and negligible influence of health care consumers, a failing requiring further attention now that New Zealand's national health strategy places more emphasis on patient-focussed services as a future goal (Minister of Health, 2016).

A practical application of these data relates to the implementation of patient focussed services which are also hindered by industry and service fragmentation. These structural issues are represented by a provider landscape made up of many small independently-owned general practices or localised elderly care facilities, though there are changes emerging with larger single site primary care facilities and older persons care increasingly delivered by larger multi-site corporates (Greatbanks, Doolan-Noble, & McKenna, 2017; Swarbrick, 2011). While consolidation is considered to be a viable response to industry fragmentation (Porter, 1998), in New Zealand's case it is found to be slow, with marginal changes to the fragmented funding and model of care strategies taking little advantage of this opportunity (Cumming, 2011). However, one policy response has been the introduction of alliance planning, which aims to break down New Zealand's localised parallel funding and accountability structures, which is being applied to join service structures through diverse actors collaborating to deliver joint outcomes (Gauld, 2014). These structures involve a wide range of organisations in planning, funding, and delivering services providing increased care and service coordination from the hospital into the community and managing care within a community context (Cumming, 2011). Our analysis reflects this situation, with the actors defining funding and model of care issues as primary concerns, and system structure and organisational issues as secondary as a means to address future workforce evolution. These data imply that without improved coordination and the involvement of actors it is unlikely that new delivery roles will develop and without the infrastructures to support them in practice, limited deployment will continue. The identification of sector actors and their principal concerns helps managers and policy makers to better frame actor derived issues and activities and begin to achieve alignment with official policy frames. For example, Primary Care consolidation provides an opportunity to introduce and diffuse nurse-led community care and treatment roles, supporting general practitioners in their work while linking these services with secondary provision. Similarly, while community-based geriatric nurse practitioners have been piloted in New Zealand (Peri, Boyd, Foster, & Stillwell, 2013), there has been little diffusion of these across the country. Part of this may be due to perceived limitations on role sustainability with respect to funding constraints or infrastructures to enable their more widespread use. Such role deployment and diffusion issues are not commonly discussed in-depth in the health workforce planning literature or are their effects contained in model assumptions.

While data from an actor analysis may identify new factors for health workforce plans, the dominance of conventional planning practices may act to prevent how these data will be utilised, if at all. Typically, policy makers and planners are under pressure to provide better models and more accurate predictions (Enserink, Kwakkel, & Veenman, 2013), supported by the dominant predictive

paradigm that underlies public institution evidence-based decision-making (Rickards, Wiseman, Edwards, & Biggs, 2014). Similarly, a wicked problem's complexity challenges the policy makers or planners' familiarity with order, rational choice and intentionality (Kurtz & Snowden, 2003), contributing further to institutional inertia (Cerna, 2013). These diminish the benefits from the use of wider actor engagement (Wangel, 2011a, 2011b), diverse information (Mason & Mitroff, 1981) and application of complementary policy development tools (Dunn, 2004). So, any attempt to reframe or recast health workforce planning to include actor data of the type presented here requires institutional commitment towards more comprehensive health workforce planning processes (Health Workforce Advisory Committee, 2005).

There are two main methodological lessons that come from the MM approach we have presented. Firstly, we were able to identify a system's set of workforce issues and contextualize these in terms of its actors' perceptions. Our frequency analysis of inductive content analysis revealed that many of the actively pursued workforce issues tended to be reactions to unbalanced workforce numbers or stocks and flows. We found that this focus is at odds with actor perceptions. Effectively, by triangulating the different data collection methods, we were able to achieve deeper understanding of the relative importance of workforce themes than could be gained from a single method alone (Östlund et al., 2011). Without this two part content analysis of the workforce issues, a recognition of these actor preferences towards addressing medium-term solutions at the higher system levels of goals and organising would have largely remained hidden. Secondly, through the transformation of these data we were able to aggregate individual perspectives into representative group positions providing a reasonable depiction of the underlying effect of actor power on the system. Not only do some actors have influence over others, their strategies and rivalries with other influential actors are now able to be understood in the context of system change and policy stalemates, providing some balance to health workforce planning's preoccupation with parameter adjustments. Overall, the mixing of a number of research methods provided here offers a systematic way to define system themes and their variables, gather disparate actor data and enable aggregation and transformation of these for power and influence analysis. Together, these outputs provide complimentary workforce planning data by indicating issue relevance, delineating actor behaviour and offering nuanced insight on the reasons for system evolution or inertia.

While providing a comprehensive analysis, the method presented here is not without limitations. Firstly, the actors were grouped according to a framework of analysis that aimed to provide a system view. While this provides comparability between the two sub sectors, it introduces a limitation that important nuanced actor interplays, such as between professions, are liable to be missed. As the method is flexible, other groupings are possible thus enabling the indication of more specific professional tensions and rivalries. Secondly, the data transformation conventions have inherent judgemental weaknesses, although these are somewhat offset by systematic procedures and the value added by additional meanings not able to be found from the other data forms (Sandelowski et al., 2009).

To close, in this article we aim to address a gap in the literature over the use of actor analyses for health workforce planning and policy making. We indicate that health workforce planning is a wicked problem and argue that conventional quantitative modelling and forecasting is ill suited to be solely relied upon to provide the data from which to develop comprehensive workforce plans. This has led us to provide, in detail, a contrasting approach to much of the workforce planning improvement literature. As such, this article is a first step in exploring the use of actor analyses in health workforce planning, going beyond typical stakeholder engagement by deriving data on actor power and system structures. While it supports recent discussions on the inclusion of actor perspectives for alternative public policy approaches (Saltelli & Giampietro, 2017; Wangel, 2011a, 2011b) and system transformations (Marchais-Roubelat & Roubelat, 2016), further research is required on the use and acceptability of these data within the health workforce planning context. As such the application of these data for health workforce policy development is therefore the focus of an additional article.

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