



catalyst

A LOCAL PARTNERSHIP IMPROVING
COMMUNITY SERVICES

ARTIFICIAL INTELLIGENCE AND BIG DATA FOR THE PUBLIC SECTOR: MANAGING FOR COLLABORATIVE SUCCESS

OPPORTUNITIES AND CHALLENGES OF
CROSS-SECTORAL COLLABORATION

The Catalyst Project is led by the University of Essex and received £2.2 million funding from the Higher Education Funding Council for England (HEFCE) and is now monitored by the Office for Students (OfS).

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Acknowledgments

The authors would like to thank colleagues from the Catalyst Project, Suffolk County Council, and Essex County Council for their contribution to this report.

December 2018



Executive summary

Around the world, cross-sectoral collaborations between universities and the public sector are the norm for leveraging data science and artificial intelligence (AI) based capabilities. In line with this vision, the HEFCE (Higher Education Funding Council for England) funded Catalyst Project brought together Essex County Council, Suffolk County Council, and the University of Essex to enable innovative and far reaching responses to pressing national and local issues. While such cross-sectoral collaboration is not new, there is a lack of a systematic review of the empirical evidence about which managerial strategies help overcome the serious challenges posed by interorganisational collaboration.

As the Catalyst Project enters its final phase, the Catalyst Steering Committee approved a programme of study to take stock of the lessons learnt in the project around collaboration between public authorities and the University and to place these in the context of global best practices in cross-sectoral collaboration.

From a review of the academic literature and the global context of cross-sector partnerships related to data science and artificial intelligence initiatives, we can identify which interorganisational collaborative management practices have positive effects on collaborative performance—thus providing a basis for future strategic management design in cross-sectoral collaborations. In many cases, local government and academic institutions exist in a paradox of demands related to the management of both unity and diversity¹. **Subtle factors influence the ability to manage a successful interorganisational collaboration and it is this sensitivity to context and situational awareness that is most needed by leadership. What seems to work seamlessly between one council and university does not always occur between other governments and institutions.**

What can be learned from this research report? First and foremost, the success of cross-sectoral management practices are contextual. They are highly entwined with public sector institutional forces at play in the field. The findings emphasise that future artificial intelligence and data science cross-sectoral partnerships should use general guidance from international success stories, but must also customise management in accordance to their own unique circumstances. This research report identifies five management recommendations that have been synthesised from the empirical evidence gathered from the Catalyst Project and four insights gathered from international best practices. Most frequently, these practices have resulted in more early-wins, cooperation, and knowledge transfer.

Lesson #1: Form data sharing agreements before project starts

Our findings suggest **data sharing agreements should be inclusively co-written and revised back and forth between parties to ensure all collaborative participants are comfortable with the requirements.** This formal task should take place immediately, and leadership should work to remind project members throughout the implementation about the reasons for sharing data for the project and how it is protected. If resistance to engage in the formation of data sharing agreements takes place, leadership should assess practices that create more conditions for bonding and trust building and provide tangible, positive examples of the benefits to all participants of how the data can be used.

Lesson #2: Don't forget role clarity

Project leadership should feel easily connected to partner organisations for matters such as information exchange and process management. To avoid frustration from difficulties navigating and communicating with collaborating organisations, boundary spanners should be designated early on. **Having key points of contact that work between organisations is an effective way for communicating efficiently, as both universities and government agencies can be hard to approach without a guide.** These relationships are strengthened if boundary spanners can 'speak both languages' of academia and policy-making.

Lesson #3: Ensure bottom-up engagement

Management should meet with government data analysts, in addition to top-level leadership, to ensure everyone is 'on the same page' about the reasons for collaborating with academic researchers. Local governments vary in terms of the extent of their need for academic research input to enhance skills and provide training. Local governments may be looking to build their own analytics capacities from within, using their own resources and capabilities, which means middle management and government analysts may not always be on board with the cross-sectoral collaborative vision of top-leadership. Bottom-up engagement is about practices that enable inclusive participation and decision-making about project ideas, so that all project members feel like their voice is heard.

Lesson #4: Academics should showcase their work where relevant

Some of the academic researchers from the University of Essex and the Catalyst Project leadership interviewed indicated that once they were able to showcase their work, abilities, and future project ideas, there was more buy-in from government analysts. Even though academics have access to the latest research methods and techniques, their skillset must be paired to the appropriate project, and their innovative perspectives for using data analytics, must be displayed in reports and presentations to middle-management partners. This suggests that leadership should introduce opportunities for members at different levels of the collaboration to come together to better understand each other's abilities to help and influence one another to achieve project aims and build long term analytical capabilities for use afterward.

Lesson #5 Increase interaction with regular on-site work days

Increased interaction is a key determinant in trust building and can take a variety of forms. **What worked very effectively for one council involved with the Catalyst was the designation of regular on-site days where academics and government analysts worked together. This built up professional relationships and created a shared collaborative reality amongst members.** For example, having members from both organisations work together once a week allowed questions to be answered as soon as an issue arose.

¹See Saz-Carranza and Ospina 2011

These five lessons from the Catalyst Project and four insights from international best practice highlight the importance of using strategic management and leadership techniques to create the cooperative conditions for cross-sectoral partnerships early on. They also stress the importance of formal arrangements related to data sharing, as well as informal assessments that reinforce the intention and purpose of the partnership at all levels. The lessons also underscore that top-level decision making does not always match bottom-level viewpoints of employees' needs gaps. Thus, an effort to create middle management buy-in can take a lot of time and effort. Although these lessons are not new, cross-sectoral management is often about getting the simple, but important details right, such as building up the informal social capital that is needed for cooperation between collaborative members.

From a positive standpoint, this means that basic cross-sectoral management strategies are proven to result in successful collaborative performance. On the other hand, understanding how to apply this advice requires the right managerial and leadership personalities, attitudes, and sense-making ability. Overall, this suggests that each opportunity for universities and the public sector to collaborate over data analytics and AI based projects does not involve applying a 'one-size-fits all' prescription. Consequently, we hope that the findings of this report illustrate that sense-making managers must understand the details of the institutional forces at play in order to apply the appropriate formal and informal solutions.

Key insights from analysis of international best practices

A summary of the four insights gathered from an analysis of international best practices:

Insight #1: Build interaction and engagement with data owners and managers who can provide raw information to help team grasp context of data and how the data tells stories about its communities

Insight #2: Start small to combat resistance

Insight #3: Mobilise support from community network of stakeholders to host educational events and to establish protocols for data

Insight #4: Involve citizen participation





Introduction

Policy background

At the political level, a call for cross-sectoral partnership has been rooted in two recent publications: the UK Government Industrial Strategy and the Artificial Intelligence (AI) Sector Deal, which frame the ambition of the UK to become the world's most innovative economy. With special emphasis on partnerships between academia, government, and industry, the AI Sector Deal, for example, will provide a sectoral support package of around £1bn that complements an additional £1.7bn under the Industrial Strategy Challenge Fund (HM Government 2017).

The main promise of AI and data science for the public sector is to improve the provision of public service delivery and public sector programme evaluation. This can be achieved through an increase in empirical based policy making that leverages a more holistic view of problems and solutions for citizens' needs. Among the known challenges of public sector adoption of AI and data science are employee path dependency on embedded processes and norms, information silos, a lack of resources and collaborative culture. While cross-sectoral collaborations are not new, navigating them requires understanding the numerous managerial complexities involved.

The materialisation of the AI Sector Deal and Government Industrial Strategy depends ultimately on the successful collaboration between three partners. Historically, such entrepreneurial state initiatives have always used cross-sectoral collaboration activities (e.g. DARPA in the U.S. and the technology behind smart phones). As such, this research report synthesizes existing knowledge on how to manage cross-sector collaborations and proposes a series of recommendations on how they should be considered to integrate AI and data science initiatives into public service delivery.

Navigating the managerial complexities of cross-sectoral collaboration

What are the opportunities and challenges for successfully managing cross-sectoral partnerships, and what lessons can we learn by placing this ambition within the international context of similar policy labs and offices of data analytics? The first aim of this research report is to incorporate qualitative insights derived from interviews with members of the University of Essex, Suffolk County Council, and Essex County Council who were involved in the implementation of the Catalyst Project. A systematic review of the literature on knowledge transfer and managerial practices for successful cross-sectoral collaboration has been conducted in order to analyse and present recommendations for practice. Findings from the interviews presented several challenges associated with cross-sectoral collaboration. These barriers are addressed through the recommendation of various management strategies for future endeavors.

The second aim of this report is to position these findings in the wider context of the academic literature on cross-sectoral management and international examples of best practice around data science and AI between government and academia. This international overview will show that two cross-sectoral collaborative structures have commonly been used to govern these initiatives: policy labs and offices of data analytics. The lessons and findings present insight into topics such as strengthening data-sharing cultures and governance processes in collaborative projects, as well as specific project examples implemented in various cities across the globe. Drawing on these insights this report finds that at the university level, the development of policy labs has provided a platform for academics to interact with local, regional, and other levels of government to provide skill development and methodology guidance for data science and artificial intelligence based policy making and service delivery. At the local government level, we have also observed that in many cases across the globe, the development of offices of data analytics provide a government structure for creating city-wide data analytics tools to help citizens.

Literature review, findings, and implications

Knowledge transfer

Throughout the duration of data and artificial intelligence based cross-sectoral collaborations, different organisations must transfer and process knowledge across organisational boundaries. Knowledge transfer is a process 'through which one unit (e.g. individual; group; department) is affected by the experience of another' (Argote et al. 2000, p.3). Overall, the type of knowledge being transferred, e.g. whether it is tacit or explicit; the organisation's absorptive capacity; the strength of personal connections between organisations; and relational features like social cohesion amongst collaborators are factors known to affect the ease of the transfer (Reagans and McEvily 2003). However, the literature has also identified management strategies that are empirically proven to successfully guide the transfer of knowledge across organisational boundaries (Goh 2002; Chen 2004; Cummings and Bing-Sheng 2003).

One fundamental aspect of knowledge transfer in cross-sectoral collaborations is the degree to which the knowledge is embedded in the organisation. For example, the context in which the data comes from within an organisation often explains the narrative of its utility to the organisation. Therefore, one challenge in transferring knowledge across sectors is the difficulty in capturing the nature of the data, which may be deeply rooted in a particular organisation's culture and social institutions. This loss of narrative during the transfer can distort the knowledge's meaning and usefulness, if not properly managed (Easterby-Smith et al. 2008, p. 683). In line with this, Lam (1997) argues this also becomes a problem when 'expert individuals' are the main vessel of the required knowledge in an organisation, since the risk is that they can leave at some point in time.

Developing mechanisms that abstract and store data and maintain its true nature, so that it can be retained and accessed in the future, is thus a key managerial task for cross-sectoral knowledge transfers. In particular, Lam (1997) conveys how some organisational cultures develop knowledge based on how individuals learn through experience during the job (see: Japanese organisational model) or develop knowledge through leveraging standardised approaches like best practices to skill development (see: British professional model). In sum, managers must identify how individuals in the collaborating organisation acquire knowledge before they can apply the appropriate model for transferring the knowledge.

To effectively facilitate the transfer, cooperation must also be developed, and it is the 'knowledge holder who must be responsible for the codification effort' (Simonin 1999, p. 597). At the same time, different levels of analysis beyond the individual level must be taken into consideration such as the group level and the departmental level. Each level has its own knowledge management strategies. The group level can ease knowledge transfer across organisations through using techniques like brainstorming, discussions, and feedback to create a collective shared reality; while the departmental level can communicate across organisations and share information related to organisational capabilities, especially when organisations possess similar strategic approaches (Argote et al. 2000). As argued by Chen (2004), the less rigid an organisation is, the more it will possess a strong absorptive capacity to help assimilate knowledge gained and adjust as needed through coping, adaptability, and confidence in its partners. Table 1 presents findings from the Catalyst Project interviews on barriers related to knowledge transfer.



Table 1 *Management strategies for managing the knowledge transfer process*

Challenges to Knowledge Transfer	Dimension	Number of mentions	Management Strategies
Weak personal connections	Relational	10	Designate boundary spanners Identify what level of the collaboration has weak ties and needs more human contact between partners; use on site visits to create familiarity and maintain regular engagement (Van Wijk et al. 2008)
Lack of social cohesion	Relational	7	Facilitate intensive social interactions Create opportunities to engage socially with one another as a collaborative team to break down cultural barriers and get to know each other better e.g. watching sports matches, coffee, lunches (Inkpen and Tsang 2005; Easterby-Smith et al. 2008)
Multiple/ Conflicting Priorities	Organisational	8	Align values and goals Use presentations, discussions, and dialogue to help individuals internalise goals of project and how these collaborative goals complement already existing organisational goals and priorities (Cummings and Bing-Sheng 2003)
Risk aversion	Organisational	4	Sense-making Frame problems in ways that encourage employees to think of experimentation as lesson learning opportunities (Goh 2002) Openness Make decisions openly; make information widely available and accessible for employees (Goh 2002)

Implications

Table 1 reveals that several challenges to knowledge transfer were mentioned by Catalyst Project interviewees along two relational dimensions and three organisational dimensions. However, the literature provides management strategies for overcoming these barriers in order to enhance the knowledge transfer process across organisations. First, future collaborators should look towards designating boundary spanners for all projects within the Catalyst Project to connect appropriate points of contact and to share appropriate information with one another. Second, there should be intensive social interactions in the beginning and throughout the collaboration to create more cohesion and opportunities to bond amongst members of different organisations. Third, project values and goals should be aligned in individual projects through more presentations, discussions and dialogues to overcome conflicting or multiple organisational and individual priorities. Fourth, leveraging engagement across all levels of management can help increase buy-in when it may not exist at the bottom. Finally, the use of sense-making and openness can help members of a project be more comfortable with taking risks and experimenting for learning purposes.

Relationships: trust and cooperation in knowledge transfers

Trust is an inherent determinant of successful cross-sectoral collaboration and knowledge transfer (Ansell and Gash 2007; Brogaard 2017; Chen and Lee 2017; Chen 2004). There are management strategies that can enhance trust so that it facilitates more cooperation at the individual and organisational level. These include practices like making decisions openly, having information widely available, the fair treatment of employees, and rewards that emphasise shared success (Goh 2002).

At the organisational level, trust building takes place when partners view their collaborators as possessing traits such as competence, reputation, and goodwill. Once cooperation is established it can produce trust between organisations that benefits future collaborative activities (Levin and Cross 2004).

Organisations can also signal trust through making mutual adjustments that contribute to the 'relational flexibility' needed during the uncertainty of a long-term project. Flexibility creates trust in partner organisations. When collaborators make decisions to surpass the procedural, structural, and cultural differences between their organisations, this signals partner commitment to the greater collective cohesion of the project, despite institutional incompatibilities (Chen 2004). At the individual level, especially regarding the protection of data in knowledge transfers across organisations, it is the formation of trust, facilitated by interpersonal connections, that creates the confidence needed between organisations that shared knowledge will not be misused or misappropriated (Reagans and McEvily 2003).

Finally, when information cannot be codified easily, relationships and social capital between individuals are the critical factors for receiving explicit knowledge (Levin and Cross 2004). In terms of the degree of relationship connectedness across organisations, Hansen (1999) distinguishes between weak and strong ties of inter-units in a project; the strength or weakness of ties has both constraints and benefits. If ties are strong, information shared may be redundant, maintained amongst a small group of members, and teams may be less likely to create new sources of knowledge; however there may be more accessibility and willingness to be helpful. If ties are weak amongst members, the infrequent interaction can enable ideas to be more novel and diffused more effectively. To create 'trusted weak ties' is the ideal situation, as trust enables learning amongst members (Hansen 1999).

Table 2 Strategies for trust building

Challenges to cooperation	Level	Number of mentions	Management Strategies for Trust Building
Communication	Individual	4	Communication and team building Establish lines of communication with appropriate contacts at universities e.g. correct academic staff with appropriate expertise for project (O'Flynn et al. 2018); The collaborative team should communicate frequently and directly and respond quickly to questions and concerns
Lack of shared collaborative reality	Project	1	Inclusive participation Nurture continuous interaction with one another such as brainstorming sessions, working as a team to define deliverables, and team-building exercises (Argote et al. 2000; O'Flynn et al. 2018)
Institutional forces	Environment	7	Limit competition Norms of cooperation can be enforced by strong third party ties who emphasise that cooperative behaviour is favourable (Reagans and McEvily 2003)
Lack of flexible adjustments	Individual, Project	3	Establish early on that concession making is a virtue of the collaboration Choose partners wisely as adaptability is necessary to overcome operating misfit and re-establish strategic fit (Chen 2004)

Implications

Table 2 indicates that there are two individual level, two project level, and one environment level dimensions of cooperation building that should be addressed for future projects. First, overcome communication barriers by establishing lines of communication and team building to institutionalise dialogue with one another on a collaborative level. Second, enhance a lack of shared collaborative reality between partners by promoting more inclusive participation that uses regular interaction such as brainstorming sessions to create a collaborative context for members. Third, overcome disruptive institutional forces related to regulative and behavioural norms through reducing perceptions of competition about common knowledge. This can be done by ensuring that cooperation is conveyed as a collaborative value early on when partners join the project so that it can become ingrained in all levels of the partnership. The final barrier, a lack of flexible adjustments, should be managed by establishing early on that concessions are a virtue of the collaboration as flexibility and mutual adjustment making helps build trust between members. It should be ensured that partners are chosen wisely and will be willing at all levels to approach project aims in an adaptable, flexible manner.

Collaborative management

The collaborative management literature emphasises that leadership style, behaviours, and activities positively impact the effectiveness of cross sectoral collaborative performance² (Ansell and Gash 2007; O'Leary and Choi 2012; Crosby, Bryson, and Stone 2006; Brandsen and van Hout 2006). Leadership styles include facilitative leadership, champions, and boundary spanners in the network; managerial behaviour should be flexible and adaptable; and activities should focus on mediating relationships, building bridges, resolving conflicts, and developing trust (Heen 2009; Hovik and Hanssen 2015; Geddes 2012).

Through sense-making, collaborative managers mobilise support and consider the dimensions, perspectives, and timing of different organisations through increased interaction, meetings, and communication (Saz-Carranza and Longo 2012). Specific activities include visiting partners on-site, altering communication procedures, and attending to misunderstandings to relieve tension (Vangen and Winchester 2014). This requires leadership and management to show empathy in order to connect at the human level across organisations.

Collaborative performance or effectiveness can be measured depending on the way it is conceptualised and defined by different levels of actors (Silvia 2017; Provan and Milward 2001). Different levels of analysis include: community, network, and organisation participant levels (Provan and Milward 2001). The assessment of collaborative effectiveness becomes challenging when there is a lack of structure, and measurement criteria is incorporated sporadically from fragmented objectives that are not formed by consensus (Koopman 2008).

Managing for cross-sectoral collaborative performance and success needs to consider strategies that contribute to the creation of shared objectives; effective communication channels; improved socialising; and attaching the relevant expertise with partners. For example, identifying what common objectives should be designed into the partnership allows two different organisations to create a coherent playing field on which to connect with one another. In contrast, divergent objectives create disunity because managers have no vehicle to change their work patterns from an 'us vs. them' sentiment towards a collective one (Ethiraj and Levinthal 2009). Communication strategies should not be overlooked during the formation of cross-sectoral collaborations. In particular, it is recommended that communications can be developed in terms of points of contact; the way and timing in which 'quick wins' are expressed to members; learning from feedback; and the placement of appropriate boundary spanners (Ansell and Gash 2017).

²See Appendix 1, Management strategies table

Table 3 Leadership challenges and managerial activities for success

Leadership/Management Challenges	Number of mentions	Activities for successful leadership/management
Role clarity	9	Designate clear roles for project participants Successful collaborative performance is associated with managerial ability to make sense of the situational need for role specifications (Heen 2009)
Low middle management and bottom level buy-in	5	Leverage multi-level engagement Make sure there is need/gap for capacity enhancement by talking with bottom level analysts; Showcase what assets individuals from each organisation can provide and how this will help grow each other's capacities at different levels; Use 'soft' approaches such as developing a document with learning expectations between analysts and academics (Easterby-Smith et al. 2008)
Misalignment between research and developing project objectives	4	Identify interdependencies Initiate an 'open exploration' stage between partners early on to explore differences and work towards project goal alignment (Easterby-Smith et al. 2008) Show evidence of success Mutual confidence must be built through small wins to find build commitment and common ground
Lack of facilitative leadership	9	Facilitative leadership Facilitative leaders should promote broad active participation; facilitative productive group dynamics; and extend the scope of the process (Ansell and Gash 2007)

Implications

Table 3 shows that several management obstacles were mentioned in the Catalyst Project interviews. The first managerial challenge was identified as role clarity. This can be solved by specifying at the beginning what roles are needed in the project and what roles different members serve through sense-making of the situational need. Next, when there is low buy-in from middle management and bottom level employees, leadership should leverage multi-level engagement to first make sure there is actual need and lack of capacity for the project aims, as well as showcase the capacities partner organisations can provide.

Sometimes a lack of shared objectives between research aims and project aims means that future managers should use an 'open exploration' technique in the beginning of the cross-sectoral project to identify organisational differences and work toward shared project goals. Small, "quick wins" in the early stage of the collaboration will also build confidence between partners in their ability to deliver tangible results. Finally, a lack of facilitative leadership can be addressed by installing appropriate managers that have an understanding of the local authority context and have experience leading in a way that promotes broad, active participation amongst members and creates productive group dynamics.

Discussion

Managing trust to enable effective knowledge transfer and cooperation in cross-sectoral collaborations is rarely easy. Partners must overcome organisational differences related to the mixing of environments, structures, goals, and values³. Often, the different environments tied to public, private, and academic organisations mean differences in accountability:

universities are accountable to the number research publications produced; public organisations are accountable to citizens and service users; and private organisations are accountable to shareholders. When implementing cross-sectoral data science and AI based collaborations, these varying organisational interests can clash and cause fragmentation amongst project goal alignment.

In order to manage successful cross-sectoral collaborations, the following practitioner's points must be taken into consideration:

- Effective knowledge transfer between organisations requires the development of social capital within the project to create confidence and cohesion
- The cross-sectoral management strategy must be carefully considered in order to install leadership that understands how to behave in a facilitative, proactive, and sense-making manner
- Large cross-sectoral projects require close attention to designating boundary-spanning roles ensuring role clarity exists at all levels for boundary-spanning activities
- Knowledge transfer is positively affected by the creation of a shared collaborative reality and opportunities that create social cohesion amongst individuals in the partnership

³See Andrews and Esteve 2015



An international overview

Case description and analysis

This section is divided into three parts: the first section gives a conceptual overview of how to manage public-university collaborations based on case study findings. The second section focuses on operational aspects that should be taken into consideration for cross-sectoral collaborative success, with particular reference to the California Policy Lab (CPL) and empirical findings from academic research. The final section reviews common barriers and opportunities to collaboration around data and refers to case study evidence as well as that from government offices of data analytics and university-public sector policy labs.

Managing public-university collaborations: lessons on determinants of success

At the core of long-term public sector-university collaborative success are interorganisational arrangements that synergise shared interests between academia and government despite their different institutional backgrounds. In an in-depth case analysis of the healthcare sector in Canada, Rod and Paliwoda (2003) identify factors of success for the establishment and management of a cross-sectoral collaborative venture, The Institute of Pharmaco-Economics, which is made up of the Universities of Calgary and Alberta, the Government of Alberta, as well as several multi-national pharmaceutical companies. Overall, this totalled in 13 government, academic, and industry organisations, the mission of the Institute being: (1) to provide national policy leadership to secure the adoption by government and industry of ethical analytical approaches to the assessment of new drugs; (2) to provide leading-edge expertise in theory and practice of pharma-economics and be centre of innovation for the design, measurement and evaluation of studies of the cost effectiveness of pharmaceutical use; (3) to undertake studies of healthcare interventions and pharma-economic studies of individual drugs; (4) to bring stakeholders together to leverage their resources; (5) to communicate the impacts of economic and outcomes evaluation on health-system reform; and (6) to support a developing pharmaceutical research capacity in Alberta and Western Canada.

The mission possesses enough ambiguity so that does not constrain the evolution of the long-term partnership. At the same time, within the mission there are clear goals and objectives that are not specific enough to result in disappointments if the details are not achieved, but not so open-ended that there is a lack of direction and vision.

Substantively, cross-sectoral collaborations aiming to solve societal problems reflect a commitment by partners to view themselves as part of a 'collective solution to it' with the mentality that each organisation's participation is 'vital to resolving issues' (Rod and Paliwoda, 2003, p. 276). According to the study, this social embeddedness must be managed and nurtured constantly to maintain the relational conditions that promote the cohesion and consensus, risk-sharing, shared objectives, and organisational culture attributed to success. In particular, the authors condensed ten propositions from their case study that capture the main themes for success from the interviews in their study:

- **Proposition 1:** Multi-sector collaborative ventures have a greater chance of achieving positive outcomes when there is a shared belief at the outset (mission)
- **Proposition 2:** It is not enough to be aware of the sorts of issues that can and do influence multi-sector collaborative venture outcomes, but to achieve positive outcomes, leadership must prioritise their importance similarly (coordinate)
- **Proposition 3:** There must be an appreciation that each partner brings something of value to the collaboration, that each partner has a right to be involved, and that they are capable of contributing something (legitimacy)
- **Proposition 4:** There has to be an awareness of each partners' needs/issues/objectives – an understanding of the environment in which partners from other sectors are operating in (empathy)
- **Proposition 5:** Partners should support and encourage each other's participation – a mutual promotion of participation (advocacy)
- **Proposition 6:** All partners must share the same overall, 'big picture' vision, and know that, within this overall vision, individual organisational or sectoral goals can be managed – individual organisational objectives can be pursued without compromising the overall vision (shared vision)
- **Proposition 7:** There should be cohesive, coordinated, consensus perspectives from each participating sector (sectoral cohesion, coordination and consensus)
- **Proposition 8:** There must be reassurances in the shorter term that realistic milestones can be achieved, defined expectations can be met, and that there is progress being made towards achieving the overall shared vision (defined realistic expectations and measures of success)
- **Proposition 9:** There must be an appropriate level and portfolio of representation on the Board of Directors (board composition)
- **Proposition 10:** The 'business' of the collaborative venture must be important to each partner organisation (relevance significance)

Rod and Paliwoda (2003) explain that historical factors influencing collaborative success can be broken down into the following dimensions:

- **Compatibility factors:** organisational culture; objectives; expectations; strategic match; management/leadership style; motives/intent; need to cooperate; commitment; organisation policies; resources, skills, knowledge; conflict resolution
- **Social factors:** personal reputation; corporate reputation; prior interactions; organisational learning; trust; communication
- **Socio economic factors:** asset specificity; reciprocal investments; uncertainty; perceived opportunism; governance control
- **Environmental factors:** changes in competitive environment

Combing insights from this case study with the historical factors of success will distil the knowledge into strategic managerial implications. The first implication is to establish the overall vision and mission of the collaboration so that it guides and reminds members of why they decided to cooperate with one another. This also helps to develop collaborative culture and commitment around these shared beliefs. Second, develop a strategy that clarifies how the relationship is nurtured, for example, define how conflict will be handled, promote flexible leadership, clarify approaches for communication with members, and the frequency of interaction that will take place in ad-hoc or formal meetings. Third, participation must be inclusive for social factors to be legitimised such as organisational learning. For instance, each member or organisational representative must feel empowered to share their perspectives and needs (from the bottom to the top)—leadership should manage the exchange of viewpoints to build trust and enhance communication about project development and implementation. Fourth, goals require a balance of power in that organisational goals can contrast with individual goals and project goals due to changes in the external environments, resources, and general uncertainty.

Similar to building the overall mission and vision of the project, members should specify a set of goals for the project through consensus that take into account contrasting organisational and individual goals. Next, make milestones and 'quick wins' transparent for members so they can be reassured of their efforts and time put into the project, and to enhance the reputation. Finally, the achievement of progress reinforces the project's relevance for members and can create more opportunities to attract funding and resources.

Heinze and Kuhlmann (2008) echo these findings in a study that develops the governance structures which support or hinder 'efforts to engage in collaborative work relations across institutional boundaries' in the German public research system domain of nanoscience. Dimensions of governance identified by the authors are as follows. In terms of the organisational dimension, specific research profiles capture the need for individuals with capabilities and profiles to conduct research competencies.

Although this is an obvious revelation, it is clear the context must dictate the means and that possessing expertise, does not always align with the need for other relational competencies in the collaboration. In addition, recruitment of qualified research personnel with a record of job mobility will ensure that researchers are comfortable working within interorganisational arrangements as indicated through their career tracks or visiting fellowships. This specific collaborative competency can speed up the project and evade obstacles related to a lack of experience in this environment. Research leadership is about creating research goals that bridge internal and external sources to sustain the project, while effective administration is about adaptable, pro-activeness at the organisational level to ensure the ease of decision making and information flows. Resource endowment is the second dimension of governance and is related to sufficient core funding from third-party or other sources. Barriers to interorganisational collaboration include incompatible working routines, a lack of interface management, and sustained budget cuts. With reference to work routines, researchers in the study conveyed that sharply contrasting work attitudes can hinder productivity without someone to mediate or facilitate cooperation. To exemplify, 'combing divergent working routines in a synergetic fashion requires mobility record and/or active research leadership at the level of institute directors' (Heinze and Kuhlmann 2008, 896).

Building operational success: lessons from the California Policy Lab

The determinants derived from scholars and mentioned above can be applied to the context of current policy labs that are developing rapidly across the globe. Within the past several years over fourteen policy labs for data science and artificial intelligence collaboration have been created worldwide⁴. For a more contextual understanding, the California Policy Lab (CPL) represents a successful example of this unique interorganisational form. The CPL brings together the University of California and government departments at the local, regional, and state level to address issues including homelessness, poverty, education, and crime.

Challenged with creating a bridge between academic questions and public sector problems, The California Policy Lab was formed in 2017 between UCLA (University of California, Los Angeles) and UC Berkeley (University of California, Berkeley) to 'create data-driven, scientific evidence and insights to help government at all levels in the state to solve urgent public problems by providing a research infrastructure; including faculty, government policy experts, full time research support staff, and administrative data' (California Policy Lab 2018). Early success for CPL resulted in immediate political action by California Governor Jerry Brown. Empirical findings from the Lab revealed that the current policy strategy of a \$15.4 million three-year programme related to prison drug smuggling has had no measurable success in achieving its main goal. Consequently, these findings prompted the governor to revoke the programme.

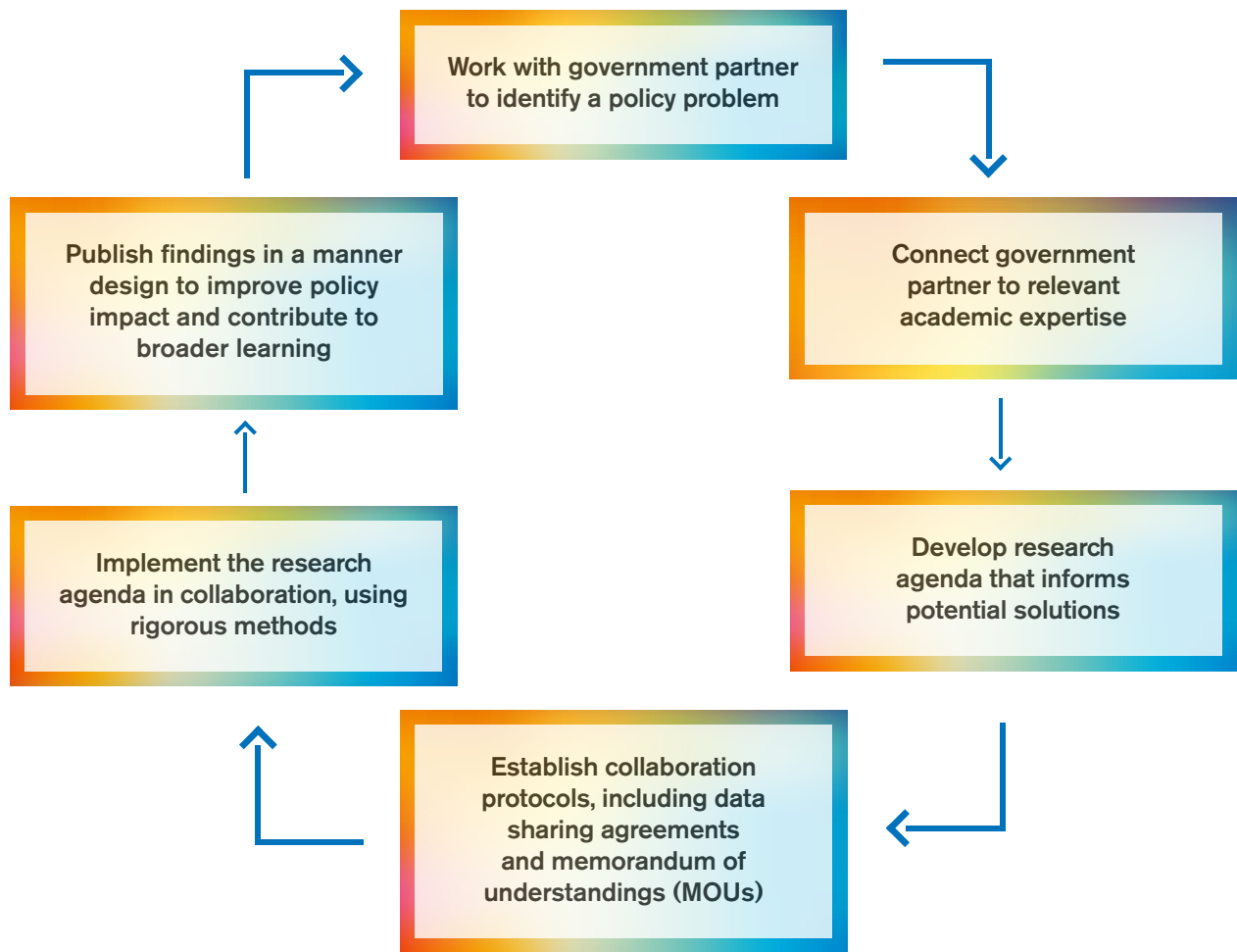
⁴See Appendix 1, Management strategies table

As a separate entity made up of academic researchers, the Lab's role involved evaluating a programme implemented by the California Department of Corrections and Rehabilitation (CDCR) as the result of a policy mandate from the California Legislature to combat contraband efforts in prisons (Raphael, Lofstrom and Martin 2017). Strategically, the Lab's governance process contributed to this successful early win. The success of this cross-sectoral collaboration is rooted in a governance structure that guarantees key standards are formed with partners such as: effective creation of data sharing agreements; ensuring data confidentiality; and pairing government agencies with appropriate experts to help them design the collaboration in a way that allows agencies to set the agenda for the research.

Furthermore, the Lab's role illustrates how this interorganisational form can operate in a separate space to evaluate government programmes with advanced data analytical methodology and experimental research strategies. The Lab is able to re-examine if a programme is using public money in the most effective and efficient way, creating a win-win for public value and university research. According to the report, administrative data was shared with the CPL by the CDCR, but there is no reference as to whether the CPL worked with department analysts. Through their analysis of the programme to gauge how outcomes change in different prisons receiving the intervention vs. those not receiving it, they found 'the most intensive version of the programme had led to a 23% decline in random drug test failures but at the same time showed a notable increase in inmate misconduct driven by drug-related rule violations'⁵. The report concluded with other complementary and alternative policy strategies.



Figure 1 *Illustration of California Policy Lab's governance process*



In addition to a clearly defined governance process, other determinants of operational success for the CPL include both environmental and behavioural factors such as possessing sufficient resource allocation and ensuring that academics and government speak the same language. During a recent interview, Berkeley's Evan White (Executive Director of CPL) and Jesse Rothstein (Faculty Director of CPL) indicate that they have seed money from generous donations from a private foundation and private individuals for the short-term and seek to secure more 'philanthropic sector and state government funding and project based funding' for the long-term.

Another important move has been to activate academic leadership for the Lab with a lot of past professional experience in government, like working directly for government agencies or closely with them through a research perspective, to avoid the ivory tower syndrome associated with academic interaction. This means key academic contacts in the Lab 'know how to speak the right language and what research is useful,' so that there is a basis for understanding the practical complexity of working in government and creating (or evaluating) policies. The main barriers for academics include a lack of access to data, communication challenges, questions not being aligned (with government), and a publish or perish mentality.

The main barriers for civil servants are data silos, a lack of capacity and time, changes in leadership and strategy, political pressure, the and rapid pace of decision making (California Policy Lab 2018). When these obstacles are fundamentally different for both organisations, one way to fuse unity is through diversity e.g. creating a team that can represent these various interests. For instance, in terms of administration, CPL uses: (1) University of California (UC) faculty directors for scientific leadership; (2) executive directors that are former government leaders; (3) UC faculty affiliates; (4) full time analysts, project managers; and (5) legal, IT, and administrative experts. Creating a winning team is as much a part of managing for success as other environmental, social, and organisational factors. Building this membership diversity on a foundation of leadership that possesses mutual understanding of the variety of institutional cultures and contexts will enable players to define problems in a way which is feasible for the operational capacity and technical expertise of the data analysts. For CPL, this results in the development of research agendas with government departments, linking and analysing government data, and then research and programme evaluation.

One interesting structural feature of policy labs is that they represent a new space for interorganisational collaboration through the development a 'platform' setting. There is a lack of research as to whether this new space for cross-sectoral collaboration is a determinant of success in that it creates a more coherent environment for data sharing and partnership cooperation amongst organisations. The intention of CPL, for instance, is to create 'capacity building for government agency employees through trainings, workshops, and resource development', which is a less threatening way to convey the intention of the partnership, which may sometimes threaten government data analysts' sense of job security.

The main suggestions for successful agenda setting in policy labs are to define governance process early on, to create short-term and long-term funding opportunities through a variety of outlets, and to avoid communication challenges by aligning technical expertise with a pragmatic understanding of what works. Securing these features of the governance process early on enables the lab to play its role as a collaborator that can enhance government's capacity to address social problems or re-evaluate current programmes for efficiency and outcome attainment through an evidence-based, analytical approach. However, government departments must also know what problems they are interested in identifying and solving, and believe that university collaboration can enhance this capacity. This requires communication with various levels of staff in a department so that bottom-up feedback is included. Creating this dialogue is not always easy, but should be the focus of managerial activities early on.

Barriers and opportunities for collaboration around data

There are two specific reasons why cross-sectoral collaboration forms such as policy labs and offices of data analytics work well in contrast to collaborating across agencies for data-based projects. First, interorganisational collaboration forms usually possess resources and funding that comes from outside government through foundations or private donors. Second, the designation of an outside entity to act as policy instrument enables the creation of a collaborative data-based culture from the bottom up. This takes place through hiring leaders with the right profiles and staff interested in data story telling who are willing to work to address the problems government organisations present to them. In the case of offices of data analytics such as the Mayor's Office of Data Analytics (MODA) in New York City, this organisational structure acts as an outside, boundary-spanning coordinator that can access data from city departments to create city wide policy tools that make better services for citizens in a holistic way (Provan and Kenis 2007).

In contrast, coordinating across agencies through top-down mandates requires agencies to tap into their already limited resources in order to participate or implement new policy tools. This illustrates Wilson's (1989) classic problem of agency turf protection, especially in terms of resources e.g. agencies want to put their mission and priorities first before helping other agencies. Thus, the two main weapons for interorganisational collaboration are forming policy labs and Offices of Data Analytics (ODAs) when possible. An office of data analytics generates a collaborative structure that designates one organisation as the 'leader' in the network and uses its own resources and data specialists to devise policy tools for city-wide use in an organic, needs based manner.



Table 4 *Examples of Offices of Data Analytics (ODAs)*

Offices of Data Analytics (ODAs)	Project examples
City of Boston Analytics Team	<ul style="list-style-type: none"> ■ Used pilot programmes to test predictive models for improving health and safety ■ Used data and maps to create a better understanding of Boston <p>Example: A safety platform “map” for citizen engagement so citizens can record problems with sidewalks, street signals, crosswalks; feedback is collected from citizens to improve strategies through this interactive crowdsourced map</p>
City of San Diego Performance & Analytics Team (PAT)	<ul style="list-style-type: none"> ■ Sought legislative approval through a resolution to create data policy for platform ■ Required all city departments provide Chief Data Officer (CDO) and inventory of data sets in accordance with technical guidelines set by CDO ■ Constantly engaged public throughout open data policy process; asked public to vote on what datasets should be prioritised <p>Example: Financial Management department teamed up with the PAT to create a tool for public to understand City's Fiscal Year 2016 Proposed Budget using data from the SAP based financial system</p>
DataLA	<ul style="list-style-type: none"> ■ Secured political action (Mayor signed executive open data order – a directive to outline immediate steps for creation of a City open data programme) ■ Created open data portal ■ Launched dashboard to engage citizens with progress of City's conservation goals, and Mayor's dashboard to provide insight into performance of city services ■ Open Budget LA - a tool used to help citizens analyse and see how their tax dollars are being used ■ Cleanstat: operationalises service delivery using data to ensure effective street cleaning across city ■ Development of data driven benchmarking analysis to quantify baseline vitality of main streets in LA (indicators like: economic activity, public safety etc.)
MODA NYC	<ul style="list-style-type: none"> ■ Created data sharing platform Databridge which uses automated data feeds from 50+ source systems across 20 agencies and external organisation to warehouse and merge geographic information ■ Serves as data liaison/ point of contact for outside partners contributing to or using City data and for academic institutions
DataSF	<ul style="list-style-type: none"> ■ Created data services infrastructure programme to make timely data easy and available ■ Created data governance programme to establish efficient and effective data governance ■ Created data use programme to increase use of data in decision making in city departments
ODA-Philadelphia	<ul style="list-style-type: none"> ■ Uses beta and alpha iterations for programmes to explore prototypes ■ Focuses on creation of human centred design methods to create services that support success/wellbeing of citizens

The main role of ODAs is to gather data from city departments in order to devise city-wide tools. On the other hand, policy labs represent collaborative structures that interact with government as a place where policymakers can bring problems, and then can work together with academics towards solutions in an evidence-based way. Recently, two important academic studies have been published that illustrate several barriers associated with developing and implementing data-based collaborations in the public sector in a cross-agency manner, which is differentiated from cross-sectoral collaboration that takes place through policy labs and ODAs. Although the focus on these studies is on cross-agency collaboration, the conclusions are still relevant. The following sections explain three themes that create challenges for collaboration around data: lack of institutional readiness, culture change, and the management of data.

Lack of institutional readiness

Mergel (2018) illustrates that in the case of *Challenge.gov*, one of the major barriers was the lack of institutional readiness to take action based on the feedback obtained from the policy tool surrounding the Open Innovation platform. First, many agencies did not actually have needs or problems to be addressed through open innovation. As one government official expressed, most 'agencies posting challenges [did not] express an initial internal need to solve certain types of problems and have in house experts' (Mergel 2018, p. 732). These in-house experts, like data legacy managers, may be scattered and located in GIS teams (mappers) and other areas; in the beginning, they must be located so that their assets can be turned into tangible sources of information and assistance (Blauer 2017). Moreover, another challenge was that agencies didn't have extra resources to award the prizes for the contest or implement many of the suggestions. In terms of legal issues, the study shows that the rules for dealing with institutional property rights, data protection, and cookie policies were non-existent or vague, and enhanced the perception of risk for public managers.

Culture change

Long established government departments and agencies contain distinct organisational cultures that often value risk-aversion and a lack of experimentation—two features normally a part of open innovation and data-based collaborations. What this means is that it is crucial to set governance process and structures such as role definitions, procedures for ad-hoc processes, and communication strategies in the early phases of interorganisational collaboration (Mergel 2018). However, there are also technological barriers to innovation like initial resistance from government employees and their path dependency on 'normal' processes and operations (ibid, p. 738). In particular, it is recommended to approach culture change at the individual level in organisations, and

there should be focus on connecting the mission of the new project to the organisation's original mission in order to loosen staff's handle on data hoarding, for instance (NYU GovLab 2017).

With reference to data-sharing across organisations, in an online lecture NYU (New York University) GovLab convey that government employees may be 'motivated by the idea that their data will become actions, so give them a say in how they want to use the data to fulfil their public mission.' In this context, it is also crucial to ensure that the strategic vision of the project is connecting with frontline workers, while incentives can be used 'to encourage data sharing and data culture.' Nonetheless, policy labs and ODAs present the structural opportunity to embed the collaborative, data-analytical culture from the ground up, helping to evade the slow-changing mind-sets and values of pre-established government organisations.

Data collection, quality, integration

Managing data is an inherent feature of data-based collaborations, and often entails many obstacles like a lack of skill or available talent, a lack of standards for collecting and assessing the data, and issues over the quality of data and its integration into policies. For example, research conducted by Chen and Lee (2017) find that issues related to the collection of data in different jurisdictions that follow different procedures for traffic data collection (e.g. tube vs. manually counting with a device) illustrate how a lack of common procedures can make the integration and analysis stage difficult for conversion. The authors further argue that in order to integrate quality data for analysis there must be data standards for collection that ensure its quality. When deciding these standards, authority should be inclusive so that power is balanced among key representatives involved in the project. Most of all, technology experts will be best able to advise the proper technology needed for implementation and the best way this can help integrate data (Chen and Lee 2017).

In addressing the issue of data quality, DataSF, an ODA in California has constructed a data quality guidebook for its team members and partner organisations in order to 'evade inaccurate decisions or conclusions and increased costs from poor data quality.' Feedback from city analysts is used and incorporated every year to determine how they feel about its quality on a scale of 1-5. DataSF recommends in its Data Quality Guidebook 2017 that for better quality data:

- (1) Collect needs and requirements (before defining your data you need to know why you are collecting it and for what purpose);
- (2) Define the data set (once the requirements are clear); and
- (3) Define the policies and process (e.g. a set of policies and processes to manage the data through its life cycle).

Best practices

This section offers a summary of general best practices based on insights from international government offices of data analytics and government-university labs.

Insight #1: Build partnerships, interaction, and intense engagement with data owners and managers who can provide raw information to help team grasp context of data and how the data tells stories about its communities (DataLA; MODA-NYC)

The intention of university-public sector collaboration is to create a holistic view of policy making and programme evaluation through data analytics in order to observe patterns that are not seen through a siloed view of problems. This suggests that trust and cooperation must be built over time with a variety of agencies and departments in order to access the various sources of data needed for benchmarking such as open data, geospatial analysis, community surveys, and feedback. Through regular face-to-face interaction with data partners, ODAs (Offices of Data Analytics) are able to ensure requirements are met through a more relational approach to engagement. Proactive involvement with data owners provides numerous opportunities for members to decide if desired solutions are feasible in terms of resources and implementation.

Insight #2: Start small to combat resistance (MODA-NYC; DataSF)

Starting small in the beginning is beneficial in a number of ways. Interorganisational collaboration, whether from the perspective of an ODA or policy lab, requires neutralising resistance through inclusive aims that everyone agrees with. In particular, using small experiments cushions room for failure; and learning from failure is easier when big problems are broken down. For instance, DataSF constantly builds up its architectural leverage within institutions by making sure solutions create space for future infrastructure use. This means collaborative projects can continue to be built upon. Iterations should be grounded in addressing people's needs and problems to move toward opportunities for improvement.

Insight #3: Mobilise support from community network of stakeholders to host educational events and to establish protocols for data (ODA-Philadelphia; SmartDubai; MODA-NYC)

There are several suggestions for using the network to enhance competencies of the collaboration and provide educational opportunities for government employees with a lack of technical knowledge. The ODA-Philadelphia works with academic institutions like the University of the Arts Design for Social Impact to host lectures and panels for city employees about transforming public service by design.

These are applied lectures that incorporate case studies and how to maintain equity in end to end service design. In addition, MODA NYC has also partnered with academic institutions for tasks other than data analysis. For example, the NYU Center for Urban Science and Progress and Columbia University Institute for Data Science help the office create data standards and protocols, while an Analytics 101 course for government employees was also coordinated to assist with training and skill development. DataLA has reached out to the university student community and made its data accessible to them. As a result, computer science students were able to pitch to the city about improvements and innovation opportunities they found from their analyses. SmartDubai utilised workshops and questionnaires within its network to assess the current state of smart-city readiness in Dubai. Without community feedback and insight from relevant stakeholders, this type of collaborations will be limited in scope.

Insight #4: Engage citizens and use bottom-up approaches (ODA San Diego; CDSPP-U Chicago)

Citizen-centred designs can be incorporated with a variety of mechanisms such as surveys and feedback loops. The ODA in San Diego uses resident and employee satisfaction surveys to gauge how satisfaction with services is perceived and uses that data to drive future decisions. Moreover, CRM software is used so citizens can report problems in a streamlined manner in incoming reports that is looped back for improvements. MODA NYC focuses on gathering frontline input and bottom up expertise in the early stage of programme and policy development, especially as data needs context.

Insight #5: Unlock expertise in collaboration with People Led Innovation Methodology (NYU GovLab)

Boundary spanners are a key determinant in collaborative success as they can bridge organisations and create communication at different levels of a partnership. Like stakeholder mapping, it is important to know who can offer what, when, and how for the collaboration. NYU GovLab recommends using the following methods:

- First, define and curate problems;
- Second, ideate and curate solutions;
- Third, experiment and curate capacity;
- Fourth, communicate and curate feedback.

Furthermore, it is suggested to identify informal and formal connections in the surrounding network to make it more obvious about who can be engaged at what stage and for what purpose. This operational tool can also serve as a visual aid if it is placed in an open area on a board so that everyone can be aware and contribute to the development phase.

Conclusion

Cross-sectoral collaborations are the main mechanism for increasing governmental capacity to deliver data science based policies and programme evaluation. Although the benefits of fusing public, private, and non-profit actors to collaborate for public service delivery are well known, they are not without very clear managerial challenges. Consequently, it is imperative to assess how best to leverage the opportunities of this particular type of collaboration in order to reap its long-term benefits. What have both the international lessons of interorganisational collaboration around data science and the insights from twenty-four interviews with members of the Catalyst Project revealed?

First and foremost, that each public sector body (in this case: a university and two different County Councils) possess their own unique set of institutional barriers and cultural differences which require customised managerial responses that address the individual, organisational, and project levels of trust-building. Future projects should take note of this reality when designing and implementing their initiatives. From this report, we have learned what particular challenges can be expected. Moreover, the interviews provide a retrospective lens for connecting the context of the Catalyst Project's successes and difficulties with empirical findings from the literature for overcoming challenges.

The international overview section exemplifies that there are a variety of modes, governance structures, and operational processes for managing successful cross-sectoral collaborations. Several themes of best practices emerged from the international analysis. These included the benefits of getting different community stakeholder involved in supporting data science based initiatives, curating the right leadership that can 'speak both languages' of academia and government, and ensuring that a sense of mutual legitimacy and dependency is felt amongst partners for capacity building.

As data science based university-public sector collaboration continues to grow, designers of such collaborations should focus on installing the right management and boundary-spanning leadership that can facilitate trust building, shared understanding, bottom-up and senior leadership buy-in, and flexibility.

These features can only be obtained through honest dialogue amongst key actors in the early stages of the collaboration and through opportunities for socialisation and relationship-building, along with the creation of 'small wins' that can showcase the competency academic researchers have to enhance the capacity of public sector analysts. The resistance or openness of government bodies to allowing a university to enhance the skills and training of civil servants will always depend on the given circumstances.

This report distinguishes five positive management activities to undertake for future university-government projects:

- #1 Form data sharing agreements before project starts
- #2 Don't forget role clarity
- #3 Use bottom-up and top-down consultation of collaborative needs
- #4 Academics should showcase their work where relevant
- #5 Increase interaction via on-site work days

Lessons #1 and #2 require early action from senior leadership to put in place the formal rules of the game and to assess the individual attitudes of those who will participate and make data sharing and collaboration across organisations happen. This will include understanding team needs or convincing government analysts of the collaborative advantage and value adding possibilities. Sometimes an understanding of collaborative advantages and values are not always straightforward and can take time to develop. Lesson #3 is a necessary tactic for penetrating all of the levels of cooperation that are needed for collaborative success. Senior leadership should not overlook bottom and mid-level concerns and create opportunities for discussion and consensus building. Lesson #4 conveys that in university-public sector collaboration, academics must also take the initiative to showcase the relevance of their work and methodology to the specific problems that public organisations need to solve. Otherwise, misunderstanding due to pre-conceived organisational and cultural differences can hinder collaborative performance. Finally, Lesson #5 emphasises the importance of building personal relationships.

Appendix 1: Management strategies for interorganisational collaboration

Author(s)/Year	Management Action	Results
Ansell and Gash (2007), Geddes (2012), Hovik and Hanssen (2015), Klaster et al. (2017), Waugh and Streib (2006)	Designate facilitative leadership at various levels and stages of collaboration (e.g. boundary spanners, 'champions,' during negotiation, etc.)	Conflict-resolution, consensus building, action, inclusive agenda shaping, broad participation, productive group dynamics, empowerment, unity of purpose, and an extended scope
Agranoff and McGuire (1999), Ansell and Gash (2017), Chen and Lee (2017)	Promotion of joint action building through creation of shared standards and goals	Develop institutional capacity through less institutional and technical inhibitions
Ansell and Gash (2017), Crosby, Bryson and Stone (2006), Saz-Carranza and Ospina (2011)	Create learning spaces, a communication strategy, and a compelling vision	Leads to reduced cultural barriers, the development of a sense of commonality amongst stakeholders, and helps to overcome tensions
Cuganesan et al (2017), Page (2003), Thomson and Perry (2006)	Induce sharing and stewardship through providing information about skills, resources, policies and examples; make impact of collaborative efforts transparent to create symbols of progress	Employees will change their mind-set in desired way through self-efficacy, certainty, and legitimisation. This stimulates cohesion, innovation and ability to reframe meanings to achieve shared and independent goals
Giest (2015), O'Leary and Choi (2012), Chen and Lee (2017), Weber and Khademian (2008), Agranoff and McGuire (1999)	Use experts to facilitate the demands of highly specialised networks	Expert knowledge helps frame tasks and alternatives ways of conceptualising problems
Heen (2009), Vangen and Winchester (2014), Weber and Khademian (2008)	Understand the situational need of management styles	Adopting practices can help positively control the impact activities have on the diverse culture and power balances

Appendix 2: List of policy labs

Lab	Participants	Aims	Core areas of application
Institute for Analytics and Data Science (IADS)	University of Essex, Essex County Council, Suffolk County Council, British Telecom, EPUT NHS, UNESCO	To create new products and services for businesses, individuals, and society; to facilitate knowledge transfer around AI between academia and private, public and third sectors. To lead the way in the next generation of ethical computational and analytical methods to derive powerful insights from data	International development, public policy, healthcare, social care, mental health, insurance, finance, telecoms, transport, media, policing and crime prevention
Singapore Data Science Consortium (SDSC)	National University of Singapore, Nanyang Technological University, the Singapore Management University, Agency for Science, Technology and Research, National Research Foundation Prime Minister's Office, Defence Science & Technology Agency, Singapore Tourism Board, ST Electronics, GIC, Micron, Fuji Xerox, Surbana Jurong, Certis Cisco, ASM Assembly Systems, Television Content Analytics TVCONAL	To facilitate collaboration between institutes of higher learning, research, industry and government in data science R&D to enable industry adoption of latest cutting edge technology to address real world challenges	Healthcare, customers and retail, manufacturing, transport
AI Singapore	National University of Singapore, Singapore University of Technology and Design, Nanyang Technological University, Agency for Science, Technology and Research, Singapore Management University	To catalyse, synergise, and boost Singapore's AI capabilities, to use AI to address major challenges that affect society, and to invest in deep capabilities to catch the next wave of innovation and broaden adoption and use of AI and machine learning within industry	Healthcare, Urban Mobility, Cybersecurity, Computing platforms/ architectures, privacy preserving technologies, sensing and measurements
Beijing Institute of Big Data Research (BIBDR)	Peking University, Beijing University of Technology, Zhongguancun Science Park, Haidian District government under supervision of municipal government of Beijing	To combine education, research, entrepreneurship, and government service to create world class programme for developing data science in China and a platform for nurturing new enterprises in big data	Healthcare, traffic, finance
Shenzhen Research Institute of Big Data (SRIBD)	Shenzhen University, Shenzhen government, Luo Hu People's Hospital, Huawei, Xiao i Robot, National Supercomputing Center in Shenzhen, CETC-14th Institute	To develop and advance a platform for data driven research efforts and provide city-wide, state-wide and nation-wide services in technology development, data sharing, and staff exchanging	Prevision medicine, future communication systems, green transportation, smart cities
RMIT Data Analytics Lab	RMIT University Melbourne, NICTA (NSW government, Queensland government), Australian Research Council	To become a hub for advanced data analytics projects to help Australian business compete on a global scale	Geospatial information search, biomedical informatics for health decision making, integrated design infrastructure for Australian cities

List of policy labs cont.

Lab	Participants	Aims	Core areas of application
The GovLab	NYU Tandon School of Engineering, White House Office of Science and Technology, Laura and John Arnold Foundation, MacArthur Foundation, The Australian National Government, England National Health Service, UNICEF, Omidyar Network	To strengthen the ability of institutions and people to work more openly, collaboratively, effectively, and legitimately to make better decisions and solve public problems with big data and open data	Criminal justice, healthcare, government innovation, public decision making
California Policy Lab	UCLA, UC Berkeley, Californian governments local, county, and state levels	To create data driven, scientific evidence and insights to help government at all levels in the state solve urgent problems; to help bridge the gap between policy makers in the research community	Homelessness, poverty, crime, education inequality
Actionable Intelligence for Social Policy (AISP)	University of Pennsylvania, Pennsylvania local and state governments, non-profit organisations.	To work with local and state government to help them design systems to improve the quality of social programmes, policies and practices through big data	Juvenile justices, homelessness, health and vital statistics, adult justice, education, assisted housing, workforce development
Center for Data Science and Public Policy	University of Chicago Harris School of Public Policy, Computation Institute, Municipality of Rotterdam, Charlotte-Mecklenburg Police Department, Metropolitan Nashville Police Department, San Francisco Police Department, Los Angeles Sherriff's Department, Chicago Department of Public Health, Chicago Department of Innovation and Technology, Wake County Public School System, Cabarrus County and Kannapolis City school districts in North Carolina, Environmental Protection Agency	To educate current and future policy makers, doing data science projects with government, non-profit, academic and foundation partners, and developing methods and open source tools that support and extend use of data science for public policy and social impact	Welfare, city infrastructure, citizen engagement, highway patrol, urban planning
Dalle Molle Institute for Artificial Intelligence (IDSIA)	Swiss Confederation Commission for Technology and Innovation, University of Lugano, University of Applied Sciences and Arts of Southern Switzerland, Imprecise Probability Group (IPG), Swiss National Science Foundation, Federal Department of Defence	To offer solutions to a range of complex problems through theoretical findings and novel algorithms, machine learning, deep neural networks, and imprecise probabilities by promoting strong cooperation with partners	Military decision making, metrology and climatology, environmental risk analysis, bioinformatics
German Research Center for Artificial Intelligence (DFKI)	University of Bremen, Deutsche Forschungsgemeinschaft, Deutschland Land der Ideen, Berlin Big Data Center	To study design, realisation, and analysis of information processing models that enable robotic agents and humans to master complex human scale manipulation tasks that are mundane and routine	Emergency response and crisis management, outreach, multimedia opinion mining
Insight Centre for Data Analytics	Dublin City University, NUI Galway, University College Cork, University College Dublin, Cisco, Intel Corporation, Tyndall National Institute, HP, Central Statistics Office, Open Data Institute, Dublin City Council, Galway City Council, Department of Public Expenditure and Reform	To use information to make decisions based on it for transformation by taking the guesswork out of decision making in society	Personalised public services, chronic disease management and rehabilitation, smart enterprise, open government, urban life quality
EBTIC	Khalifia University-Abu Dhabi campus, ICT fund-Telecommunications Regulatory Authority, Etisalat, BT	To collaborate with industry, universities, and government organisations to be a driving force for innovation for the Middle East region	Smart infrastructure, smart network design, smart society, smart enterprise



Appendix 3: Steps for strengthening the data analytics culture in collaborations

In an online lecture, NYU GovLab has created the following recommendations for strengthening the data analytics culture in collaborations:

- 1. Understand your organisation's needs and the ability to meet them:** you have to know who it is you are looking to build the analytics capacity for; you have to be clear on their needs; always meet them where they are; understand their needs and then their capacity to adopt and apply tech solutions – concept of not having a hammer and looking for nails. Think about what the organisations innovation strategy is and how they think they are solving problems. You need to know the core goals, the mission, and the performance metric to apply the data analytics. Understand those core needs and historically how the organisation has been successful – you want to adopt their successful processes to use those as you go down an analytics capacity. Also, know what ways they have not been successful – the clear underlying things that you may have to dig out.
- 2. Understand your organisation's characteristics:** culture is about attitudes and behavioural characteristics of groups. To truly strengthen the analytics culture means understanding where are they with respect to their general culture; hand in hand with understanding goals and mission. It's the culture of the agency that can allow them not to meet goals or be successful so know the organisational characteristics. For example: what keeps organisations going and what slows them down; what keeps initiatives moving like diversity and inclusion – when you understands what gets them excited you'll have a good sense of the current culture you are looking to build into. You need to spend time understanding exactly how things get done: their processes from end to end. Then you know where to apply analytics and know how people do their job and what they think about on a daily basis.
- 3. Obtain executive buy in:** do you need this to strengthen the analytics culture? It could go either way. Usually a hybrid approach is smart e.g. executive knowledge and some buy in, but you also need support from the bottom-up like the IT folks and process people and main staff to come together.
- 4. Distinguish analytics from data management:** if it's about strengthening the analytics stance for an organisation, you need to make it easy for them to adopt. Don't artificially meld management with analytics; bifurcate the two. First use data management like governance, stewardship, standards, security, quality. The next step is analytics: like surfacing the data and mapping something or describing data, machine learning.
- 5. Show return on investment early with complete successes:** show quick wins/complete successes early on; ends with the organisation being more situationally aware, smarter, and informed than how they begun. Think of all the different ways you want to be impactful like a 3 week marker, a one-two month solution, a six month solution. The difference between short, mid, long term solutions is about answering questions to produce smarter questions to build a mechanism that allows for continuous engagement through time.
- 6. Create a low barrier of entry:** The lower the barriers of entry for organisation, the easier it is to adopt the practice. Costs-understand what tools different parts of organisation use for analytics to meet the organisation, where they are, and even use the tools already in use to create new solutions.
- 7. Provide repeatable and flexible training: build a curriculum that is flexible – easy to adapt as organisation changes:** the way people learn, the things people need to know, the views people have on problems the organisation is facing. Build a training curriculum that is reusable – the knowledge stays in the organisation to truly be impactful needs flexibility in training. Training should be about the trainee and structured in a way that whomever is trained can easily find mechanisms and teach others.
- 8. Create reusable analytics frameworks:** identify similarities in the questions; solutions with similar characteristics; the framework that can be drawn from those solutions.
- 9. Grow towards making yourself smaller:** if you are leading a team in an organisation where you want to grow the analytics capacity and adoption, you achieve that by growing to make yourself smaller. Create an essential centralised analytics team to drive the initiative and allow that team to empower others. The team should identify that they should be at biggest at 3-5 years then slowly offload capacity to other spaces and places in the organisation.
- 10. Clarify and solidify the role of analytics:** when it takes its true form what exactly does that look like? The core function should be steady enough to be stable from leader to leader and with budget changes.



Appendix 4: Supporting quotes for findings from Catalyst Project interviews

UN = University actor
PU = Public sector actor

Concept: interaction via showcasing work

PU Our team was quite resistant [at the start]. I think they thought, 'We can do everything—the University aren't going to add any capability that we don't already have.' Yet, once they saw some of the work University [did], it was helpful in shifting cooperation. Some of the modeling [University academics] did for the data analytics was good, and actually, we thought, 'That's a model we can use!'

PU So my personal experience with that is that it is about building confidence. Doing test cases; showing what you can do—and just taking it one step at a time.

PU It was when teams understood approaches and could respect one another on a professional level and see the value of one another.

UN If you just actually talk to them and ask what they think, that might get them more on board. As an academic if you can showcase what you can do, so they can see the benefits to their work when you talk to them, that's important. It's the other way around too. If they are presenting about that their particular issues are, then as an academic, you shouldn't have a fixed idea of what they can do. You need flexibility. Have these discussions really early on.

UN So as an academic if you can showcase what you can do so they can see the benefits to their work when you talk to them that's important.

UN Big gaps between meetings it makes people forget stuff and it doesn't have that momentum.

UN Because prior to the level of engagement, the [Council b] authority didn't really know the level of expertise in the University, so it is really about being able to demonstrate and showcase that.

UN By having senior stakeholder meetings—and by training their staff as well through training cases...that is how we showcased our expertise.

UN The first thing that could've happened with the project was first discussed with them from the very beginning was that there should've been a couple of reports presented to them that explained in a lot of details for them to accept as well of how the process would work.

Concept: interaction via designated on-site work days

UN When we are there they seem to come over and say, 'We need help with this – can you help?' The shared process of having someone there seems to spark an engagement of some description.

UN With Council [b], I think they were more open. People started knowing and coming to us to discuss projects. We had a lot of discussions. I suppose relations are important, I don't believe personal relations are a prerequisite, but it certainly helps. To go and meet the people you're working with and to have one face that is always there, that always interacts with people from the Council and reports back, that's a good example. On Wednesdays, I work at Council [b] and interacted with everyone that I've done projects with and that was helpful because I could go directly to them if I wanted a clarification.

UN I think the Catalyst Project has probably helped in the fact there has been someone on site, especially with Council [b] from the University doing work.

UN And this is where the University can come in handy because we've got the analyst and expertise so we can go into the Council and help them discover the data, and use those data sets to help them answer questions they would find useful. But we need people in effect on site to do that.

UN By having staff co-located there—because we are available at their offices, they can come to us and ask questions. And that's what they do. Our staff are there every week; we have a co-location day where our University staff access the data via laptops [Council b] has provided—it's all secure. It is an easy environment.

UN For example, on Wednesdays I work at [Council b] and interacted with everyone that I've done projects with. That was helpful because I could go directly to them if I wanted any clarification.

UN The Catalyst Project has got two or three people in [Council b] on a regular basis (one day a week) there is at least two or three researchers from University in [Council b]. So, we have run training courses for them. We are running another training course for them.

UN The risk team people with Catalyst go to [Council b] every week and I think that works better because you can go into an organisation and understand how it works.

PU But also the fact that the researchers come here once a week to our building and sit with us for a whole day. That way they are there to have some of those conversations and that cross-over of skills and ideas. They become part of the team. And that makes people feel engaged with it all.

PU Maybe if we would have interacted more we would have seen they have more people to deliver data, but we didn't have a lot of interaction. We just saw a couple of people who were dealing with data.

PU On the University side what made the biggest difference was being clear of what the objectives are; but also the co-location...having the University researching on site was the biggest change we could make.

PU I think the fact that the researchers are here...you build a proper human relationship with the analysts and it's not just someone on the end of the phone or email who is anonymous. That definitely helps with sharing data.

PU And the fact that the researchers have been good and keen, if we say to them "someone has got an interest will you go talk to them?" They've been really good about going out and making people feel like it's relevant and should be part of their day to day work.

PU Having the University analysts present has helped us do much better through visibility and profile and go 'Oh ya! You're really useful!'

Concept: show benefits

PU The approach we've taken there is to build confidence by showing some results. And then people get confident and think 'actually we can do this; this is sensible.'

PU So, we can start to show the benefits of how bringing together the different data sets...so if we use the police data and social care data...we can go back to them and say hey did you know about that relationship from these two data sources? The more evidence you can provide the more happy people are. It is something we should be doing all the time.

PU For us the benefits are that this is a high volume piece of work with probably low margins of success. So we'd have to do an awful amount of work to find a small amount of risk. It's not something we would have human beings doing.

PU I think by and large it's not the analysts who we need[ed] to convince. It was more challenging for some of the service managers who don't routinely work with lots of data. From an organisational perspective there is some—not reputational risk—but a piece that needs managing there. So, we need to be clear as senior managers about: why we are doing this, what the benefits are, what we are trying to get out of it, and we need to be, I need to check, everyone is still wanting to stand firmly behind that. And I think they are.

PU It is about expressing the mutual benefits because we all need to get something out of it. We are very comfortable that University is getting something out of it and I think they are comfortable we are getting something out of it.

PU The whole point of the Catalyst Project is to figure out what skills University has got that can be useful to us by making better use of the data in projects we've already got. I think once people understand that and the benefits of that, I don't think there's any particular barriers to wanting to do it. It does need to reach the right person; they have the front door.

PU The benefits of cross sectoral collaboration are about the skills sets: having the change to work with people with high level skills. I run a team of analysts here, but we're not university mathematicians! We are doing our best in our jobs—but we don't have access to some of the skills and techniques and some of the training that the Catalyst researchers have. So it was really about being able to work in partnership, here, it is really important.

PU I've asked the Catalyst Project to start developing a pipeline report and a monthly progress report because there wasn't any documentation at all about the programme and what they were all doing...which means that it was very difficult to keep it all visible within the council. You know it's important that people understand what they're up to. So we've got that now.

UN Council [b]—they tend to approach it completely different way in that they say 'If you've got the skills and we need it...show us...what we can do!' And that's their way of protecting their estate.

UN If they can't see the benefits for them then it's very difficult to get buy in.

UN We started to get more and more papers and reports that were shared around [Council b]. People started to see the benefits. So people then started to approach us as well.

UN There was some time that needed investment and effort to take place before the academics could see the benefits of working in this way. This for me was the big issue.

UN I think that the main benefits are about the fact that we get to share different points of view among organisations.

Concept: bottom up engagement

UN Once you got down to a certain level in the council to the people you really wanted to get on board that had the ability to do the work to deliver the project, this was where it was quite difficult to get that engagement.

UN It is really important that the senior managers from each organisation really communicate that and get the buy-in from the middle manager and the people who line manage the people we need.

UN What is really interesting is that you get the buy-in from very senior people—they are all on board and brought in, but where it fails sometimes is that it doesn't feed into the middle management and where people actually are working on it.

UN We had the buy in from the top, but not from the middle.

UN We did try a number of different ways of getting the engagement. We had the Challenge Lab where we got a lot of analysts and middle management people together to pitch their projects and then look at how the University could work with them. That was a good way of getting people together in the same room.

UN Coming together and running workshops; look at the objectives; do a little brainstorming with people to see what each one can really understand what these objectives are and get buy in. So people can really get to know each other; it's social.

PU It does need to reach the right person; they have the front door. [For us] that really came about because the manager of our service had been involved in a whole bunch of communications [given] to our senior leadership. He said 'wait a minute! I have an idea' so it's that kind of enthusiasm and vision of what they can get out of it and what it can mean for them. I think that really kick started that one.

PU That greater mission of working in the public sector, everyone to some degree wants the greater public good, yet that's not quite enough to make a programme operate effectively...it's the knitty gritty detail stuff.

PU The final point really is I became involved the projects mostly after the priorities had already been set. I know 'how do you choose what is a priority?' I think there is often a discrepancy between the important people and senior leaders and commissioners...they will always have something that is keeping them awake at night which will always be the first response if you ask them what would like us to do?

PU Maybe the core experts of people doing the analysis aren't 'in the ring' so maybe there is a discrepancy between what will be useful and possible and by the time the technical experts do become involved, the research question has been so far defined, but you may find that I am not sure you will get anything out of the end of it.

Concept: role clarity

UN The main benefits have been to deepen those links with external partners. Council [a] is massive and it's difficult to know how to approach it without a guide.

UN Or it might be that now there is more clarity of leadership whereas before there was a hiatus.

UN I think definitely one problem we had with [Council a] is there was a lot of re-structuring so you keep talking with the same people...but in different roles...so sometimes it was difficult to understand that sometimes.

UN I think once we got people in new roles with the clarity as to what their responsibilities and involvement in the partnership were then it has been very productive. We have two people at [Council a] now who are coming to regular meetings with the [chief data scientist et al].

UN It was simple to work with them. I contacted the director if he was interested to work with us—he gave me three people to contact and within two weeks we incorporated all the elements; we shared it—they could put all of their specific areas. We had all partners statements or letters of support.

UN But at the beginning you need to have the person of contact. [The project sponsor] had a very good understanding of what was happening in the council and could help us navigate because she had the personal relationship with some key people there.

PU Whereas I find the rest of the work I do with University is a bit scattered, I understand why—they are usually chasing funding.

PU I don't think there was much understanding at the beginning, and it's easy to say this after the fact, about how that worked and what would need to develop; for each project you would need someone who is: technically capable from the University of Essex and someone from [Council b] who understand the data and the business area. If you don't have all of those people there and all of those people wanting it, it is very difficult to get anywhere at all.

PU I sort of think the only way (strategy) would be to have a sort of joint-team or something like that. You really have to have people sitting side by side, building those relationships.

PU That said, I think there is always a challenge with getting large organisations to coordinate; challenge of getting multiple contact points and making sure that all of us are properly joined up and coherent.

Concept: problem framing

PU We had started off thinking, 'Ah, so here's some problems which would be well addressed by predictive modeling,' rather than saying, 'What problems is the organisation facing? And how can we apply more advanced analytical thinking to that?'

PU You've just got to start with what's your problem and how can I solve it and get to a common set of problems; the motivation to solve the problem helps people overcome the barriers. If people feel like they are handing over the data and not getting problems solved they are going to be slower to do it.

PU The benefit was looking at system wide issues; if I'm in an organisation and just looking at the problem from an organisation perspective, I'm not thinking about the people because people aren't based in organisation silos. We were looking at how we effect outcomes for vulnerable groups of people who need service delivery across the public system.

PU Inevitably, the people change; circumstances change. Because the agreement at the beginning didn't acknowledge that case, that becomes hard to then organise. One of the projects was around asset mapping as part of the Catalyst. And what was agreed to, it never happened in that way. That then causes people problems because they said "Oh we said we would do this thing... and we're not doing that thing anymore." So, it's hard within that to re-align.

PU What the agreements did, was to set out what the deliverables would be: we will deliver this thing, this thing, and this thing. It would have been much better to agree on more ways of working; a more iterative approach; this is the goal – or the problem we are trying to solve and NOT this is the thing we're going to do about it. We aren't bound by solutions that then have to work. So, I actually think we should have had less binding paperwork and agreements that said we have to deliver the things we said we would deliver.

PU There is a difference between research questions and public sector problems. In the public sector, we don't just want to answer things we want to know how to do them as well. There is quite a difference there and it kind of struck me as...once you know the answer to something...or you want to test something...how do you convince people about that? And change resources and bring people along with you? All of that type of stuff.

PU Understanding more of the process; question it; having those open conversations that get you to a better end result. Because I can go to the analysts and say...'can you help me do this thing' but without saying why you're doing it; what's your start point; what's your end point and working through the process...I'd be asking completely the wrong thing.

PU When it comes to the partners we speak with, sometimes we do end up helping them re-define what it is they are looking for or just acknowledge that what they are looking for is possible to measure.

PU The particular area I was working on was sharing data to enable evaluations. I think when you see data sharing happen it is because there is a clearly defined micro reason. So if you just start with "Oh we're going to work with University to improve outcomes" people will go "yaya we will share data." But it is meaningless.

UN I think our discourse with [Council b]—we have gotten them to explain the issue. And then we sort of have a process where we get them to define the scope of what it is they want to achieve. We can align our academic outputs from that because we make an assessment: 'Well is this something that just helps them to do the analysis work or is it actually an academic publication we can get out of this?'

UN We can share a lot of information with each other and understand better how both institutions work. For example, the University looks directly for data and we want it to be organised and we do focus a lot on

research while the Councils focus a lot on helping people and less with the data. By sharing information with each other we see helping people can be a lot easier if the data is organised in the first place and if we understand their processes for organising it.

UN But then there needs to be the dissemination and the garnering of support and understanding within the partner institutions as to why certain things are being done and why there should be engagement and prioritisation to some degree of this project work.

UN So in some sense it was not just academics saying we would like to research this area, and we would like you members to participate; it was the other way around. We started with very practical problems the Council had and basically the research time put towards a device around very specific issues they had.

Concept: forming expectations

UN I think in the beginning the discussions were very high-end. And people were talking about what could happen and everyone just made up their minds in their own way. And when the time came for us to do actual projects to start...expectations weren't met from any of the points.

UN You can have a framework, that's fine, but we might have needed much clearer commitment from each partner in terms of expectations, goals, resources, and objectives. That might be where we fell short. And not only from the senior partners, but also from the middle management.

UN And when the time came for us to do actual projects to start...expectations weren't met from any of the points. So basically: set clear terms from the beginning about what will happen; data sharing agreements et al.

PU In terms of data sharing making sure we and academia are understanding each other's concerns... we haven't done that particularly well. But now we are trying to set up a monthly catch up meeting with all the researchers, and the lead manager from the [Council b] side. We try to talk those issues through proactively instead of waiting for something to go wrong.

PU It would be better I think to have those sort of discussions up front where we are really honest about on these issues we really do have a common interest where collaboration will work, but maybe on some other things it won't because the timing is not right; the interests are not quite aligned. It would be better to have those discussions up front. So we know where collaboration will have the most success.

PU At the beginning of the project you say we are all going to agree to do this and agree to work with University in this way; as a formal governance mechanism. I don't think that was very effective; but it would be a factor. I think the key was around the streams of work being aligned with what those organisations wanted.

PU So, if the right stakeholders from the beginning influenced what the work was going to be, and it was something that was aligned with their interests and organisational priorities, then there is impetus to get it done.

PU That then causes people problems because they said "Oh we said we would do this thing...and we're not doing that thing anymore." So, it's hard within that to re-align. This governance framework was massively problematic and the fundamental for things not working as well as they could have.

PU I think they thought we can do everything—the University aren't going to add any capability that we don't already have; they're just going to slow things down; we'll be more effective if we can just crack on and do the work ourselves than if we try to involve a load of academics who might not get it and be really slow.

PU I don't think we were that dependent on the University if I am being honest. I think it was slightly nice to have. But I think we could deliver what we needed to deliver with internal resource and the University was adding some value. I don't think it was absolutely critical for us. That was one of the issues really.

Concept: institutional differences

PU But the bit that has been more difficult to align is the research publications elements of the Catalyst work. You know obviously we understand that academic institutions need to publish—that's their lifeblood—but actually when you get to quite specific data with partners, some of that has been difficult.

PU Or actually their research interests are not really aligned with our policy interests.

PU We need to be much clearer on communicating from the beginning what the differences are and what the similarities are.

PU Typically, in an academic setting you will be more drawn to these new niche and exciting questions, that may be of no relation to x, y, z. Typically the highest problems of local government are going to be not those glamorous hidden questions, but will tend to be what will have the biggest savings? So our problems tend to be different by politics or by pound signs.

PU While everyone here may say "oh I want to do something innovative and new..." at the end of the day, a real simple answer to a boring like question or boring problem which has existed for ten years...that's going to be better than a real sophisticated interesting piece of work which doesn't lead to the same kind of level of savings.

PU I think we have played it safe to date. We are not really taking many risks. But with the projects we have on the plan we are starting to delve into that area. We are starting to look at things that we have not addressed before.

PU But so far future projects are more about things where we might need some new methods we haven't tried before in this new area we aren't so sure about. That's a good way to go...but we mustn't lose sight of the bigger problems that are easier...because then we will just get swept up in the desire to do new and exciting things.

PU I think there are definite cultural barriers between the focus and the pace at which academic research moves and the focus and the pace at which real public policy moves.

UN If you want to do something differently then both sides have to be up for that. You can't really make organisational differences match. What happens was with over a period of time we found academics that already had an interest with something that matched to a degree things that the [Council b] and [Council a] wanted to do.

UN What was difficult was to have buy-in from the academics because academics like to propose research pushed by them so the process of having research that is co-designed by the user is not very common.

UN There was some time that needed investment and effort to take place before the academics could see the benefits of working in this way. This for me was the big issue. Of course the Council is a huge organisation and for some councils they may find it easier to find the core councils, but other councils have different procedures that make it more complicated, but this is the issues you will always have.

UN The problem is that academics have an idea of what is research and sometimes there isn't a much of an awareness of real life problems for researchers. This is true for every discipline to be honest even those that have a more applied side.

UN There's always a disconnect between the questions the Council want answered and the questions academics want to answer. A massive disconnect between the two.

UN The one thing is that didn't help at the beginning, but it's a learning curve with every partnership, is that when you bring different partners together that don't speak the same language—when I say that they have a different culture; a different language. Academics have their language and [Council a] has their one. There are some times at the beginning where we don't understand what one another means.



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Led by the University of Essex, the Catalyst Project received £2.2 million funding from Higher Education Funding Council for England (HEFCE) and is now monitored by the Office for Students (OfS).

We are using this funding to work with local public services to:

- Evaluation**
Empowering public services to evaluate the impact of their work
- Risk Stratification**
Using predictive analytics to anticipate those at risk and to better target resources
- Volunteer Connector Hub**
Providing local volunteering opportunities for students

University of Essex working in partnership with:

