

Gladstone Harbour: a case study of building social license-to-operate in a multi-use area

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Abstract

Maintaining a social license-to-operate is a key challenge for industry and regulators. The city of Gladstone in Queensland, Australia, surrounds a highly industrialised harbour supporting major industrial activities, including alumina refineries and an aluminium smelter, other heavy industry, port facilities and, most recently, three natural gas liquefaction facilities built on nearby Curtis Island. Industrial and port growth coincided with some extreme weather events (cyclones and floods) and unhealthy fish and crabs in the harbour in 2011, generating community concern about potential cumulative environmental impacts of development. These were difficult to address at the time because of limited monitoring data and scientific knowledge, as well as some fractured relationships between stakeholders.

In response to this debate the Gladstone Healthy Harbour Partnership was formed in 2013 by stakeholders from industry, community groups, and all levels of government. Experts from environmental, social and economic disciplines assisted to evaluate and report on the health of the harbour. Membership required ongoing and deep participation in activities which ranged from targeted research to community engagement. Central to partnership activities was a clearly communicated annual Report Card, derived from complex environmental, socioeconomic and cultural data. A data and information management system (DIMS) was developed that integrates data from multiple organisations after automated quality checks, tracks data treatments and calculates the Report Card scores.

The Report Card is intended to be meaningful to a wide variety of stakeholders yet allow access to underlying detail. This increased transparency and robustness has contributed to building community trust. Conversations now focus on likely management scenarios, rather than all imagined possibilities, and this in turn paves the way for reducing business risk for industry.

Keywords

social license-to-operate, SLO, report card, data, information, community engagement, risk.

Introduction

Conceptually easy to understand but difficult to measure, an enduring social license-to-operate (SLO) is the holy grail of projects and organisations that draw on a community and its resources (Moffat and Zhang, 2014). A SLO is not a single, clear license given by a recognised authority but is more nebulous, representing positive community or stakeholder sentiment towards a project or activity. It is also scale-dependent, changing whether you consider it in terms of the owner (a specific company project or the company itself, governments and their many departments or authorities) and the section of society that grants it (local community, non-resident community with a vested interest in the region resources e.g. governments who may collect taxes/royalties, communities with a strong sense of ownership of a distant natural asset). Rarely is a SLO obtained or given against a neutral backdrop as most urban or resource rich regions have histories of multiple and ongoing developments.

An example of this is Gladstone in Queensland, a city surrounding a busy harbour which has undergone multiple periods of development by different sectors. The most recent, starting in 2008, saw several companies seek to coincidentally develop multiple natural gas liquefaction plants in a city which was already expanding port facilities and industrial capacity. As these developments approached approval and construction, repeated reports in 2011 of diseased and disfigured fish and crabs captured by commercial and recreational fishers generated alarm among the local community escalating fears of “over-development”. The Queensland government banned all forms of commercial and recreational fishing in the harbour for a temporary period in 2011, impacting fisher livelihoods and intensified community concerns. Unsurprisingly, SLO was impacted for multiple stakeholders as the community sought an explanation for the phenomenon and, in some cases, someone to blame. Out of this atmosphere, stakeholders from industry, community, government and the research sector formed a consortium called the Gladstone Healthy Harbour Partnership (GHHP) to promote an evidence-based understanding of the environmental, economic, social and cultural health of the Harbour and to help rebuild community trust in stakeholders, institutions and processes governing the region and its continued development.

A key tool was an annual Report Card which reduced numerous indicators (environmental, economic, social and cultural) into grades (Gladstone Healthy Harbour Partnership, 2017; Johnson et al., 2017; Pascoe et al., 2016; Windle et al., 2017) which were trustworthy, easily communicated and understood. Report Card co-production, and by implication co-endorsement by the numerous stakeholders (Irwin et al, 2018), some with competing interests, was also seen as a pathway to increased trust in the reported information. The derivation of indicators was guided through a community visioning activity involving community, environmental and indigenous groups (McIntosh et al., 2014). During each annual report card cycle a large volume of monitoring data were generated which required efficient management and error free analysis at the end of the monitoring period. Scientific rigour and transparency was critical which required a system that tracked data capture through to use and all actions by those who handled the data as well as all algorithms and code used to transform measures into grades. To address this need, a tailor-made data and information management system (DIMS) was required, with development starting when the monitoring began and took four years to be fully operational. In this study, using Gladstone Harbour as a case study we provide evidence of building SLO in a multi-use area.

Body

Four factors contribute to a SLO: economic legitimacy, socio-political legitimacy, interactional trust and institutionalized trust (Fig. 1A) (Boutilier and Thomson, 2011). The stronger these four factors, the greater the SLO, potentially reaching the point where the community and stakeholders have a sense of co-ownership of a project or entities' activities. The events of 2011 eroded community faith in industrial users of Gladstone Harbour and those bodies that oversaw their environmental and social performance. But in the absence of a single project or company to focus upon, it was recognised that all Gladstone Harbour stakeholders had to cooperate to rebuild community confidence with the Gladstone Healthy Harbour Partnership (GHHP) launched on 6 November, 2013. Founding members included industries that operated within Gladstone Harbour; local, state, and federal governments; government owned corporations, community organisations including traditional owners, research organisations and universities, providing diverse views about priorities and needs.

Boutilier and Thomson (2011) disaggregated the abovementioned SLO factors into fifteen statements (Fig. 1B) which measure trust, legitimacy, credibility and perceived benefits. One of the most critical statements, and one that contributes to the most powerful SLO, namely institutionalised trust, is sharing of relevant information. GHHP adopted the strategy of reporting on harbour health using a Report Card, an information communication tool increasingly used in numerous sectors (Bunn et al., 2010; Dauvin et al., 2008). Moreover, by grading sociocultural, economic and environmental performance, it could inform discussions about complex trade-offs (Benham, 2017). Good governance is also important to obtain community support (Moffatt et al 2017), so an Independent Science Panel (ISP) was formed comprising relevant expertise in water quality, ecology, oceanography, biodiversity, social sciences and harbour operations.

The ISP oversaw expert teams contracted to design, monitor and report on harbour health in specialist areas. With water quality and sediment data, field measurements are related to Queensland Government Department of Environment and Heritage (DEH) water quality guidelines and further broken down into geographic zones based on boundaries designed by the DEH. Other environmental assessments are conducted for ecosystems (seagrass, coral and mangroves) as well as for fish and mudcrabs. Social grades comprised community survey results integrated using Bayesian analyses to relate data to community satisfaction on Harbour usability, access liveability and wellbeing. Cultural indicators measured sense of place and indigenous cultural health. Economic data was related to historic performance based on shipping, tourism and commercial fishing, economic stimulus and the value of recreation.

To enable this Report Card, a Data and Information Management System (DIMS) was built by combining open source and bespoke software (Figure 2). This DIMS ingests raw, and highly diverse, field data uploaded via the internet from disparate organisations, including environmental measurements, fishery, shipping and regional economic statistics, biodiversity assessments, social and cultural survey results. Automated checks during the upload process ensures properly structured data files are ingested after which validation scripts more deeply check dataset contents and validity of individual points. In some cases, datasets are visualised for inspection by experts. Once data gathering is complete and each provider endorses their data, a central administrator initiates integration of data using multiple discipline-specific models to produce Report Card grades. The system also tracks data provenance and treatments, as well as algorithm versions for the various, and mathematically diverse, models.

Chosen indicators were representative, easy to interpret, comparable to other locations, able to show major changes, relatable to a reference or threshold value and data collection was likely to be enduring. Indicator selection process was further guided by a range of qualitative models developed for various environmental assets in Gladstone Harbour (Dambacher et al 2013). After a pilot Report Card in 2014, four subsequent Report Cards and associated community consultations, have increased coverage and improved indicators and score calculations. To aid readers, confidence in each grade was assessed by the ISP on a three - point scale (low, moderate and high) by assessing indicator appropriateness, number of missing indicators, adequacy of sampling designs and the availability, completeness and quality of the monitoring data.

Each year the launch of the annual Report Card is accompanied by a detailed technical report, interactive website and a range of factsheets. Links to these resources are posted to traditional and social media fora followed by intensive community engagement. Communication continues to occur throughout the year to improve understanding of the Harbour health, how it is managed and the outcomes of that management. Materials focusing on harbour health, stewardship and environmental monitoring are also provided for teachers to educate local school children and three story books have been published that target children below the age of 10. Together, this increases the broader understanding of the Harbour, how Harbour users operate and strive for continued improvement in sociocultural, economic and environmental performance.

Discussion and results

One of the most dramatic indicators of environmental health is the appearance of disease and other disorders in resident biodiversity, often called sentinel species (Bossart, 2011; Kwan et al., 2018). When these indicators appear in species easily observed by people, such as fish captured by fishers, news of potential issues spreads quickly and can trigger strong community reactions (Messer et al., 2015). This is what happened in Gladstone in 2011 coincidentally with a period when numerous developments were underway or planned within an already busy harbour. When fishing was banned, community questioning intensified of the management and stated benefits of developments that were already underway or had been completed. This indicated that industrial development generally, and not solely specific projects, had lost its SLO as well as diminishing trust in the institutions, and their processes, which managed development approvals and ongoing compliance.

In response, numerous stakeholders cooperated to report on the socioeconomic, cultural and environmental health of the common user Gladstone Harbour despite the risk of it generating negative reports. Evaluating the success of the Partnership and Report Card is difficult but some indications exist that attitudes towards Gladstone Harbour have changed since 2011 when significant media activity and community expressions of concern were rampant. Internet searches for Gladstone Harbour from within Australia have shown a clear downward trend since 2011 with minor peaks in activity near GHHP Report Card releases and follow-up communications (Figure 3A). Likewise, several questions used to generate social and cultural health scores for the Report Card (e.g. relating to 'sense of place') have parallels to questions used by Boutleier and Thomson (2011) to quantify SLO (Fig. 1B) and show an improving trend in recent years (Figure 3B) indicating the quality of community ownership of Gladstone Harbour is improving..

Summary and conclusion

The GHHP uses a Report Card to enable diverse stakeholders to understand a region of common interest and allow “apples-to-apples” comparisons. It tailors reporting to the user, providing reliable summary grades for ease of communication to a broader audience but also enabling access to underlying detail increasing transparency and robustness of both data and derived interpretations to build community trust. Critical to the Report Card was scientific quality and an underlying data management system that tracks data capture to use and archiving, along with all algorithms and code used to generate statistical outputs, so all manipulations are available for examination if desired.

The Report Card alone is not sufficient to build and maintain a SLO. Continual and targeted communication is even more critical to ensure it reaches the right audiences, both locally and non-resident, and ensure it is understood and trusted. The approach described here is not a panacea for rebuilding or developing a SLO but it provides a solid foundation by providing understandable and unbiased reporting verified by scientific rigour and independence.

Conflicts of interest

All authors have been involved with the GHHP in a variety of forms. LL has conducted research projects for the Partnership. RB, BS, NM and JR have all been or remain members of the Independent Science Panel with JR also being its Chair since November 2016. UP and EM have previously been employed by GHHP.

Acknowledgements

The authors acknowledge a large number of people and organisations that contribute to the GHHP, its Report Card and other communication materials used to inform the Gladstone community. Numerous providers of data and model codes are critical to the production of the Report Card. All members of the GHHP and the members of its Independent Science Panel have been critical to the ongoing success of the Partnership and the quality and veracity of its Report Card. Details of organisations and individuals involved in GHHP and its Report Card can be found at www.ghhp.org.au.

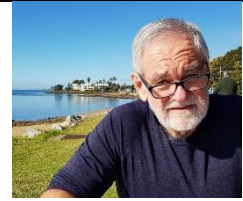
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Biographies

Dr. Lyndon Llewellyn gained his PhD in marine biology from University of Queensland, followed by additional training in analytical biochemistry (Uni NSW) and molecular pharmacology (Yale Uni). Starting out in biotechnology research at the Australian Institute of Marine Science, his interests and roles have moved towards data science, policy and impact. Along the way, he has led multi-organisational (government, industry) projects on e-research, technology development (biosensors), biodiscovery and marine ecotoxicology (using both biomolecular tools and model organisms). An author of over 100 publications as diverse as a book, book chapters, journal articles, industry reports, patents and eTools, he has been a peer reviewer for numerous granting agencies and journals covering disciplines as varied as analytical chemistry, biochemistry, toxicology, microbiology and biomedicine.



Dr Richard Brinkman leads the Sustainable Coastal Ecosystems and Industries in Tropical Australia Research Program at the Australian Institute of Marine Science, Townsville, Australia. Richard is a physical oceanographer/numerical modeller with a background in applied environmental fluid dynamics and significant expertise in conducting observational and modelling based research on Australia's tropical coasts and marginal seas. He has strong experience in identifying research needs of stakeholders to deliver outcomes that benefit their operations, and has delivered projects for clients ranging from state and federal government agencies, natural resource management bodies, and a range of industries with coastal and marine interests. Richard's research interests fall within the broad topic of coastal oceanography with a focus on coupling shelf and ocean circulation, sediment dynamics on tropical coasts and physical-biological interactions at regional and local scales. His emphasis is always on delivering scientific outputs that are accessible, usable and impactful to end-users.



Dr. Emma McIntosh has a PhD from the University of Oxford where she evaluated the effectiveness of biodiversity conservation interventions. Emma's PhD studies were supported by a prestigious General Sir John Monash Foundation Scholarship. Emma was Science Convenor with the Gladstone Healthy Harbour Partnership from 2012-2014. Emma is a member of the Society for Conservation Biology and Royal Geographical Society and was Early Careers Representative in South-East Queensland with the Environmental Institute of Australia and New Zealand.



Dr. Nadine Marshall is a senior social scientist with CSIRO, Land and Water. She did her Honours degree in marine biology at the University of Melbourne, her Masters degree at Monash University in ecology, and then completed her PhD at James Cook University within environmental social sciences. Her current research attempts to better integrate the human dimension into natural resource management. She has written over 100 papers on the subject, and been cited by over 3,000 people. Nadine has held various formal advisory positions with industry and local, state and federal governments including the Fisheries Research and Development Corporation, Queensland Fisheries Research Advisory Board, Gladstone Healthy Harbour Partnership, Gas Industry Social and Environmental Research Alliance, Townsville Local Marine Advisory Committee for the Great Barrier Reef Marine Park Authority, Queensland Natural Resource Management organisations, as well as holding editorial positions with journals such as *Frontiers in Ecology and the Environment*, *Ecology and Society*, and *Anthropocene*.



Dr. Uthpala Pinto is an Environmental Scientist at NSW Office of Environment and Heritage. Uthpala was a Science Project Officer at Gladstone Healthy Harbour Partnership and involved with the production of five report cards. He completed a PhD at the University of Western Sydney titled 'Development of Indicators and Framework for Assessing River Health in Peri-urban Landscape'. He has authored over 20 research publications and contributed significantly to various aspects of freshwater health of the Hawkesbury-Nepean River system in NSW and indicators of environmental and social health. His research interests are in environmental anthropology, river health, catchment and wetland health, tools for predicting and monitoring water quality and soil quality, adaptive management strategies for water cycle management, community aspects of water resources and reuse of water. He is a member of the Project Management Institute Australia and Golden Key Honour Society Australia.



Professor John Rolfe is a resource economist who has specialised in the use of choice modelling and other non-market valuation techniques. John is Professor of Regional Economic Development at CQUniversity, and a fellow of the Academy of Social Sciences Australia. He has a number of research interests, including regional development, environmental, resource and agricultural economic issues, resource trade-offs, and economic impact assessment in regional areas. John has been a member of the Independent Science Panel for GHHP since its inception and its Chair since November 2016.



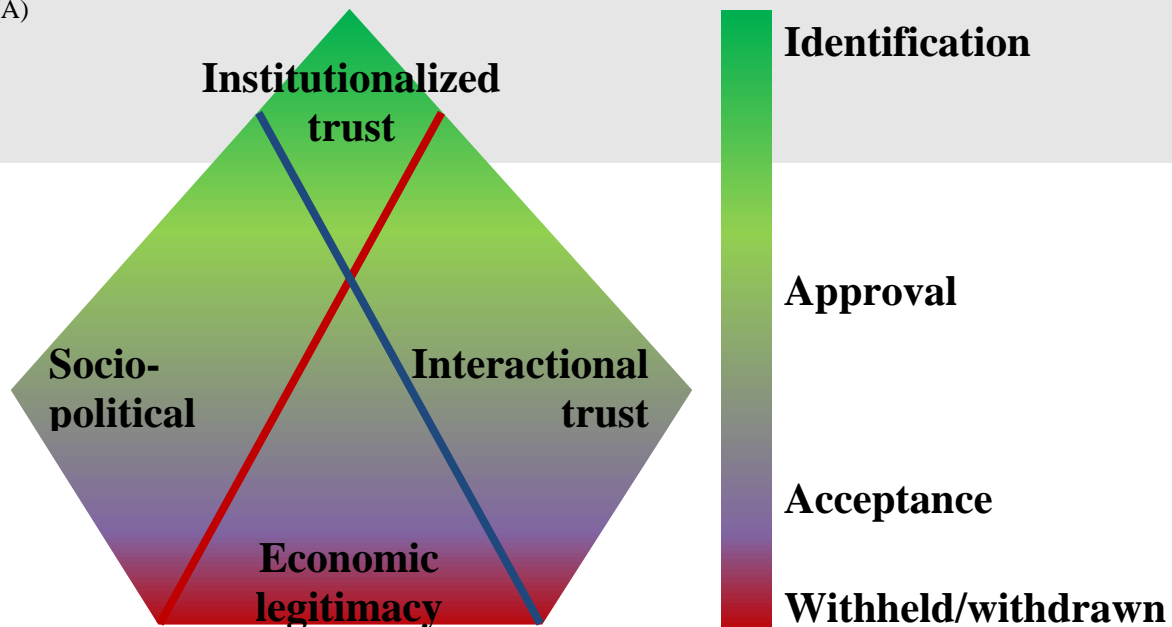
Dr. Britta Schaffelke holds a PhD in Biology from the University of Hamburg, Germany (1993) and has over 25 years of professional experience, spanning marine research, science leadership, environmental management and knowledge exchange. Since 1995, her work has focused on the Great Barrier Reef, specifically on the interface between science and policy for the management of environmental impacts. Britta is currently the Research Program Director A Healthy and Resilient Great Barrier Reef at the Australian Institute of Marine Science. Britta is a member of the Australian Government's Reef 2050 Plan Independent Expert Panel, the Fitzroy Basin Association Partnership for River Health Independent Science Panel, the National Environmental Science Programme Tropical Water Quality Hub Science Advisory Committee and the Steering Committee of the Reef Restoration and Adaptation Program.



Figures

Figure 1 Model of SLO after Boutilier and Thomson, 2011. The arrow head figure depicts the proportion of the four factors which contribute to the scale of the SLO possessed by a project or company using the right hand colour scale. The table underneath lists the fifteen yes/no statements that can be used to quantify an SLO modified to reflect application to Gladstone Healthy Harbour Partnership (GHHP) and its members.

(A)

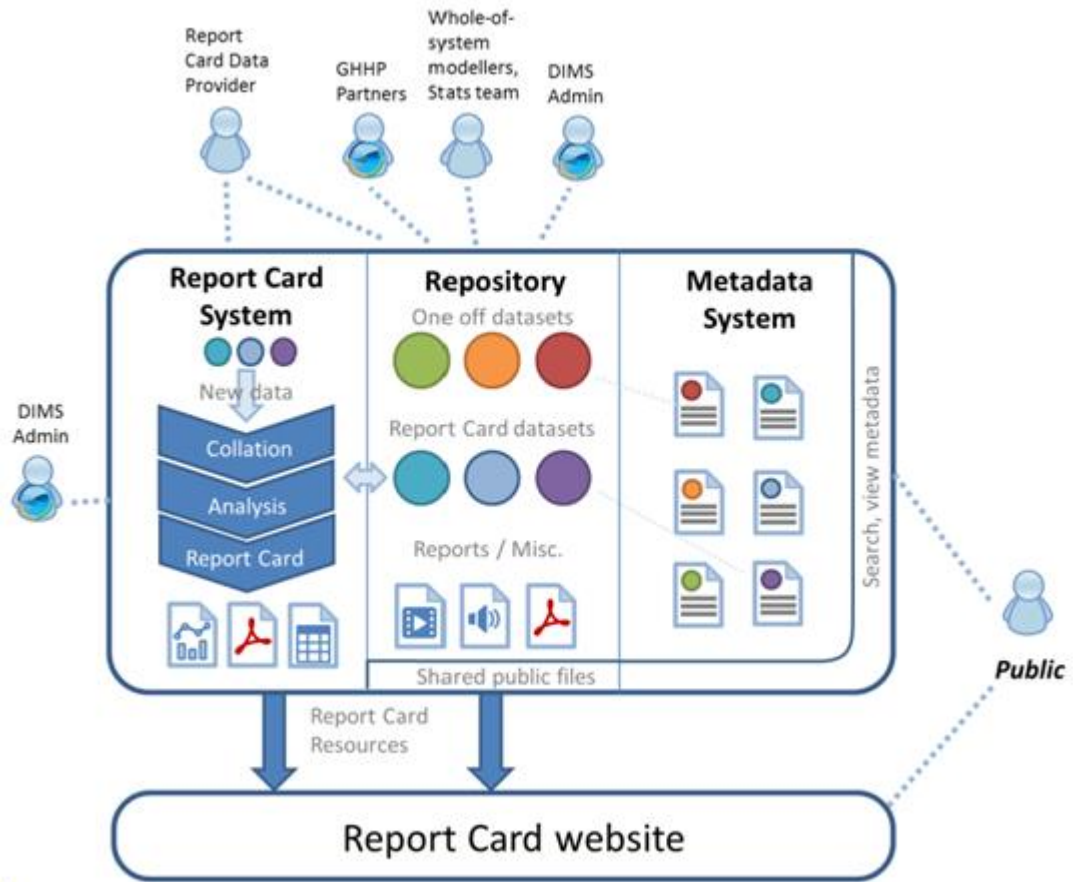


(B)

Factor	Definition	#	Yes/no measurement statements
Economic legitimacy	Project or entity offers benefit to community/stakeholder	1	We can gain from a relationship with GHHP members
		2	Cooperation with GHHP members enables us to reach our most important goals
Interactional trust	Project and company proponents and managers listen, respond, keeps promises, engages in mutual dialogue and exhibits reciprocity	3	GHHP members do what they say they will do
		4	We are very satisfied with our relationship with GHHP members
		5	The presence of GHHP members are a benefit to us
		6	GHHP members listens to us
Socio-political legitimacy	Project or entity contributes to regional well-being, respects local way-of-life, meets societal expectations, acts fairly	7	In the long term, GHHP and its members make a contribution to the wellbeing of the whole region
		8	GHHP and its members treat everyone fairly
		9	GHHP and its members respect our way of doing things
		10	Our organization and GHHP members have a similar vision for the future of this region
Institutionalised trust	Enduring regard for each other's interests between community/external stakeholders and project proponents/company management	11	GHHP and its members gives more support to those who it negatively affects
		12	GHHP members share decision-making with us
		13	GHHP and its members take account of our interests
		14	GHHP members are concerned about our interests
		15	GHHP and its members 'share information relevant to us.

Figure 2 (A) High level design of the GHHP Data and Information Management System (DIMS) and relationship to different user groups. (B) Workflow for data ingestion and Report Card generation

(A)



(B)

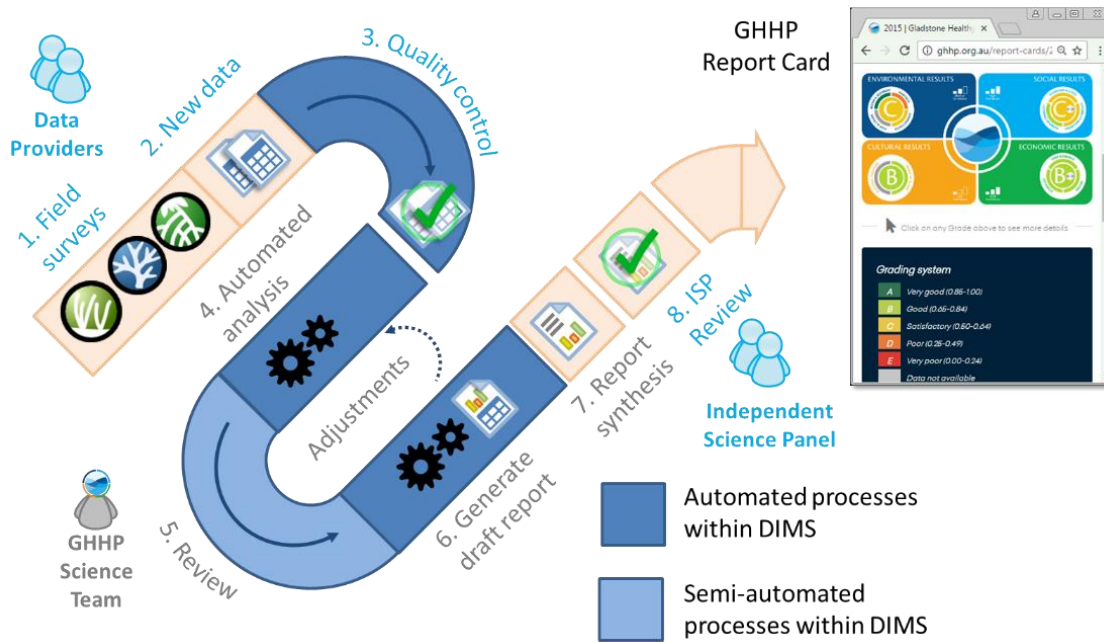


Figure 3 Community responses to GHHP Report Cards and attitudes towards Gladstone Harbour. (A) Timeline of major events in GHHP history overlaid with Google search activity originating from Australia for “Gladstone Harbour”. Events indicated are: ①: fishing ban by Queensland government (16 Sep - 6 Oct 2011) in response to reports of diseased and disfigured fish and crabs; ②: announcement of establishment of the GHHP (6 Nov, 2013); ③: release of pilot Report Card (4 Dec 2014); ④: 2015 Report Card release (1 Feb, 2016); ⑤: 2016 Report Card published (2 Feb, 2017); ⑥: 2017 Report Card announced (13 Feb, 2018). Note that every April, Gladstone is the destination for an annual yacht race starting in Brisbane (B) Change in average scores from surveys of 400 Gladstone community members for the depicted questions. Those time series where there was statistically significant change between the survey responses between 2016 and 2017, and 2016 and 2018, are depicted by ▲ and ✦, respectively ($P < 0.05$, Students 2-tailed t-test).

