



Science for Communities



EXPLORING ESR'S EMERGING FUTURES

DECEMBER 2017



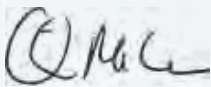
INTO THE
FUTURE

ACKNOWLEDGEMENTS

The Future Trends Working Group was commissioned by ESR Chair, Dr Denise Church, the Board and Chief Executive Officer who have maintained a close interest in how the findings will impact upon the future form and function of ESR. The Strategic Leadership Team (SLT) and its members have contributed regularly in shaping the outcomes of this and the allied strategic work undertaken contemporaneously. Dr Norman Chorn of BrainLink Group brought us the methodology, his experience and generous guidance to implement the methods used.

Many thanks to the Future Trends Working Group members who were nominated by their various General Managers as forward thinkers: Dr Virginia Hope (Chair); Dr Craig Billington; Gavin Jolly; Nicole Moore; Jymal Morgan; Dion Sheppard; and Seamus Watson. Assistance has been provided by Jolene Philips, Dr Jill Vintiner, Bruce Peddie, Lynne St.Clair-Chapman and Jenny Ralston.

Thanks also go to ESR's Tier 2 and 3 Managers for engaging in workshops and their open approach, enthusiastic discussion and contributions.



Dr Keith McLea
Chief Executive Officer

FOREWORD

ESR provides the core scientific intelligence underpinning government policy and responses for many threats to health and society.

In order to best prepare to serve our clients and society into the future, ESR needs to develop a realistic view of the future in an environment of very relevant and dynamic technological and scientific change.

Exploring ESR's Emerging Futures informs our 'ESR into the Future' programme and provides this perspective for our business planning processes and to provide clarity to our stakeholders as we move forward. It identifies emerging trends and uncertainties and their implications for the work we do, the timeframes and key foci for response and the core capabilities and initiatives we need to develop.

We are excited and optimistic about the opportunities that changes will provide and the future that we see emerging for ESR and for New Zealand.

CONTENTS

1 EXECUTIVE SUMMARY	2
2 BACKGROUND	3
Future Trends Working Group	3
3 CHANGE IS COMING	4
4 OPERATING IN THE FUTURE WORLDS	8
5 HOW CAN ESR RESPOND	12
6 NEXT STEPS	14
7 APPENDIX 1	15
Process	15
Methods	15

Figure 1
The four worlds 9

Figure 2
PORT Analytical process 9

Figure 3
Key characteristics of the environment presented
by each potential world 9

Figure 4
ESR's strengths in each potential world 10

Figure 5
ESR's potential weaknesses in each potential world 11

Figure 6
Capabilities to develop 13

1 EXECUTIVE SUMMARY

The role of science organisations is going through a period of remarkable change. Disruptive technology, revolutionary advances in science and the development of high throughput instrumentation are altering the way scientific work is carried out and how it will look in the future.

This report, prepared by the Future Trends Working Group, examines the key disruptive global trends facing ESR and explores the challenges and opportunities of preparing the organisation for long-term sustainability.

To determine how best to prepare ESR for an unknown future **four alternative future-world scenarios** were developed. The future-worlds were opposing views defined by two key influencing variables that have the greatest potential to impact on ESR: knowledge and relationships.

Knowledge represents a continuum of access to IP from open and available, to closed and restricted. Relationships represent a continuum of business interactions from transactional to strategic. As a result the four future worlds became: **closed and transactional, closed and strategic, open and transactional, and open and strategic.**

Using this matrix, ESR's current and future capabilities were explored to determine the ideal organisational requirements needed to flourish, independent of the actual future state.

As a result eight critical capabilities were defined:

1. Build external strategic relationships
2. Provide intelligence for community and environmental health
3. Develop strategic leadership for coordinated responses
4. Build deep expertise and organisation knowledge management
5. Use agile resource allocation and project management
6. Develop global connectivity and scale
7. Exploit profitable commercialisation opportunities
8. Build strong Vision Mātauranga and Māori cultural awareness

Each of these capabilities will need to be further developed to help ESR move into the future with greater ease and success. In addition, this work sits within the wider context of activities being undertaken as part of the ESR into the Future programme and the complementary strands of work in progress.

The future world that we will find ourselves in may be unknown, but we do know that expert science will form an essential component of how tomorrow's communities stay **safe, healthy and prosperous.**



2 BACKGROUND

Disruptive technology change and the rapid progression of science present both a challenge and an opportunity for ESR. This disruption provides new opportunities for the type of organisation we could become and the range of services we could seek to deliver. But, equally if ESR does not thoroughly examine how to take advantage of these opportunities, our current way of working could be under threat.

The drivers for change are external to ESR and beyond our control, so understanding what is coming and preparing the organisation to respond to them is essential to our long-term sustainability.

To help identify the drivers for change and to understand the potential impact on our business, ESR established the Future Trends Working Group.

Key amongst the group's terms of reference were:

1. Identify the key disruptive trends that ESR is facing
2. Research and analyse these trends to describe and model the potential impacts on ESR
3. Understand how other successful organisations are approaching disruption
4. Construct 3-6 scenarios describing what these could mean to ESR, its services, its clients and stakeholders
5. Prepare a discussion document and present the findings to the ESR Senior Leadership Team (SLT)

In considering what the future might look like for ESR, the organisation needs to consider the impact of several major, potentially disruptive trends. Developments in genomics, big data, data science and the miniaturisation of technology are some examples of evolving developments that have the potential to significantly disrupt the way ESR provides services to its clients. These present both opportunities and threats, and can be used to help shape our business and inform key investment decisions.

ESR's financial turnaround in recent years has put the organisation in a strong position to increase its investment in new areas of science and technology. Underpinning ESR's financial performance has been a careful approach to our investment decisions, largely focussing on equipment and research that provide immediate (Horizon 1) benefits to our clients.

With a stronger balance sheet and facing a period of uncertain disruptive change, ESR is now in a position to make larger deliberate investments in capability, research, and / or equipment that will better secure a prosperous future. ESR has the opportunity to **"change before we have to"**.

In order to remain relevant to our clients in our role of keeping New Zealanders safe, healthy and prosperous, we need to be at the forefront of a response to disruptive changes to our operating environment, maximising the opportunities that these will present, and understanding and responding to threats that emerge.



FUTURE TRENDS WORKING GROUP

The Future Trends Working Group was led by Dr Virginia Hope, ESR's Medical Director of Health, and contained representatives from each of the key areas of the ESR business.



Group members included Gavin Jolly (IMSG), Dr Craig Billington (Environmental Science), Nicole Moore (Health), Jymal Morgan (Commercial), Seamus Watson (Environmental Science), and Dion Sheppard (Forensic).

The group members provided a diversity of opinions that not only represented their individual areas of science but also the insights of the potential future direction that each area of science could take. The range of employment tenures and

stages of career also ensured that the key question about how the future might impact on ESR and our opportunities to embrace this coming change were examined from all possible angles.

Supporting the Group was the mentorship of Dr Norman Chorn, independent consultant from Brain Link. Dr Chorn's role was to provide guidance and methodology input as well as support the liaison with ESR's senior management and the Board.



3 CHANGE IS COMING

Globally, science is going through a period of significant change due to factors including revolutionary advances in digital technology and high throughput instrumentation.

These developments will alter the way scientific work is currently being carried out and how it may look in the future.

While ESR is unique in the services and expertise we provide to the New Zealand community, we are not exempt from the effects of these changes. In the past, we may have relied on our relationships and/or expertise in these areas being sufficient to keep pace with significant changes in the scientific environment. However, we recognise that in the future this may not be possible due to the scale and speed of change and so we need to prepare for these scenarios now.

The technological challenges that have affected us in the past or that affect us today will be less of a concern in the future. In this era of social media, easily accessible information and open data, people will be empowered to take ownership over the information regarding their health and wellbeing, food safety, environment and crime in their communities. We believe that science in New Zealand tomorrow will look very different to what it looks like today, and we believe ESR will be better positioned to adjust to these revolutionary changes underway as a consequence of the programme of work which has been completed and described in this document.

This section describes some external trends and key uncertainties which were identified and we believe will drive the need to make significant changes to our organisation.

EXTERNAL TRENDS

A number of potentially disruptive global trends and sub-themes were identified which will likely influence the way that ESR will operate in the future and these are highlighted below.

- Rapid technological change or revolution
 - Automation
 - Miniaturisation
 - Increasing mobility
 - Artificial intelligence and machine learning
 - Big data and data analytics
 - Advanced digital capability incl. social media, digital crime, block chain certification, virtuality, the Internet of Things
- Rapid contemporaneous and inter-linked development of core sciences
 - Remote monitoring
 - Data sciences
 - Rapidly emergent new applications based on emerging technologies e.g. bacterial data storage.
- Data sharing
 - Transparency
 - Open datasets
- Changing economic models
 - Subscription models such as My Food Bag and Netflix
 - The Giga-economy
 - Competition through delivery to emergent needs
 - Social investment models

- Social trends and changing norms
 - Diversity
 - Changing expectations and changing ideas of 'community'
 - The growth of collaborative approaches
 - Terrorism

- New methods of teaching and learning

Through analysis and grouping of these external trends and discussion of the implications each has on the future operations of ESR, several megatrends emerged:

- **Mutualism and alliance:** we need to work even more closely with our clients and consumers
- **Adaptable and responsive – cutting to the chase:** we must be highly focussed on the most highly prioritised requirements of our clients and identify and respond rapidly to emergent needs
- **Power to the people – and other clients:** we need to recognise and address the increasing engagement of consumers in every aspect of our work and the opportunity to work collaboratively with consumers more broadly to best serve our clients
- **Capability revolution – science and beyond:** whilst the trends that will impact us drive rapid scientific capability change, our non-science capabilities must also evolve quickly
- **Culture – highly empowered, highly accountable:** our staff will be working more directly with clients and consumers and must therefore be both empowered and accountable in terms of alignment with ESR's strategic direction.

KEY UNCERTAINTIES

Although we recognise that these trends will significantly change the world in which we operate, a number of key uncertainties exist and affect our ability to determine the timing and extent to which these trends will influence our business and services.

These uncertainties are catalogued below:

→ Science and services

- To what degree our effort will be on generating laboratory outputs in contrast to creating wisdom and evidence from existing and new data sources to inform decision-making and action
- The extent of a move from gold standard reference laboratory testing to fit for purpose testing
- The extent to which our 'expert' knowledge can be digitally codified and therefore replaced or shared
- The degree to which mobile point of use devices will be used for analysis in the field

→ Technology

- The extent of the pervasiveness of miniaturisation, new device development and changes in personal computing
- The impact on our work of artificial intelligence, machine learning and rapid prototyping
- Impact of pervasive internet connectivity of devices (Internet of Things)

→ Society

- The degree of focus required on response in contrast to prevention or recovery
- The degree of the need to 'disrupt' processes such as disease patterns, environmental harm and the escalation of crime

→ Demography

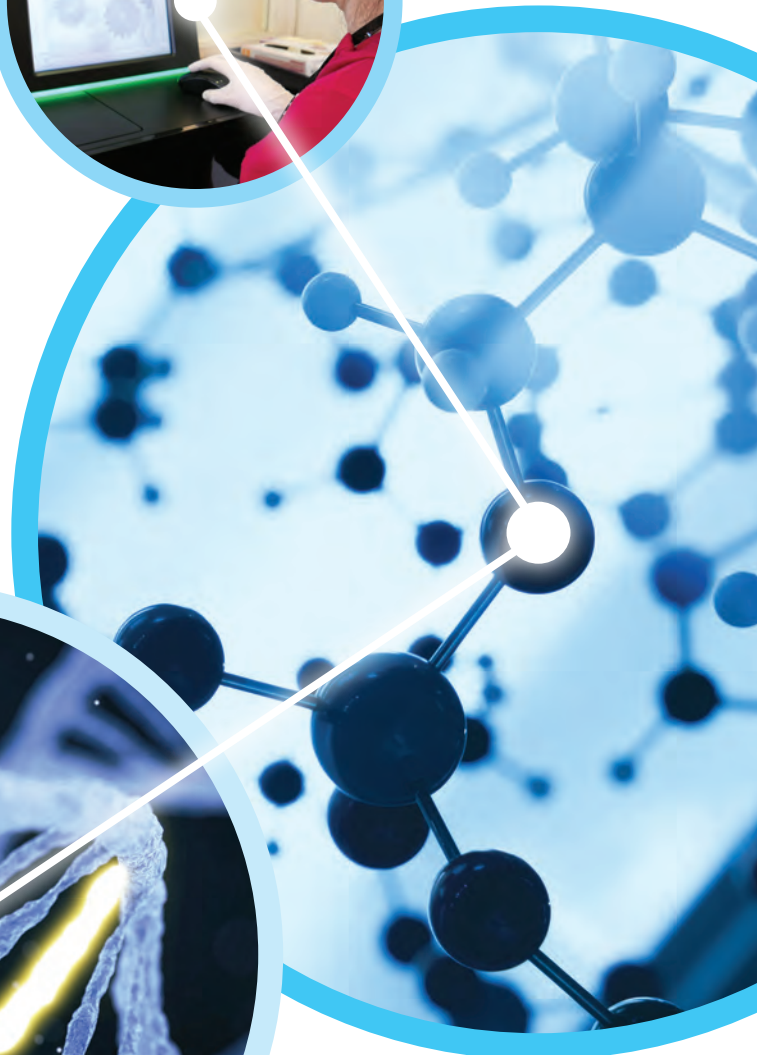
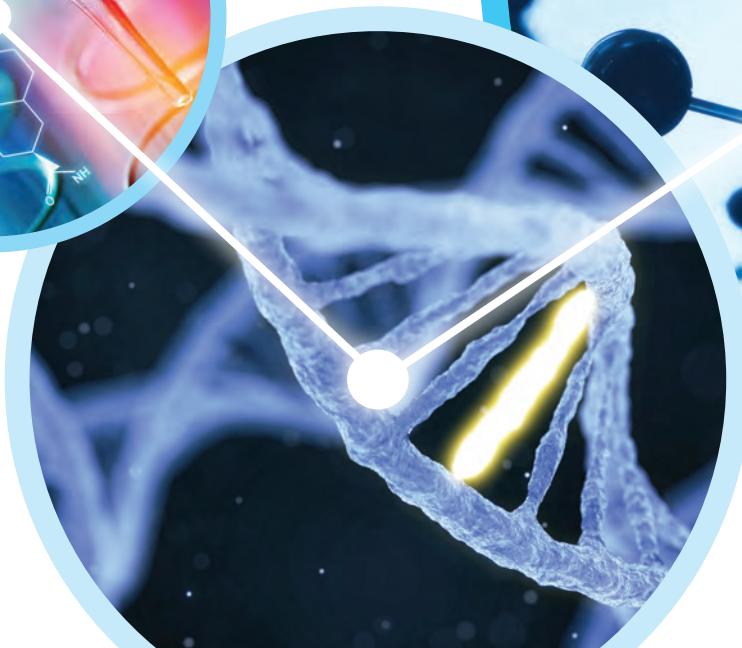
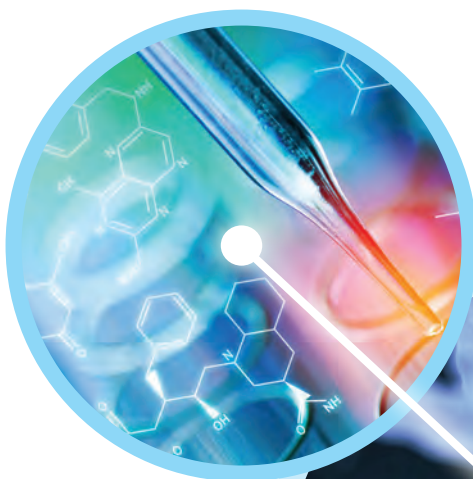
- The impact of the changing role and power of the consumer
- The rise of citizen science and the Internet of Things

→ Government, Business, & Political

- The future configuration of budgets and other revenue streams
- Political drivers including policy change and an increasing focus on social investment
- The degree to which there is a match between our future capabilities, our profiled capability and market need

→ The Unknown

- We will not be able to predict 'black swan' and other unknowable events
- The overall pace of change in multiple interdependent fields may create paradigm shifts not yet envisaged.



SCENARIOS FOR ESR

Taking our trend information and the underlying evidence into account, the FTWG and Strategic Leadership Team developed a number of statements about the future to guide our planning:

1. From classical microbiology to point of use metagenomics in 5-6 years.

Classical reference microbiological testing will be replaced by whole genome sequencing (WGS) of cultured isolates over the next 1-3 years and then subsequently by specialised metagenomic testing of primary specimens at point of use within 5-6 years. The speed of transition will be dependent on the pace at which current experts can be retrained as both sets of knowledge are relevant in this transition phase. Classical microbiology will become a smaller reference level activity focussed on emerging infectious diseases and in-depth (project-based) investigation.

2. Alternate forms of evidence will reduce the need for laboratory testing within 2-5 years.

Current 'laboratory grade' results will not generally be essential for police, environmental or health in 5 years. More outcomes will be achieved through non-traditional means of gathering evidence for policing, environment and health (field sensors, remote testing, CIDT). Tests will be in real-time at scene of crime or point of care. Digital forensics, including data analysis, digital identity and encryption, will be a factor for almost every crime.

3. Point of use testing will facilitate real-time resolution in 2-5 years. Networked sensors are coming in 5-10 years.

Over the next 5 years, ESR will need to identify opportunities to use networked sensors to download information in environmental, health and crime settings. (e.g. chemical sensors, aptamers for meth detection and health monitoring). ESR will need to be actively involved in the standardisation of devices and device management.

4. Networked remote sensing will allow automated action which will follow within 10 years.

We anticipate that the further development of sensors and intelligent systems will facilitate automated action. For example, sensors will be embedded in distributed water supply systems enabling automated responses to disrupt pathways through which contaminated water could reach consumers. Pumping systems could then be switched off at the source of supply or in the distribution system in response to remote findings of E.coli contamination at any point in the system.

5. Real-time intelligence to and from new actors to disrupt disease and crime – an urgent need to demonstrate capabilities

ESR needs to develop ways to obtain information in real-time from distributed sources. Devices will become democratised. Scientific interpretation, communication and engagement will be a key foundation of competitive advantage as methods become more esoteric. This will be for the consumption of a wider (non-scientific) audience

than ESR usually addresses (e.g. 'experts at expert evidence') including citizens as first responders. Tools for visualising and presenting science will be a crucial component of this as will be the rapid adoption of new arenas for distributing our intelligence (e.g. social media rather than conferences). ESR will need to develop a presence in this space (e.g. Flutracker, Crime Scene Safe, Meth Calculator, GastroNet).

6. Information for action will replace surveillance as an endpoint within 2-4 years

Early warning systems providing information for disruptive action will require the development of surveillance into real-time, automated data reporting to point of use. Data analytics, surveillance informatics and predictive modelling will be crucial. Machine learning will need to be incorporated into our surveillance systems to support this. New sources of data will need to be incorporated. ESR will need to use the information it has and will have to create new value.

7. Some current products will be outmoded or saturate market in their current form

STRmix™ will meet market saturation in 5-7 years without further development. Other products that may meet market saturation or face other challenges include: WDT, PDS, and radionuclide testing.

8. Our knowledge management needs to change markedly in 1-5 years

Within 1-5 years, ESR will need to implement robust data science capabilities. This incorporates governance, learning and development, and management of source code and data. This will become a requirement to support our science outputs and will allow us to demonstrate provenance (including for bio-informatic analyses). Most of the world's code sits on Github. Such an arrangement will allow ESR to have a repository for our work, eliminate duplication, reduce the loss of work, protect our IP and allow others to validate our work. Some of this work needs to be done now or soon (bio-informatic coding).

9. End to end certification documentation will be required within 3-5 years

Within 3-5 years, specific ESR outputs, including food export certificates, will require full and verifiable supporting evidence using blockchain to demonstrate the end to end science value chain. This evidence will include reports, certificates, test details, machine certification, laboratory certification and verifiable date stamps for all events.

10. Prioritisation between and within these areas will require careful strategic and commercial analysis

We will need to consider audience, demand, public health good, and ability to replace and retain existing business and commercial viability in order to financially and chronologically prioritise these different directions for ESR. This could be linked to ongoing economic analysis of impact. Careful consideration will be required of the opportunity to benefit Māori and the Māori economy.



SCIENCE TO SUPPORT THE RESPONSE TO NEW RECREATIONAL DRUGS

There have been major changes in the nature, availability and use of different types of recreational drugs in recent years.

The continued emergence and chemical evolution of these drugs poses significant challenges internationally with enforcement and health agencies struggling to manage the impact of the harm caused.

ESR is at the forefront of approaches to identifying newly emerging recreational drugs and variants of existing drugs, mapping changes in the patterns of drug usage and contributing new science to inform society's responses to these changes. A key focus is the detection and surveillance of new synthetic cannabinoids and fentanyl analogues.



4 OPERATING IN THE FUTURE WORLDS

The FTWG's examination of the external drivers for change, megatrends and uncertainties analysis, supported the process of determining how ESR might prepare our organisation to best respond to the potential future operating environment.

The uncertainty of the future is a key aspect of this planning approach. As no one can accurately predict what the future will be it would be foolhardy to design a single-track solution.

To ensure ESR could consider a range of potential futures a scenario testing methodology was applied. The first stage of defining the future scenarios was to identify the two most significant Influencing Variables that could impact ESR. Through facilitated meetings with the ESR Strategic Leadership Team and Board the two main Influencing Variables were identified as the accessibility and ownership of knowledge; and the nature of the organisation-customer relationships.

These were defined as:

- Closed or open knowledge and intellectual property (IP)
Considers whether knowledge and IP will be held closely or centrally by a small number of experts and the degree to which it will become accessible, distributed and openly and widely held
- Transactional versus strategic relationships
Considers whether our relationships with clients and funders will be more transactional (output focussed with defined interactions and targeted exchanges) or strategic (collaborative, deliberate, tactical, calculated).

These two **Influencing Variables** have particular significance for how ESR will be required to operate in the future. As a science organisation we leverage complex intellectual property (IP) in the delivery of our services. The ownership and accessibility of this IP will have considerable influence on how we structure our business and how we respond to the needs of our customers.

When IP is held close and controlled by the organisation it provides an opportunity to monetise services built on this knowledge. However, this only applies to IP that ESR has access to and should key IP be held in a closed manner by other parties then the ability of ESR to increase its service offering could be significantly curtailed.

Open IP, or an open ability to utilise the knowledge, even if the core IP is unknown, enables a diversity of users as well as a diversity of uses.

This represents both a threat and an opportunity to ESR. In this environment, the core knowledge that underpins our current services would be available to competitors, but new knowledge that may support opportunities for ESR's expansion would be more readily accessible to our clients and end users.

As a Crown Research Institute (CRI), ESR relies on existing relationships and traditions to stay connected, trusted and relevant to our key government sector customers. Changes in the nature of the business relationships that ESR can develop will impact on the strength and stability of our existing relationships, and impact on the opportunity to forge new partnerships.

Transactional relationships enable targeted services with known expectations about price, volume and service but potentially restrict opportunities for growth. They also have the potential to weaken customer stickiness. The development of strategic relationships can support an organisational and customer win-win, deepening the understanding and the scale of the business relationship.

However, developing such relationships takes time and effort, and may result in expenditure that doesn't get a return or at least an immediate one.

These two Influencing Variables allowed us to identify four very different worlds in which ESR may find itself operating:

- Closed and transactional
- Closed and strategic
- Open and transactional
- Open and strategic

These four future world scenarios represent the extreme or opposing views for the two Influencing Variables. The actual future that ESR finds itself operating in may be any one of these worlds; it may be some blend of these worlds; or it may even be a combination of concurrent future worlds that vary for different service offerings or for different parts of the business.

By imaging these four opposing world views and examining each scenario we intend to identify the features that can be collated to address the true future world that will present itself.

The four worlds are depicted in Figure 1. The FTWG used a 'dining' paradigm as one analogy to help illustrate and differentiate their key features:

- **Closed and transactional:** where expert service is provided in a transactional setting (restaurant dining scenario)
- **Closed and strategic:** where expert service is provided in a context negotiated between the client and the expert (private dining scenario)
- **Open and transactional:** where service is provided by multiple potential providers in the context of a transactional environment (night market scenario)
- **Open and strategic:** where extended choice of service is available and the provision of service is the subject of negotiation between several providers and the client (Uber Eats scenario)

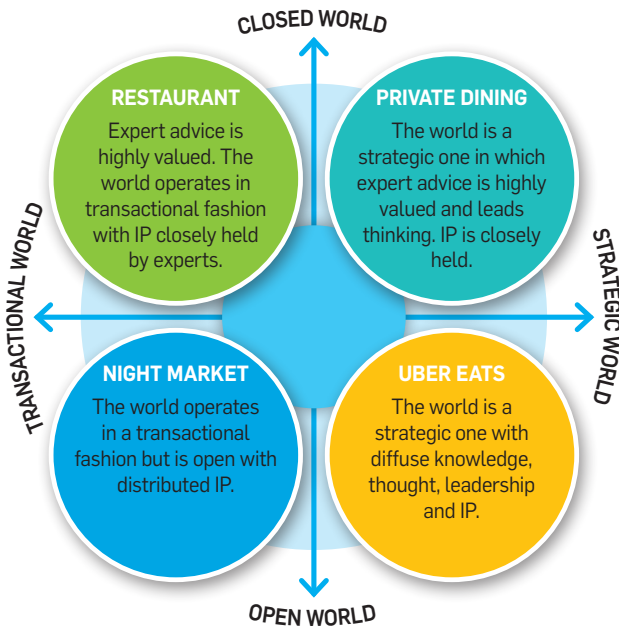


Figure 1: The four worlds

To understand the different environments of each of these worlds we assessed their key features using the rubric of **PORT**: people (including social and human resources), operating environment (including political, legislative and economic), resources (environmental, societal, knowledge) and technology (organisational, private and public).

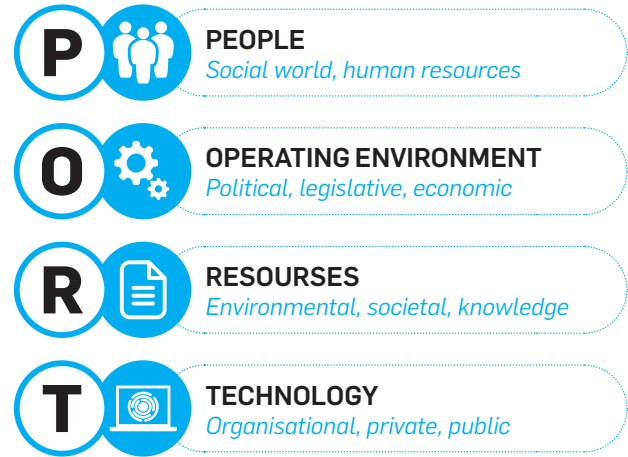


Figure 2: PORT Analytical process

The key characteristics of each of these potential worlds were explored in detail and is summarised in the following diagram.

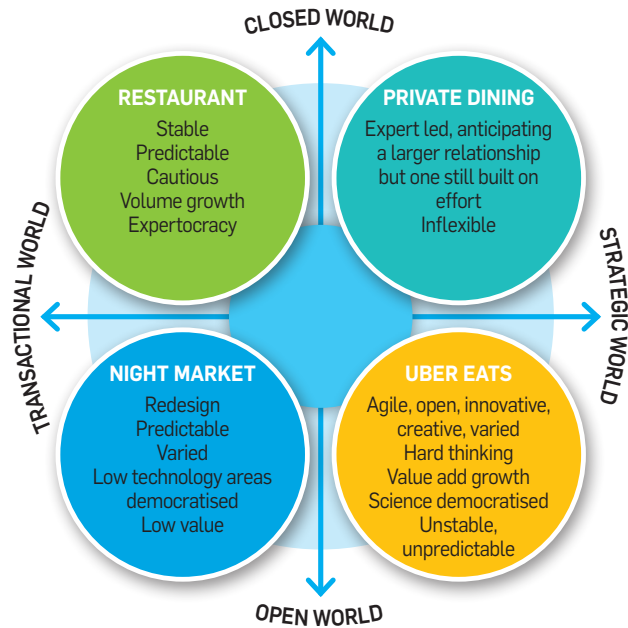


Figure 3: Key characteristics of the environment presented by each potential world

WIND TUNNELLING

ESR's ability to be a successful operator in each of these potential future worlds was then assessed to evaluate the organisation's readiness to thrive in the diverse conditions represented by these scenarios. This process of testing our readiness is referred to as wind tunnelling.

Wind tunnelling involved considering ESR's strengths and weaknesses – in its current model – if we were operating in each of these potential worlds. The organisational strengths and weaknesses are separately summarised at a high level in the following two diagrams.

STRENGTHS

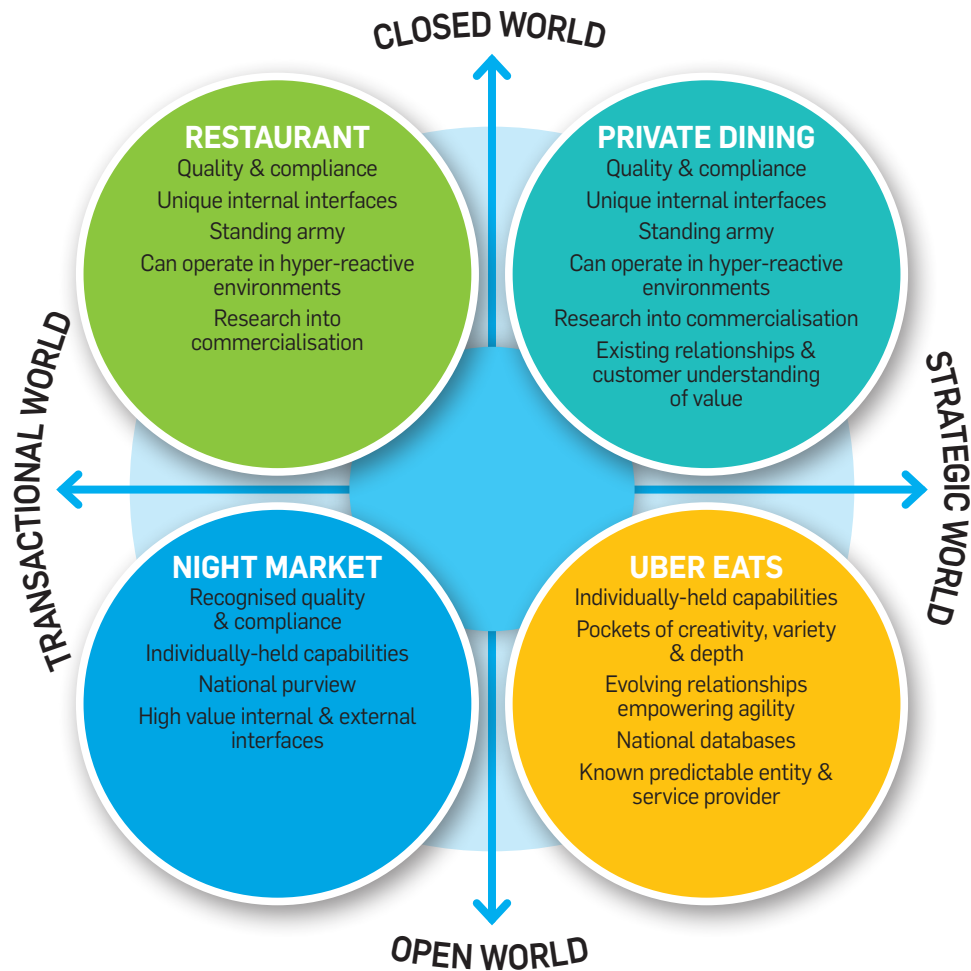


Figure 4: ESR's strengths in each potential world

ESR has a long tradition as a trusted provider of science solutions across the health, forensic and environmental science disciplines.

Underpinning our existing delivery are a series of key organisational strengths that places us in good stead for the future. At the cornerstone of our work is the commitment to quality which will be an essential component of however we deliver our services in the future. The high level of expert knowledge within the organisation provides the standing army of experts required for either of the closed world scenarios, and with the right support and structures this expertise can be effectively delivered in either of the open world scenarios. The depth and duration of current relationships will be essential no matter what the future world becomes, and the experience of developing these type of relationships with existing customers can be leveraged in either transactional or strategic environments.

WEAKNESSES

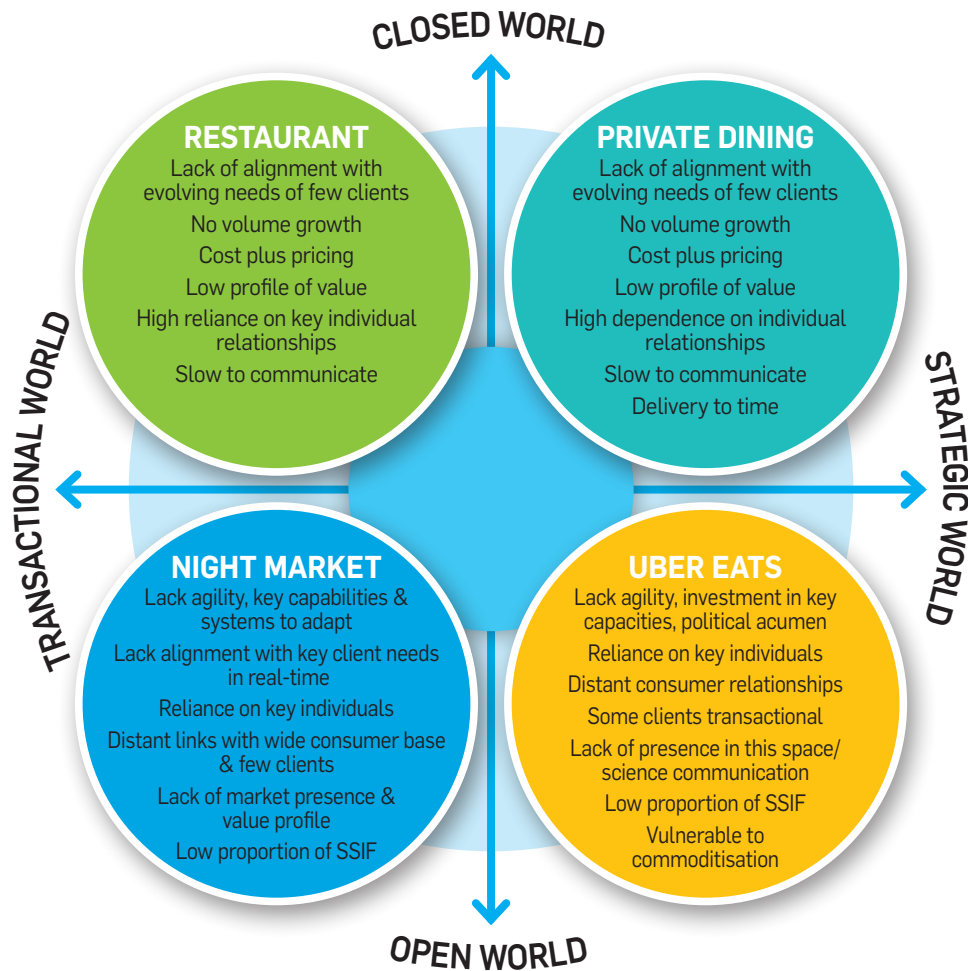


Figure 5: ESR's potential weaknesses in each potential world

ESR's greatest weakness in a time of rapid technological and scientific change, perhaps common to many scientific or government organisations, is our lack of agility.

External environments can change rapidly and an inability to respond, evolve and embrace the new opportunities that are presented will put the organisation at risk. Despite the longevity of existing client relationships ESR tends to be a fee for service provider in many of interactions. Initiatives will be required to manage and expand existing and future relationships to ensure we align with client needs and can be active participants in those more strategic future worlds. The increasing commoditisation of less complex science and science services is a further risk to ESR across some of our current service lines. Our proportionately smaller SSIF allocation when compared with other Crown Research Institutes and lower access to other sources for R&D funding is a limitation to staying ahead of the curve in developing responses to new opportunities or to replace superseded tests. This will be especially important for open future worlds where IP is less likely to be exclusively held.

5 HOW CAN ESR RESPOND

To meet the challenges posed by the four future scenarios identified, we have identified the capabilities required to prepare for success in each world.

Each world required a different approach and set of capabilities on the part of ESR. For example, a closed and transactional world would require different contract and operating arrangements from an open and strategic world. However, some capabilities are shared between worlds. It is important to note that these are organisational capabilities, not specific scientific capabilities which are considered separately. These capabilities were not assessed quantitatively and our work on these is complementary to work done in parallel by ESR's Grow Research Group.

CAPABILITIES

CLOSED AND TRANSACTIONAL WORLD

- Interagency regulatory and quality compliance and harmonisation
- Highly skilled people with a narrow focus
- Science communications
- Strategic relationship management
- Communications and profiling

CLOSED AND STRATEGIC WORLD

- Interagency regulatory and quality compliance and harmonisation
- Highly skilled people with a narrow focus
- Science communications
- Strategic relationship management
- Communications and profiling

OPEN AND TRANSACTIONAL WORLD

- Organisational agility – people and resources
- Can respond rapidly to changing environments and requirements
- Can develop and support accessible and quickly changing customer and public interfaces e.g. website content
- Rapid method development
- Market research for ES and Health

OPEN AND STRATEGIC WORLD

- Active management of organisational expertise and key capabilities
- Aggregation of like organisational capabilities
- Sector/ policy contextualisation
- Contextualised project and relationship management
- Science communication

Following consultation with ESR senior management and the board, the above capabilities were distilled into eight overarching key capabilities for ESR to develop.

DISTILLED CAPABILITIES



Figure 6: Capabilities to develop

Each of the capabilities shown in Figure 6 needs to be further developed to help ESR to move into the future with greater ease and success. Building strategic relationships with our clients and stakeholders will provide an important basis for building collaboration in new and/or existing areas of work, developing new work and also communicating clearly any development of existing work in the future. This will also allow for testing regimens, quality compliance and regulatory and performance standards to be developed and/or unified across common areas between different agencies. Changes in testing regimens with the adoption of disruptive technology techniques such as next generation sequencing and the production of big data may result in the focus of our work shifting from simply testing samples and reporting results, to providing useful intelligence on data collected by other parties.

In the future, communities or individuals may be empowered to take charge in the monitoring of their own health, community or environment but will need interpretation of its meaning, delivered in a format that is fit for purpose. Disruptive events such as outbreaks or natural disasters require co-ordinated responses, often across multiple disciplines and organisations. ESR is often involved in these events, particularly in the co-ordinated responses of outbreaks, but further development of strategic leadership in this area can only enhance how we respond in future events.

With the adoption of sequencing techniques, larger datasets will become available and need to be analysed efficiently to provide timely results to clients or collaborators. For this to occur a newer expertise in knowledge management will need to be developed across our organisation to understand how we incorporate different and much larger datasets together to provide more complete and cohesive answers when responding to our client's needs. ESR has proven to clients and stakeholders that we are good at responding in times of need when events such as natural disasters or outbreaks occur. This is due to our diverse and connected

skillsets across the organisation and our relationships with existing clients. However, during these times project management will need to be closely managed, alongside the reallocation and utilisation of people and resources by other areas of the business to provide a faster turnaround time on crucial work or developments. While ESR is unique in the array of services and work we provide in the setting of New Zealand, there are many other key players we could connect with internationally to collaborate with on projects, or gain insight into how we might be able to improve or enhance the work we currently do.

By working with larger international groups, ESR may be able to gain access to more research funding or projects, emerging technologies and different testing techniques which could enhance our service and research delivery. This may help us in gaining more visibility globally and enable us to increase the scale of the work and projects that we do. Some of the scientific research produced by our organisation is innovative, ground-breaking work that could generate initiatives to benefit New Zealand and revenue in the future. As shown by STRmix™ developed by Forensics, the opportunities need to be developed and taken opportunistically. As New Zealanders, Māori culture is an important part of our history and upbringing. In science we need to do better to develop a strong Vision Mātauranga and better awareness of Māori culture and the needs of the Maori economy. This means working more closely with iwi and the wider Māori community to develop and reflect greater awareness and relevance in research proposals and projects, as well as completing more work that focus on issues that affect them such as the health and wellbeing of their communities, food safety and protection of the environment. Scientists of Māori descent may be able to help provide better insight to ESR of what can be improved and developed further in these areas.



6 NEXT STEPS

This document provides greater detail on the work undertaken by the FTWG to augment references in ESR's strategic statement

There were some limitations of the project:

- The investigation has been a qualitative one. There is limited hard and fast quantitative data to inform a quantitative assessment
- ESR will need to monitor trends at least annually to continue to titrate the impacts that rapid change will cause change to the way we do business
- Although we have described four different worlds, ESR may need to operate simultaneously in each of these at the same time

Significant additional and complementary strategic work has been developed contemporaneously both at the organisational level and from the A3 strategy document.

These additional streams of work include:

1. The ESR into the Future Programme which incorporates and brings together all other strategic programmes and projects at organisational and Group level, led by Dr Jill Vintiner
2. The Property Strategy
3. The Grow ESR Strategy
4. The Science Strategy
5. The Technology Strategy
6. Annual business planning and initiatives
7. Organisational form review
8. Next Operating Model

The next pieces of work to transform the organisation to address the future scenarios focus significantly on several directions that are crucial for organisational change and preparedness:

- Mutualism and alliance
- Focus on the client and consumer/ end user
- Adaptability and responsiveness – cutting to the chase to solve customer challenges
- Capability revolution - organisational capabilities and individual competencies to ensure we are prepared for what might come. This includes the scientific capabilities identified by several projects
- Cultural change throughout the organisation to support empowered and highly accountable independent scientists

Given the pace of change, there is a requirement for this future watch to be on-going to support ESR in what will need to be a rapid pace of change. The FTWG will meet in some form in 2018 to review the work to date and progress against these strategic challenges.



7 APPENDIX 1

PROCESS

In order to explore emerging trends and their impacts on ESR, the Chief Executive appointed an internal 'Future Trends Working Group' in August 2017. This group worked with Dr Norman Chorn of BrainLink Group, an organisation with expertise in developing anticipation frameworks.

Key tasks for the Future Trends Working Group were to:

- Identify the key disruptive trends that ESR is facing
- Research and analyse these trends to describe and model the potential impacts on ESR
- Understand how other successful organisations are approaching disruption
- Construct 3-6 scenarios on what these could mean to ESR, its services, its clients, New Zealand
- Prepare a discussion document and present the findings to ESR's Strategic Leadership Team (SLT).

The FTWG worked alongside Norman Chorn and aspects of their work were be directed by him as well as by ESR's SLT. The Board also worked on ESR's anticipation framework and considered the inputs from the work of Brainlink and the FTWG.

The output of this work was also to provide input into the ESR into the Future programme.

METHODS

The Brainlink Methodology involves several processes which were followed sequentially in this work:

- Development of alternative scenarios of the future
- Wind tunnelling the existing business model under the conditions of those alternative scenarios
- Using the wind tunnelling process to identify future capability and focus
- Developing an action plan

An initial literature review and consideration of trends and uncertainties formed the basis for the development of scenarios.

Method steps:

1. Identify trends and megatrends relevant to ESR
2. Link Trends into key themes and identify relevant uncertainties
3. Establish a scenario framework – the point of the compass: open-closed and transactional-strategic (with SLT)
4. Define alternative world views in each quadrant of the model
5. Identify strengths and weaknesses of each of the 4 world views
6. Determine key capabilities required to flourish in each of the 4 world views .



USING SOCIAL MEDIA SURVEILLANCE FOR HEALTH

Internet-derived data can provide an alternative source of information to support timely decision-making and emergency response.

Two of the most widely used internet data sources that have shown promise in monitoring population behaviours relevant to public health are Google Trends and Twitter. ESR, with Health Research Council funding, is looking retrospectively at these data sources in relation to the Havelock North *Campylobacter* outbreak in 2016 to determine how effectively they can support early warning of possible health events in advance of our traditional surveillance systems.

Utilisation of this sort of data may also augment routine surveillance systems to provide a more complete picture of the occurrence of diseases in our community. Investigation of the systems and platforms required to integrate real-time internet data into our surveillance is also a focus for ESR.





