Government of **Western Australia**
Department of **Health**

IRDiRC
INTERNATIONAL
RARE DISEASES RESEARCH
CONSORTIUM

Re(ACT) Congress 2018
International Congress on research of rare diseases and orphan drugs
Bologna Conference
8-12 March 2018

OPPORTUNITIES IN RARE DISEASES AROUND THE WORLD

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Government of Western Australia

Opening slide

- A simple, although non-linear, narrative about people, people and connectedness
- Recognising that 6-8% of our population was invisible in the health system
- Rare disease families wanting to be visible, and to be able to live the best life possible
  - A speedy accurate diagnosis
  - Equitable place in the health system
  - Assurance of receiving best practice care
  - Gaining visibility and a voice
- What changes have we witnessed in Australia as a result of translating global initiatives locally
- Knowledge translation is not linear and there is no single starting point for change

Closing Slide

- What will the rare diseases landscape be in your country in 2027 ?

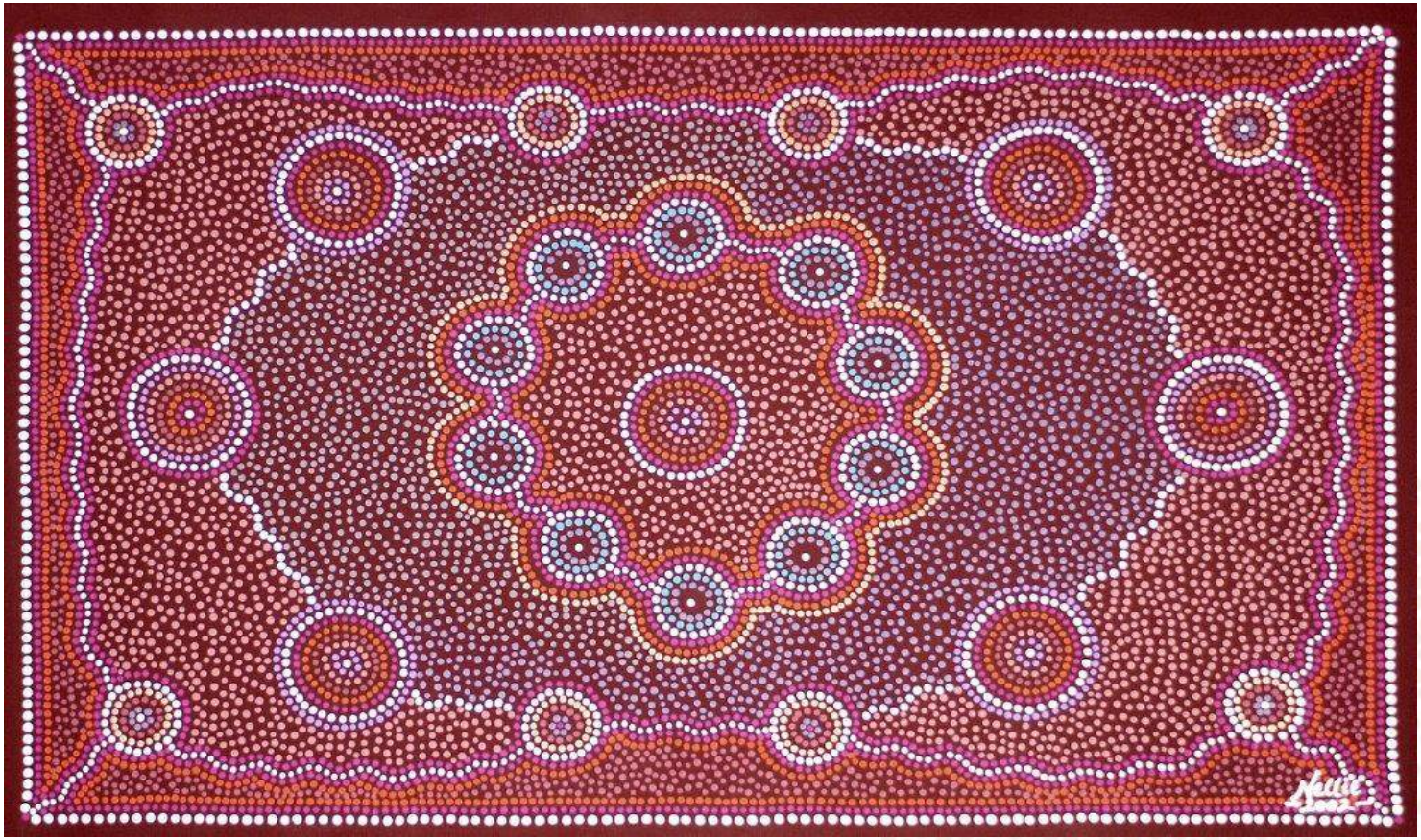
- What new knowledge will you take home to help improve the lives of people living with rare diseases;
- How can you better use your networks and connectedness; and
- What will be your starting point/strategy for effecting transformative change

Acknowledgment of Country and People

- I would like to start by acknowledging the Aboriginal people of the many traditional lands and language groups in Western Australia and particularly the Noongar people who are the traditional owners of the land and region in Australia where my family live, work and enjoy the abundance.
- I would also like to acknowledge the wisdom of Aboriginal Elders, both past and present, and pay my respects to the aboriginal communities of today whose thinking has helped me to frame my thinking on connectedness.

Transendence

Jonelle (Nellie) Green [2002] a Badimaya woman from the Yamatji people of the Central Wheatbelt (Morawa) area in WA.



“**Transcendence** captures all the ways we transcend those things that can drag us down. Instead we link up and stay connected to those important things that are all interconnected – like a blanket of spirit from our country and ancestors that wraps us up and keeps us safe. The image represents the strong circle of connectedness that exists in Aboriginal communities. It represents the collaboration that is necessary between our communities and other stakeholders if there is to be sustained change in the health (indicators) of Aboriginal people in Western Australia”. **Copyright image from WA Aboriginal Health and Wellbeing Framework 2015- 2030 [reproduced with permission]**

April 1657: RARE DISEASES

Nature is nowhere accustomed more openly to display her secret mysteries than in cases where she shows traces of her workings apart from the beaten path; **nor is there any better way to advance the proper practice of medicine than to give our minds to the discovery of the usual law of nature by the careful investigation of cases of rarer forms of disease.** For it has been found in almost all things, that what they contain of useful or of applicable nature, is hardly perceived unless we are deprived of them, or they become deranged in some way.

William Harvey, MD
London, April 24 1657

THE CLARITY IN THE EXTREMITY

Rare Disease

- Recognised public health issue; unmet need
  - Orphan drugs policies
  - Convergent Technologies: molecular & computing
- Catalyst two people agree to organise EC and US NIH resources to better coordinate efforts and aggregate their respective rare disease efforts
- Immediate reaction - a global vision created
- How could Australia participate & meaningfully contribute in this powerhouse initiative?

International Rare Disease Research Consortium (IRDiRC)

Co-operation at international level to stimulate, better co-ordinate & maximise output of rare disease research efforts around the world

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ASPIRATIONAL GOALS 2010

- 200 new therapies for rare diseases by 2020

- Means to diagnose most rare diseases by 2020

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Aspirational Goals 2017-2027

- All patients coming to medical attention with a suspected rare disease will be diagnosed within 1 year if their disorder is known in the medical literature;
  - all currently undiagnosable individuals will enter a globally coordinated diagnostic and research pipeline
- 1000 new therapies for rare diseases will be approved, the majority of which will focus on diseases without approved options
- Methodologies will be developed to assess the impact of diagnoses and therapies on rare disease patients

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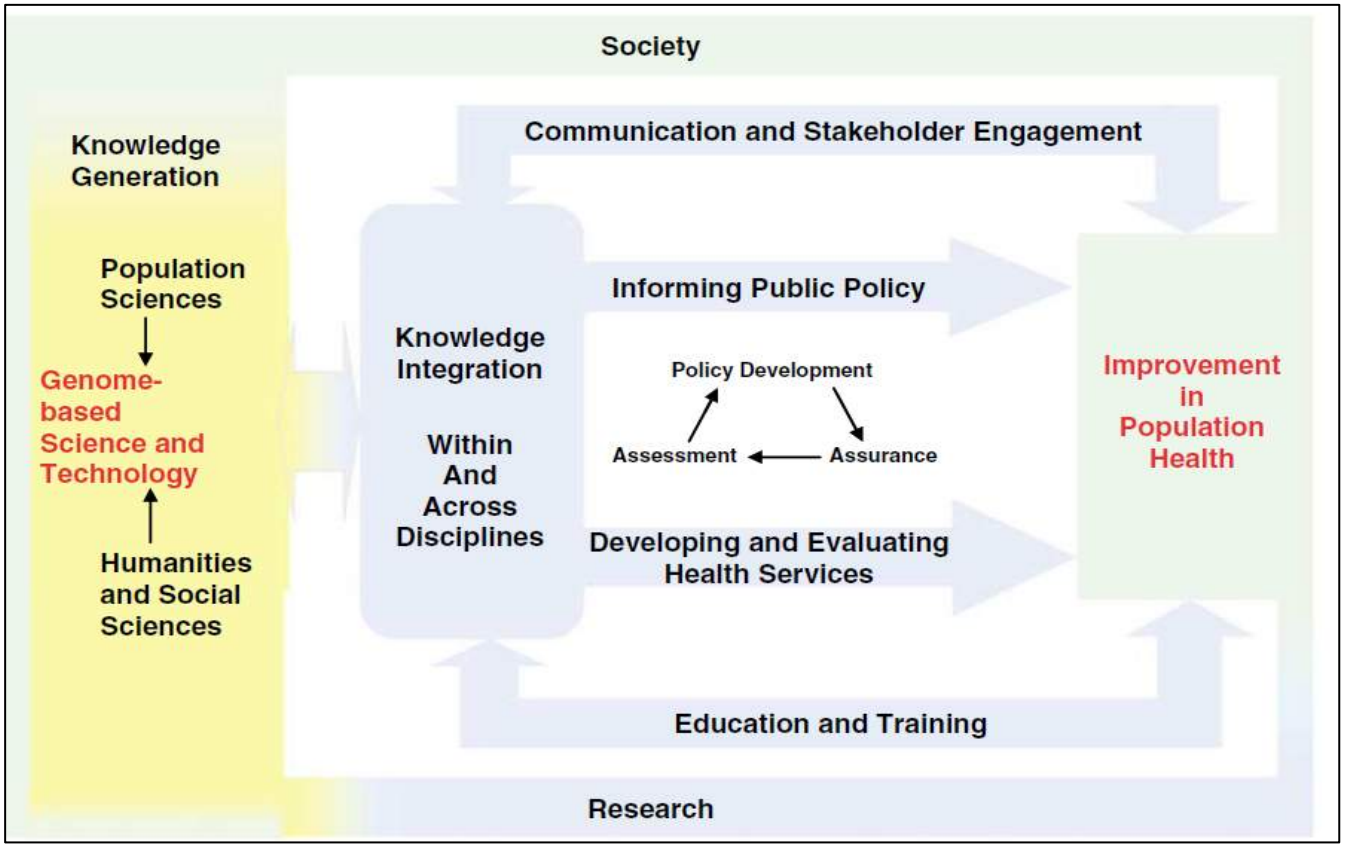
Public health genomics enterprise[1]

Translating knowledge and technologies into the health system to meet the needs of people living with genetic, rare and/or undiagnosed diseases

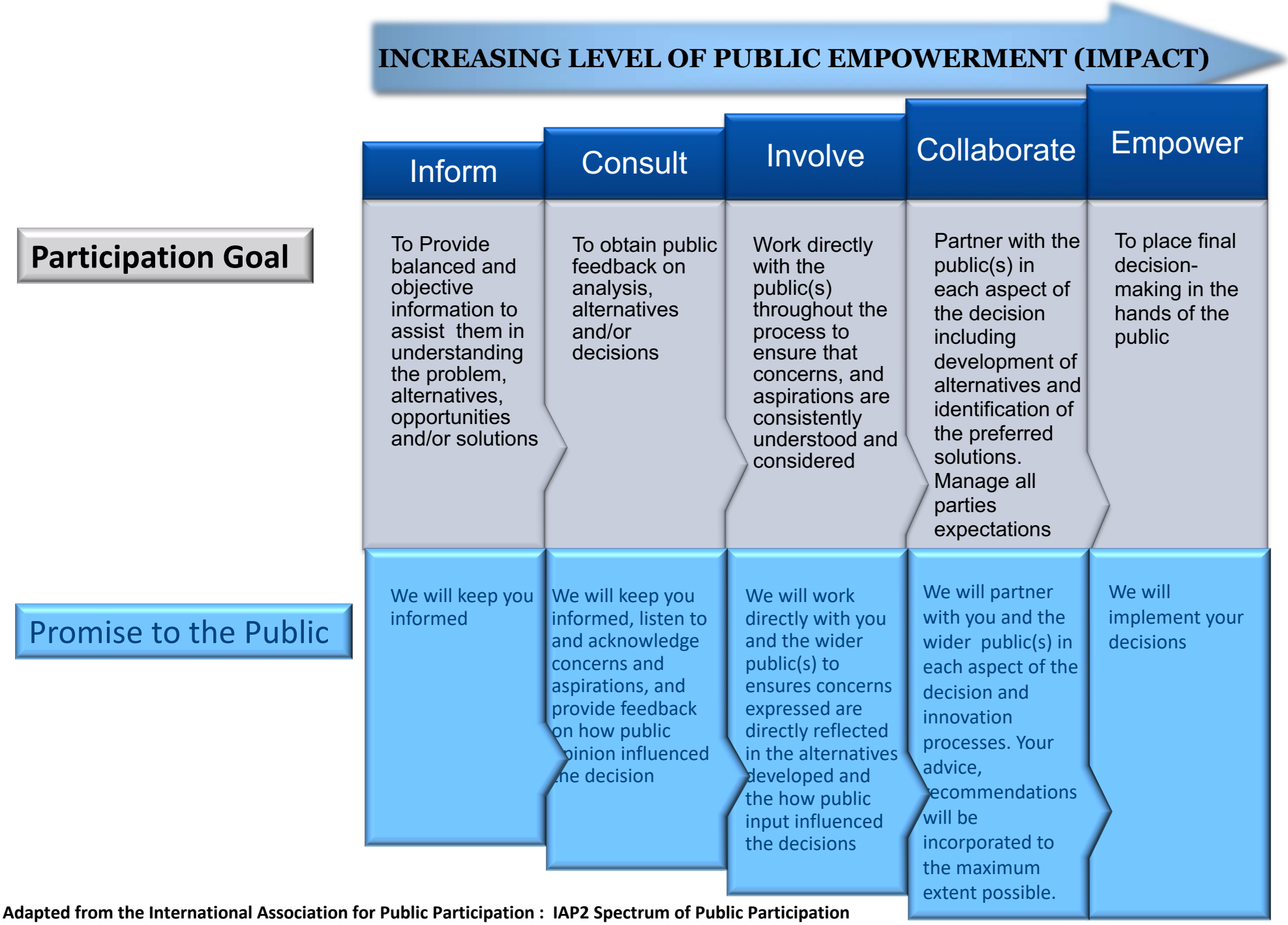


1. Brand et al European Journal of Human Genetics (2008) 16, 5–13; doi:10.1038/sj.ejhg.5201942

Technology Adoption: Starting points

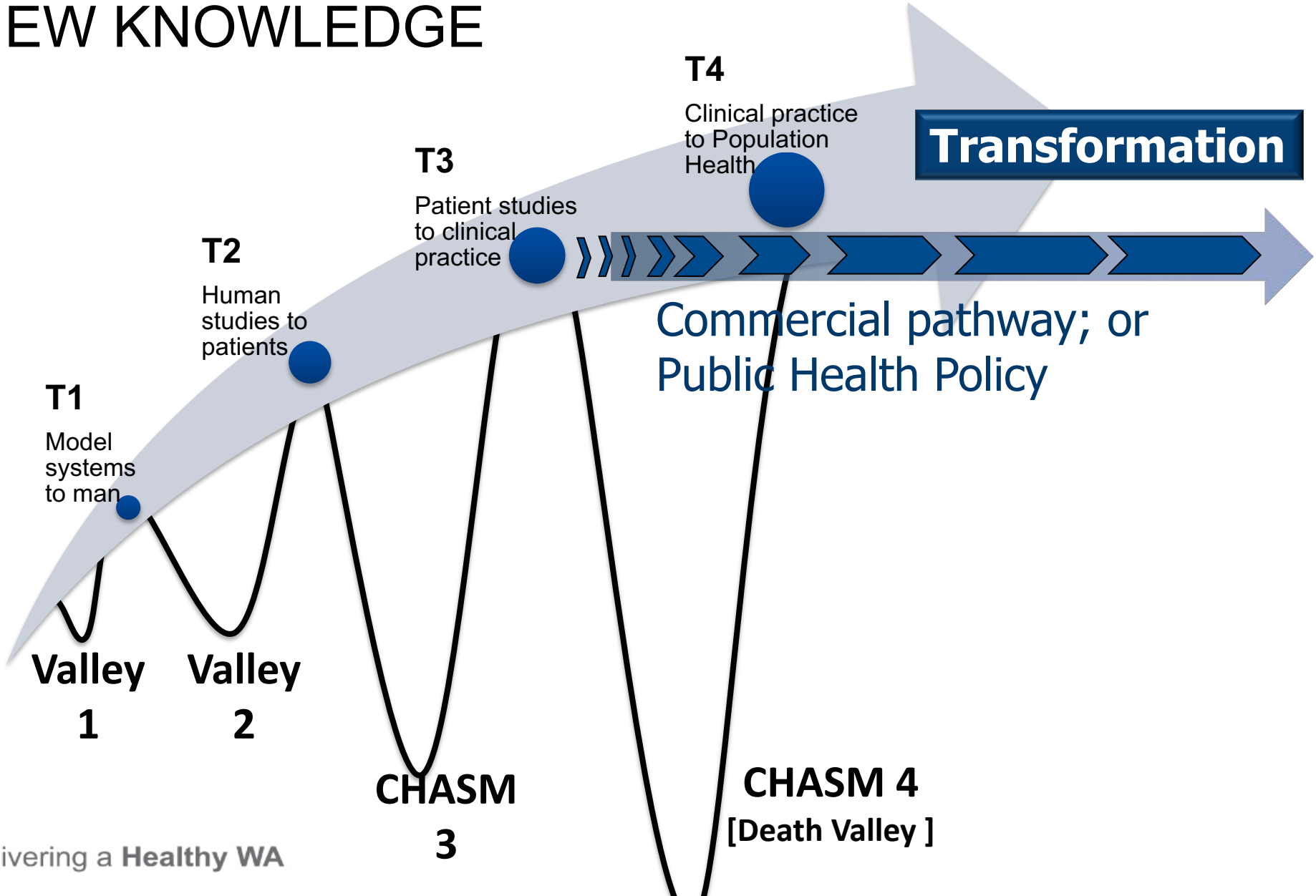
- Technology (Steel processing technologies; oil & gas discoveries; combustion engine; computing; informatics; genomics …….)

- Innovation and technology adoption occurs in waves
- Resources and society organise around the technology
  - people; investment ; markets, and resources aggregate
- First wave of knowledge translation and benefits accrue in resource rich countries based on conventional investment risk - reward paradigm
- Creates inequities – initially those with the most benefit the most
- Subsequent waves of knowledge translation and benefits are linked to start (entry) point and local resource leverage…equity



Adapted from the International Association for Public Participation : IAP2 Spectrum of Public Participation

TRANSLATION OF NEW KNOWLEDGE



EXPERT HUMAN KNOWLEDGE

- Siloed, fragmented knowledge & expertise

MACHINE SYSTEMS

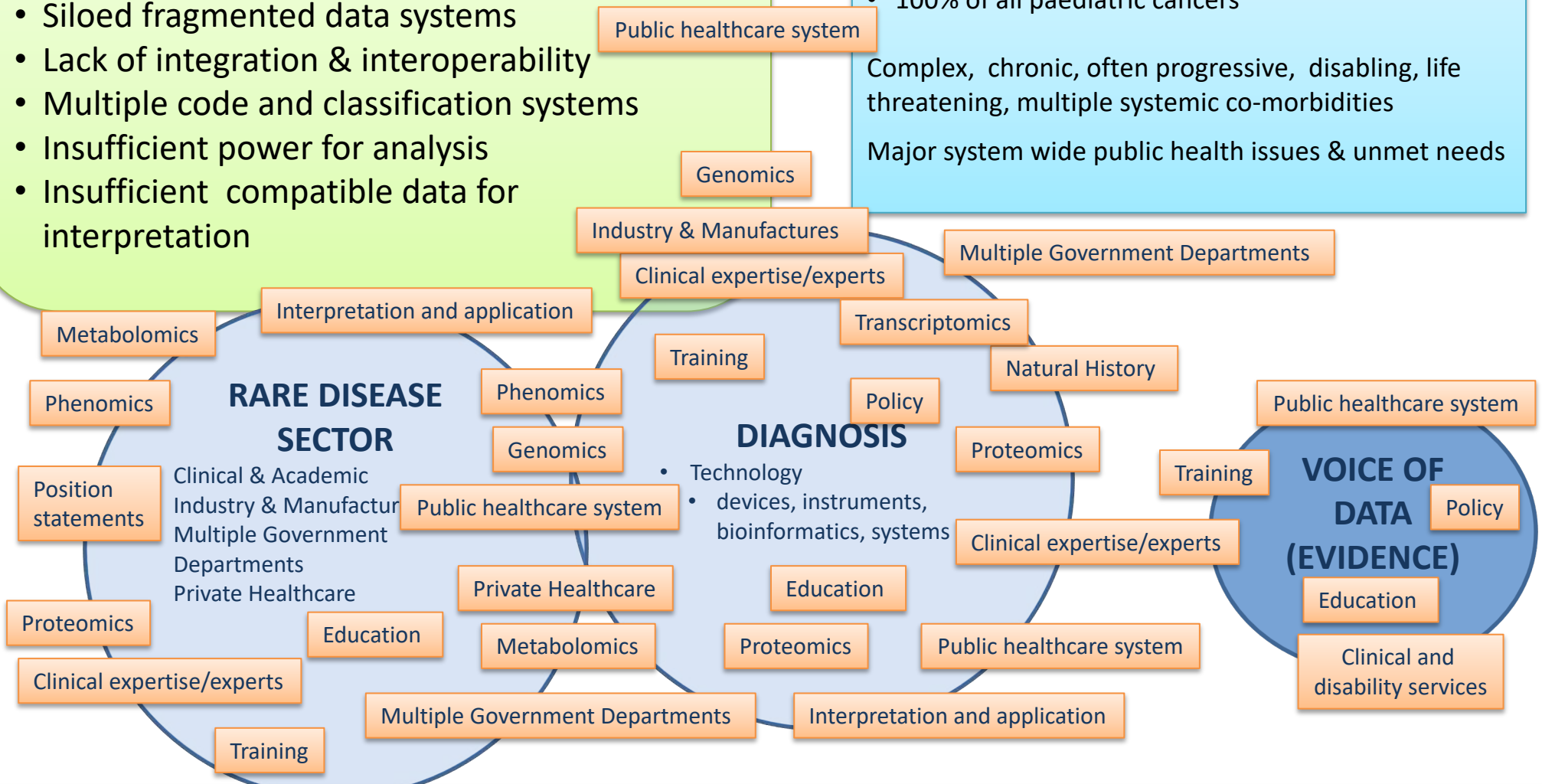
- Siloed fragmented data systems
- Lack of integration & interoperability
- Multiple code and classification systems
- Insufficient power for analysis
- Insufficient compatible data for interpretation

VOICE OF THE PEOPLE LIVING WITH RARE DISEASES

- 1.2-1.4 million Australians
- Over 400,000 children
- 25% of adult cancers
- 100% of all paediatric cancers

Complex, chronic, often progressive, disabling, life threatening, multiple systemic co-morbidities

Major system wide public health issues & unmet needs



THE CHALLENGE

Big Country Small Population

Unmet Needs and issues faced

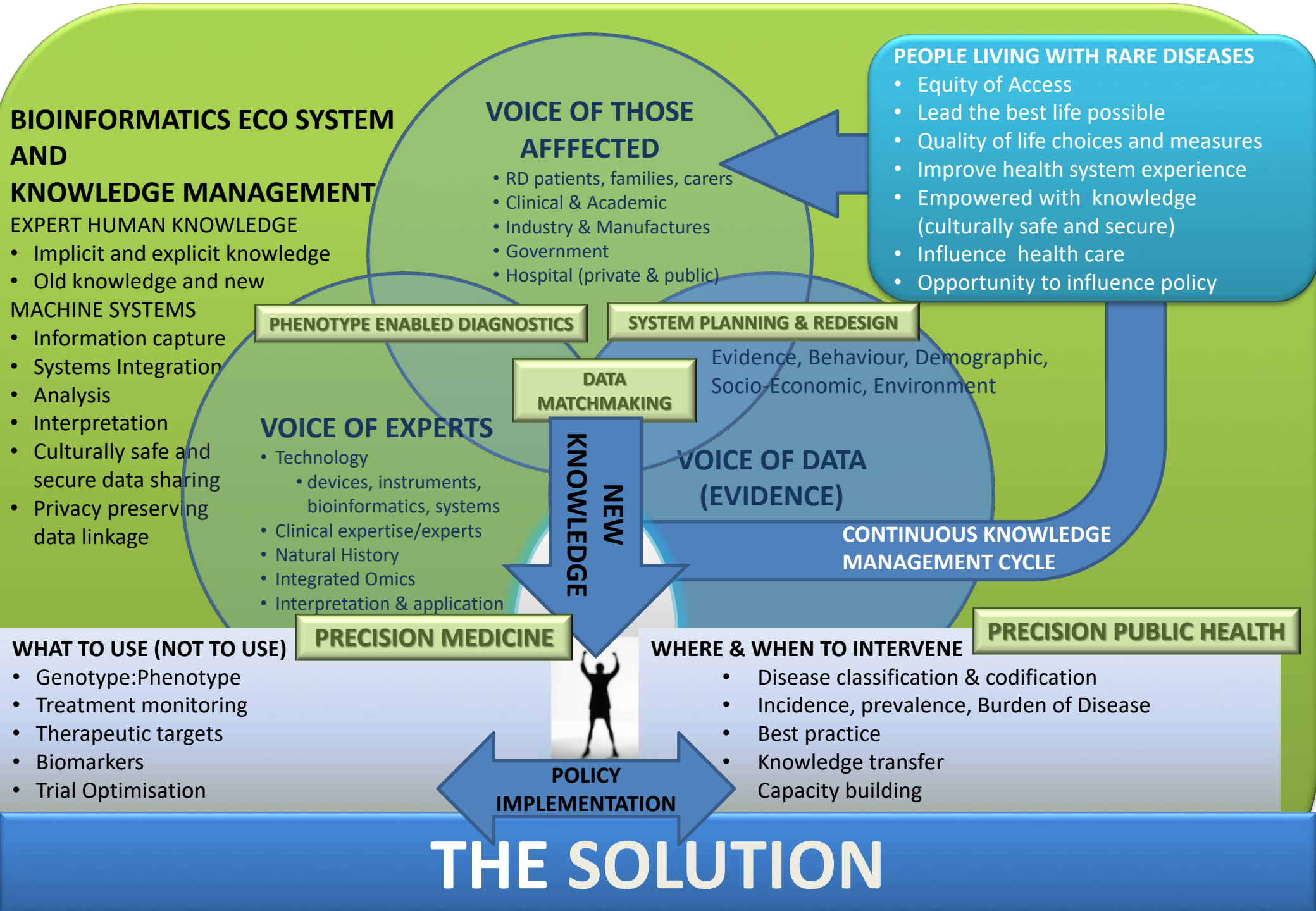
- At need population within our community
- Rare diseases invisible to the health system
- Dispersed population (urban to remote communities)
- Dispersed resources
- Limited research funds

Outcomes required

- Equitable access
- Optimised outcomes
- Sustainable
- Better use of public health system resources
- Empower rare diseases patients

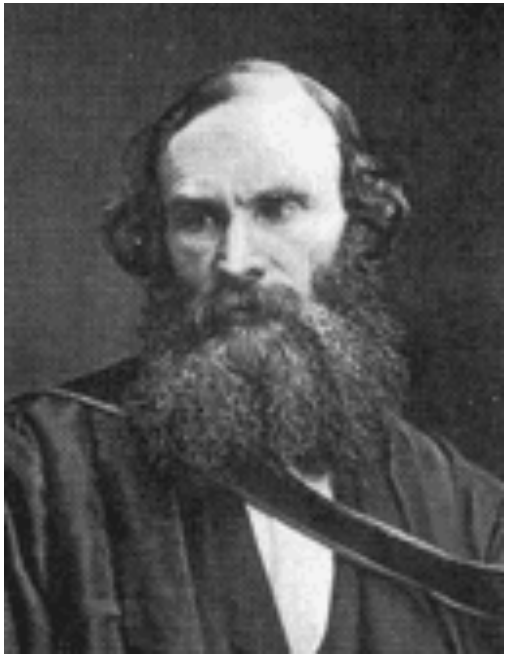
Our Starting Point

- Be pragmatic: use local strengths & be agile
- Use the public health system, moving towards person-centred care (Equity)
- Access clinical records (Data)
- Health system executive looking for efficiencies and improved patient outcomes (Optimise)
- Empower patient voices (Champions)
- Engage clinical services (Champions)
- Create policy frameworks (Sustainable)


BIOINFORMATICS ECO SYSTEM AND KNOWLEDGE MANAGEMENT
EXPERT HUMAN KNOWLEDGE
• Implicit and explicit knowledge
• Old knowledge and new
MACHINE SYSTEMS
• Information capture
• Systems Integration
• Analysis
• Interpretation
• Culturally safe and secure data sharing
• Privacy preserving data linkage
VOICE OF THOSE AFFFECTED
• RD patients, families, carers
• Clinical & Academic
• Industry & Manufactures
• Government
• Hospital (private & public)
PEOPLE LIVING WITH RARE DISEASES
• Equity of Access
• Lead the best life possible
• Quality of life choices and measures
• Improve health system experience
• Empowered with knowledge (culturally safe and secure)
• Influence health care
• Opportunity to influence policy
PHENOTYPE ENABLED DIAGNOSTICS
SYSTEM PLANNING & REDESIGN
DATA MATCHMAKING
Evidence, Behaviour, Demographic, Socio-Economic, Environment
VOICE OF EXPERTS
• Technology
• devices, instruments, bioinformatics, systems
• Clinical expertise/experts
• Natural History
• Integrated Omics
• Interpretation & application
VOICE OF DATA (EVIDENCE)
NEW KNOWLEDGE
CONTINUOUS KNOWLEDGE MANAGEMENT CYCLE
PRECISION MEDICINE
PRECISION PUBLIC HEALTH
WHAT TO USE (NOT TO USE)
• Genotype:Phenotype
• Treatment monitoring
• Therapeutic targets
• Biomarkers
• Trial Optimisation
WHERE & WHEN TO INTERVENE
• Disease classification & codification
• Incidence, prevalence, Burden of Disease
• Best practice
• Knowledge transfer
Capacity building
POLICY IMPLEMENTATION
THE SOLUTION

1889: UNDERSTANDING RARE DISEASES

This time next year,- this time ten years,- this time one hundred years……I cannot doubt but that these things, which now seem to us so mysterious, **will be no mysteries at all; that the scales will fall from our eyes; that we shall learn to look on things in a different way** - when that which is now a difficulty will be the only commonsense and intelligible way of looking at the subject.



LORD KELVIN
Sir William Thomson, Baron Kelvin of Largs
1889

What did we do?

- Patient organisations - Surveys – who are our stakeholders and local champions; what can be done
- Clinical services – what is in place, identified champions in the system; what can be done
- Local information – what data are collected, identified champions; what can be done
- Developed a plan – appreciative approach; empowered by stakeholders; what can be done
- Needed to be sustainable – we took a clinical service start point
- Used genomics policy makers

Policy development: what can be done?

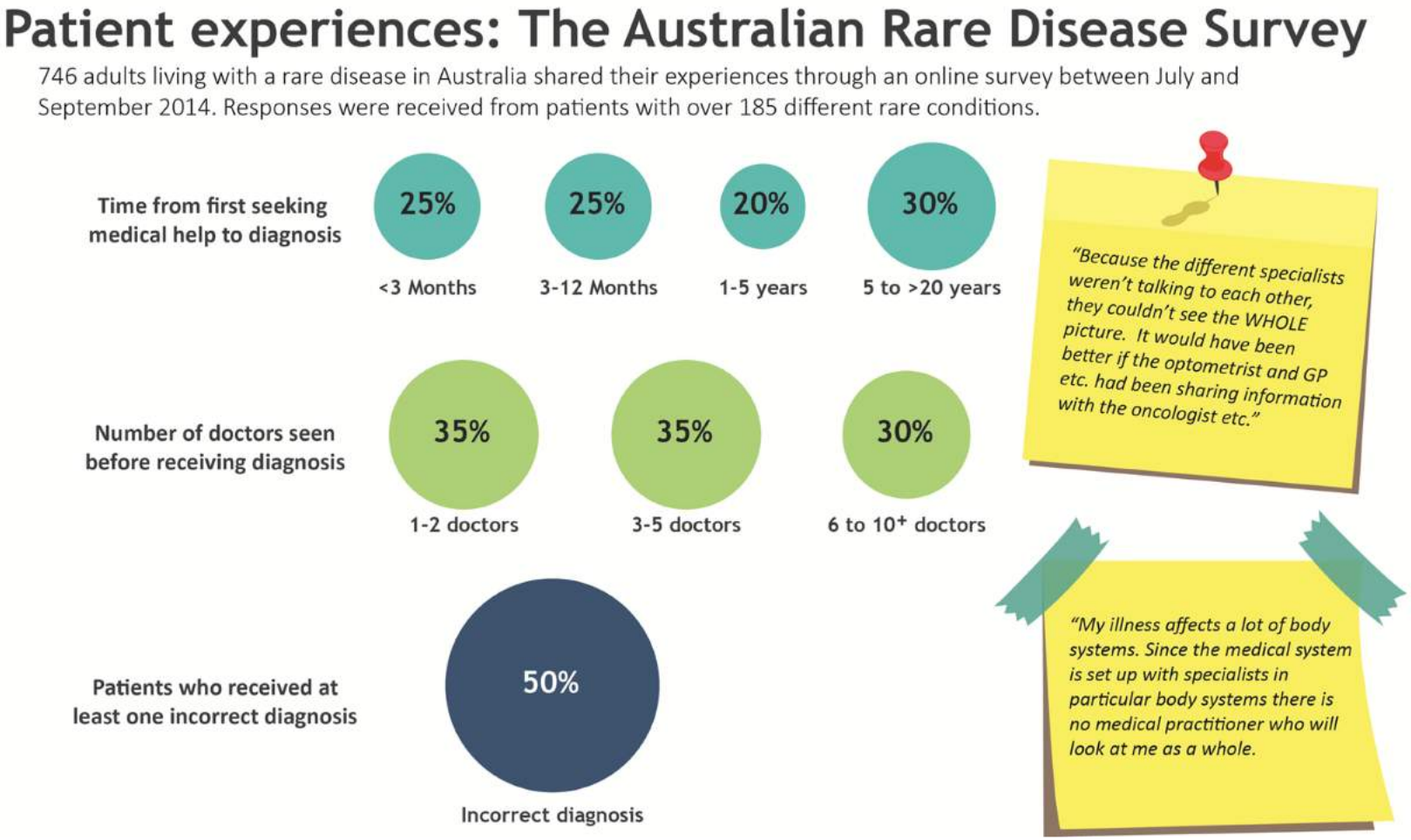
The best possible health and wellbeing for Western Australians living with rare diseases

- 12 objectives
  - Facilitate access to support networks and information
  - Build on existing services for screening and diagnosis
  - Promote care coordination
  - Champion integration and partnerships in the delivery of healthcare
  - Facilitate health professionals' access to information
  - Build epidemiology and health system evidence
- Foundation: more local evidence required!

Impact to policy – why did we succeed?

- Built on available evidence
- Have not tried to change the whole system – built on strengths and opportunities
- Political support and champions
  - Linked policy-makers and stakeholders, including patients and patient organisations who gave personal stories
- Recognises more evidence of impact required

Assessing the impact:
diagnostic journey



Molster et al. 2016 Survey of healthcare experiences of Australian adults living with rare diseases, Orphanet Journal of Rare Diseases 11:30 DOI: 10.1186/s13023-016-0409-z

Assessing the impact:
health system

Collective Impact of Rare Diseases on the WA Health System

A **data linkage study** aimed at identifying and describing a cohort of people:

- who were admitted to WA hospital between July 1999 and December 2010
- with one of 467 RD recorded in their hospital records

The utilisation of inpatient hospital services by our study cohort was compared to the general WA population.

There is a **marked disparity** between the proportion of the population with a **rare disease** and the **combined cost** to the **state health system**

In 2010 the study cohort accounted for:

2.0% of the WA population

4.6% of the people admitted to hospital

9.9% of WA hospital admissions

10.5% of WA hospital expenditure

Walker et al. 2016 The collective impact of rare diseases in Western Australia: an estimate using a population-based cohort. Genetics in Medicine : doi:10.1038/gim.2016.143

Needs to be addressed?

- Early, accurate diagnosis
- Information at time of diagnosis
- Multi-disciplinary care
- Integrated, coordinated health services
- Psychological, financial and social support

Assurance – linking people to services

"We connect key stakeholders and service providers with people affected by genetic and rare diseases"

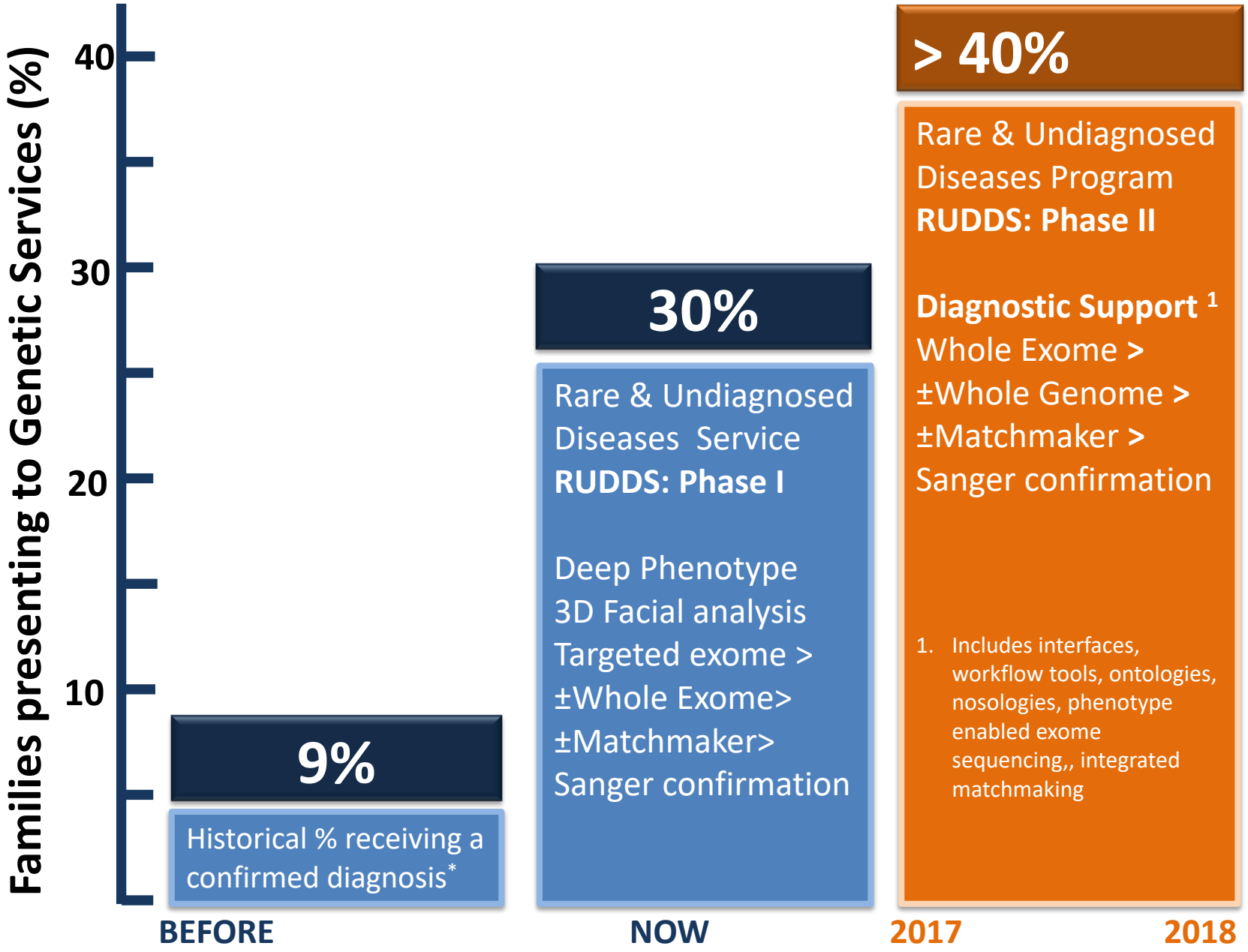
- Building capacity of community service organisations
- Provide increased access to resources, support and information on health and other services
- To link people living with RD, their carers and families to existing healthcare and other services

GENETIC AND RARE DISEASE NETWORK

rare voices AUSTRALIA

RARE DISEASES INTERNATIONAL

A EURORDIS INITIATIVE



* Diagnosis in this instance meaning a definitive diagnosis with a high level of certainty with or without a molecular confirmation (pathogenic mutation)

Assurance – linking people to services

Undiagnosed Diseases Program WA (UDP-WA)

Target group: Children who remain undiagnosed despite numerous hospital admissions and specialist assessments across multiple disciplines.

Program steps

- Case referred to program. Program Director invites parents or carers to take part.
- A cross-disciplinary Expert Panel reviews existing medical history and makes recommendations.
- Patient attends a day facility at children's hospital for up to five days for tests and examinations.
- With patient consent data is shared with national and international partners.
- The UDP-WA team determines if a definitive diagnosis can be made.
- Parent/caregiver attends a meeting with the Program Director to discuss the findings and receives a written report.

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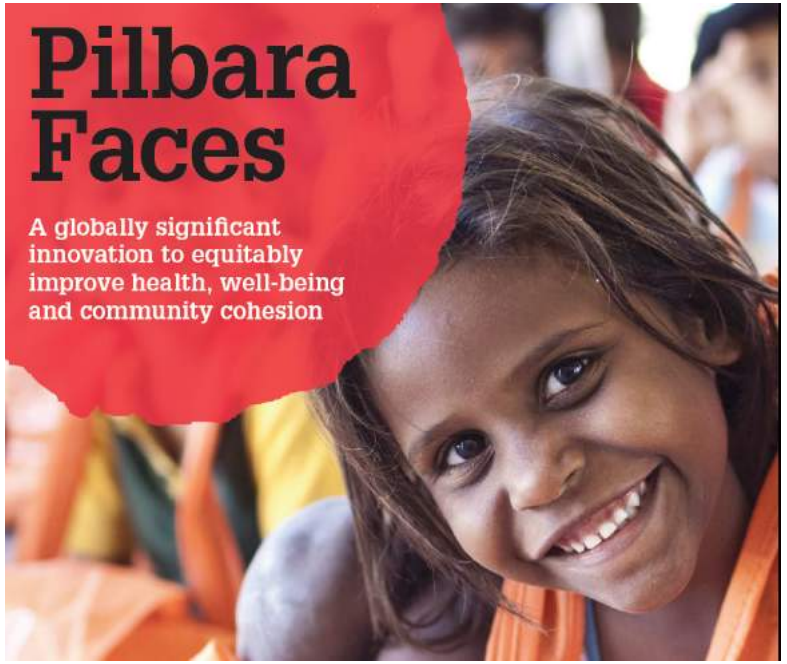
Matchmaker Exchange

Patient Archive

All people living with rare disease

- Timely and accurate diagnosis
- Aboriginal genomics
- Enabling optimised best care



What next – pathways to diagnosis

- Ensuring timely accurate diagnosis
  - IRDiRC task forces
    - Solving the Unsolved, UDP, UDN, UDN-International, MME
  - RD-Connect platforms and 3D facial
- Patient Archive – Human Phenotype Ontologies (HPO)
- Orphanet disease coding system
- Developing best practice guidelines
- Primary healthcare pathways
- Patient centred outcomes
- Integrating new knowledge
  - Care4Rare, Phenome Central, Patient Archive, ERN, RDCRN…
  –

What next – health policy

- Ensuring increased visibility
- Ensuring sustainability
- Ensuring equity and optimised outcomes
- Policy frameworks
  - Standardised disease classification and coding
  - Standardised phenotype language
  - Data sharing
  - Indigenous genomic (reference) data
  - Timely accurate diagnosis
- Better use of all new knowledge through revisiting the knowledge cycle

Closing Slide

- What will the rare diseases landscape be in your country in 2027 ?

- What new knowledge will you take home to help improve the lives of people living with rare diseases;
- How can you better use your networks and connectedness; and
- What will be your starting point/strategy for effecting transformative change