

## UTILIZATION AND COMMERCIALIZATION

After enhancing the foundation for Thailand's genomics industry in the first 10 years, the government should explore different options for commercialization / monetization of the data collected and tools develop to generate potential return of investment.

There are different commercialization options that Thailand could consider in the long run, namely:

- Driving adoption through genomic medicine centers
- Commercializing database and analytics tools
- Marketing Thailand as South East Asia's genomics hub

### DRIVING ADOPTION THROUGH GENOMIC MEDICINE CENTERS

Thailand should place the highest priority in driving clinical adoption in genomics among the public as this will ultimately fuel demand for new genomics applications, analytics tool and sequencing tests.

#### CASE STUDIES

Wide clinical adoption in genomics comes with many benefits\*, for example :

- **Prevention** : Prevention or early detection can improve individuals' ability to identify potential predisposed condition, for example:
  - **Familial hypercholesterolemia (FH)** affects 1 in 250 people but only 1 in 6 are diagnosed. Identification of FH is primarily done by clinical diagnosis with subsequent confirmation by genetic testing where possible. By systematically using both genetic and biochemical testing, FH can be identified, and patients can receive inexpensive medicines to protect from future problems. Early detection and optimal treatment of FH has led to an annual savings of ~USD 8.6 Mn per annum in UK

- **Diagnosis** : Comprehensive genomic profiling (CGP) test can reveal clinically relevant alternations in DNA and identify personalized treatments

- **CGP test** : Foundation Medicine (FMI) offers genomics testing and personalized treatment consultations for oncology. In 2018, FMI launched an FDA-approved CGP test for all solid tumors to assess all classes of genomics alterations. FMI CGP test estimates 1 in 3 patients across 5 common advanced cancers are expected to match with FDA approved targeted therapy

- **Treatment**: Adoption of targeted therapies have reduced adverse events and improved overall survival of patients

- **Pembrolizumab** : Anti PD-1 immunotherapy (e.g. pembrolizumab) has made it likely that 20% of untreated NSCLC

patients' lives longer than the average of 2 years. In advanced urothelial carcinoma, using pembrolizumab in replacement of chemotherapy has reduced frequency of adverse events from ~50% to ~15%

The NHS Genomic Medicine Centers (GMC) is a good example for Thailand to learn from. The 11 NHS GMCs have been designated by NHS England to contribute to the delivering of the 100,000 genomes partner as a recruitment center.

\* The benefits of personalized medicines to patients, society and healthcare systems, Charles River Associates

The objectives of a GMC are to:

- Complete whole genome sequencing of thousands of samples from patients and families
- Integrate whole genome sequencing into standard clinical care pathways

The NHS Genomic Medicine Service provides genomic testing for cancer and rare diseases. Tests are ordered by GPs and specialists, then sent to the NHS Genomic Laboratory Hub for processing and analyzing.

Building on the success of the 100,000 Genomes Project, the NHS Genomic Medicine Service will make genomic medicine available to more people than ever before. It will give NHS patients greater opportunities to participate in genomic research for the benefit of their own health, as well as to shape future care.

## PROPOSED IMPLEMENTATION ROADMAP FOR THAILAND

A 3-stage approach :

- **First step** : Build awareness on genomics
- **Second step** : Set up National Genomics Medicine Services
- **Third step** : Engage

The first step of encouraging clinical adoption of genomics services is to raise awareness among HCPs first then subsequently patients and the public. The relevant stakeholders need to be aware of the benefits of using genomics in prevention, diagnosis and treatment of diseases so that they will be willing to use the genomics testing / medicine services offered. This can be done through training HCPs who can in turn educate

their patients. To reach the public, social media can be used to spread awareness.

Next, Thailand should set up its own National Genomic Medicine Services by forming national genomics laboratories and building national coordinating and oversight function within public hospitals to enable centralized sample collection and tracking.

Lastly, to generate returns from the investment made during the initial years, the new central genomics body to build strategic partnerships with pharma companies to identify new and effective mechanisms to prevent, diagnose and treat diseases.



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## COMMERCIALIZING DATABASE AND ANALYTICS TOOLS

Science can be translated into products and services so that patients can benefit in a variety of settings. It is important for researchers to work with the industry to identify areas of common interests and the most appropriate partnering model. Collaborative work with partners enables researchers to:

- Discover and develop information, platform technologies and early- and late-stage products
- Facilitate further biomedical research through the creation and supply of genomic technologies and shared resources

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## CASE STUDIES

There are many commercialization models that are used by institutions all around the world :

- **Dual licensing model** : Academic users would have free access to the entire database in a downloadable format, allowing integration with other data sources or the development of new data visualization tools. Industry users pay an annual subscription fee commensurate with the size of company
- **Collaborative development with industry** : Open Targets platform is a public-private initiative to generate evidence on the validity of therapeutic targets based on genome-scale experiments and analysis. Open Targets is working to create an R&D framework that applies to a wide range of human diseases, and is committed to sharing its data openly with the scientific community
- **Fee for service** : Rare for genomics database, but GIS offer sequencing services to the public for a fee

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## PROPOSED IMPLEMENTATION ROADMAP FOR THAILAND

A 3-stage approach:

- **First step** : Build clinical interpretation capability
- **Second step** : Setup data interface
- **Third step** : Engage partners

Clinical interpreters play an important role in supporting clients in the analysis of genome and clinical data as most industry partners do not have the capability to analyze the data on their own. As a result, maintaining a pool of skilled genomics clinical data interpreters is imperative to ensure that the database is utilized to its fullest potential.

Next, the central genomics body should build a user-friendly data interface that can be used across different stakeholders including researchers, clinicians and participants to coordinate in data sharing and application.

Lastly, the central genomics body should embark on partnership engagement with private companies and government bodies to facilitate their access to genomics data and bioinformatics tools.

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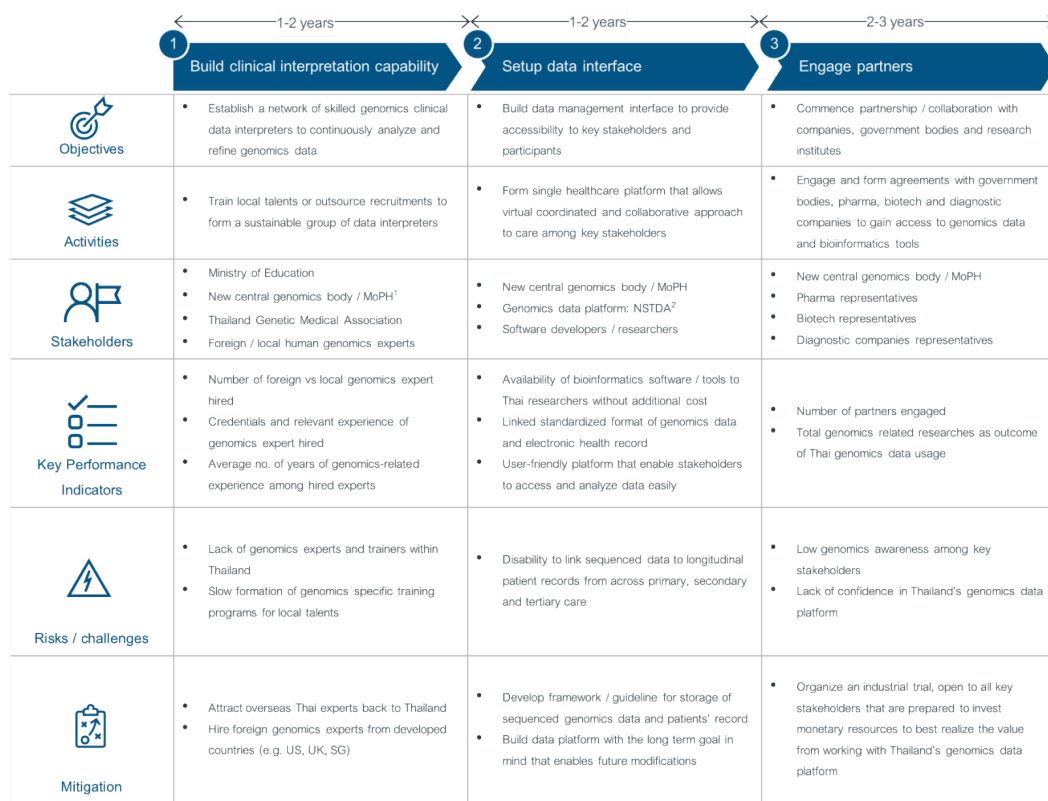


Figure 81 : Implementation roadmap summary for data commercialization

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## MARKETING THAILAND AS SOUTH EAST ASIA'S GENOMICS HUB

Thailand currently holds the largest share of Asian medical tourism market (followed by India and Singapore). As South East Asia's medical tourism hub, it is natural for Thailand to extend its healthcare services to cover genomics services as well. However, there is stiff competition in the race to become South East's Asia's genomics hub.

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### CASE STUDIES

Besides Thailand, Singapore has one of the most advanced and efficient healthcare systems in the world. In fact, the nation nearly tied with Hong Kong in Bloomberg's global healthcare efficiency index, narrowly missing out on the No 1 spot by a 1.7-point margin\*. This has opened doors to a booming medical tourism opportunity as more patients from neighboring South East Asian countries have begun to look to Singapore as a preferred destination for advanced medical care.

Among South East Asian countries, Singapore has the most advanced capabilities in genomics and has started its plan on monetizing its genomics research and tools developed. The Genome Institute of Singapore has begun to provide sequencing services to researchers for a fee. It is only a matter of time that precision medicine is included as part of the many medical services offered to medical tourists.

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### PROPOSED IMPLEMENTATION PLAN FOR THAILAND

A 3-stage approach:

- **First step** : Identify needs of foreign patients
- **Second step**: Provide one-stop service
- **Third step** : Promote service offered

Firstly, Thailand should estimate what is the potential market size of genomics services in South East Asia / Asia Pacific. Next, Thailand should identify who are the current competitors and the services offered. The central genomics body should also conduct research on the current unmet needs among patients who need genomics services, how much are they willing to pay, and their key drivers in choosing a genomics service provider.

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\* <https://www.businesstimes.com.sg/opinion/can-precision-medicine-keep-singapore-ahead-in-advancedcare>

\* *Genomics in the UK: An industry study for the Office of Life Sciences*

\* *Genomic Thailand Integrated Action Plan (2020-2024)*