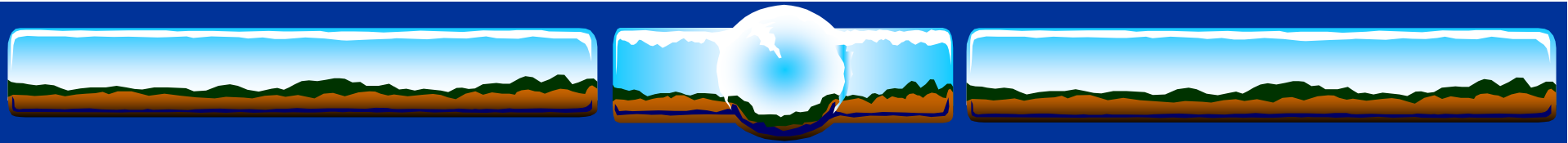


TECHNOLOGY TRANSFER

Workshop in Singapore 17th and 18th of
Februaray- 2009

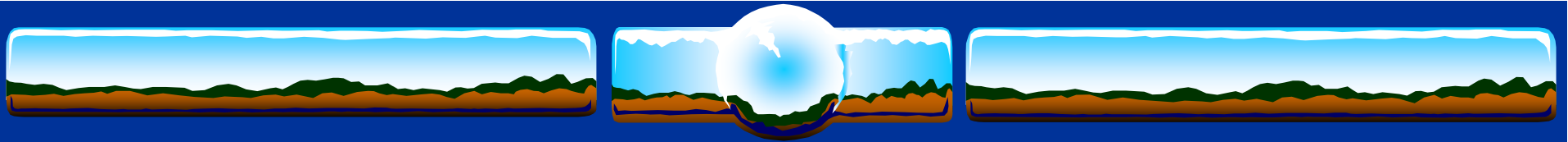
By Knut Fossum, Msc



Technology transfer- Norway – Singapore in 1999- 2000

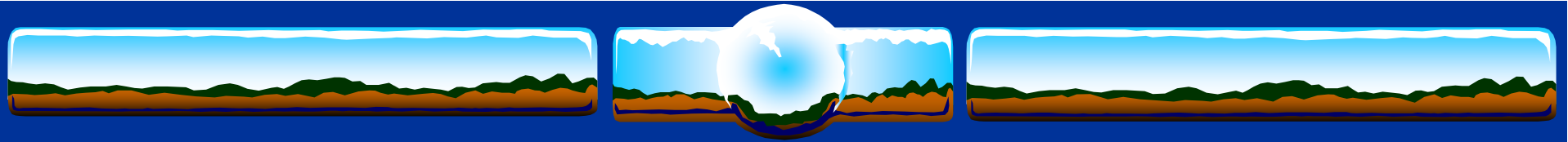
- ❖ Development program for how the transfer could take part.
- ❖ Who were involved to whom, 3 groups:
 - ❖ NDEA- to DSTA
 - ❖ Norconsult- to STAE
 - ❖ Selmer AS to Sembcorp
- ❖ Goal to get Singapore self operating.

18.02.2009



Define what is to be transferred with whom- Categories of people

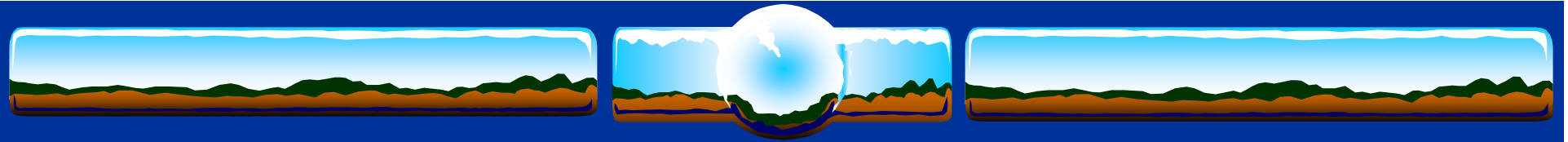
- ❖ Drill Operators, and foremen in the tunnel
- ❖ Tunnel supervisor and surveyor system
- ❖ Workshop Superintendent
- ❖ Planner and QC-
- ❖ Engineering geologist
- ❖ Tunnel Manager
- ❖ Managers, like myself



Phase 1- Calculation of tender

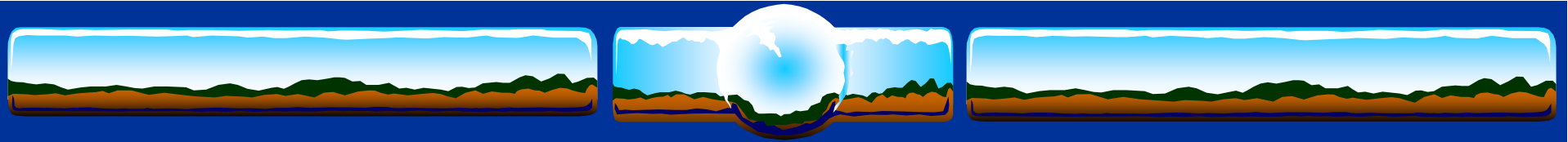
The Problem was, the design and operation was classified.

- ❖ The Lay out of the site and the constructions.
- ❖ Technical solutions.
- ❖ Different alternative solutions
- ❖ Calculation of the given solution



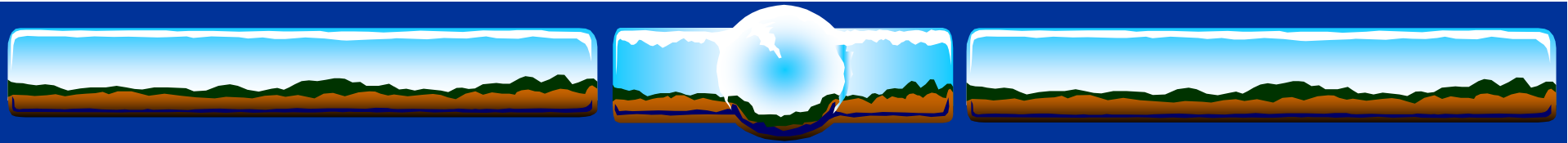
Phase 2- Training

- ❖ At different stages , different training expectations.
- ❖ Training overseas or in Singapore
- ❖ Site setup
- ❖ All from pipes, fans, cables, gen- set, water supply etc



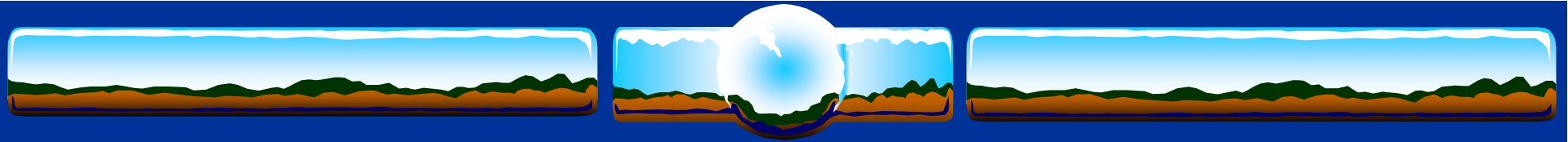
Phase 3- Description for tendering of equipment

- ❖ Equipment
- ❖ Rental of equipment
- ❖ Depreciation rates
- ❖ Selection of equipment
- ❖ Specification of equipment



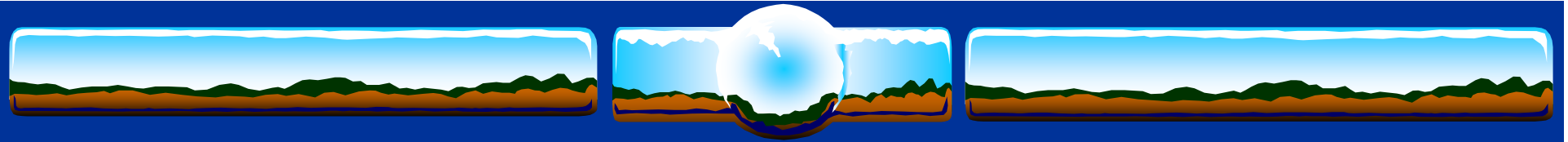
Phase 2- Description for tender of equipment

- ❖ Operational cost.
- ❖ Either buy or rent?
- ❖ Limitation for km in use, economical issues, differences when use in Singapore.
- ❖ Capacities in use
- ❖ Etc.
- ❖ modell for a technology transfer to be agreed



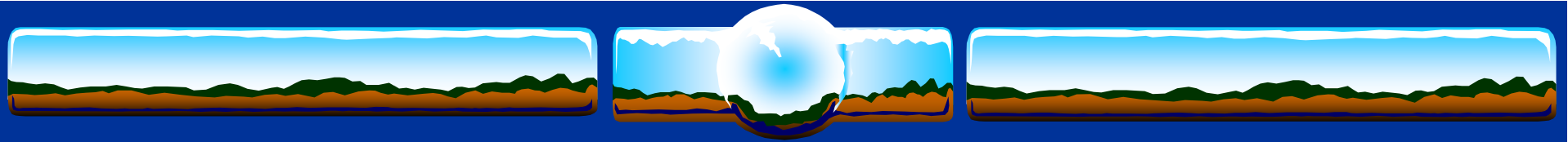
Phase 4- Material

- ❖ Calculation of capacities for different material
- ❖ The cost of the different material
- ❖ Limitations for the different material
- ❖ Quotations.
- ❖ Compare to Norwegian traditions.
- ❖ Calculation models for how to operate with different material.



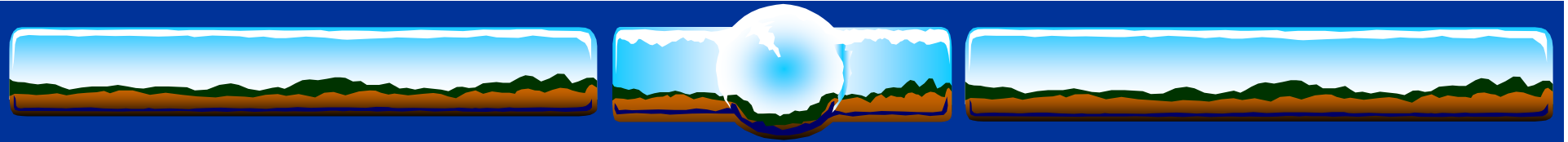
Phase 5 - Staffing

- ❖ Coming up with staffing plans related to the phases.
- ❖ Shift plans
- ❖ Week plans
- ❖ Month and year plans
- ❖ Cost for different phases related to staffing.



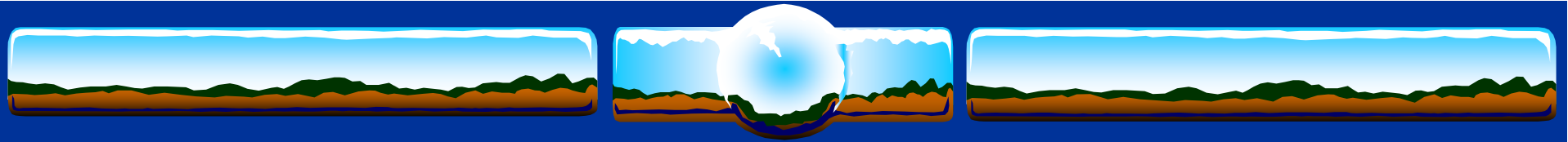
Phase 6- Quality Planning

- ❖ General QA - planning
- ❖ HSE –plans
- ❖ Limited traditions in Singapore



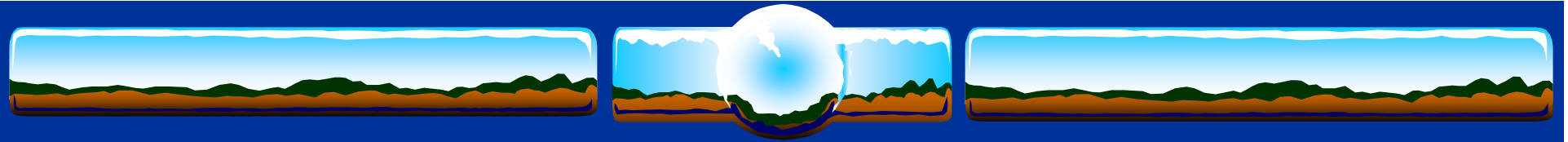
Phase 7- Consulting works

- ❖ Training related to the technology transfer
- ❖ Interaction with the consulting engineer in Singapore
- ❖ Interaction with the client in Singapore.
- ❖ Assist in general to the contractor



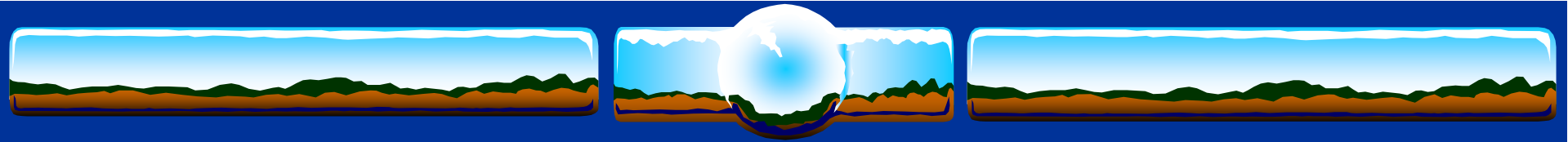
The Management with counter partners

❖ Project Mnanger-	Singapore
❖ Tunnel Manager-	Singapore
❖ Chief Engineering geologist-	Singapore
❖ Surveyor-	Singapore



In the tunnel

- ❖ Tunnel Foremen
- ❖ Tunnel supoevisors
- ❖ Workshop fitters
- ❖ Electrician



Workshop

- ❖ Work shop superintendent
- ❖ Work shop SI, assistant
- ❖ Work shop foreman
- ❖ Mechanical fitter
- ❖ Electrical Supervisor
- ❖ AMV man
- ❖ Store man

Tarald Øyen
Singapore

Chua Kim Hock

Tin Tuen Myint

Peter Crook

Service agreement

John Sim