



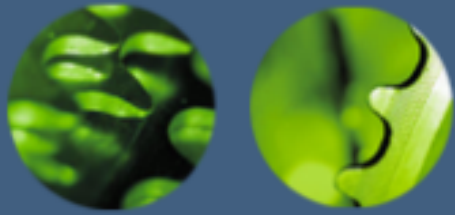
...THE HYDROGEN AND FUEL CELL TECHNOLOGIES STRATEGY

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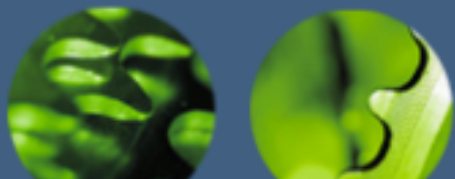
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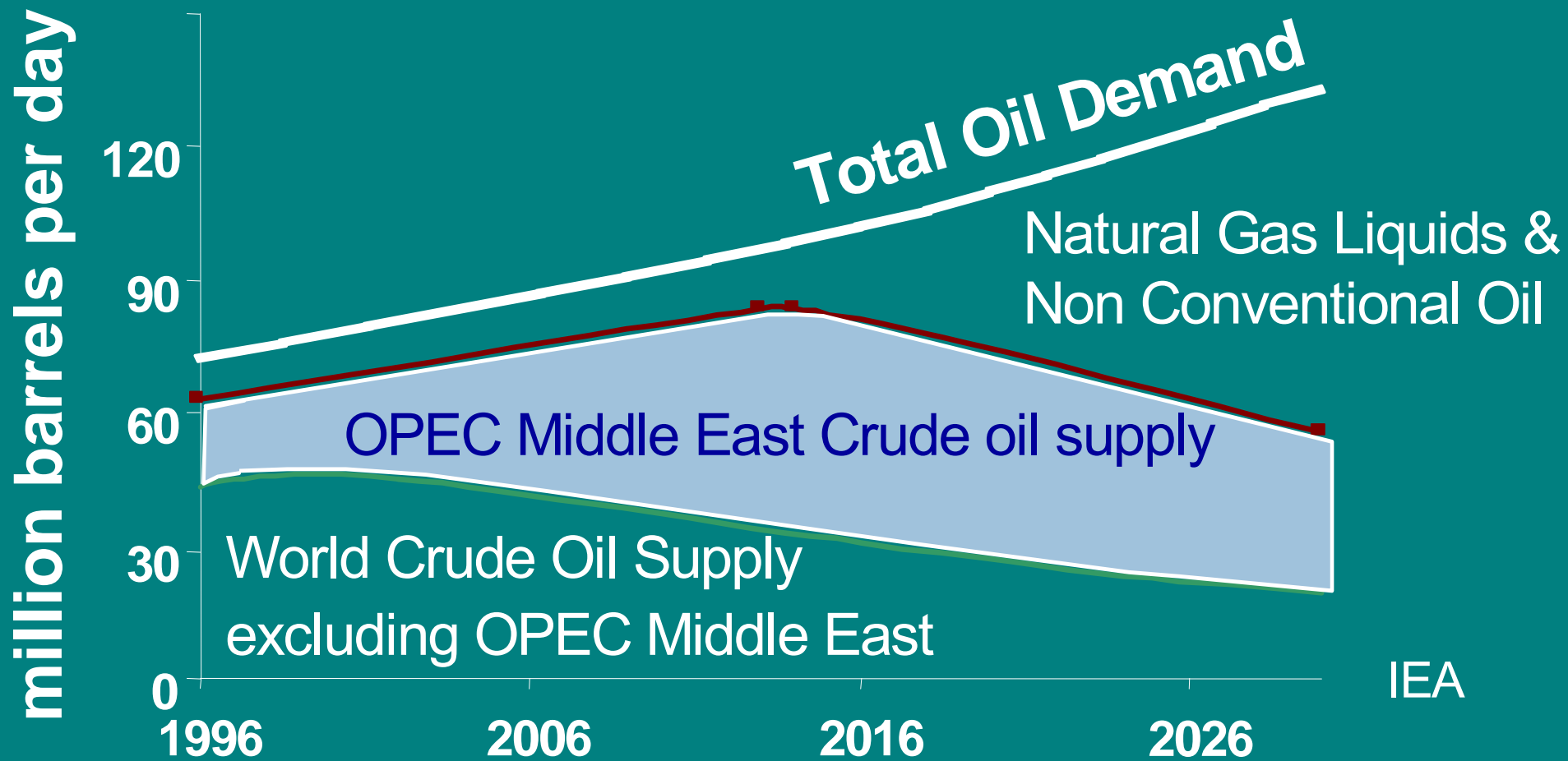


...Presentation Outline

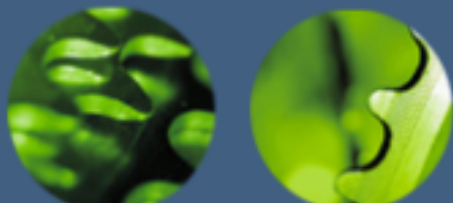
- Why is South Africa talking Hydrogen?
- Strategy in brief
- Implementation plan
- Competence Centres
- Planned outputs



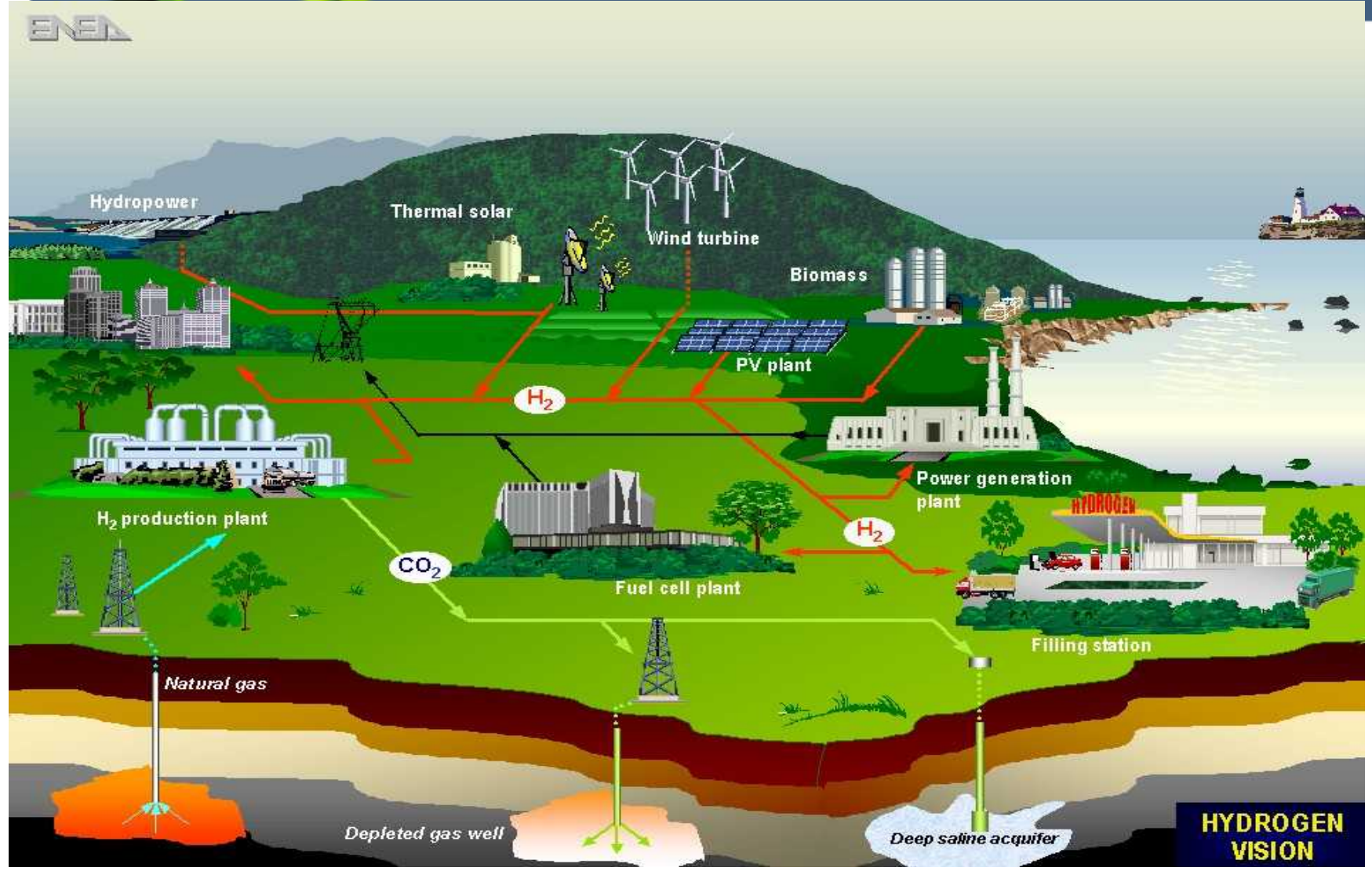
...Global Drivers

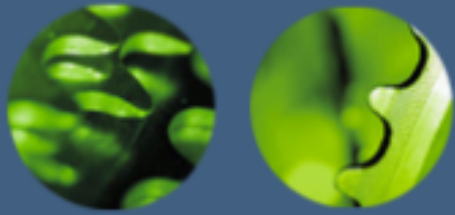


IEA



...The Hydrogen Vision

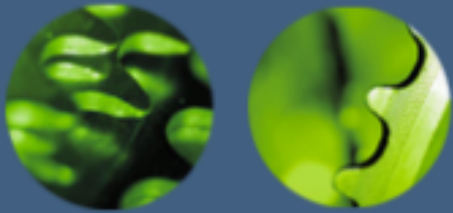




...Value chain analysis

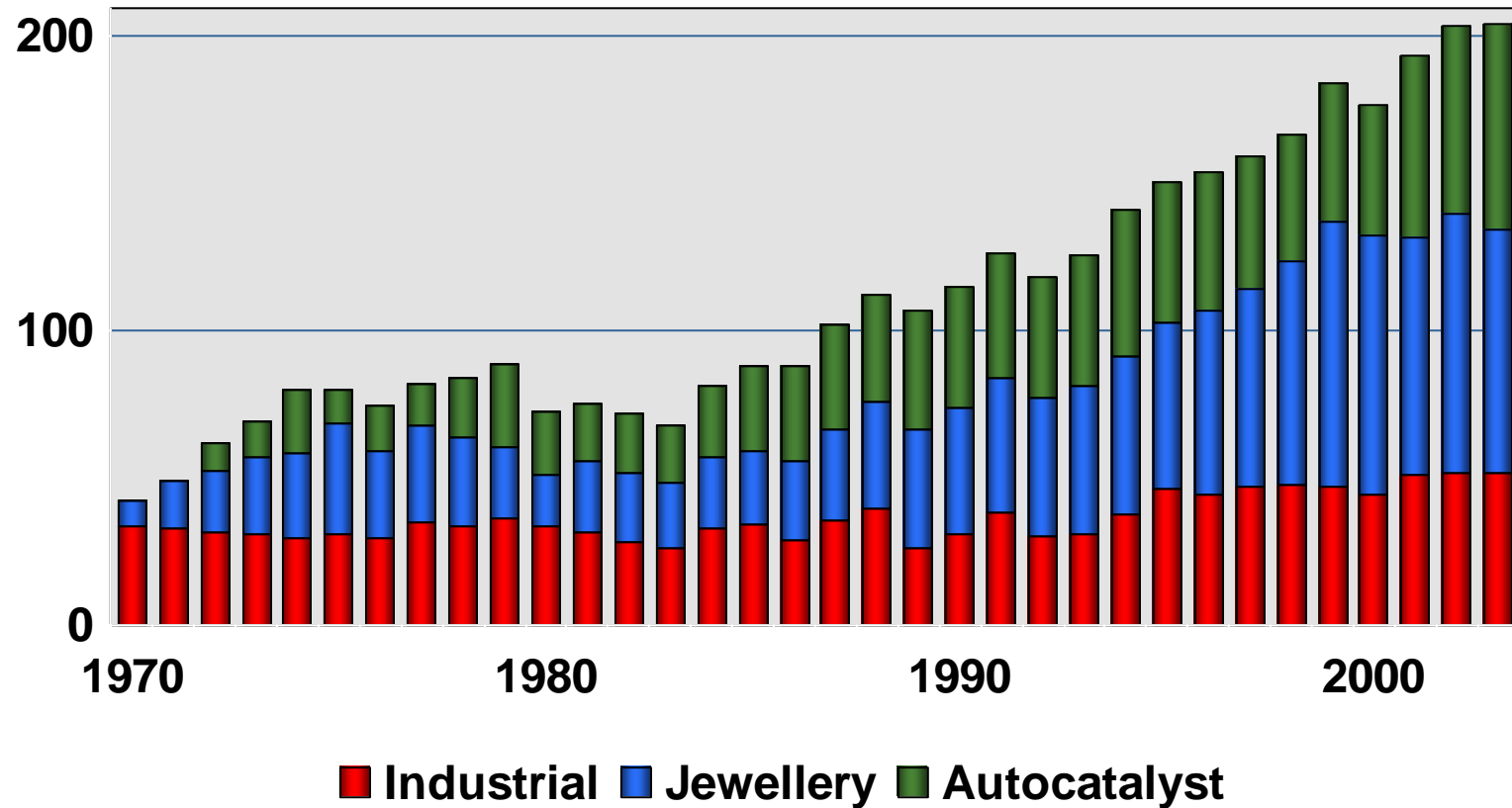
Pt role in the future H₂ Economy

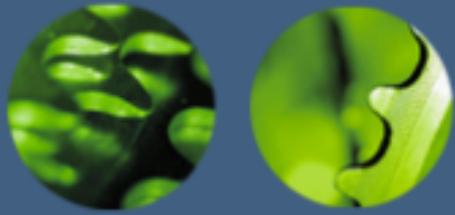
- How much platinum is there?
- What are the current markets?
- How much platinum will fuel cells need?
- Can the mines supply this platinum?



...Pt markets since 1970

Pt tonnes sold per year





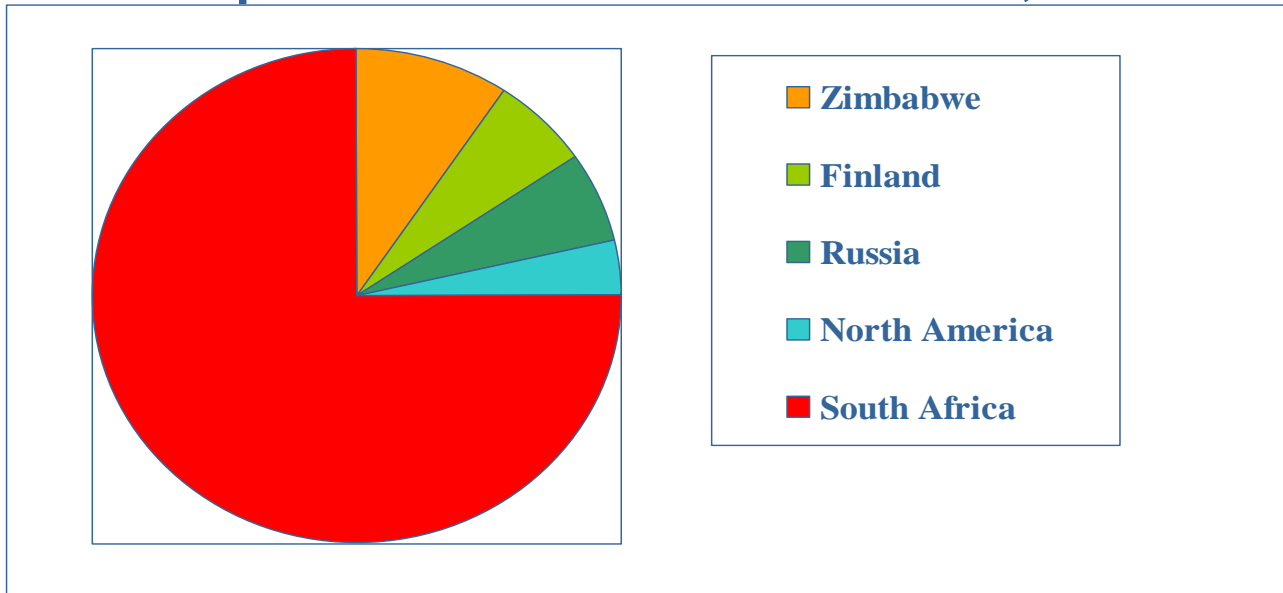
...Additional Pt resources likely

- Old data was based on 1.2km max depth
- Northam Platinum already mine at 2+km
- Bushveld drilled down to 3.3km
- Gold Mines in SA operate at ~4km already
- Some estimates* say 64000 tonnes Pt in SA

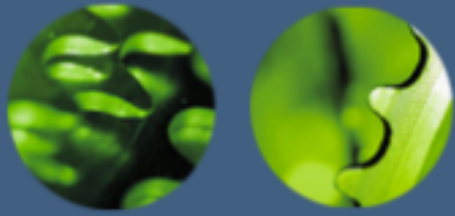


...Why is South Africa talking H2

World platinum resources: Cawthorn, 1999



- Fuel cells catalytic properties, substitutions investigated, platinum still shows superior properties
- Current investment in various applications R&D \square US\$1b annually (outside of SA)

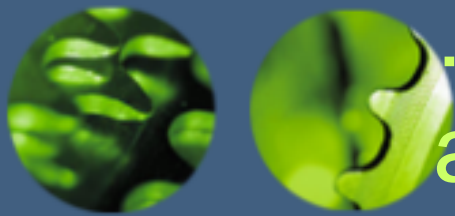


...Pt in a car today vs. fuel cell car



Car today : 2 - 5g Pt
60g Pt

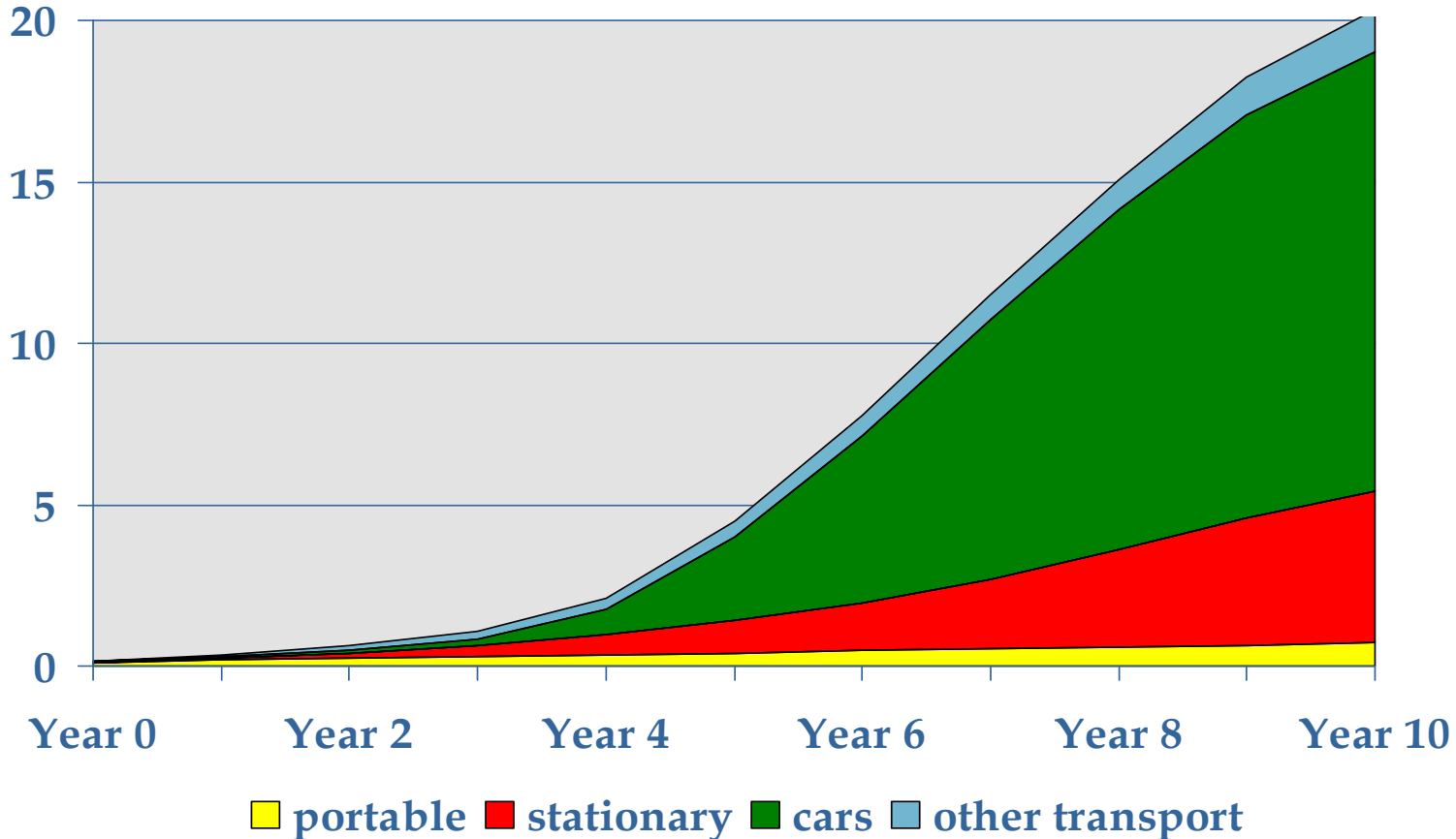
Fuel cell car :



...Pt demand for Fuel cell applications

(Data from Johnson Matthey, 1995-2005)

tonnes



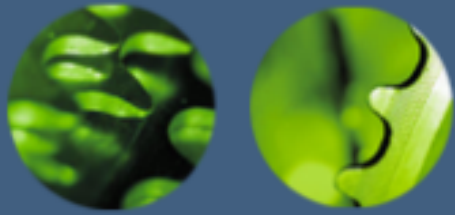


...The Mining and Minerals Sector Downstream Dimension

“We have always been a supplier of minerals to the world, what we are now finding is that the world economy is changing rapidly and is expecting an economy such as ours to be able to produce higher-value manufactured products.

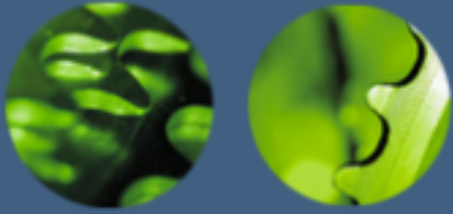
(Min. Alec Erwin)

- SA holds a significant share of the worlds minerals resources and production
- However, we have not been able to use this endowment to attain a satisfactory economic and social performance



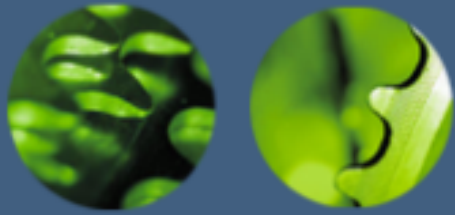
Our Hydrogen Vision

“ to create knowledge and human resource capacity that will develop high value commercial activities in hydrogen and fuel cell technologies utilising local resources and existing know-how”



Key Initiatives

- Policy and Regulatory Influence
 - Intergovernmental Committee (DME, DTI, DOE, EAT, DOT)
- Codes and Standards
- Continuous development of local and International Networks



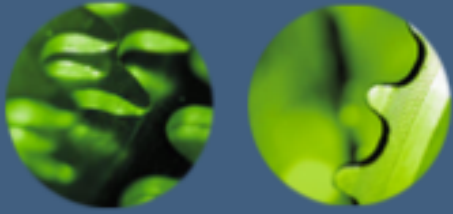
...Strategic Goals

- Develop PGM-based catalysts in South Africa: supply 25% of catalysts demand for the global fuel cell industry by 2020
- Develop local cost competitive hydrogen infrastructure solutions (based on natural resources)
- Promote beneficiation, develop downstream industries & create sustainable jobs linked to our minerals wealth

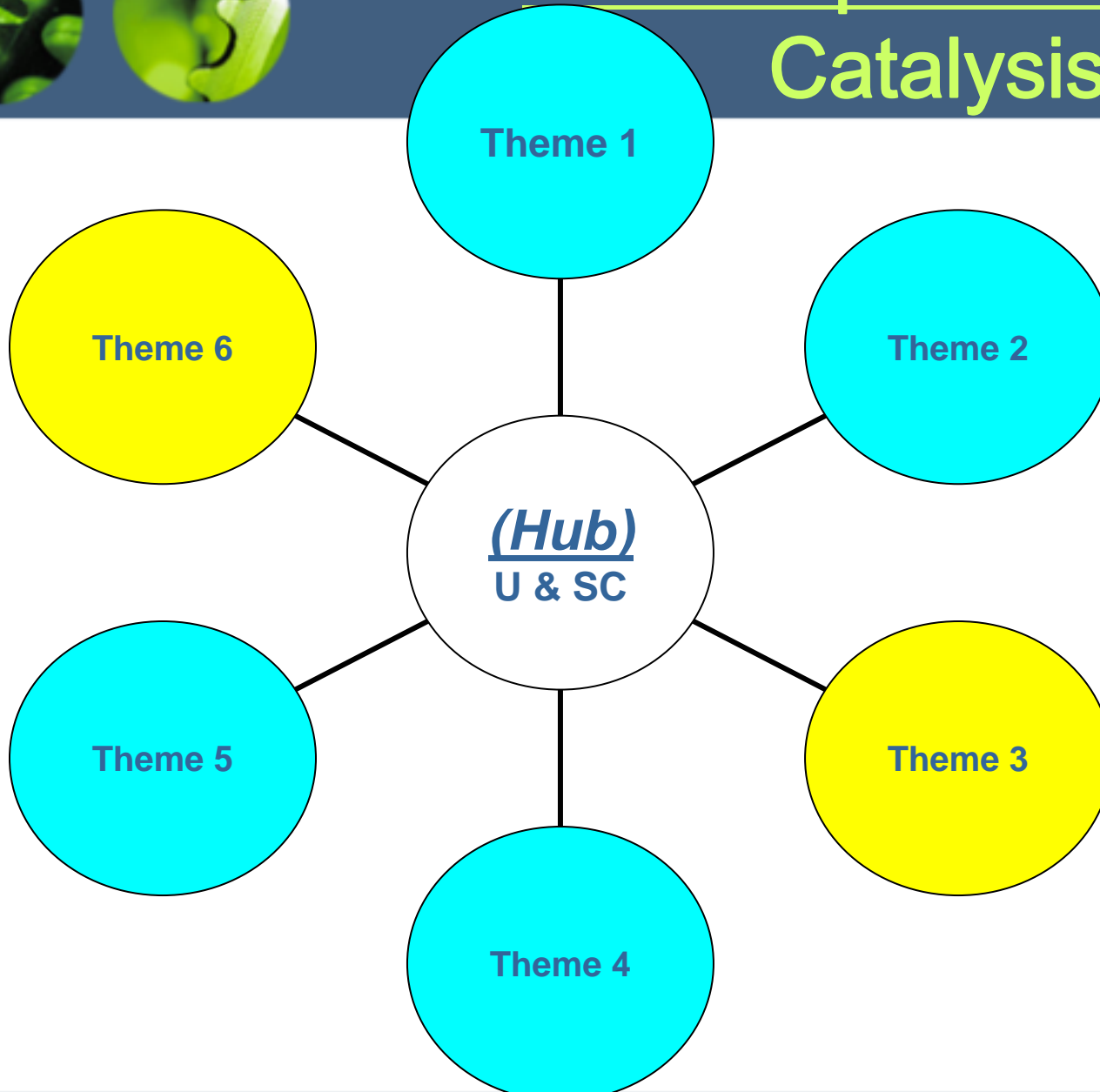


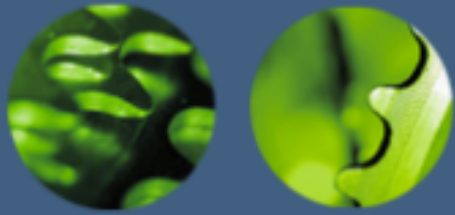
...Implementation

- Establishment of 3 Centres of Competence
 1. Hydrogen Catalysis
 2. Hydrogen Infrastructure
 3. Systems Integration and Validation
 4. Demonstration and Public Awareness
Project(2010 Green Transport& Public Awareness Platform)

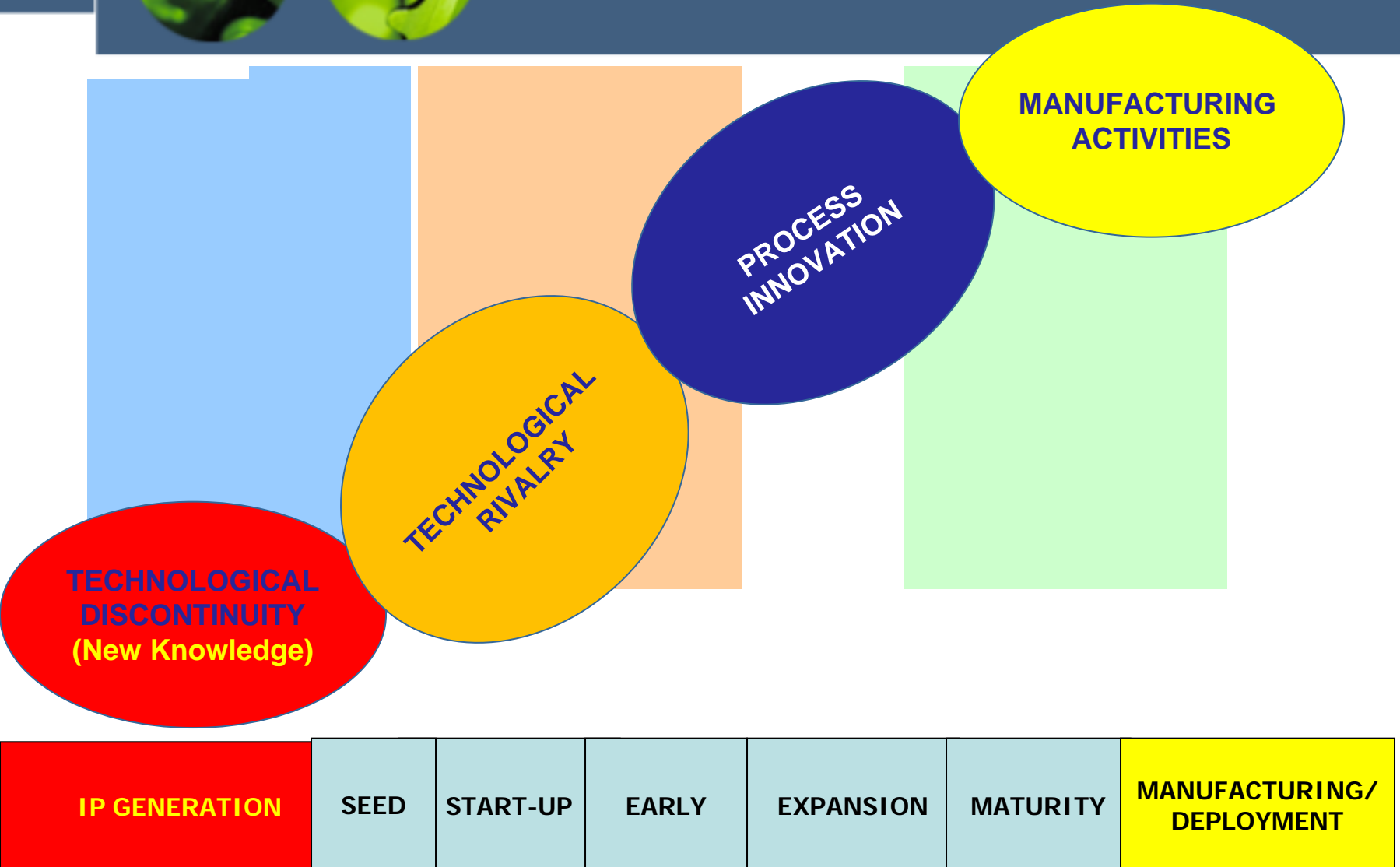


Hub & Spokes Model : Catalysis

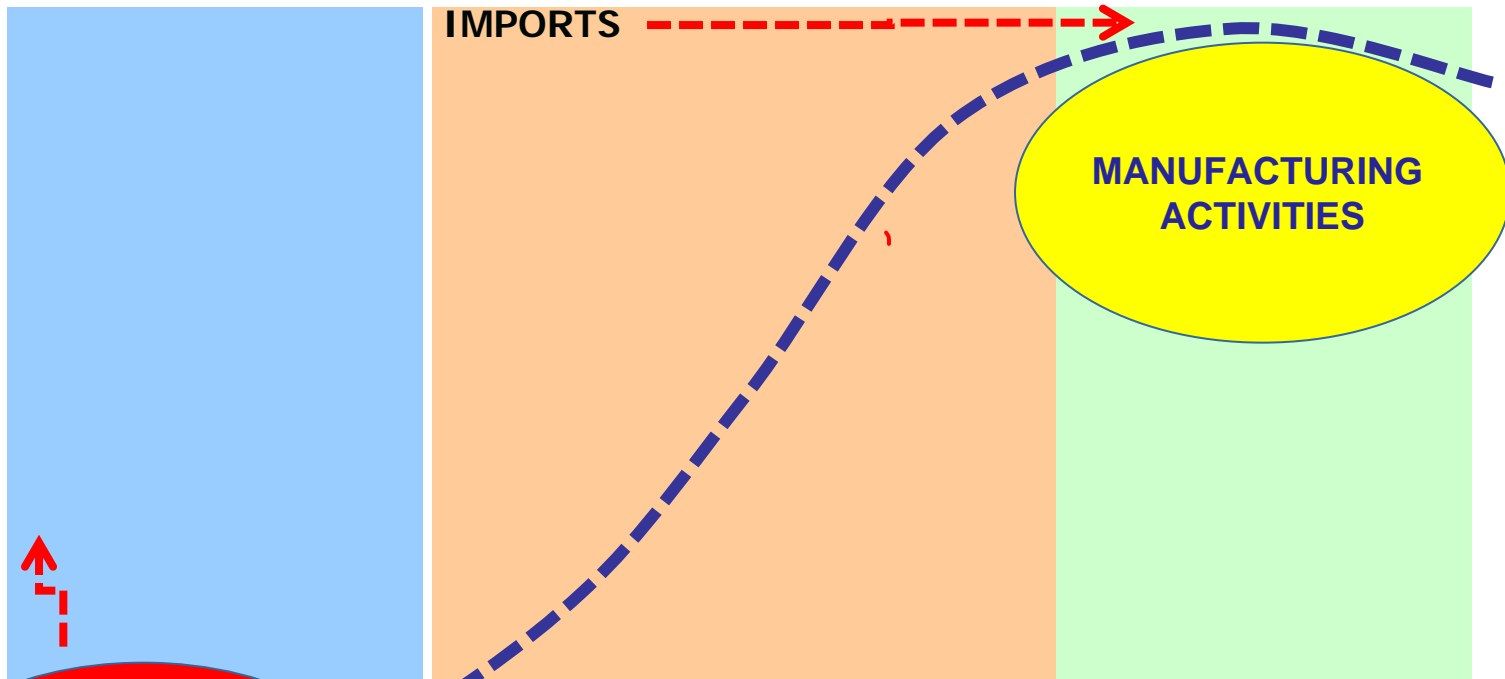




The Innovation_Chain



THE INNOVATION CHASM IN SOUTH AFRICA

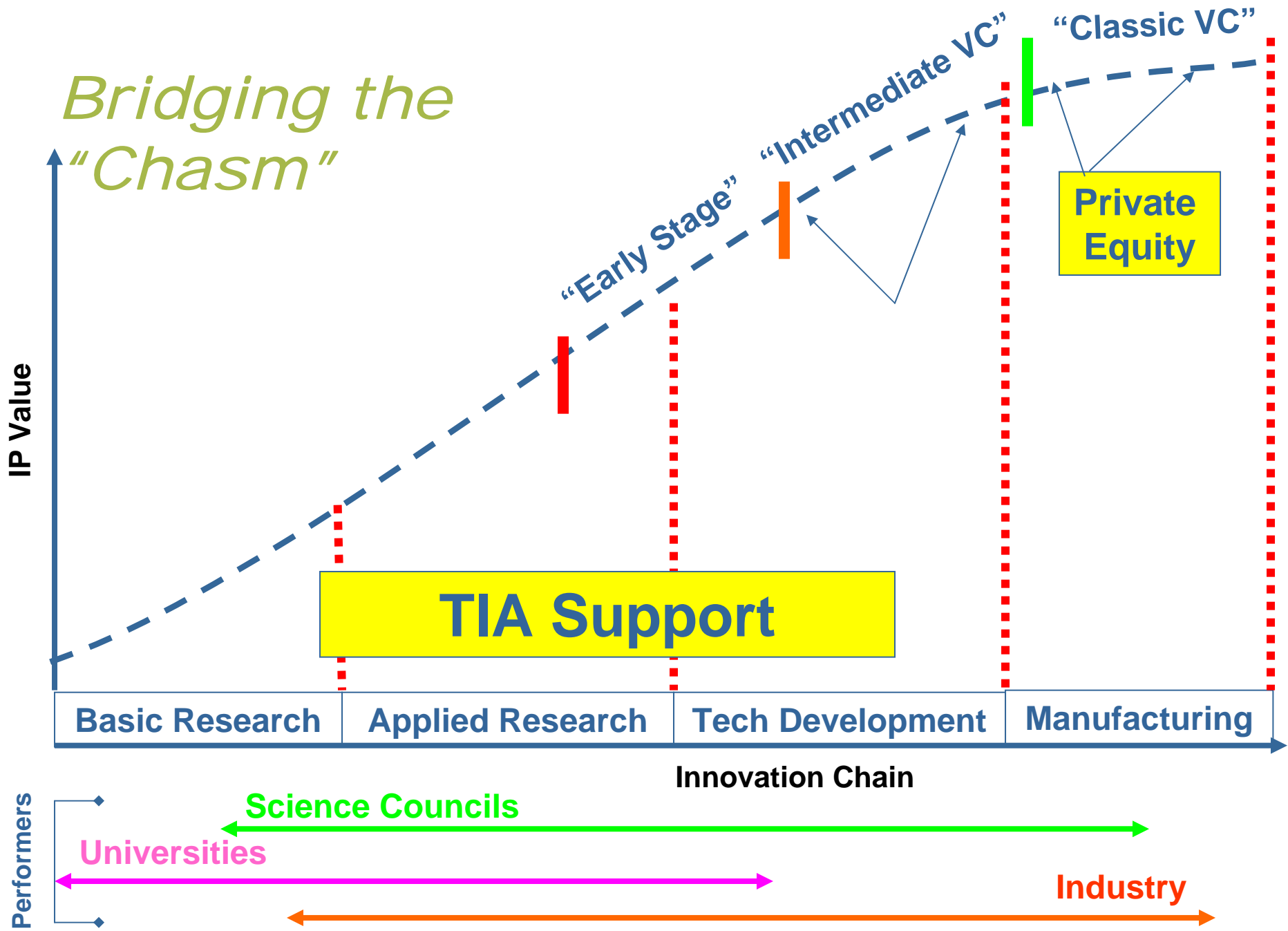


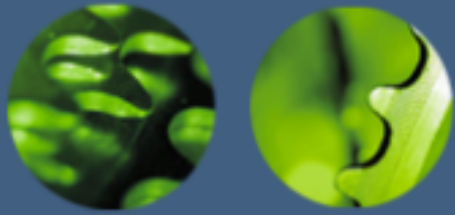
TECHNOLOGICAL DISCONTINUITY (New Knowledge)

RETURN ON INVESTMENT IN R&D NOT REALISED

IP GENERATION	SEED	START-UP	EARLY	EXPANSION	MATURITY	MANUFACTURING
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Bridging the "Chasm"





TIA products and services

The range of proposed TIA products and services include:

- **Innovation financing** (including providing seed, first and second stage funding towards the commercialisation of technology based products and services)
- **Technology development** (including technical and advisory services relating to nurturing of technologies and implementation)
- **Contracting services** (for example, contracting and managing research services on behalf of other role-players and TIA clients)
- Capacity building (including institutional and human capital development)



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. . . Objectives re CoC

- Mechanisms
 - 10 to 15 year commitment
 - Incentives for the private sector participation
 - managed product value chain –TIA
 - Marketing strategy for industry participation
 - Piloting with Hydrogen & Fuel Cell Centres
 - 1 Centre already has 2 private sector partners



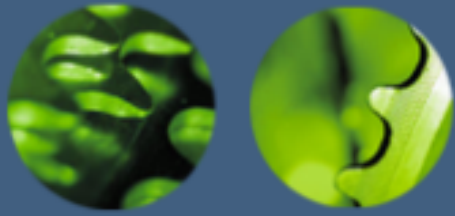
. . . Objectives re CoC

- Deliberate industry participation and new industry development focus
- Competence Centres are far more than networks they involve :
 - contractual relationships between the parties
 - clear short, medium and long-term innovation objectives
 - the establishment of specialized infrastructure
 - shared staffing between partners
 - shared RDI agenda with clearly defined product outputs
 - commitment to commercialisation from the starting point
 - proactive attention to intellectual property issues



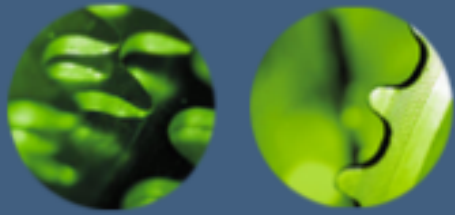
. . . Objectives re CoC

- It is desirable that:
 - If at University Campuses, should not operate directly under academic supervision
 - have the flexibility of an emerging R&D area with a focus on expertise develop initial for a particular product development application
 - adopt best practices of other systems rather than sticking to fixed guidelines
 - Mechanism to attract international researchers and post doctoral fellows



... Demonstration Project Objectives

- Showcase South Africa's clean energy research outputs, capabilities and achievements during 2010 world cup
 - Clean fuels supply and infrastructure (Refueling Stations)
 - Electric vehicles (battery and FC powered)
- Provide an opportunity for practical skills and human resource development in clean transport technologies
- Provide a platform for exploitation of SA developed intellectual property



... Demonstration Project Objectives

- Create awareness, visibility and acceptance amongst the public, entrepreneurs and key decision makers in South Africa about the operability, safety, high performance and low emissions of clean transportation technologies
- Develop local capability and experience to operate and maintain clean transportation technologies, with its required fuel supply infrastructure
- Develop collaborative partnerships both locally and internationally regarding clean transportation technologies for both skills and IP transfer



...Partnership/Affiliation

- Prof Malyshenko-board member UWC
- UNIDO-ICHET
- IPHE Membership
- International Energy Agency

THANK YOU FOR YOUR ATTENTION