

MIoIR MiSET 2014

Scenarios – Scenario Methods; Scenario Models

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Outline

- A Taster
- What is Foresight?
- Why has it grown in prominence?
- What are Scenarios?
- What is the role of Scenarios in Foresight?
- How are (different types of) Scenario produced and used?

A taster- ESRC Genomics Scenarios (2002)

Project Overview

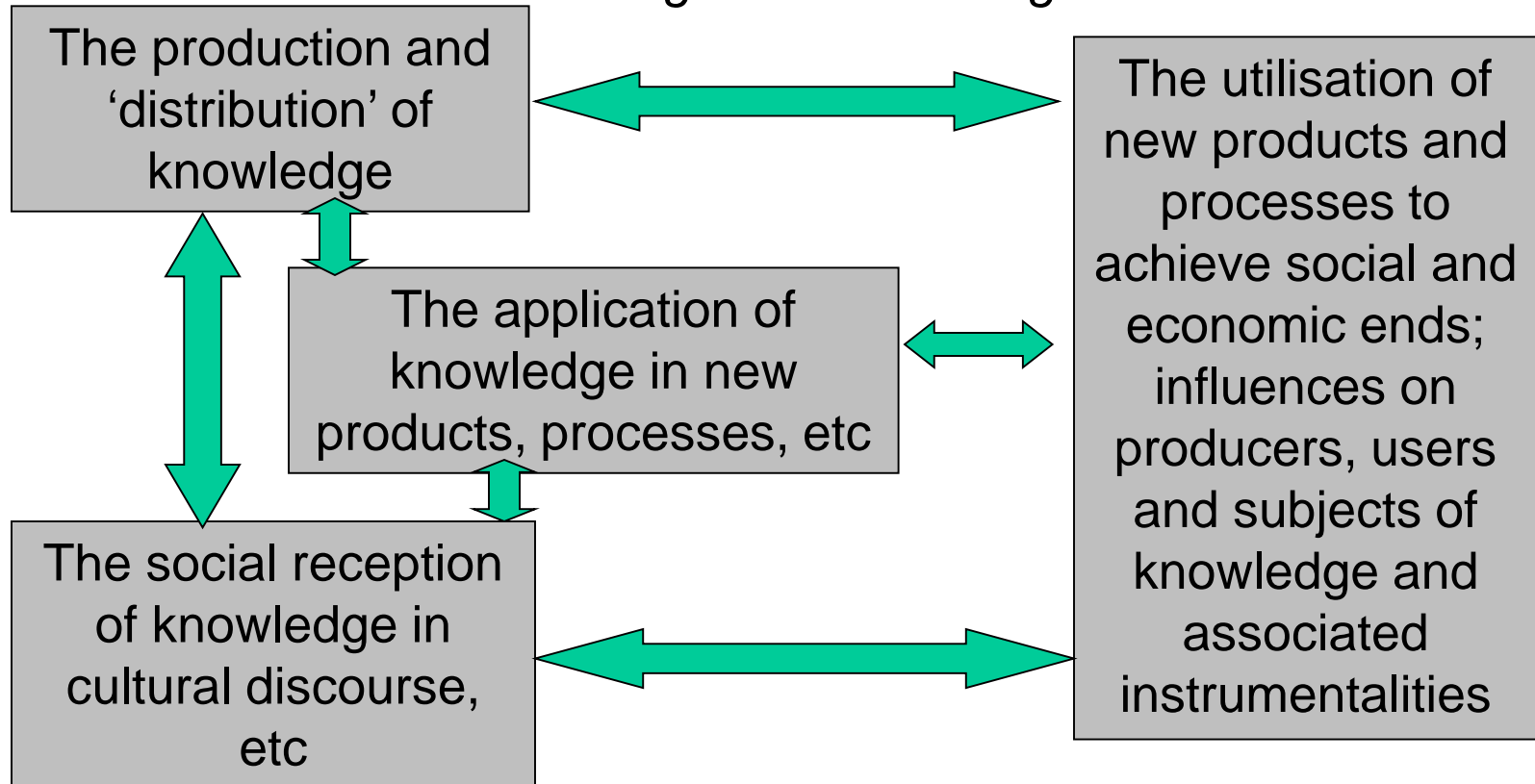
- Aim: Inform ESRC about key directions for its forthcoming programme funding social research on issues concerning genomics
- IAF/CRIC input for Forecasts and Scenarios:
 - Dec. Design Meeting
 - IAF/CRIC Research
 - Interviews with 22 Experts (activists, social scientists, scientific researchers, business professionals)
- Convened January 2002 Workshop.
 - Used three different “lenses” to help clarify the role of Social Science Research for Genomics
 - COUNCIL group collaboration software
 - 24 Participants

Work published in Foresight vol 4 no 4

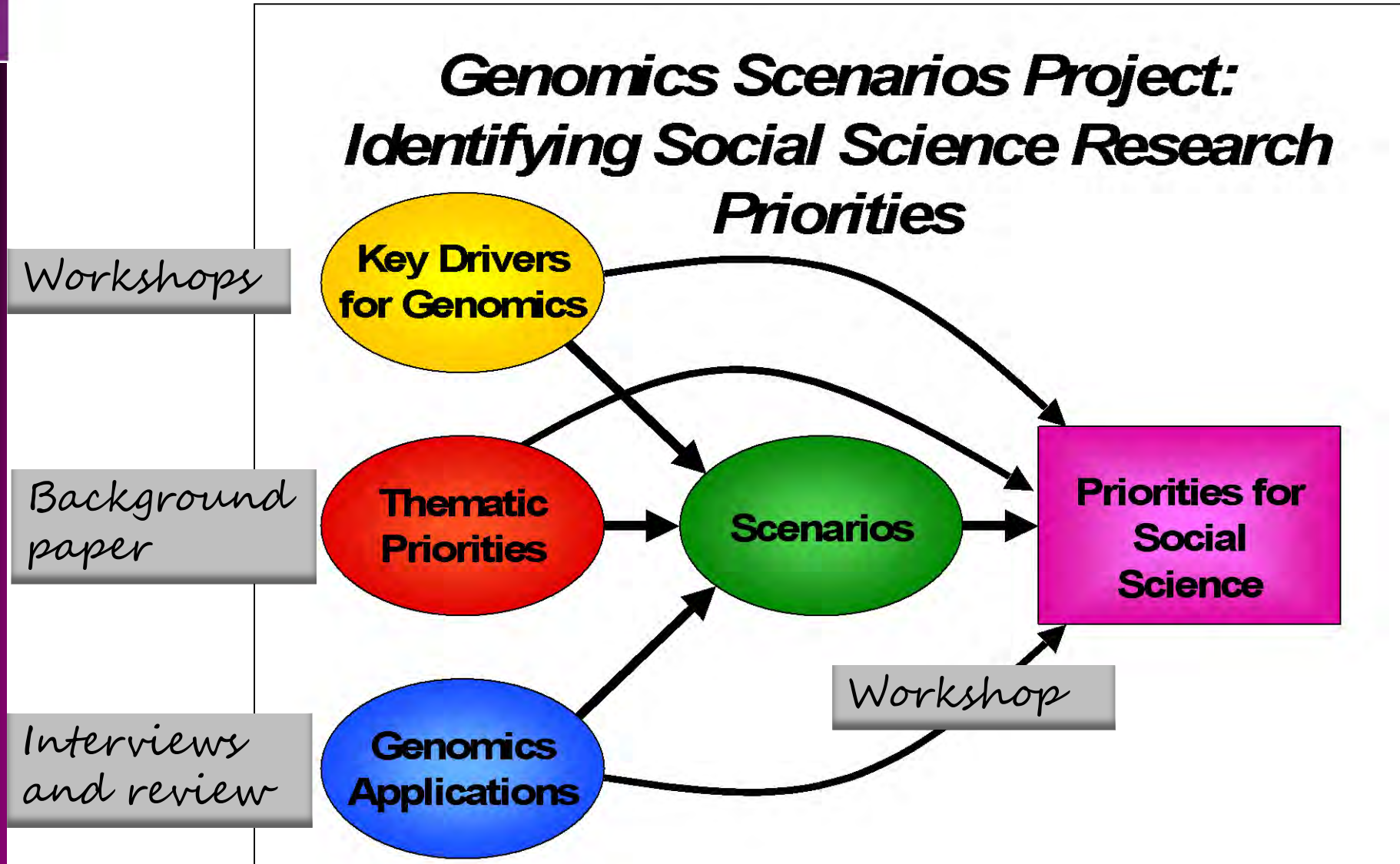
Framework for thinking about social research in relation to scientific (and other?) knowledge:

Background paper prepared on how genomics relates to generic ESRC research priorities

Research can examine Social Structures, Processes, and Relations contributing to and resulting from:



Multiple Approaches for Examining Priorities



Key Drivers of Genomics



1. **Functionality of Genomics**
2. **Regulation of Genomics**
3. **Business Forces and Beyond**
4. **Genomics Itself**
5. **Politics and Geopolitics**
6. **Demand**
7. **Social Attitudes**
8. **Social Mobilization**
9. **Governance of Knowledge**
10. **Events**
11. **Risk**
12. **Environment**

Influences
on
Development
of Focal
Topic

Scenarios

4 Scenarios constructed, involving variations of the drivers, using “archetypes” approach -

- **Genomics, Inc.**
- **Broken Promises**
- **Out of Our Control**
- **Genomics for All**

α

β

γ

δ

Themes from Discussion of Social Science Thematic Priorities

Specificities of Genomics

- nature and impact of scientific activity

Science and Technology Knowledge

- relationship between public and private science

Regulatory Issues

- privacy and data protection

Social and Health Policy Challenges

- insurability and health impacts

Interfaces Between Disciplines

- effects on social and economic structures

Cultural Implications and Institutional Resources

- social science in relation to natural sciences

Social Science Research Priorities – How? & What?

How?: Priorities related to Research Organizations and Process

What?: Priorities related to Genomics Research Issues for Social Science:

Social Science Research Priorities – How?

Priorities related to Research Organizations and Process:

- 1. Interdisciplinarity – outreach to natural scientists**
- 2. Engaged Research – provide context for innovation**
- 3. International Research – role of developing world**
- 4. Conflict and Inequality – social division and equity**
- 5. Communication of Results – enhance dialogue**

Social Science Research Priorities – What ?

Priorities related to Genomics Research Issues for Social Science:

- 1. Social Perceptions and Ethical Structures**
- 2. Critical Analysis of Key Social Constructs**
- 3. Business and Economics**
- 4. International Politics and Institutions**
- 5. Cultural Reception and Consumption Practices**
- 6. Co-Evolution of Laws and Legal Structures**
- 7. Food and Agricultural Applications**
- 8. Mobilization of Groups**
- 9. Inter-relations Between Technologies**
- 10. Corporations, Innovation, Technology Transfer**
- 11. Genomics Innovation and the State**

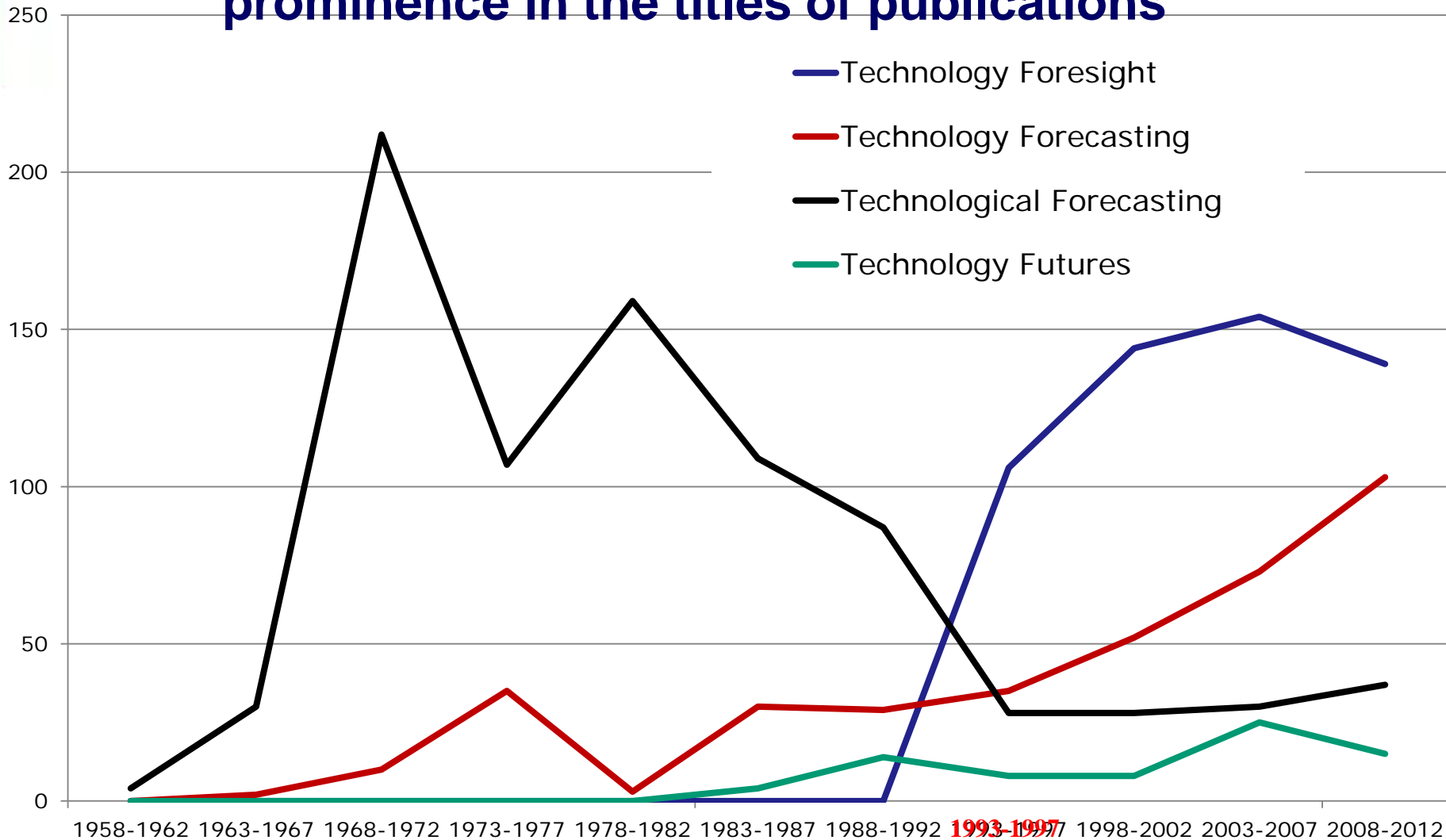
Social Science Priorities

- Challenge for Social Science going beyond specific research topics :
 - Grasp the technical issues
 - Deal with topics that cross disciplinary boundaries
 - Interact with researchers from a wide variety of disciplines
 - Help envision alternative paths of development for the technology
 - Critically examine conceptual frameworks
 - Confront social conflict and inequality and how it changes – and is changed by –
Genomics

Back to Scenarios Later...

...FORESIGHT

The career of a word: Foresight suddenly rises to prominence in the titles of publications



Something has happened. Is it just terminological?

But this was not the trigger

- The upsurge of interest in Foresight begins in the 1990s
- It moves on in significant ways from the use of the term as an alternative to Futures Studies, etc.
- This is because it introduces – or at any rate emphasises – new elements
- This stems very much from the stimulus associated with STI policy problems.

Problems in Science Policy:

Pressure on budgets vs.
escalating costs
Limited innovation and
growing competition

Grand Challenges:

Environmental crises
Emerging technologies
and ways of life

STI Futures

"Innovation"

Technology forecast

"Future technology"

Sociotechnical

Policy

Problems in Science Policy:

Pressure on budgets vs.
escalating costs
Limited in
growing c

- Innovation systems;
Capabilities;
Product Cycles...

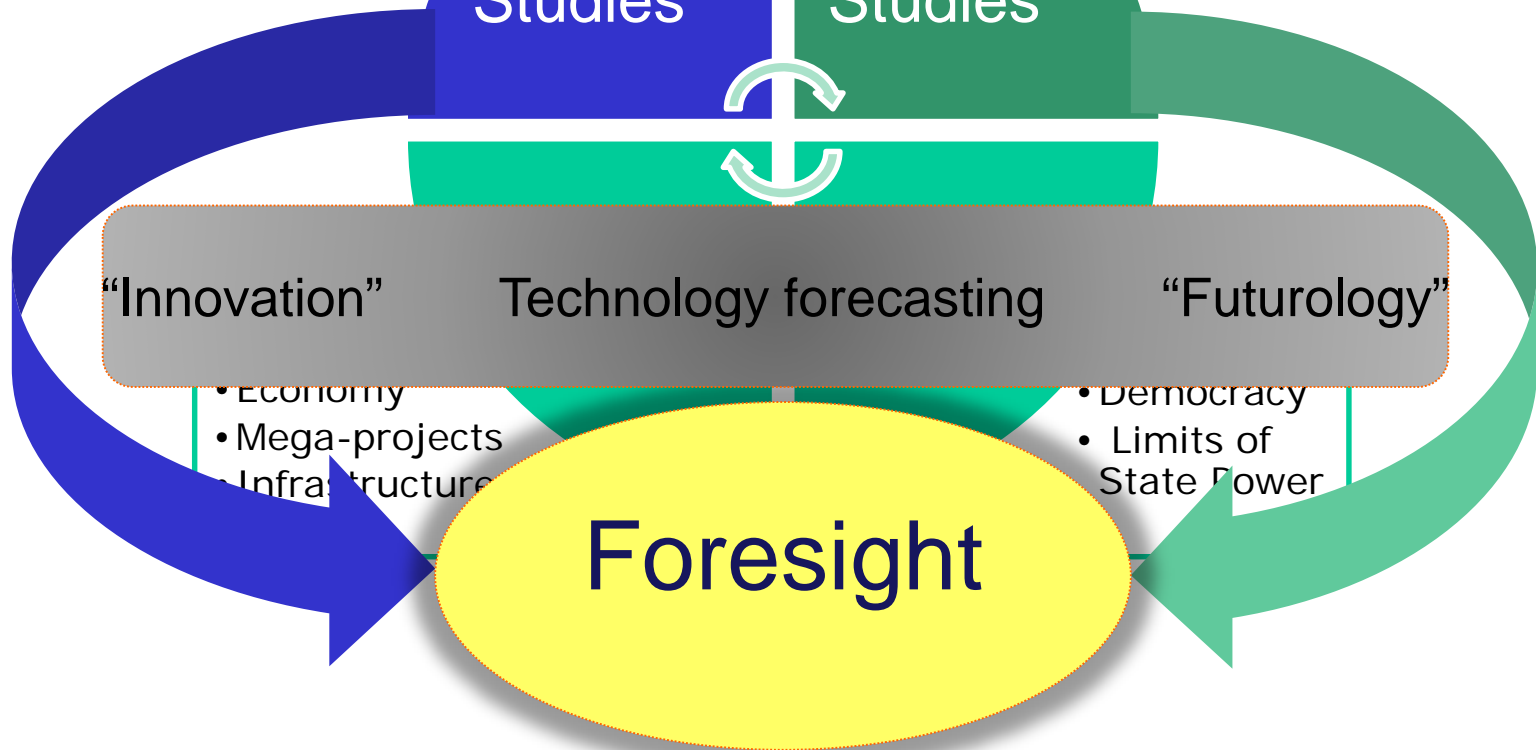
Innovation
Studies

Futures
Studies

Grand Challenges:

Environmental crises
Technologies
ys of life

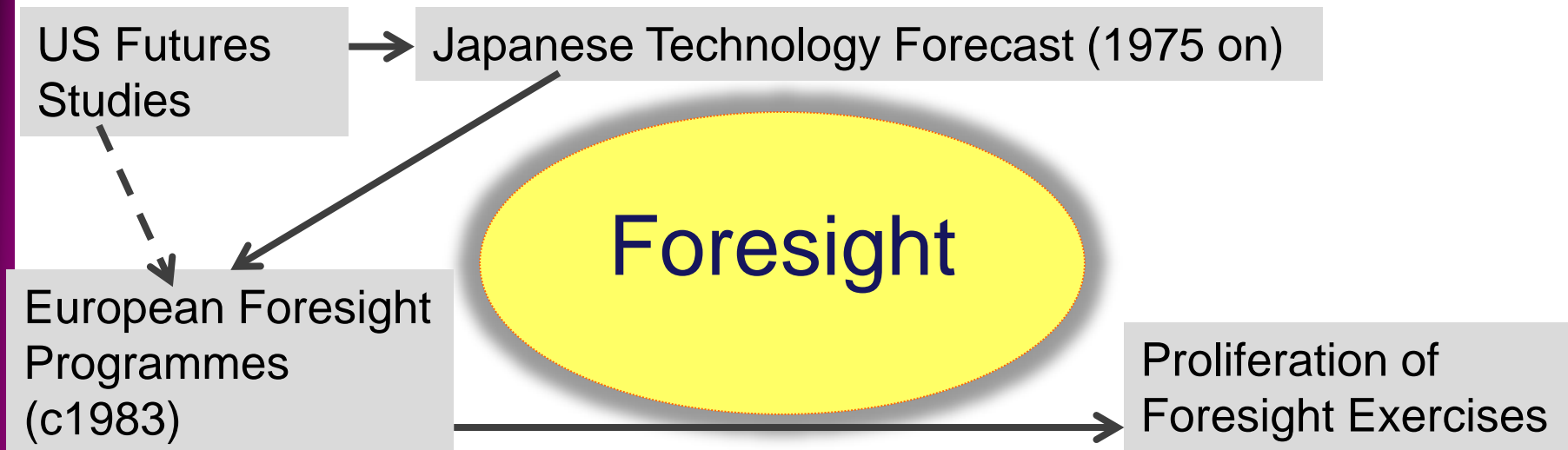
- Alternative Futures
- Systematic techniques
-



Foresight

A Wave of Foresight Programmes

- 1984: Irvine and Martin: **Foresight in Science: Picking the Winners** (strong impression from Japanese experience... which had Nipponised US futures methods and applied them to Research Policy)
- **Picking the Winners** - Oops! But interest from many countries
- Martin & Irvine 1989 **Research Foresight**... more studies and then...
- Early 1990s: (Technology) Foresight Programmes launched in several European countries
- Later 1990s: many more countries follow, with accession members of EU, regional foresight activities, and much else



Foresight

- **Foresight** emerged as a major area of activity in mid 1990s. Especially focused on national S&T programmes, with exercises in many large EU countries – and rapid diffusion more widely. (Good resource for strategists.)



Foresight

Making the future work for you

[Home](#) | [Site Map](#) | [Whats New](#) | [Search](#) | [Help](#) | [Contact Us](#)

Welcome to Foresight

The current projects are: [Brain Science, Addiction and Drugs](#), [Detection and Identification of Infectious Diseases](#) and [Intelligent Infrastructure Systems](#)

What is Foresight?

- Foresight aims to provide challenging visions of the future, to ensure effective strategies now. It does this by providing a core of skills in science-based futures projects and unequalled access to leaders in government, business and science.

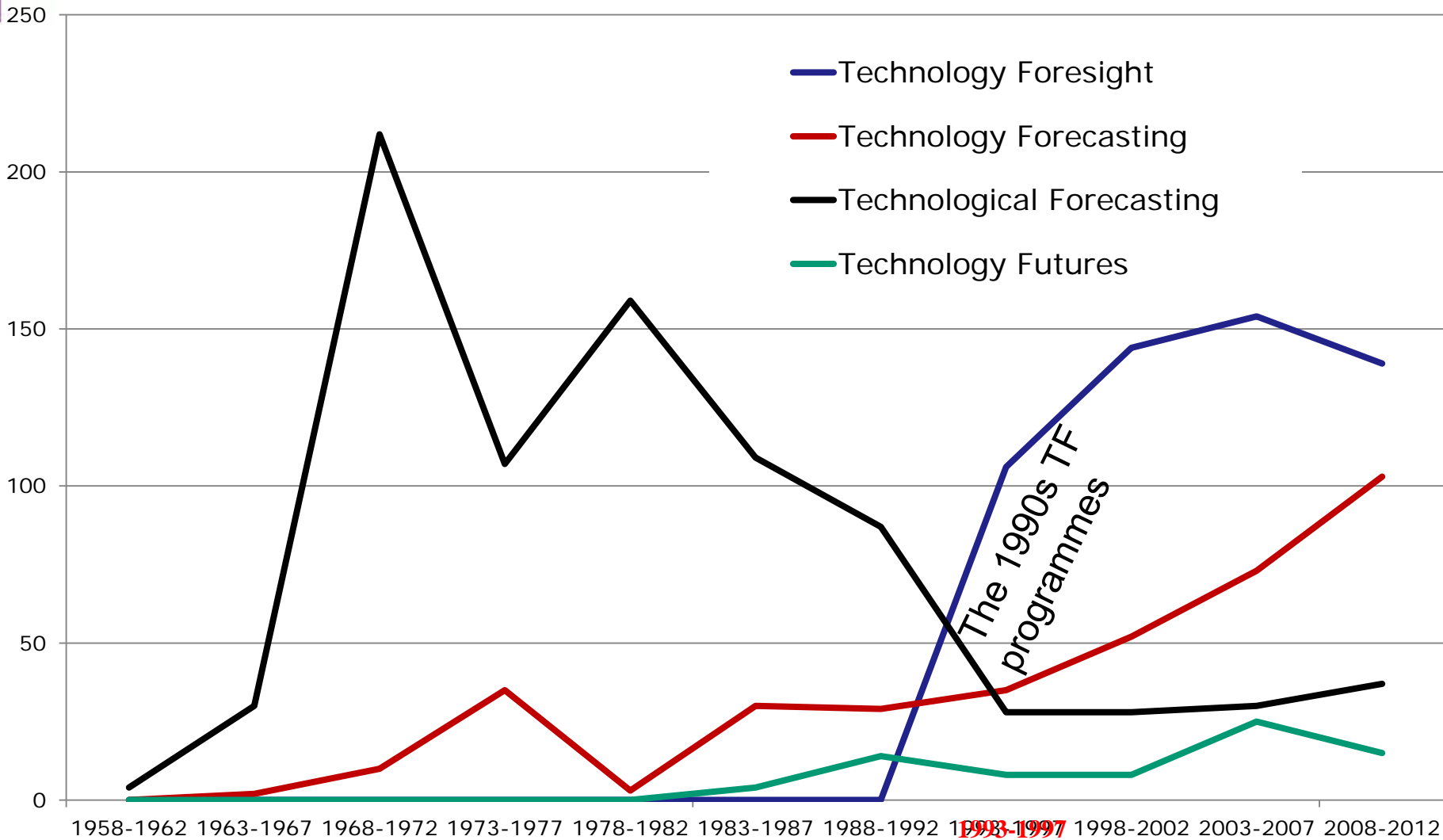
News

- **NEW:** Public Perception of Risk.
- **NEW:** 7th edition of e-sight published.

[Projects:](#)
[Intelligent Infrastructure Systems](#)
[Detection and Identification of Infectious Diseases](#)
[Brain Science, Addiction and Drugs](#)
[Cyber Trust and Crime Prevention](#)
[Exploiting the electromagnetic spectrum](#)
[Cognitive Systems](#)
[Flood and Coastal Defence](#)

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Terminological Trajectories



Fully-Fledged

Foresight

**Prospective
orientation -
examining
long-term
potentials**

Stakeholders
understand underlying
rationale for long-term
analysis: improved
knowledge of responses
to challenges and
opportunities

Decisions informed by
longer-term analysis,
while analysts
understand decision
timetables and contexts

**FULLY-
FLEDGED
FORESIGHT**

**Participatory
orientation -
engaging
stakeholders &
sources of
knowledge**

Stakeholder knowledge
informs planning, while
stakeholders understand
basis for decisions:
increased legitimacy and
engagement

**Practical
orientation -
informing
decisions
(policies,
priorities...)**

(Technology) Foresight

- Not ivory-tower futures studies, but tied to actual decisions and policy processes
- Not just small expert group analyses, but involving wide participation
- Achieving wide legitimacy and (often) publicity, developing communities of practice, being embedded
- WARNING: term is appropriated widely! and not all Foresight is labelled as such.



WARNING

The term Foresight has become very popular – achieving more legitimacy than futures studies, etc.

Often familiar forecasting activities are relabelled as foresight.

Often foresight work is undertaken by people with limited experience or understanding.



Back to...

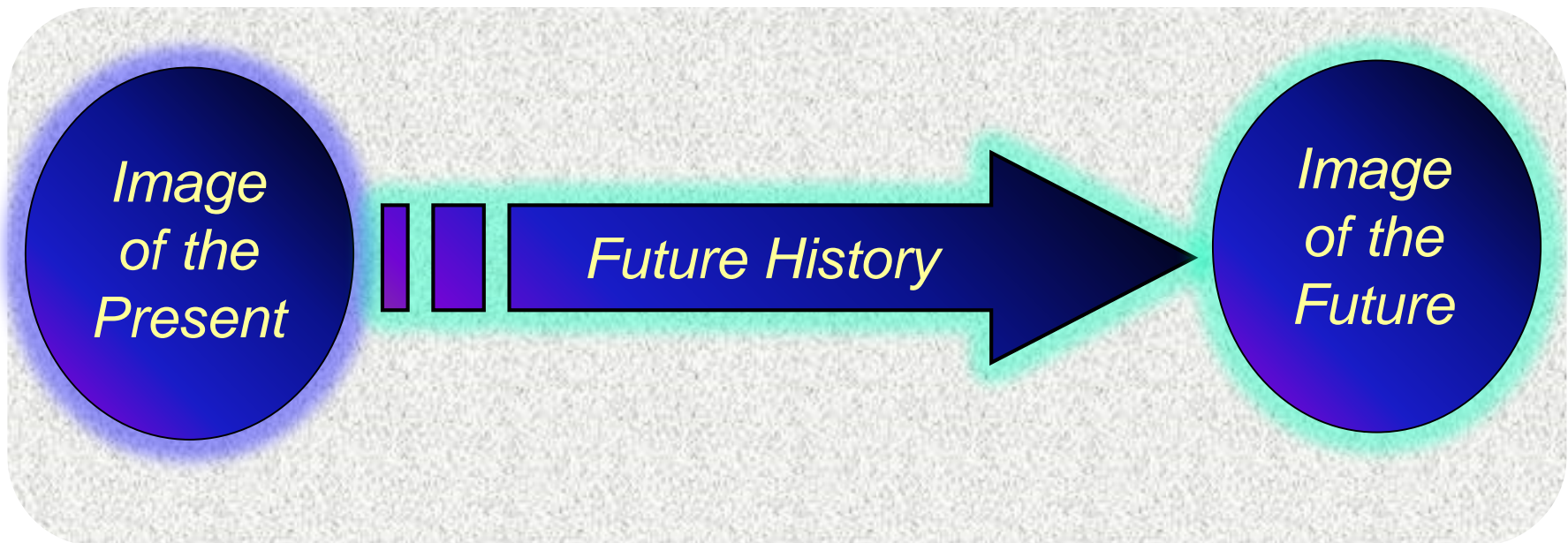
...SCENARIOS

Scenarios:

- ☀ What are Scenarios?
- ☀ Why Use them?
- ☀ Varieties of: ~ Scenarios
~ Ways of Producing Scenarios
- ☀ Scenario Workshops – principles and examples
- ☀ Models and Scenarios
- ☀ Designing, Presenting and Using Scenarios

Definition of Scenario

A systematic, explicit vision of a possible future.



This involves us having, or creating, at least a basic view of how elements of the phenomenon relate together – a model

Scenarios – Why?

Systematic, explicit visions of possible futures



Business as Usual can be a scenario – albeit an unlikely one

- Visioning alternative futures, Subjecting BaU to analysis
- Sharing knowledge and establishing shared views of alternatives and actions
- Reflect on our Image of the Present

More
later

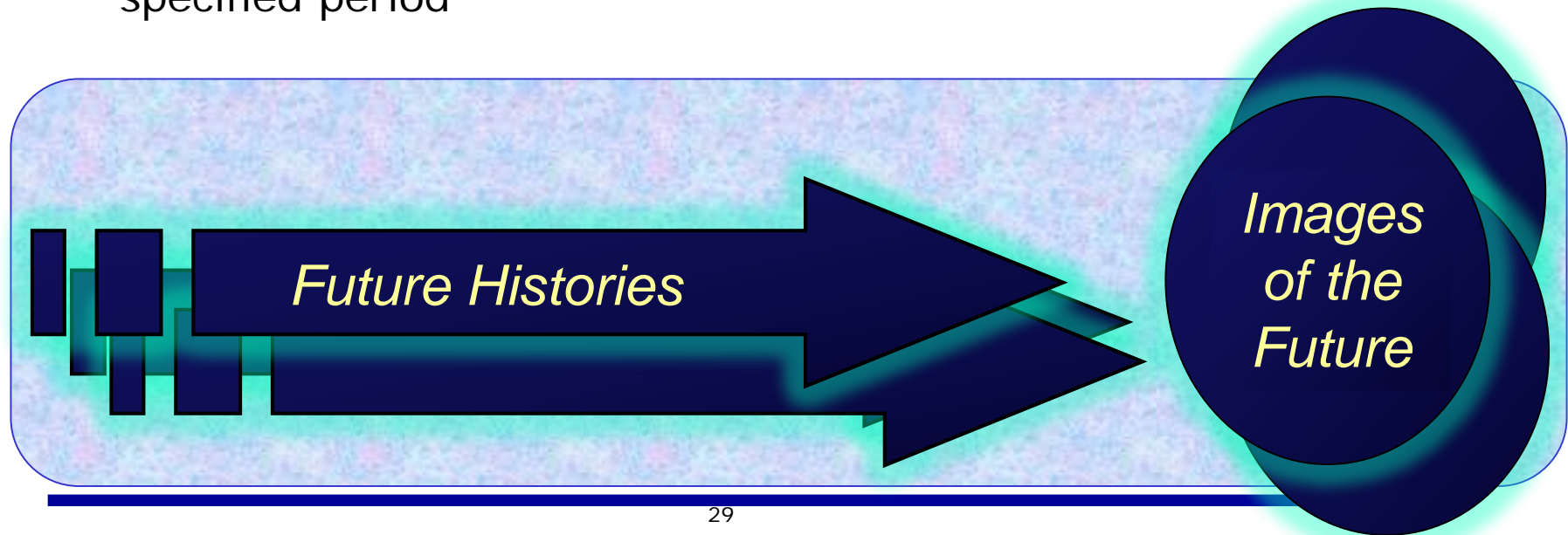
Two Sides of Scenarios

FUTURE HISTORY

description of a future **course of events**, sequence of developments, often highlighting key events, decisions, or turning points, over a more or less tightly specified period

IMAGE OF THE FUTURE

description of a future **set of circumstances**, a portrait of the state of affairs (at a more or less tightly specified date or period, or after a particular set of developments)



Example of the Two Sides of Scenarios _ UK Foresight “Intelligent Infrastructures”

FUTURE HISTORY

Timeline: Perpetual Motion

2055

2053 Auto-delivery systems increasingly replace humans in service jobs

2049 99.2% of UK citizens possess encrypted ID devices

2042 Sustainable housing more commonplace but costly

2040

2038 Growing resistance to 24/7 working patterns

2036 ‘LifeServe’ technology incorporated into ID devices

2030 Tackling identity theft becomes EU’s first priority

2028 Inter City Europe (ICE) rapid train system connects SE & Birmingham to Europe

2025

2021 Chief Wellbeing Officer’s Report on stress levels released

2020 Real-time telepresencing perfected

2018 Enhanced ground-based GPS

2016 Hydrogen-fuelled guided buses trialled

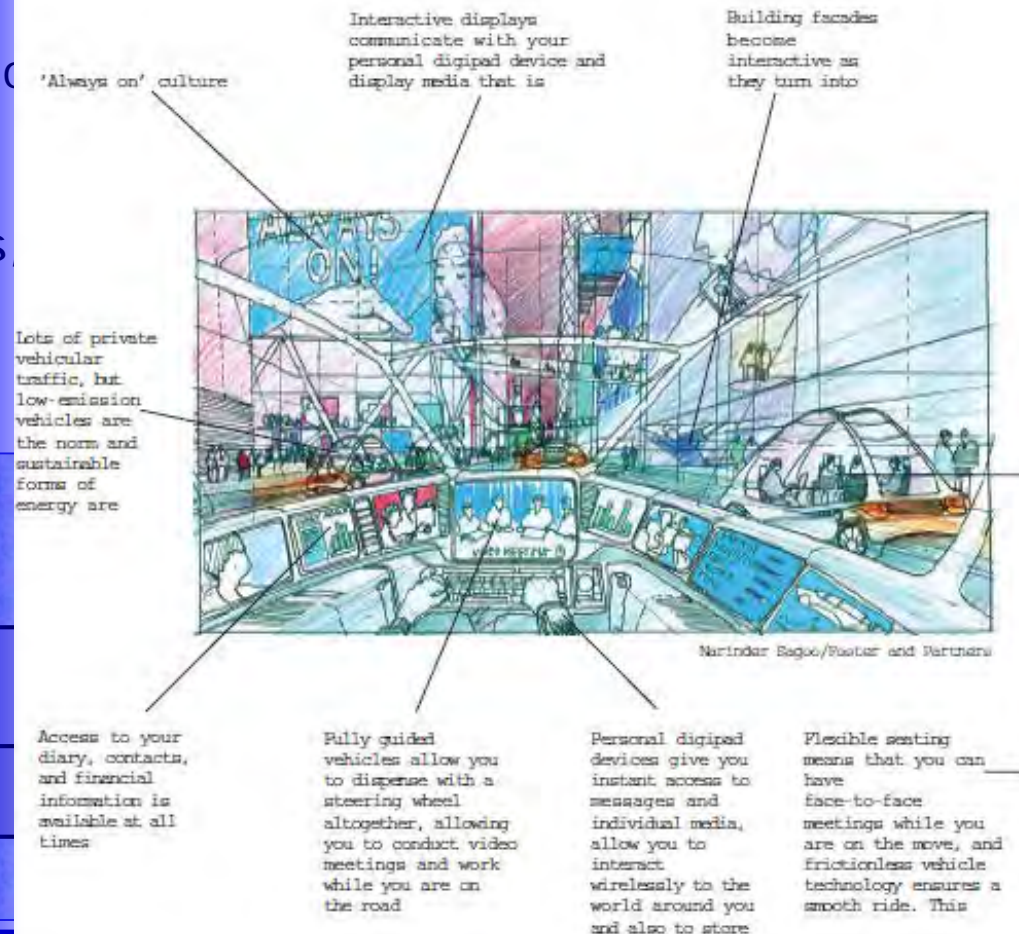
2015 Encrypted ID devices tested

2013 Construction of nuclear power plants starts

2009 National Wireless Network connectivity

2005

IMAGE OF THE FUTURE



These are more or less explicit models

FUTURE HISTORY

How are these events linked? Some are determined by others, some “exogenous” .

Is the story plausible?

2015 Encrypted ID devices tested

IMAGE OF THE FUTURE

How are these features linked? Some are related intimately, some are independent (but their effects combine).

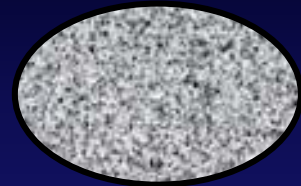
Is the image coherent?

Interactive displays
communicate with your
Building facades
become
'Always on'
Lots of private
vehicular
traffic, but
low-emission
vehicles are
the norm and
sustainable
forms of
energy are
Access to
diary, contact
and financial
information is
wearing wrist
messages and
face-to-face

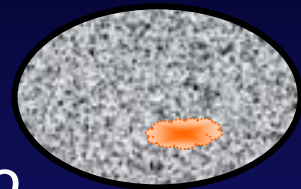
Discussing these links, while building the scenario, contributes to developing shared understanding / aligned models.

Further Definitions

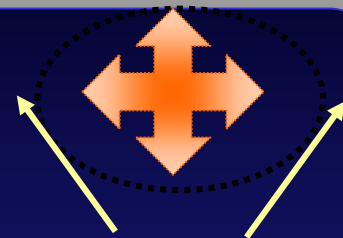
Scenario – covers a wide range of features of the future, provides a multidimensional overview.



Vignette – detailed account of one element of a scenario, usually through narrative or picture. Focus on one dimension, others contextual. Used to elaborate experience/practice/critical incidents.

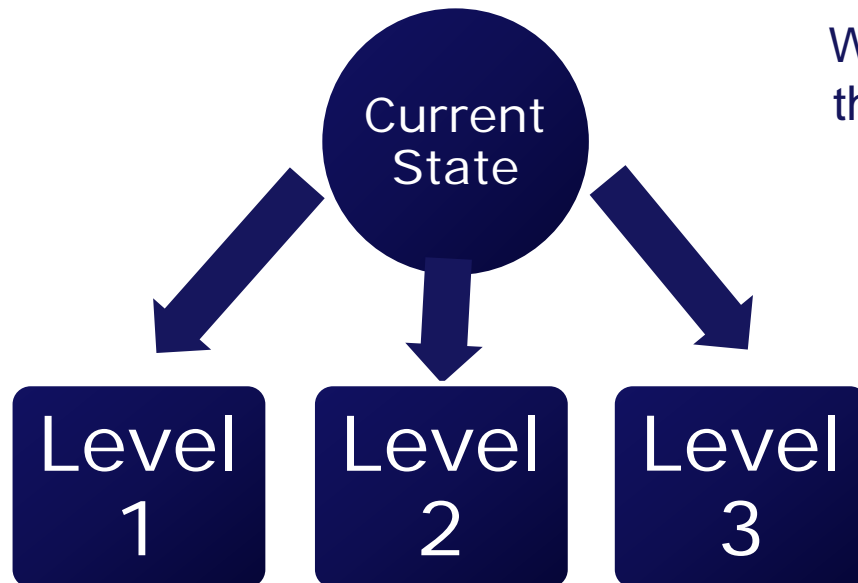


Profile -skeletal description of future in terms of key parameters – e.g. Result of combining position on axes of a 2*2 scenario matrix.



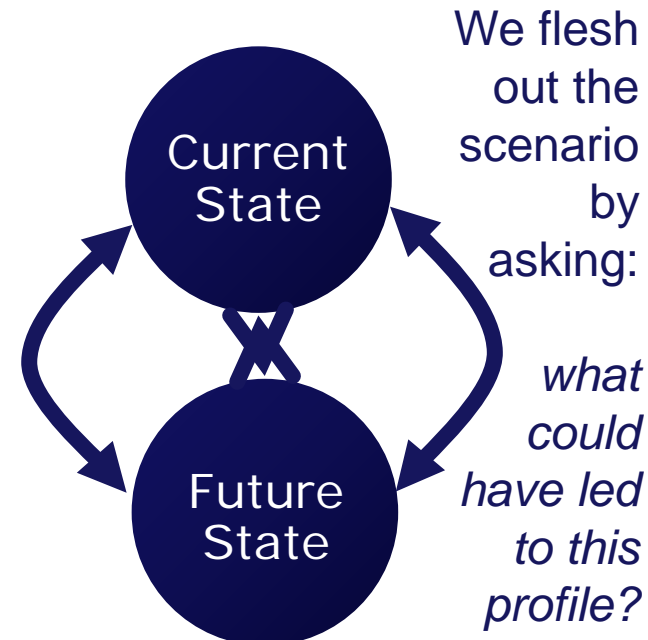
Profile

- A skeletal account of development or an end-state in terms of just a few key variables, often just one or two.
- Economic growth rate, or a combination of growth and inflation; extent of global warming; pace of diffusion of a new technology...
- Often the starting point for scenario development and analysis – what would happen if this trend continued? How might we have arrived at this state of affairs?



We flesh out the scenario by asking:

what would this profile look like?



We flesh out the scenario by asking:

what could have led to this profile?

Classic Variants of Scenarios

***"Exploratory";**
..outward; forecasting*

***"Normative";**
inward; backcasting...*

Starting from the **present**:

- What next?
- What if?

DIRECTION

Starting from the **future**:

- Where to?
- How to?

DESTINATION

*Image
of the
Present*



*Image
of the
Future*

Why undertake scenario analyses?

- To provide a novel basis for sharing knowledge and ideas, developing common visions and shared understandings.
- The process is potentially very valuable for raising/sharing awareness, the products are valuable communication devices.

Single scenario analysis ~

- To elaborate on a particular future (usually desired one, but may be a warning)
- To demonstrate implications of assumptions and/or trends elaborated into future.
- To help identify goals and set targets; to explore actions and instruments, to build a roadmap.

Multiple scenario analysis ~

- To illustrate alternatives, indicate a range of plausible developments (not one inevitable future path).
- To stimulate reflection on underlying assumptions.
- To assess robustness of strategies.
- To give insight into contexts and outcomes (intended or otherwise) of actions, events, objectives.
- To help identify turning points, key decisions, indicators, early warnings of change.
- Often deliberately to challenge Business as Usual.

Multiple scenario analysis

Common to use < 4 scenarios:

- Mainly because this number is usable by sponsors, and feasible to elaborate in a brief workshop. Thus, since there are infinitely more possible futures, the scenarios chosen should be structured so as to capture MAJOR variations – parameters, drivers.
- This usually does means NOT basing scenarios on Wild Cards (<10% probable) This is usually a separate task. Weak signals however are often illustrated via scenarios.
- 2 scenarios can be used – but danger that users will try to average.
3 scenarios – catch several dimensions of change. 4: 2*2 approach.

Occasionally, more scenarios are used: e.g. in Canadian Foresight, one scenario (set) per major driver.

But often so-called “multiple scenarios” are just (a) canonical variations on a theme, or (b) vignettes within a standard framework

- A single scenario may be developed especially for aspirational purposes – e.g. to set a target.

A few recent examples from UK Foresight

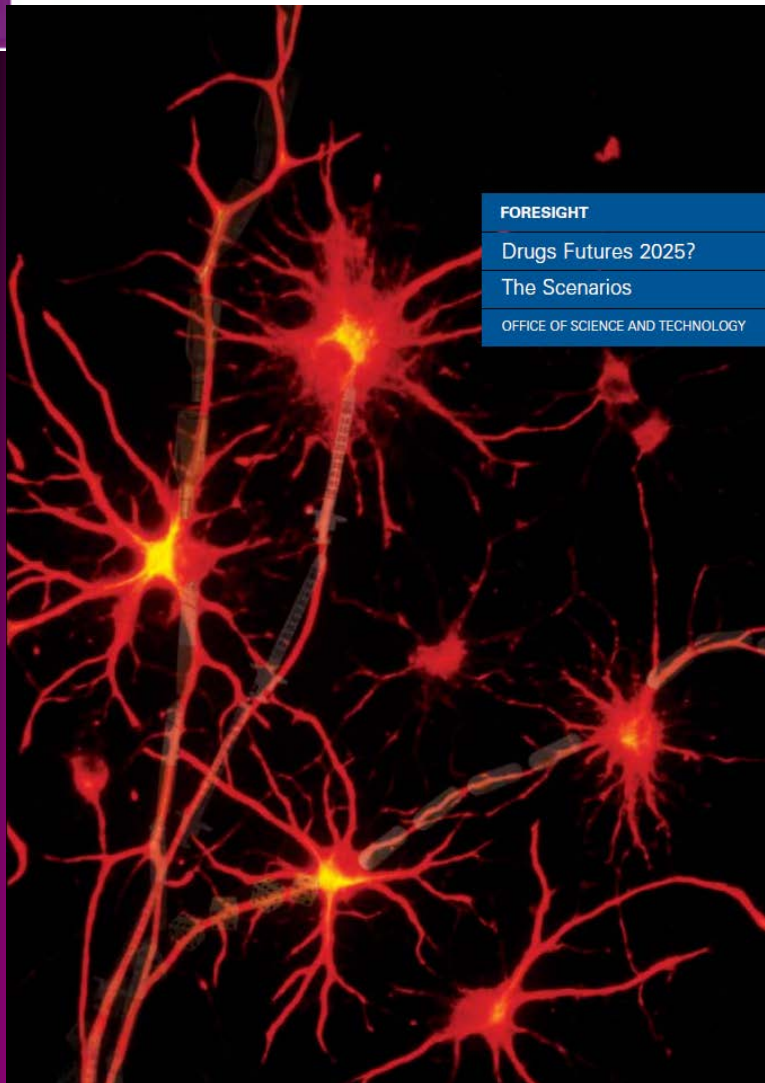


Figure 1: The scenario matrix



Obesity



Values

INDIVIDUAL
RESPONSIBILITY
FIRST

ANTICIPATE & PREPARE

Scenario
One

Scenario
Two

NATURE OF RESPONSE

VALUES

SOCIAL
RESPONSIBILITY
FIRST

Scenario
Four

Scenario
Three

REACT & MITIGATE

Responses

Scenario One: summary over time

2010	Individual awareness of long-term challenges, awareness of need for behavioural change.	Long-term impacts and costs valued increasingly highly.
	Consumers demand systemic change from business and government to address their concerns for the future.	Social divides widen around access to technology, education, wealth.
	Food industry a focus of new models of sustainability.	High commodity and labour prices reinforce need for market action to meet long-term challenges.
2020	New approach to resource management stimulates investment in sustainable infrastructure.	Tensions exist between individual and wider public needs, e.g. around transport.
	Some misallocation of resources due to working on incomplete evidence.	
		But resource pressures continue, sustaining need for change.
2035	UK remains globally competitive, with an open-door policy on immigration.	
		Successful resource management has meant tough choices and opportunities missed. Some duplication of effort.
2050	The consumer is still king, but only if they can afford it.	

Some Nanotech scenarios

The future of nanotechnology: We need to talk (2006)

ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/nanologue_scenarios_en.pdf

Nanologue European Commission-funded project (→2015)

Disaster recovery

The story so far

How things have changed since 2006

What's selling well?

What's worrying us?

More in depth...

Now we're talking

The story so far

How things have changed since 2006

What's selling well?

What's worrying us?

More in depth...

Powering ahead

The story so far

How things have changed since 2006

What's selling well?

What's worrying us?

More in depth...

no change	Proportion of scientists working in nanotechnology who feel that the media present a fair and balanced view of nanotechnology
--	Equality of access to nanotechnology-related products between the industrialised and developing world
--	Proportion of nanotechnology-related patents originating in the European Union
+	Public agreement with the statement that "nanotechnology on balance can make a significant contribution to my quality of life"
+	Public sector funding for nanotechnology research and development
+	Penetration of nanotechnology-based products in food and packaging
+	Penetration of nanotechnology-based products in medical diagnostics
+	Penetration of nanotechnology products in the energy sector
+	Number of nanotechnology pollution events
+	Number of nanotechnology-related patents filed

Some Nanotech scenarios 2

Nano Tomorrows (2007)

<http://crnano.org/CTF-ScenarioIntro.htm>

Center for Responsible Nanotechnology CRN Task Force

[Scenario 1: Secret Military Development](#)

[Scenario 2: Positive Expectations](#)

[Scenario 3: Negative Drivers](#)

[Scenario 4: Presidential Commission](#)

[Scenario 5: ... And Not a Drop to Drink](#)

[Scenario 6: A Goal Postponed](#)

[Scenario 7: Newshound Notebook](#)

[Scenario 8: Breaking the Fever](#)



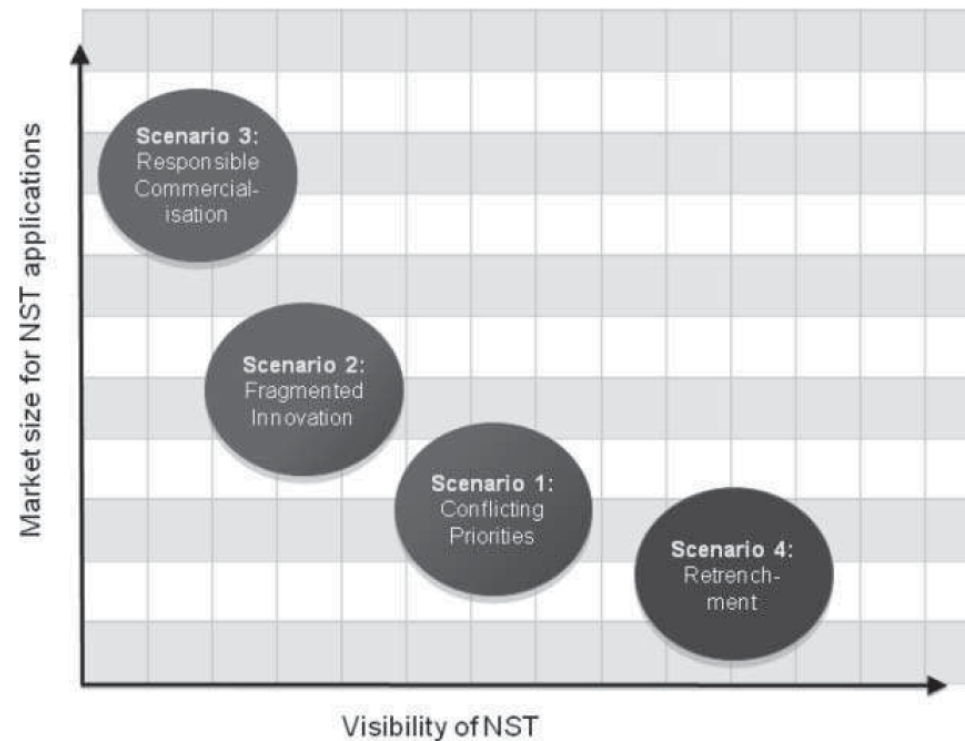
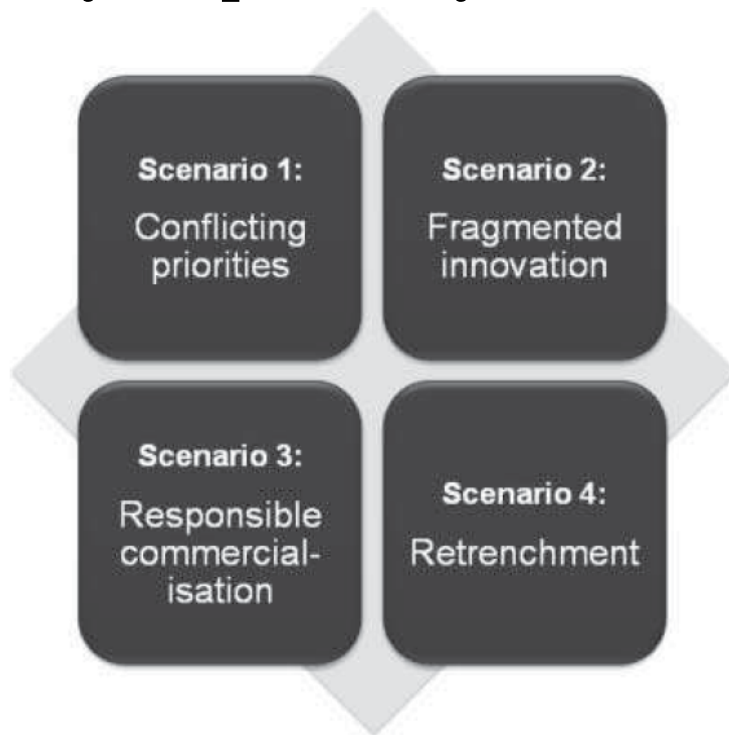
Some Nanotech scenarios 3

Christopher Groves' **Four scenarios for nanotechnologies in the UK, 2011–2020**

Technology Analysis & Strategic Management, 2013

Vol. 25, No. 5, 507–526, <http://dx.doi.org/10.1080/09537325.2013.785510>

Policy Delphi Study



How are scenarios constructed?

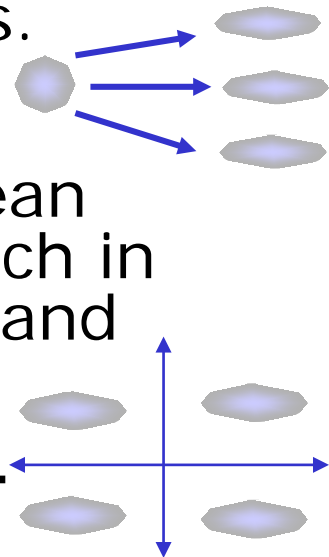
- Many ways of organising this:
 - Deskwork: “genius forecaster” (may be possible to collect partial scenarios from many experts),
 - Deskwork: expert group
 - Surveys: establishing viewpoints in a population (find clusters of people with similar expectations, for example;; or ask respondents about what would happen if, or what would be good or bad outcomes)
 - Utilising simulation models, gaming, etc.
 - **Scenario workshops**
- There are also several quite distinctive ways of proceeding, including more than one “extrapolative” and “normative” approach.

Scenarios from Drivers

- Identify key Drivers. Determine those that are most uncertain in terms of possible development and/or implications. Then...

- ✚ **Either:** 1) take each Driver, and build a scenario around it – around alternative paths of development of the Driver, or around an “extreme” path of development as compared to conventional business-as-usual expectations.

- ✚ **Or:** 2) take the two Drivers that are most important **and** most uncertain (this may mean some combining of Drivers), dichotomise each in terms of direction in one or other direction, and create a 2x2 matrix by combining the polar paths of each. **This is most common.**



Scenarios from Individual Drivers – EPO scenarios



Market Rules (business)

The story of consolidation in the face of a system that has been so successful that it is collapsing under its own weight



Whose Game? (geopolitics)

The story of conflict in the face of changing geopolitical balances and competing ambitions



Trees of Knowledge (society)

The story of erosion in the face of diminishing societal trust



Blue Skies (technology)

The story of differentiation in the face of global systemic crises

- <http://www.epo.org/topics/patent-system/scenarios-for-the-future.html>

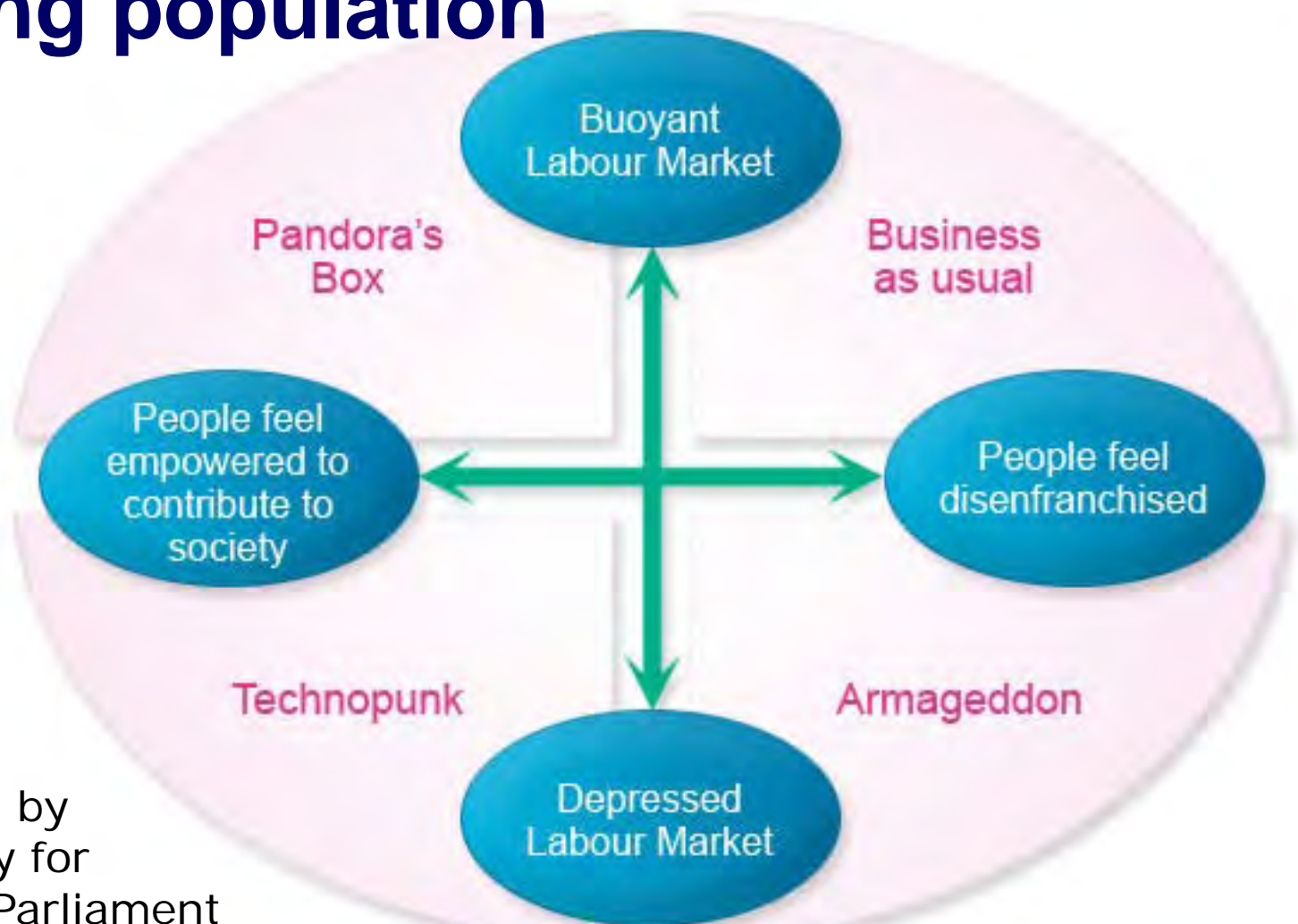
E

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Intersecting Drivers – scenarios for an ageing population



Produced by
Waverley for
Scottish Parliament

– see <http://www.waverley-consultants.com/waverley.aspx?a=6&b=1>

Driver-based approaches: advantages and disadvantages

- Scenarios can be closely related to the system under consideration
- May be numerous drivers, making selection of key drivers problematic – often hard to select key drivers for 2x2 approach [May be numerous scenarios developed if many drivers are seen as important (e.g. Canadian Foresight)]
- May lose analysis of interactions of drivers when working with individual drivers only. (e.g. implicit assumptions adopted about how other drivers are likely to evolve – danger that Business as Usual will be assumed)

Deskwork – advantages, limitations

- Possible to be highly systematic and conceptually elaborate, drawing on substantial data, literature, analysis
- Can deploy extensive documentation and argumentation
- Danger of becoming ivory tower
- Lacks enlistment and recruitment of users (unless can embed as placements or similar)
- May lack articulation with sponsor approaches

Deskwork often stand-alone, but is also often designed as input to groupwork – and is usually needed for workshops

Workshop Process

- **Who** to engage – expertise and information sources; insiders and commentators; stakeholders and possible implementors.
- **What** methods to use to provide inputs and to elicit scenario development?
- Typically use several methods, with (for example) literature review and trend analysis being fed into scenario workshops

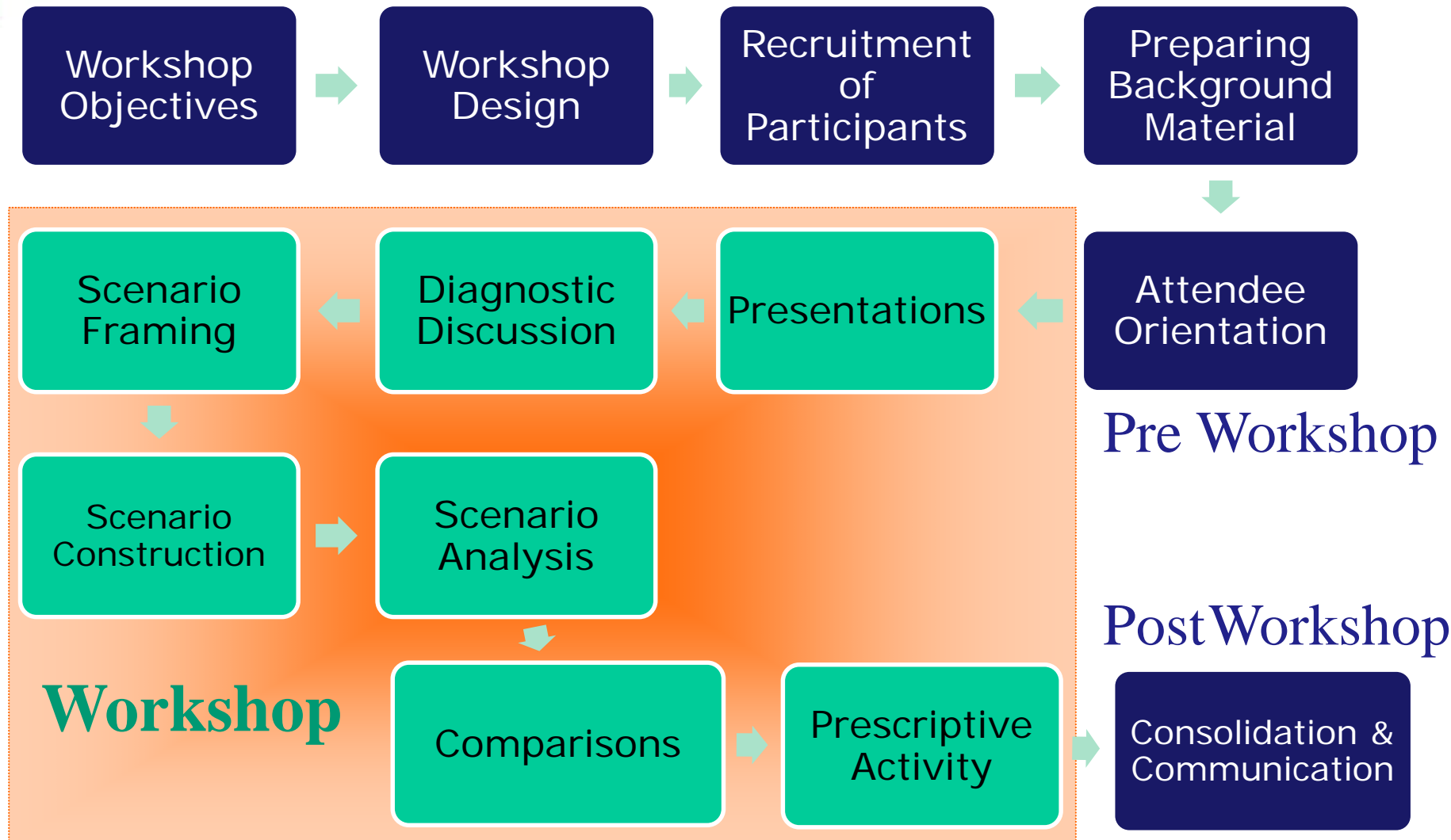
Design

- Often informal
- Can organise Design workshop to undertake preliminary tasks – eliciting feedback and buy-in from sponsors, enlisting stakeholders, identifying issues and experts.
- E.g. **Genomics study** organised design workshop:
 - Involves sponsors, futurists, area specialists
 - Discussed scenario workshop design proposals, participants, possible outcomes
 - Validated programme of interviewing, proposals for background inputs to scenario workshop
 - Undertook brainstorming on drivers
 - “broke ice” and allowed study teams to gain familiarity with each other’s approach, language, etc.

Planning a Scenario Workshop

- Define objectives – illuminating a specific issue – or providing general strategic intelligence for an organisation?
- Preparation required – “design workshop” or steering group useful. Can help embed scenario work, fostering “ownership”
- Technical facilitators valuable (whether posters or PCs).
- Planning team, drawing on relevant expertise (within and outside organisation)
- Background Material for common information base
 - “starter scenarios”
 - SWOT, benchmarking and relevant statistics
 - Useful analyses
 - Orientation
 - But don’t overwhelm or rely too much on this! Prepare presentations
- Workshop Material
 - Presentations
 - Instructions
 - Equipment, software, pencil and paper tools, etc.

Typical Elements of Workshops



Workshop Process - Presentations

Presentations

- Aims of Workshop
- Background Material
- Common Orientation
- Ice Breaking

Workshop

Workshop Process – 2 - Diagnosis

Diagnostic Discussion

- STEEPV or similar process:
- Examine drivers
- Specify key drivers
- (often) Identify extent of uncertainty



DRIVERS

- Social
- Technological
- Economic
- Environmental
- Political
- Values

Workshop

Workshop Process – 3a – Scenario Framing

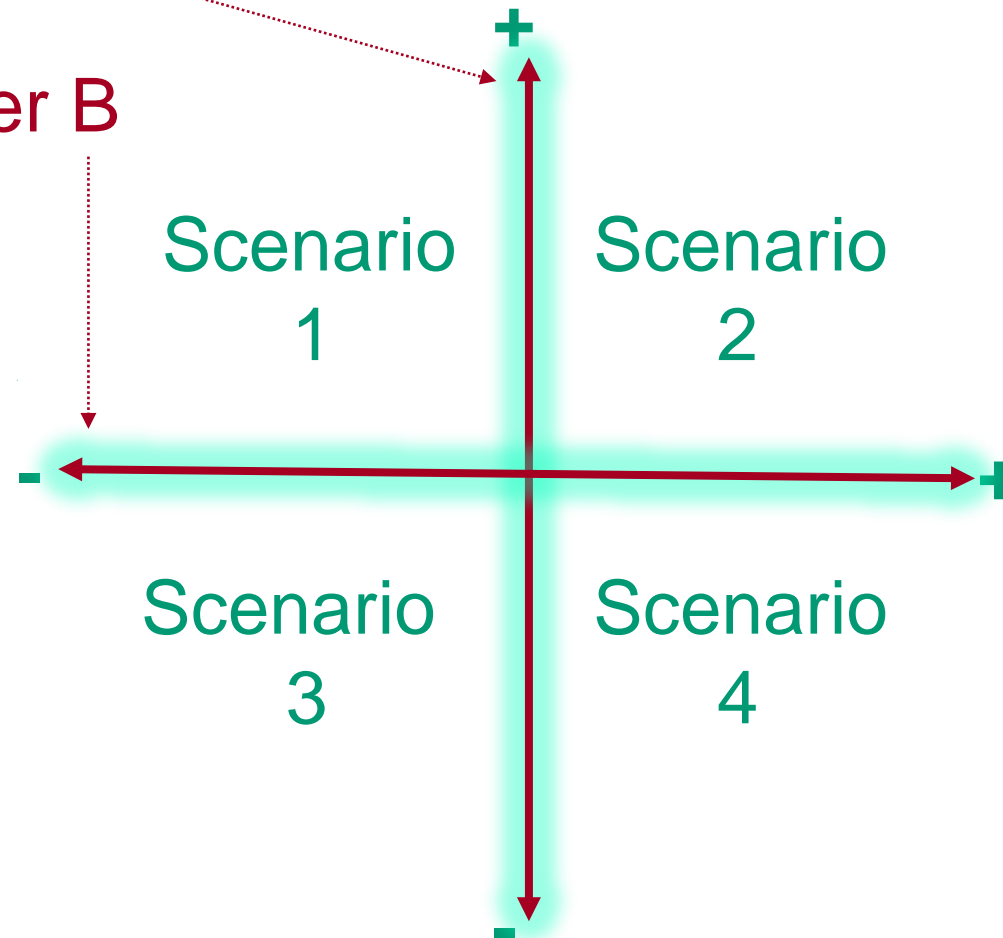
2+2 “Exploratory” Approach

Scenario Framing

- Select (construct) two key axes around important and uncertain drivers
- Frame scenarios around 4 quadrants

Driver A

Driver B



Workshop

Workshop Process – 4a – Scenario Construction

2+2 “Exploratory” Approach

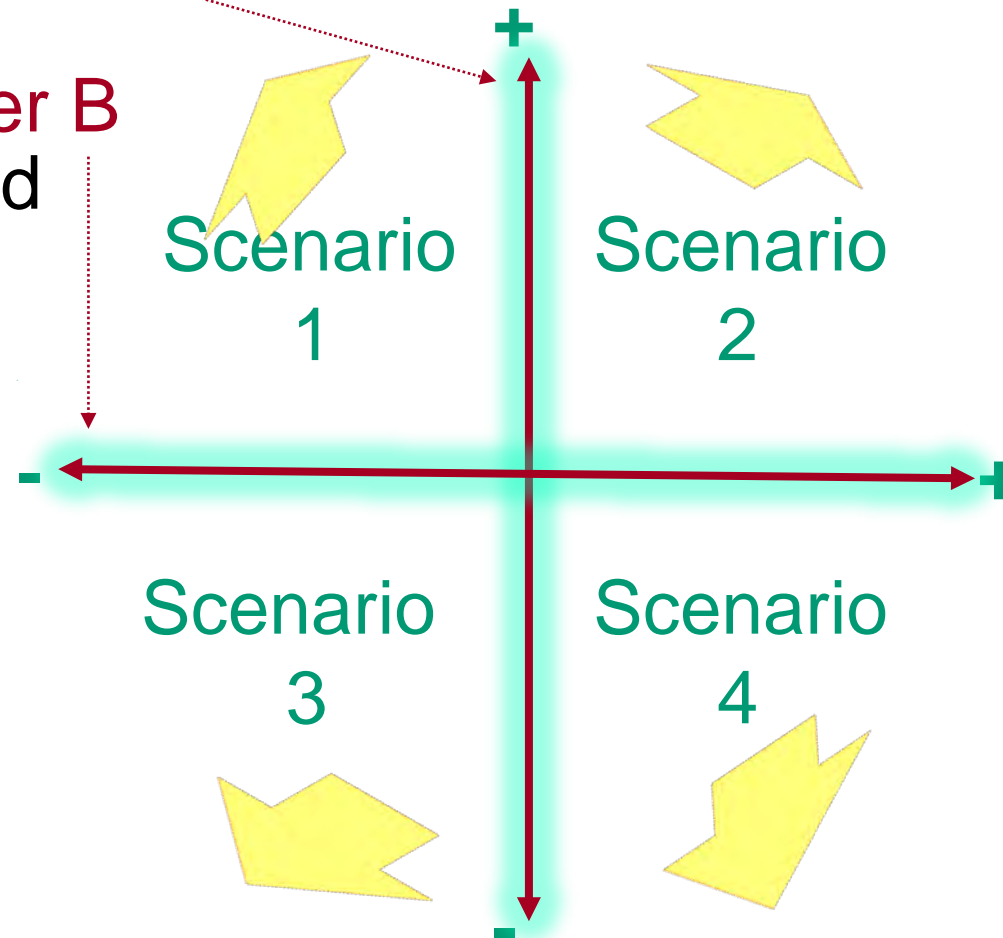
Scenario Costruction

- What sort of future would unfold from drivers?
- What do the history and image of the future look like?
- Answer common questions.

Workshop (Break-outs)

Driver A

Driver B



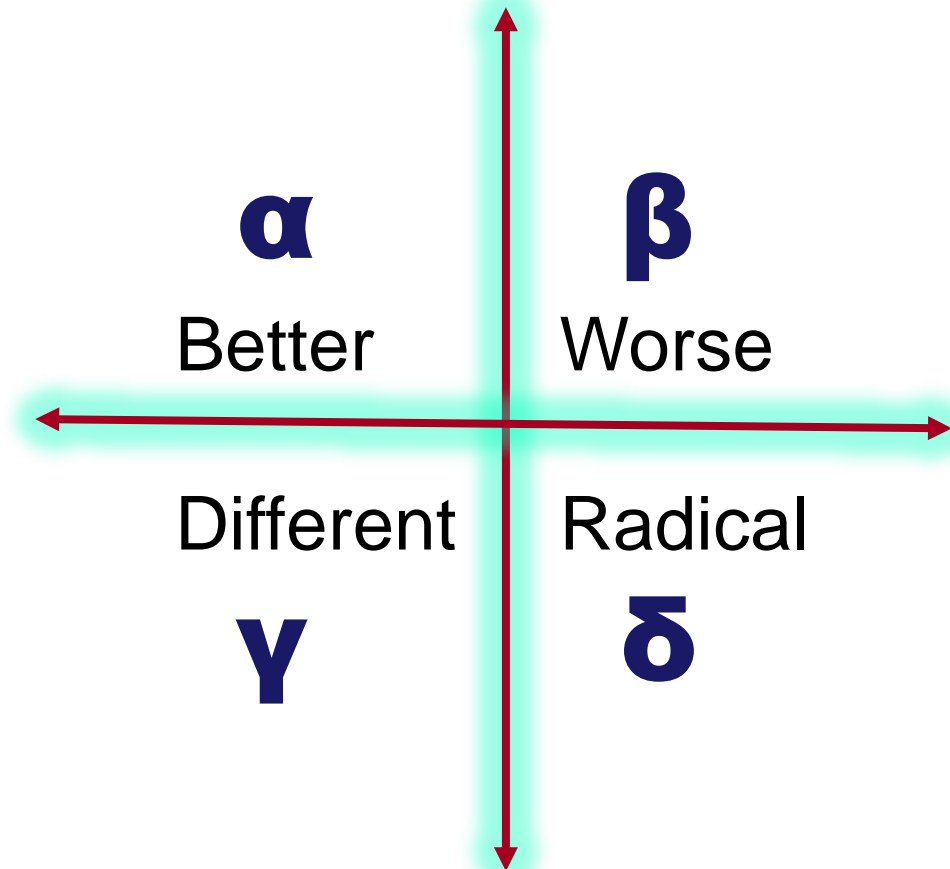
Workshop Process – 3b – Scenario Framing

Archetypes “Normative”

Scenario
Framing

- Provide profiles
- Share key understanding of framework

Workshop

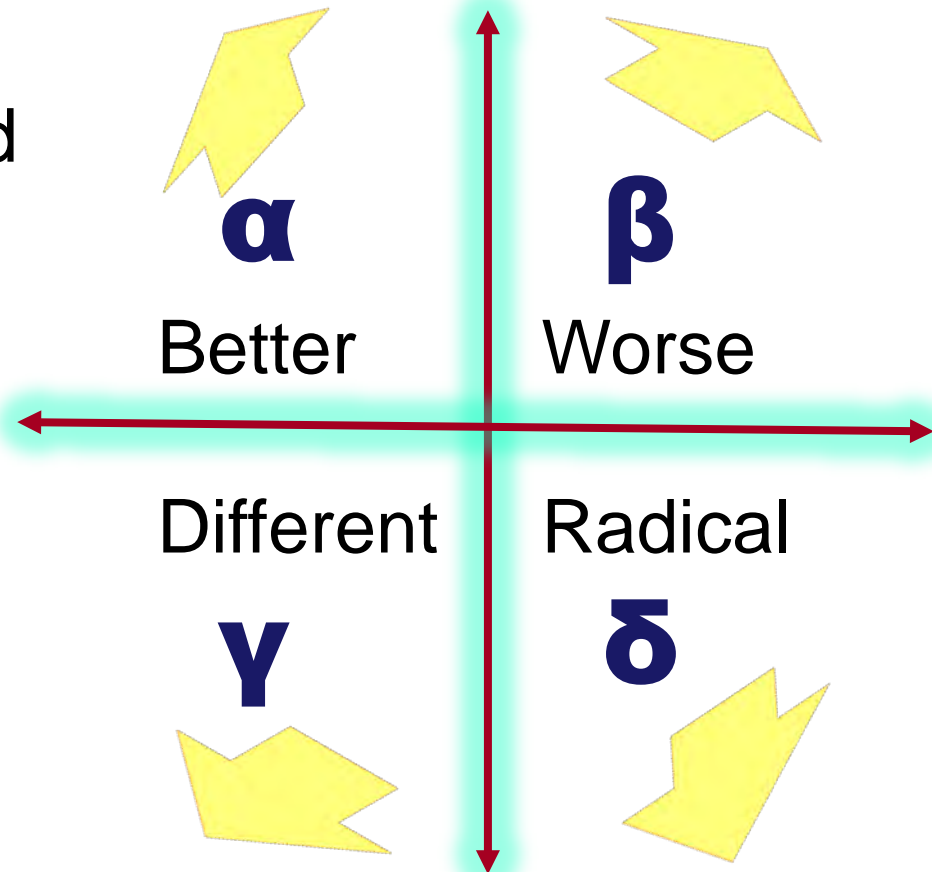


Workshop Process – 4b – Scenario Construction Archetypes “Normative”

Scenario Costruction

- What sort of drivers could produce this future?
- What do the history and image of the future look like?
- Answer common questions.

Workshop (Break-outs)



Example: Four Destinations of Genomics

Scenario 1, Genomics, Inc.

Genomics gains more public acceptance as better safety standards and new applications demonstrate the value of genomics. Mergers and alliances create a handful of "Life-Science" conglomerates that operate on a global scale. Many individuals use genomics to identify their unique health risks and sensitivities.

Scenario 2, Broken Promises

Genomics applications prove more difficult to develop than expected, and several prominent genomics accidents turn public opinion against genomic technology. Activists mobilize for stronger measures against the industry and further reduce public demand. Liability lawsuits severely diminish the industry and force genomic patents into the public domain.

Scenario 3, Out of Our Control

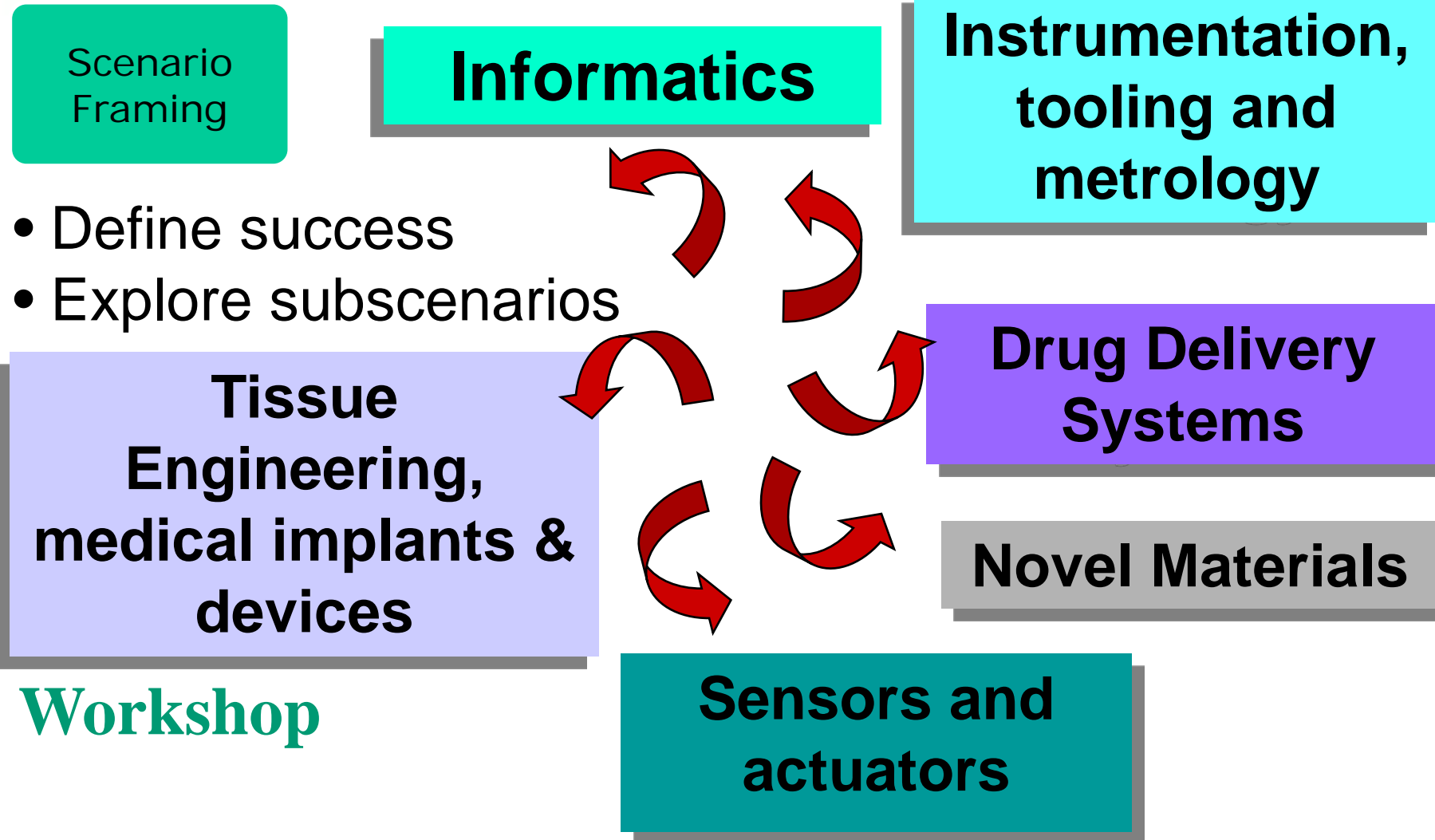
Genomic breakthroughs accelerate and the costs of research decline; throughout the developed world, applications are delayed in approval processes. In the meantime, developing nations use unregulated field trials to rapidly advance and develop genomics applications. Miracle products create widespread public acceptance, despite genomic accidents and uncertainties.

Scenario 4, Genomics for All

Genomics is successfully implemented, with wise and participatory management of the risks and side effects. A consensus emerges not only on how genomics should be implemented, but also on the type of society that genomics should serve. Genomics plays an important role in building a global society dedicated to improving equity and sustainability.

Workshop Process – 3c – Scenario Framing

Success Scenario



Workshop Process – 4c – Scenario Construction

Success Scenario

Scenario
Costruction

**Tissue Engineering,
medical implants & devices**

- What actions could produce this future?
- What do the history and image of the future look like? (targets, indicators)
- Answer common questions.

Informatics

**Instrumentation,
tooling and metrology**

Drug Delivery Systems

Novel Materials

Sensors and actuators

**Workshop
(Break-outs)**

Workshop Process – 5 /6 – Scenario Analysis /Comparison

Scenario Analysis

- Elaborate scenarios (Stories, headlines, vignettes...)
- “Sell” scenarios
- Fine-tune scenarios
- (perhaps) quantify...
- (In case of single success scenario, reconcile any inconsistencies)

Scenario Comparisons

Workshop / Break Outs

Workshop Process – 7– Prescriptive Activity

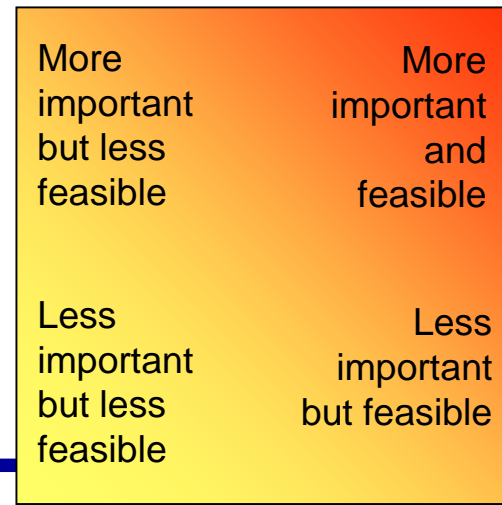
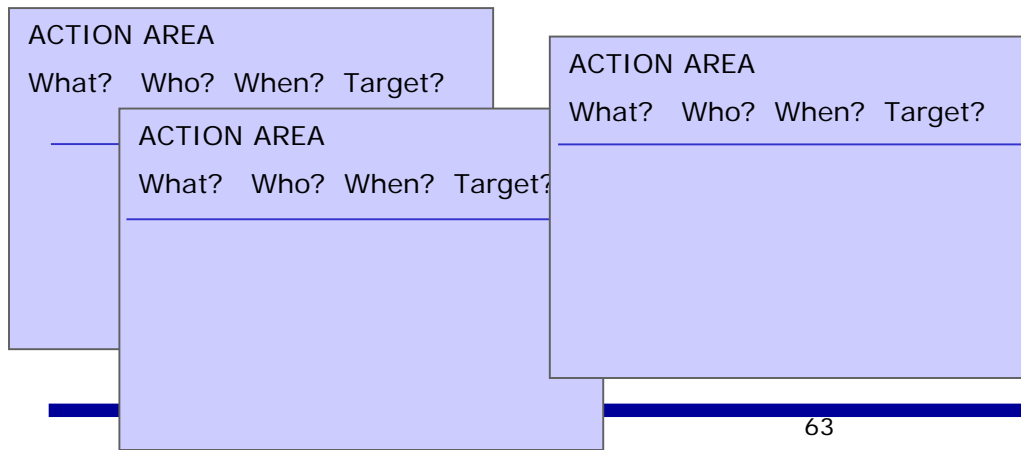
Prescriptive Activity

- Generate actions – what, who, when..
- Assess actions – impact, feasibility, challenges...
- Recommend

**Workshop
/ Break
Outs**

Translating Scenarios to Action

- Ways of identifying possible actions – in break-out groups (per scenario), or via other approaches (e.g. carousel/samba method) – Who should do WHAT, WHEN, with what targets and indicators?
- Ways of relating actions to scenarios - and to underpinning dynamics as well as to specific scenarios - e.g. how do various projects look in different scenarios
- Ways of prioritising and selecting among activities – which to do now, later, keep on back burner; how much resource (of what kind) to invest, etc.
- What does this mean for ongoing planning and strategising: intra- and inter-organisational dimensions?



Workshops

- *Scenario Reports as **Products***
- for synthesis and presentation of results, integration of elements; checking coherence of outputs and robustness of strategies, stimulate and challenge informants, help define priorities; communication and illustration of major results and conclusions.
- *Scenario Workshops as **Process***
- frameworks for exchange and elaboration of views and (shared) visions, provoke and legitimate thinking “out of box”, help in constituency-building, etc.

Workshop Process

- Social engineering is needed – ice-breaking, ways of getting people to know each other, exchange freely. GROUND RULES are important (e.g. “Chatham House” rules in UK).
- INSTRUCTIONS need to be explicit and detailed: what you are to do, how, when. These need to be written down and be available for inspection and probably discussion/clarification.
- Facilitators: it helps to have staff in the break-out groups to explain tasks, to keep people to time, to get communications and other outputs in the right form. (May need separate rapporteurs to report back to plenary; and chairs to run the session.)
- TIME: to encompass all activities plus possible delays and novel events.

Scenario Analysis

- Once we have defined our scenarios, we need to ask:
 - How might we know if this scenario is emerging?
What would be leading indicators?
 - What should we be monitoring?
- We also undertake comparison of the different scenarios
- Are there issues, strategies, etc. that apply across all or many of these?
- Usually the workshop will end with some examination/prioritisation of actions.

Using Scenarios

■ Gaming

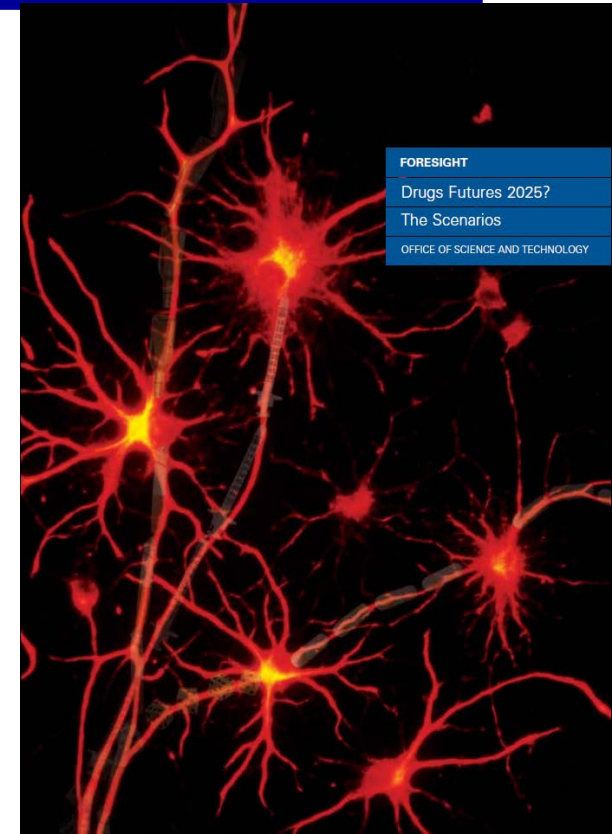
- Role play different stakeholders
- SWOT and similar approaches: what is their situation and what are their demands across scenarios?
- Policy responses

■ Windtunnelling

- As above, but focus on barriers to successful policy implementation
- Explore robustness and how to increase
- Establish actions now to start delivering policy

■ Reverse engineering

- Establish trends and events implied by scenario (backcasting)
- Identify high-impact events, likely time of occurrence, impacts
- Turn into implications for monitoring, planning, etc.



Effective Scenarios

Robust (*not*
Accurate as such)



Reflect the range of potential future conditions, challenges, for the topic/users

**Novel/
Stimulating**



Stretch thinking, include surprises

**Provocative/
Challenging**



Confront the difficulty, ambiguity, and significance of the topic; Scope for thinking the unthinkable and “out of box” - while not triggering kneejerk

Useful



Not too numerous, detailed or ambiguous – expressed in terms relevant to user capabilities and interests

Presenting Results

HISTORIES

- “Flow charts”
- Trend analysis
- Signposts (indicators and events – useful for scanning)
- Narratives (press reports; historian’s reflections...)
- Strategy games – good for analysis of options, plans...

IMAGES

- Comparative Tables
 - Charts
- Narratives (press stories; diaries, vignettes ...)
- Portrait of organisation/ market/ actors... policy outcomes

Using scenarios as a basis for discussion and further workshopping is very important!

Presenting Comparisons - Scottish Ageing Study



Growing older and wiser together

A futures view on positive ageing

	The Lifestyle Business	Age of Enlightenment	Helping Hands
The economy	<p>is growing strongly</p> <p>is highly competitive</p> <p>labour is in demand internationally</p>	<p>is recovering from the turbulence caused by major global crises</p> <p>is focussed on energy efficiency</p> <p>is funding efforts to combat global warming</p>	<p>has restructured</p> <p>Scotland and the UK are an attractive location for high value creators</p> <p>tourism and services are strong</p>
Individuals	<p>have to work hard</p> <p>seek more responsibility and are willing to retrain</p> <p>develop 'retirement strategies' if they can</p> <p>often set up businesses of their own in later years</p>	<p>are informed about old age</p> <p>have the tools they need to prepare</p> <p>get some support from communities</p>	<p>have access to services and to paid or voluntary work</p> <p>are valued and supported members of the community</p> <p>co-design solutions for ageing</p>
Business	<p>retains and retrain older workers</p> <p>is unable to afford flexible working arrangements</p> <p>is learning from older entrepreneurs about what works</p>	<p>supports older workers</p> <p>values their contribution</p> <p>takes a flexible approach to retirement</p>	<p>provides extensive services to the ageing population</p>
Finance	<p>is a personal responsibility</p> <p>...and many are unprepared</p>	<p>remains a personal responsibility</p> <p>...but people are offered advice</p> <p>...although they are slow to realise what they need to do</p>	<p>is provided by the government</p> <p>...and government invests in services</p>
Environment	<p>sees little investment</p> <p>exclusion remains a problem</p>	<p>sees some investment</p> <p>some efforts to bring old and young together</p> <p>care is largely down to families</p>	<p>is tailored to the needs of older citizens</p> <p>is caring and compassionate</p>

Summing Up

- Various types of scenario workshop
- Different structure and output, though similar focus (R&D priorities), facilitators, tools, etc. Cumulative.
- Many different types of workshop possible, with or without computers (though expect more developments here)
- Face to face meetings particularly good for detailed discussion, vision-building, and networking... But more sustained interaction may be needed to explore complex domains and relate together expert knowledge.
- Not magic or guru-driven: but does take planning.
- Ways of using the results need to be planned

End of Presentation

Exercise 1

- What is our Focal Object?
- Maximising nanotech development for beneficial applications while avoiding high levels of risk?

Exercise 2 - Drivers

- Usually devote an hour or more to STEEPV, often with back-up from literature review, expert interview, etc. Sometimes use other approaches like system mapping...
- Short-cut – Groves identified four issue clusters:
 - Scientific Knowledge
 - Commercial capability
 - Public attitudes and behaviour
 - Regulatory strategy
- Can we use these as starting point?
- Assessment of important subissues, and main uncertainties.

Exercise 3 - Profiles

- **Alpha** – nanotech applications accelerate, take off very widely by 2020, regulatory framework unproblematic
- **Beta** – nanotech applications are much more marginalised, progress is far less than most practitioners now would expect, regulatory problems
- **Gamma** – things evolve in quite different, surprising ways

- In a small group we consider each in turn. In most workshops we use break-out groups devoted to each scenario:
 - what would be a plausible version of this profile? What would you call this future?
 - What does it look like in terms of drivers (factors and role of actors?)
 - What sort of scenario emerges?
 - Volume and style of activity; Sponsors/clients and topics; collaborations; governance...