Practical Foresight Guide

Chapter 3 – Methods

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3. Methods

Planning your Future

No-one can predict the future, yet we all make plans based on our assumptions and desires. Making plans in a changing and complex environment is a little like being the captain of a ship faced with uncertain weather and variable seas. Yet, he still puts to sea in pursuit of his desires. But, despite the daunting prospects and just like the captain, if we know where we want to go we can chart a course, navigate with our compass, use our lookout's weather eyes, and trim our sails to make the best of the changing conditions. These methods give us a far better possibility of reaching our destination than trusting in providence.

Making better plans

Society today is all at sea tossed around like little boats in a swirling maelstrom of change. But the smarter captains anticipate the future and create very different expeditions to new places from those we all experienced yesterday. These captains signal their change of direction and it is up to us to interpret and use their signals or chart our own very different course.

We all do this unconsciously when we watch the news, read the paper, or talk to friends and, in turn, seek to influence our communities, families, and organizations. If you've ever planned for a holiday, job interview, trip to the movies, shopping for dinner, thought about what to wear for the following day, or looked at your watch to check what time it is then you have been shaping your own tomorrow using foresight to plan ahead. Foresight work is therefore an everyday issue of life that pretty well every person on the planet engages in at some level or another. But, most people have learned these skills from others and have had no formal training in how to interpret and respond to the myriad of signals they receive each day. A school's curricula rarely expose us to thinking about and acting in the future except at a very shallow level and awareness of futures education opportunities is very low.

Inquisitive people who engage with and try to improve their foresight seek to add greater breadth, depth, and distance to the process of formulating decisions because all choices have future consequences. Yet often we rely too heavily (or solely) on history as our guide. Even the dominant western paradigm of financial markets recognizes that "past performance is no guarantee to future success" - a warning to consumers that is now a part of any financial growth instrument.

Examining consequences

'While an often significant factor for consideration, "history" is an unreliable guide to the future. Most members of the public would have heard of, or been exposed to, some of the more common "foresight methods" like forecasting, trends, and scenarios.

These approaches are but three of more than forty methods that professionals use when thinking about the future and when considering in greater detail a future-based issue. Foresight oriented people consciously choose to give themselves the time to consider in greater detail the future-based consequences of their actions before deciding the path to take. To that extent both forecasting and trend projections are highly limited in scope, with both methods being attempts to extend history (current thinking and paradigms) by "predicting" the future. Scenarios also have their place, and they do so only when given specific contexts in which they can be considered. Instead, exploring the space between the "possible" and "probable" ensures that any assessment of the much needed "Breadth," "Depth," and "Distance" components yields a more critical consideration of future potential.'

Source: Adapted from the work of Marcus Barber (Australia 2020) with his kind permission

Multiple solutions

There are many more futures methods available than most people realize. They cover Creative, Descriptive, Statistical, Opinion, Monitoring, Scenario, Analytical, Decision and Modeling methods.

Before starting a project or program, examine the different methods which will best achieve the desired outcomes. A mix of quantitative and qualitative methods should be chosen. Methods and tools that allow one to combine different approaches are especially suitable. Spend time examining the pros and cons of each before jumping to a previous solution or one you have heard of in passing. Draw your program design out like the example below.
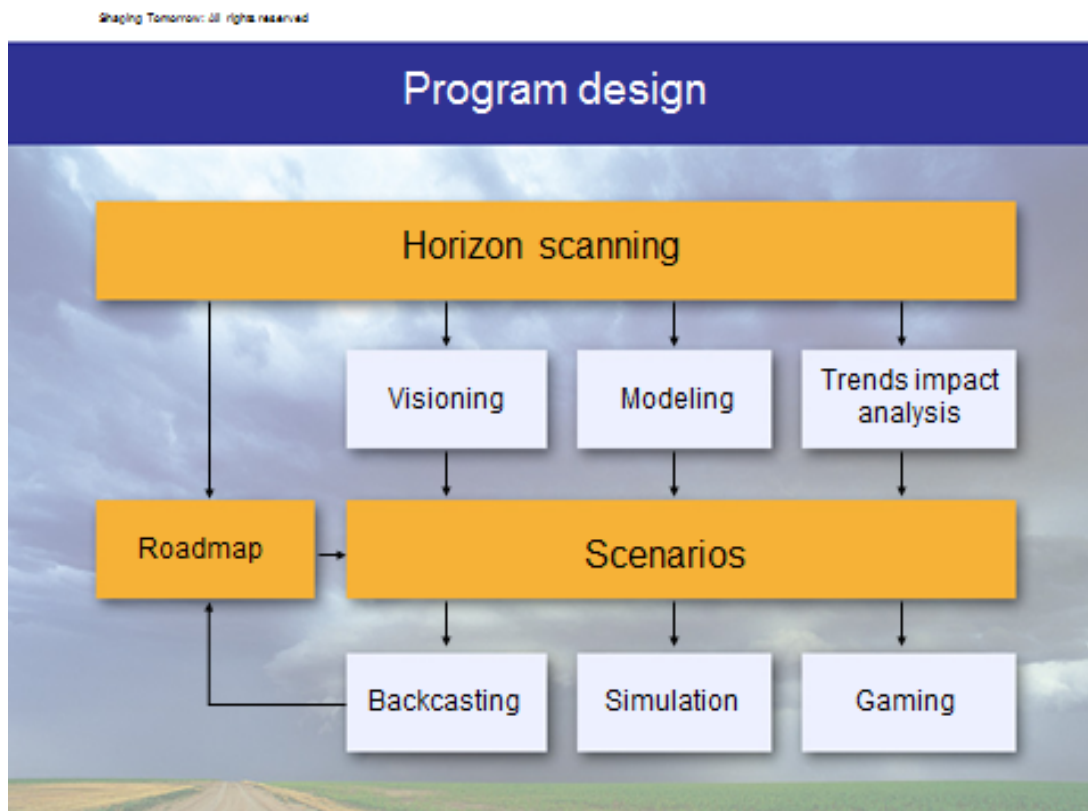
Figure 25. Program design.

Courtesy of Shaping Tomorrow

One way to select suitable methods is to consider the level of uncertainty involved choosing the more sophisticated tools when complexity abounds and the time horizon is far out e.g. scenarios, forecasting, modeling and simulation. When uncertainty is less and the time horizon more near-term then methods like Trend Impact analysis /extrapolation and Delphi methods may be suitable.

A methodological competence should be built up within the organization and shared with the users; this is the

task of the project or program manager and essential to future skill building.

Further reference

- Horizon Scanning Center, Foresight
- Designing the Methodology, For-Learn, JRC European Commission
- Futures Tools and Techniques, Foresight International 1998
- Questioning the Future, Methods and Tools for Organizational and Societal Transformation, Sohail Inayatullah 2005

- Futures: Multidisciplinary Studies of Patterns to Determine the Likelihood of Future Trends, Wikipedia
- Knowledge Base Of Futures Studies, Foresight International 2005
- So What? Implications and Impacts, Local Government Association, UK
- Managing – How Could the Future Develop Differently? Local Government Association, UK
- What Alternative Futures Exist?
- A Tradecraft Primer: Structured Analytic Techniques, Richards Heuer CIA 2009
- What do We Mean by Futures Thinking? The Tomorrow Project
- 20/20 Foresight: Crafting Strategy in an Uncertain World, Hugh Courtney Doubleday 2001
- Futures Research Methodology, Millennium Project
- Futures Concepts and Powerful Ideas, Foresight International 1996

Note: Many of the tools and methods listed below can be found on the Shaping Tomorrow website. They have been highlighted with an asterisk below. Those not asterisked will be added to the site over the next two years.

3.1 Backcasting

Overview

Defines a desirable future and then works backwards to identify major events and decision that generated the future, to allow organizations to consider what actions, policies and programs are needed today that will connect the future to the present. Backcasting reminds participants that the future is not linear, and can have many alternative outcomes depending on decisions made and the impact of external events on an organization.

Uses of the method

- Planning
- Resource management

Benefits

- Avoids extrapolating present conditions.
- Quick & agile.
- Accessible and engaging.
- Lightweight.
- Creative.
- Disadvantages.
- Assumes the desirable future will occur.
- May need constant updating.
- Can be resource intensive and time consuming.
- No defined, conceptual framework.
- Best for skilled practitioners.

Steps to complete

- Set timeline.
- Define the present state.
- Define desirable future.
- Develop sequence of backward steps to achieve desirable future.
- Assess opportunities and risks.

- Identify policies and programs that will connect the future to the present.

Further reference

- [Backcasting 101](#), IA Summit 2008 Session Presentation

3.2 Brainstorming *

While not a specific foresight technique Brainstorming attempts to draw out peoples' creativity through idea generation. It is a good way to quickly identify the key opportunities and risks inherent in an issue and to determine different future possibilities and alternate long-term strategies.

Uses of the method

Brainstorming is used for all manner of creative thinking tasks that range far beyond foresight uses. In Foresight Projects it can be used to generate ideas about patterns, events and uncertainties gleaned from Horizon Scanning, deriving key driving forces from reviewing Trends, imagining future scenarios, strategizing preferable futures and creating action plans etc.

Benefits

- Fast
- Collaborative
- Cheap
- Commonly known and proven technique
- May produce 'out-of-the box' thinking and solutions

Disadvantages

- Insufficiently robust underlying thinking if no other foresight tools used

Steps to complete

- Develop a lot of ideas in a short space of time around a chosen issue
- Defer discussion and judgment until the idea generation phase has completed
- Encourage out-of-box-thinking
- Build off one idea to create others

The facilitator of the brainstorm encourages the participants to offer solutions to the issue at hand.

All ideas are encouraged however, seemingly off the wall. Criticism of ideas offered is strictly not allowed.

Ideas are recorded without regard to ordering.

After the idea gathering process is exhausted the participants sort, order and rank according to priority. Duplicate and similar ideas are consolidated. The finalist is then used to determine next steps and actions.

Further reference

- Thinkertoys: A Handbook of Creative-Thinking Techniques, Michael Michalko, Ten Speed Press, 2006
- [Southbeach Modeller](#)

3.3 Causal Layered Analysis *

Causal Layered Analysis, or CLA for short, identifies the driving forces and worldviews underpinning diverse perspectives about the future and what it means to groups. For organizations, CLA allows the perspectives of a range of staff and stakeholder groups about an issue or strategic option to be explored to identify driving forces and worldviews shaping that issue. It is particularly useful when different groups hold

different perspectives on the future of an organization and what strategy should be actioned. Through group discussion, sharing of diverse perspectives, and surfacing contrasting worldviews and underpinning myths, the method encourages the deconstructing of conventional thinking to produce a shared view of possible future outcomes that can break existing paradigms of thinking and operating.

Uses of the method

- Uncover why things are not working today and develop potential and shared solutions
- Question conventional future thinking
- Develop shared organizational strategy
- Explore issues from qualitative perspectives to strengthen understanding of the issue
- Facilitate multi-cultural dialogue and understanding
- Gain a better understanding of one's own worldview and ways of making sense of the world
- Develop different sorts of products and services and revised policies

Benefits

- Collaborative and appealing to wide range of participants
- Integrative with other foresight methods
- Supports the development of powerful and richer future scenarios
- Useful check that constructed scenarios are robust across diverse perspectives
- Develops shared visions of a preferred organizational future
- Potential for issue transformation
- Links short, medium and long-term strategic thinking

Disadvantages

- Requires participants to be willing to share their perspectives and challenge their assumptions about how the organization operates
- Needs to be connected with other foresight methods to generate future scenarios
- Requires acceptance of the basic CLA theory by the participants
- May reduce individual creativity
- May constrain action through 'analysis/paralysis'

Steps to complete

Begin by:

- Identifying the critical issues or trends that are contentious or critical to better understand

Then apply the CLA method:

- *Litany*: map current responses and views about the issue – at this level people are describing their reaction to the issue as they 'feel' it
- *Social causes*: identify what is causing the issue to develop – this level identifies the trends and drivers shaping the issue as it appears to participants – these drivers are usually accepted and not questioned at this level
- *Discourse/worldview*: asks whose worldview is shaping the issue, whose voice is being heard and whose is not,
- *Myth/metaphor*: identifies stories and myths that underpin the dominant and minority worldviews to demonstrate the depth of thinking that is generating the issues we see today.

The next stage is to re-build that thinking by exploring a new metaphor that can inform thinking and start to shape the issue in a shared way. Once there is a shared view of the issue, action steps can be identified to address the issue today.

CLA can be used to inform the development of scenarios and a preferred future for an organization as its output is based on a shared view of both the issues and its underpinning drivers.

Further reference

- Future Research Methodology - Version 3.0, Millennium Project 2009. CD ROM
- The Causal Layered Analysis (CLA) Reader, Sohail Inayatullah (editor), 2004

3.4 Chaos theory

Overview

Chaos theory suggests that the future is both patterned and chaotic. "...chaos is manageable, exploitable and even invaluable......The behavior of a chaotic system is a collection of many orderly behaviors, none of which dominates under ordinary circumstances. ...by perturbing a chaotic system in the right way, it can be encouraged to follow one of its many regular behaviors." Ditto and Pecora (1993).

So from a futures perspective applying Chaos Theory helps determine where and how problems and issues can be positively influenced.

Uses of the method

- Slow the system down
- Nudge the system in new directions
- Empower locally not manage centrally
- Work with the system for advantage
- Add resources to the system - human and/or physical
- Introduce systems feedback loops and control programs
- Add interference noise

Benefits

- Greater understanding of a systems behavior, sensitivity etc.
- Modeling of alternative scenarios and effects
- Risk/opportunity analysis assessment

Disadvantages

- Requires advanced analysis skills and mostly likely outside specialists
- Complex and costly
- Greater chaos can ensue through additional human intervention
- Outcomes can be suspect or useless

Steps to complete

We recommend you explore the Further Reference links below and develop your bespoke process after having consulted with the specialists.

Further reference

- what If? Technologies: provides software technology and consulting services for systems models and simulation. Models are used for strategic planning and scenario analysis, as well as risk analysis, policy analysis and education.
- Visokio: software package from Omniscope
- Southbeach Modeller: notation to help you with innovation, improvement, collaboration
- Chaos Data Analyser: software package by J.C. Sprott and G.Rowlands.

- Future Research Methodology - Version 3.0, Millennium Project 2009 CD ROM

3.5 Cross-impact analysis

Overview

Cross-impact analysis is a family of techniques often thought of as an extension of the <u>Delphi</u> technique. Like its name entails, it involves identifying and evaluating the impact of trends or events upon each other using a matrix format.

Uses of the method

- Commonly used as part of an expert-opinion study
- Can be considered part of the Delphi technique.
- Exploring a hypothesis and finding points of agreement and divergence.
- Targets audiences comprising experts from industry, academia, research and government

Benefits

- Limited skills required
- Forces attention of the respondents
- Estimates dependency and interdependency between issues
- Increases knowledge of the respondents and clarifies views

Disadvantages

- Can be time-consuming if several iterations required or matrix is very large
- Limited pair-wise nature of the method
- May not reflect reality
- May not yield sufficiently consistent respondent response
- Relies on experts input

Steps to complete

- Choose issue and select experts
- Construct a matrix to show the inter-dependencies of different events. A matrix lists the set of events or trends that may occur along the rows, and the events or trends that would possibly be affected by the row events along the columns.
- Design the probability scale
- Require respondents to assess how occurrences in each row affect the probability of the event in the corresponding column.
- After preliminary probabilities and inter-dependencies are estimated, the probabilities are iteratively recalculated using Monte Carlo sampling or another method.
- Points of convergence and divergence in thinking are then agreed by all respondents and scenarios generated.

Further reference

- <u>Cross-impact analysis</u>, Wikia
- <u>Cross-impact analysis</u>, For-Learn, JRC, European Commission,
- Future Research Methodology - Version 3.0, Millennium Project 2009 CD ROM

3.6 Decision modeling *

Overview

Models constructed to examine the impact of alternative strategies by replicating system behavior.

Uses of the method

- assessment of risk/reward structures
- evaluation of strategy and policy options
- consumer choice
- product portfolio analysis
- future market potential
- capacity analysis
- optimization
- agent-based models

Benefits

- provides choices among competing alternatives
- provides clarity
- offers on-going decision support
- based on formal underpinnings
- has potential for sensitivity analysis
- can create multiple, linked scenarios
- can be flexed over time
- can be flexed in terms of changes to criteria

Disadvantages

- may not work if unexpected events happen
- past and today focused in terms of inputting data
- original criteria may change

Steps to complete

- formulation of the type of model
- determination of the rules and ways to judge alternatives
- evaluation
- appraisal
- sensitivity analysis
- development of key scenarios or preferred outcome
- recommendation

Check out the available software resources below for assistance with this method:

Further reference

- <u>Decision model</u>, Wikipedia

- Future Research Methodology - Version 3.0, Millennium Project 2009. CD Rom
- <u>Expert Choice</u>: Collaboration software helps organizations make better decisions that achieve alignment and buy-in with speed and transparency.
- <u>Decision</u><u>Tool Suite</u>: The DecisionTools Suite is an integrated set of programs for risk analysis and decision making under uncertainty that run in Microsoft Excel.
- <u>Logical Decisions</u>: Lets you evaluate choices by considering many variables at once, separating facts from value judgments, and explaining your choice to others.

3.7 Delphi method *

Delphi is a technique to structure group communication processes to deal with complex issues. It is particularly used by experts in a series of iterative learning rounds.

Delphi first establishes the group's initial view, presents instant feedback on differing opinions, and goal seeks an agreed position in the final round.

Contributors to the group analysis do not have to meet in person and can see the results as they, and their colleagues, add their views in real time.

At the beginning, the organizer(s) formulate questions about the future and present these to contributors.

Contributors respond by adding their rankings and comments.

The organizers then modify the anonymous comments received to formulate better questions. The process is run again, in a series of rounds, until a consensus answer is arrived at.

Uses of the Delphi method

- Consensus building.
- Avoiding group think.
- Generating ideas.
- Forecasting future issues.

Benefits

- Fast consensus.
- Virtual participation.
- Handles single or multiple questions.

Disadvantages

- Paradigm shifts can be problematic.
- Participant expertise may reduce result.
- Cross-impact not considered.
- Team leaders can bias the result.
- Disagreements may not be properly resolved.

Steps to complete a Delphi Analysis

- Team creation
- Selection of participants
- Establishment of the question(s)
- Question sense-check testing
- First round voting/commenting
- First round analysis
- Revision of question(s)
- Second round/voting/commenting
- Second round analysis (more rounds if required)
- Stable consensus achieved
- Conclusions produced

Further reference:

- Delphi Analysis (case study), David Reay, Heriot Watt University, 2002
- Forecasting Economic Variables Using The Delphi Method, Society of Actuaries Meeting2004
- Delphi Method, UNIDO
- The Delphi Technique, JISC InfoNet
- Delphi method of Forecasting, Zane Ewton Associated Content, 2006

3.8 Environmental scanning *

Overview

Environmental or Horizon Scanning is the art of systematically exploring the external environment to (1) better understand the nature and pace of change in that environment, and (2) identify potential opportunities, challenges, and likely future developments relevant to your organization. Environmental Scanning explores both new, strange, and weird ideas, as well as persistent challenges and trends today.

Uses of the method

- *Detecting*: important economic, social, cultural, environmental, health, scientific, technological, and political trends, situations, and events.
- *Identifying*: the potential opportunities and threats for the organization implied by these trends, situations, and events.
- *Determining*: an accurate understanding of an organization's strengths and limitations.
- *Providing*: a basis for analysis of future program investments.

Benefits

- Better, faster anticipatory warning.
- Time to prepare improved.
- Research repository.

- Innovation and risk management enhanced.

Disadvantages

- Resource intensive and requires intensive effort.
- Not a panacea to spot all emerging change in time.
- No hard and fast rules to lead to a "correct" interpretation of information.

Steps to complete

- Identify emerging issues by scanning the horizon (and beyond) in areas of interest.
- Research the background, future, and potential impacts of these issues.
- Evaluate issues and explore why these are important for your organization
- Developing strategies to support preferable futures.

Further reference:

- Sharpen Your Business Acumen: A six-step guide for incorporating external trends into your internal strategies, Ram Charan Strategy + Business
- Thinking About The Future: Guidelines for Strategic Foresight, Andy Hines & Peter Bishop, Social Technologies 2007
- Environmental Scanning[1], Wikipedia
- Environmental Scanning: A Holistic Approach, Wendy Schultz, Infinite Futures 2002
- Was It Good For You?: Subjective-Objective Issues in Applied Futures Research, Wendy Schultz, Infinite Futures 2002
- Environmental Scanning: What it is and How to Go About It: Maree Conway 2009

3.9 Expert panel *

Overview

Uses a pre-determined group of experts and renowned people (sometimes anonymously) to give feedback on issues.

Uses of the method

- Qualitative input and feedback on issues
- Quantitative feedback on issues

The method has a legion of uses wherever expert opinion is required.

Benefits

- Fast feedback.
- Wide perspective on issues.
- Convergent and divergent thinking.
- Good for evidence building.
- May uncover potential innovations or unforeseen risks.
- Improves output quality of final reports.

Disadvantages

- Experts can be wrong and miss weak signals that affect their current knowledge.
- A different group of experts or larger population may offer different advice.
- More costly, time consuming and resource hungry than some other methods.

Steps to complete

- Determine issue to study.
- Determine if experts will be anonymous to each other.
- Define their roles.
- Determine method of engagement: telephone interview, face-to face, meeting, electronic etc.
- Find, recruit and agree terms with experts.
- Provide process for, and receive expert input.
- Review and resolve disagreements.
- Produce draft final report.
- Peer review
- Produce final report.

Further reference

Futures Research Methodology Version 3.0, Millennium Project, 2009 CD ROM

3.10 Forecasting

Overview

Forecasting is a process of making statements about events whose actual outcomes (typically) have not yet been observed.

Uses of the method

- Forecasts are universally used across all PESTLE subjects to forecast and predict outcomes by all manner of individuals and organizations.

Benefits

- Quick and easy to do at basic level.
- Can be taught and learned.
- Can be peer reviewed.
- Facilitates strategy and policy-making
- Can create challenge to existing paradigms and resource constraints.

Disadvantages

- The forecaster ignores related fields.
- New technical approaches supersede the forecasters' assumptions.
- Assumptions and likelihoods can/will be wrong
- Can be complex and require training or facilitation.
- Forecasts can be taken as gospel by untrained people.
- Can be very time consuming.

Because of these problems, it is better to combine forecasts rather than to try to select one method. If this is done, the strengths of one method may help compensate for the weaknesses of another.

Steps to complete

Futurists usually use explorative approaches (What might the future be?) or normative methods (What is hoped for in the future?) to create forecasts through:

- Trend extrapolation - estimates future outcomes based on historical data using time series methods.
- Causal / econometric methods - assumes that the underlying factors that might influence the variable that is being forecast can be identified.

- Judgmental - uses human judgment, opinion and likelihood estimates usually through consensus methods e.g. the Delphi Method and surveys.
- Artificial intelligence - simulates structured futures outcomes.
- Genius forecasting - use of Science Fiction writers and other experts.

See also prediction markets, gaming, simulation and modeling, cross-impact analysis and scenarios.

Most forecasting approaches follow the steps below though not in a linear process as described here. Forecasting is usually an iterative learning process:

- Define the forecasts purpose
- Gather initial data, forecasts from others and ideas
- Choose the method
- Fix the time-frame
- Define alternative futures
- Create a forecasting model
- Populate the model
- Evaluate the results
- Share results and obtain buy-in
- Refine and maintain

Further reference

- [Forecasting](#), Wikipedia
- Footprints of the Future: Timelines and Exploratory Forecasts in Futures Research, Peter Von Stackelberg - Social Technologies, June 2008
- Futures Research Methodology- Version 3.0, Millennium Project 2009 CD ROM
- Operations Research and Technological Forecasting, Roy K. Frick, Airpower September 2003

3.11 Futures Wheel

Overview

Produces a graphical visualization of direct and indirect future consequences of a change or development.

Uses of the method

- Organize thoughts about a future development or issue.
- A series of wheels can be constructed to consider different aspects of the issue.

Benefits

- Structure possible impacts.
- Visualize interrelationships.
- Aids brainstorming.
- Multiple future conscious perspectives possible.
- Quick and easy to do.

Disadvantages

- Pre-cursor only to employment of other foresight methods.

Steps to complete

- Place the central issue describing the change in the center of a page.
- Position events or consequences that follow directly from that development around and near it.
- Then position indirect events or consequences of the direct consequences around the first level consequences.
- Mark these concentric levels with concentric circles or use different colors as above.
- Connect the consequences in a tree or a spider's web.

Further reference

- Futures Wheel: Local Government Association, UK.
- Futures Research Methodology - Version 3.0, Millennium Project 2009 CD ROM

3.12 Heuristics

Overview

A heuristic is an algorithm that is able to produce an acceptable solution to a problem in many scenarios using experimental and especially trial-and-error methods.

Uses of the method

Heuristics are typically used when there is no known method to find an optimal solution, under the given constraints; Very common in wide range of real world problems and implementations.

Benefits

- Heuristic algorithms may be the only way to get good solutions in a reasonable amount of time.

Disadvantages

- Performance is never guaranteed.
- No formal proof of correctness.
- Complex and requiring significant expertise.

Steps to complete

These are rules of thumb rather than specific steps in a process. By their very nature 'heuristics' don't fit well within a step-wise procedure but these principles are generally true:

- Determine the issue to be studied.
- Develop the small set of evaluators (success criteria and measures).
- Create a model.
- Test and stress the model.
- Determine if the model works sufficiently close to real world results that it can be used as a surrogate test-bed.
- Amend the model with experience.

Further reference

- Ten Usability Heuristics: Jakob Nielsen, UseIt.com
- How to Conduct a Heuristic Evaluation: Jakob Nielsen, UseIt.com

3.13 Modeling, simulation, gaming

Overview

Modeling, simulation and gaming are techniques to help the user see the effects of their decisions in advance. Modeling, simulation and gaming has grown in influence as computerization of the structure and rules allows complex systems dealing with many variables to be presented dynamically and graphically. As computer gaming technology becomes more sophisticated and monitoring devices become ever more ubiquitous we can expect these foresight methods to become ever more pervasive and exciting to use. For instance, virtual worlds too are very large simulations hosting smaller simulations and these are growing in power exponentially.

Uses of the method

- Entertainment
- Design
- Planning
- Foresight
- Education
- Research
- Forecasting
- Negotiating

Benefits

- Help describe the behavior of complex systems in a safe and dynamic environment.
- Are driven by the pre-defined structure of the design and the chosen set of rules applied to each iteration.

Disadvantages

- Understanding the rules and their limitations is key to obtaining useful results that emulate the real world
- Unless a simple model, costs time and resources are likely to be very high.

Steps to complete

- Determine vision, aim and strategy
- Set goals and objectives
- Create initial design
- Involve participants in the development
- Develop design
- test design
- Launch
- Modify design as participants use it or suggest improvements.

Further reference

- Future Research Methodology - Version 3.0, Millennium Project 2009 CD ROM

3.14 Morphological analysis *

Overview

Explores all the possible solutions to a multi-dimensional, non-quantified, complex, usually 'wicked', problem.

Uses of the method

- Can be used in diverse fields including policy analysis and futures studies for scenario planning purposes plus new product development.

Benefits

- Opens new possibilities beyond traditional thinking.
- Non-quantified method for investigating problem complexes, which cannot be treated by formal mathematical methods, causal modeling and simulation.
- Unclear parameter definitions and incomplete ranges of conditions are quickly identified.
- Can accommodate multiple alternative perspectives rather than prescribe single solutions.
- Functions through group interaction and iteration rather than back office calculations.
- Generates ownership of the problem formulation through transparency.
- Facilitates a graphical (visual) representation for the systematic, group exploration of a solution space.
- Focuses on relationships between discrete alternatives rather than continuous variables.
- Concentrate on possibility rather than probability.

Disadvantages

- Can be overly structured
- Complex and time consuming
- Needs facilitation.

Steps to complete

- Agree the problem to be investigated
- Identify and define the dimensions
- Assign ranges of values to these dimensions

- Construct a 'morphological box' placing these dimensions against each other in an n-diameter space
- Establish which configurations of the dimensions are useful, practical, and interesting.
- Define this configuration as the solution space (boundary conditions).

Further reference

- <u>General Morphological Analysis</u>: A general method for non-quantified modeling - Tom Ritchey
  Swedish Morphological Society

3.15 Participatory methods *

Overview

Participatory methods should be an integral part of any foresight project.

Uses of the method

Participatory methods are now well developed in relation to project-level impact assessment. Participatory methods are therefore a diverse and flexible set of techniques for visual representation and stakeholder involvement characterized by a set of underlying ethical principles.

Benefits

- Participatory methods enable better identification of who is affected in which ways.
- Enable the voices of many stakeholders to be heard and their messages woven into future solutions.
- Objection handling is forewarned and fore-armed
- Relatively cheap and fast to do.
- Can help avoid unforeseen future pitfalls and consequences.

Disadvantages

- May produce a 'Tower of Babel' effect.
- Not 'neat and tidy'.
- Needs strong and effective management or reputation loss will ensue.
- Managers may not want to hear or act on the feedback.

Steps to complete

Participative methods are now widely used as a result of the dramatic rise of electronic social networks and use of Web 2.0 technologies. As a result there are many ways to set up a participatory foresight project:

- Calendars
- Diagrams
- Diaries
- Ethnography
- Ethno-classifications
- Focus groups
- Interviews
- Mapping techniques
- Narrative analysis
- Participatory analysis
- Photo and Video sharing
- Questionnaires
- Ranking techniques
- Role-play

- Story-telling
- Theatre
- Time trends analysis

Further reference

- Participatory Methods: Dr. Linda Mayoux, Manchester University, UK

3.16 Personal future

Overview

Provides a research method for instructing individuals in understanding and developing their personal futures.

Uses of the method

Anyone with an interest in managing their future.

Benefits

- Provides the individual with strategies, contingency plans and an action plan that would help the individual achieve a preferred future.
- Encourages individuals to use these methods in their everyday lives.
- Enable experienced futurists to develop teaching methods and materials that will effectively lead individuals in their exploration of their futures.
- Can be undertaken individually or in groups.
- Fast and free.

Disadvantages

- None

Steps to complete

- Personal research
    - - Exploring life stages
    - - Exploring personal domains
    - - Exploring life events
    - - Constructing a personal framework
- Scenario development
    - - best plausible
    - - transformational
    - - worst plausible
- Personal strategic planning
    - - preferred future
    - - strategy development
    - - contingency plan
    - - action

Further reference

- Personal Futures: Verne Wheelwright

3.17 Prediction market

Overview

Speculative markets created for the purpose of making predictions.

Uses of the method

- Many internal and external prediction markets exist covering many topics.

Benefits

- Prediction markets are betting exchanges exhibiting no risk for the bookmaker.
- Prediction markets are thought to be at least as accurate as other institutions predicting the same events with a similar pool of participants.

Disadvantages

- Helpful for short-term but not so much for mid to long-term predictions.
- However, the comments generated can be helpful for spotting tipping points, emerging issues and wild-cards.
- Prediction markets may be subject to speculative bubbles.
- Can be direct attempts to manipulate such markets.
- Some kinds of prediction markets may create controversial incentives.

Steps to complete

- Companies that provide enterprise prediction markets include NewsFutures, Crowdcast, CrowdWorx, Inkling, and Consensus Point.

3.18 Relevance trees

Overview

An analytical technique that sub-divides a large subject into increasingly smaller sub-topics. Output is in the form of a visual hierarchical structure.

Uses of the method

Can be used to study a goal or objective, as in morphological analysis, or to select a specific research project from a more general set of goals, as in network analysis. Similar to concept maps. Network displays sequentially identify chains of cause-effect (or other) relationships.

Benefits

- Ensures that a given problem or issue is broken into comprehensive detail
- Important connections among the elements considered are presented in both current and potential situations.
- Aid in both historical analysis and in forecasting.
- May show new combinations in insightful ways.

Disadvantages

- Requires critical judgments which if in error may weaken the outcome.

Steps to complete

- Determine the issue to be studied and agree the objectives.
- Arrange the tree in a hierarchical order, the objectives, sub-objectives, and tasks in order to ensure that all possible ways of achieving the objectives have been found.
- Evaluate the relevance of an issue to the finding of a solution.

- Choose the tree(s) with the highest relevance for further in-depth study.

Further reference

- <u>Judgment-Based Technological Forecasting Techniques</u>: Relevance Trees, Wiley
- <u>Relevance Trees</u>, Jim Flowers, Ball State University 2005
- Futures Research Methodology - Version 3.0 - Millennium Project 2009 CD ROM

3.19 Road-mapping

Overview

Road-mapping is an important tool for collaborative planning and coordination for corporations as well as for entire industries. It is a specific technique for technology planning, which fits within a more general set of planning activities.

A road-map is the document that is generated by the process. It identifies (for a set of product needs) the critical system requirements, the product and process performance targets, and the technology alternatives and milestones for meeting those targets. In effect, a technology road-map identifies alternate technology "roads" for meeting certain performance objectives.

Uses of the method

- Can help develop a consensus about a set of needs and the technologies required to satisfy those needs.
- Provides a mechanism to help experts forecast technology developments in targeted areas.
- Can provide a framework to help plan and coordinate technology developments both within a company or an entire industry.

Benefits

- Provides information to make better technology investment decisions.
- Determines the technology alternatives that can satisfy critical product needs.
- Helps clarify alternatives in complex situations.
- Identifies critical product needs that will drive technology selection and development decisions.
- Generate and implement a plan to develop and deploy appropriate technology alternatives.
- Complex maps can be developed that can be updated in real-time.

Disadvantages

- Resource, time and cost hungry.
- May not consider other emerging forces impinging on the road-map.
- Some of the participants must know the process of road-mapping.

Steps to complete

- Define the scope and boundaries for the road-map.
- Identify the "product" or 'issue' that will be the subject of the road-map.
- Identify the critical system requirements and their targets.
- Specify the major technology areas.
- Specify the technology drivers and their targets.
- Identify technology alternatives and their time lines.
- Recommend the technology alternatives that should be pursued.
- Create the technology road-map report.
- Critique and validate the road-map.

- Develop an implementation plan.
- Review and update.

Further reference

- <u>Fundamentals of Technology Road-mapping</u>, Marie L. Garcia, Olin H. Bray, Sandia National Laboratories
- <u>Road-mapping</u>, Gerrit Muller, Embedded Systems Institute, 2010

3.20 Scenarios *

Overview

Scenario planning is one of the most well-known and most cited as a useful technique for thinking about the future. Scenarios are preparation for potential future challenges, not predictions of what will happen. They help us to identify future option spaces and give us confidence to act in a world of uncertainty.

Scenario planning questions assumptions we all make about the future. The method creates plausible views of the future that decision-makers can use to determine their best response and how to react to alternative plays.

Scenarios are qualitatively distinct visions, told as stories, of how the future looks. They make explicit the assumptions of how the world works. As the project progresses, the process will move from wide exploration to a narrowing of focus, from horizon scanning to envisioning potential futures and determining response as the diagram above shows.

The key in creating scenarios of best/worst case options is in finding that strategy that represents the best ground on which to base subsequent action plans.

Uses of the method

- explore uncertainties
- test for limits
- order alternative futures
- Identify emerging risks and opportunities
- improve future assumptions
- derive better planning information and knowledge
- provide an outside-in challenge
- act as a forum against conventional inside-out orthodoxy
- a way to dream in a safe environment
- as an approach to derive fresh vision and/or current or new strategy development
- sensitivity and risk assessments and comparative testing of projects, portfolios and organizations
- rehearse the future
- informs both personal and organizational choices

Benefits

Building scenarios help us to

- understand the realm of possible options
- make us live the future in advance so as we can take better decisions today
- avoid unpleasant surprises
- change our vision of how the world works
- generate a common understanding of the real issues

- test our decisions against a range of possible worlds
- deal with complex adaptive environments where the outcome is uncertain
- teach people and teams how to think strategically about the future and know how to act
- agree a common language
- inspire, engage and enable shared action
- identify issues for further horizon scanning

Scenarios are not an end in themselves, but a tool to

- identify risks to, and opportunities over a desired time period
- expose long term challenges for strategies and policies
- deal with a mix of wide ranging qualitative and quantitative inputs
- enable assumptions to be made clear and explicit
- make real the implications of these challenges
- encourage collaboration
- support and improve vision and policy making by starting grounded and challenging conversations about choices, trade-offs, and conflicts
- build capacity among staff in futures work

In some organizations scenarios are embedded in the fabric of decision-making and are a way to do business.

Disadvantages

- can be construed as the 'official future' by non-experts.
- may lack credibility as being too far-fetched, subjective or meaningless.
- after a time scenarios can be seen as plain wrong!
- cannot be validated.
- can suffer from cognitive/cultural myopia.
- people may not be able to suspend their disbelief.
- time consuming.
- complex.
- can be expensive.
- may suffer major project creep if mot well managed.

However, these can be overcome by proper communicating of the purpose from the outset.

Steps to complete

Almost all formal scenario planning is done manually in workshop settings and the approaches are usually deductive using quadrant-based models or inductive (determine all of the potential futures that could be problematic or opportunistic, and mix them and match them into commonly-themed groups).

Both of these approaches can be very useful and insightful, but are intrinsically limited -- there are only so many possibilities that mere humans can come up with in the limited time and with the limited tools that are typically available. Most authors and experts recommend the construction of four scenarios as one can only be considered a forecast, two would most likely limit competing uncertainties and three may cause people to assume one is the forecast. Where more than four scenarios are required then the Morphological Analysis method should be considered.

Timing of scenario projects should be considered carefully. Avoid such a project when the strategy round has just ended, when key executives are on the move, the market or organization is in chaos, when there is political-infighting or competing projects make too much noise.

An effective way of trying to exhaustively identify futures that could be of particular interest is to do it abductively with technology. Scenarios can also be developed using technology but technological approaches are not always the most effective way to do scenario work though they certainly can provide a good input into scenario thinking.

- identify the specific domain/environment that is of interest (e.g. terrorism, renewable energy, alternative health care, etc.)
- spend time to build a systems model.
- identify the major driving forces (e.g. market elements, government regulation, social values, manufacturing processes, etc.)
- determine how they contribute/interact with the other forces, both positively and negatively using the cross-impact method to identify patterns and choose the strongest driving/restraining forces
- exercise/iterate the system through possible states or futures.
- evaluate to determine which is high-value and needs to be evaluated through construction of a scenario.
- determine and rank the predetermined elements that will inform your strategic response: slow-changing phenomena e.g. demographic shifts, constrained situations e.g. resource limits, in the pipeline e.g. aging of baby boomers, inevitable collisions e.g. climate change arguments.

- capture and rank critical uncertainties (key variables) from the underlying assumptions you have made. Both these and the predetermined elements will be key to creating scenarios and examining potential future paradigm shifts.
- give the strongest driving/restraining forces (scenarios) a short sharp metaphoric, vivid and memorable title that does what it says on the tin and that defines the key question and scope. Create several scenarios at once.
- determine whether medium term (plausible) or long-term (possible) scenarios are required.
- conduct interviews, workshops and horizon scanning to flesh out, group ideas and refine the scenarios. Use the input form here to define your scenario and capture your outline script.
- produce narrative stories for each key scenario adding these to the input form. Read this article on story types and this one on how to write stories
- ensure each scenario is grounded in the real world particularly how it evolved from where it is now.
- use one person to document and aggregate all of your scenario material here.
- add evocative images from the time of, and perspective of, future generations.
- stress test and wind tunnel the scenarios looking for consistency, plausibility, relevance and presentation style among them.
- capture unique insight into new ways of seeing that can be utilized by the organization e.g. vulnerabilities uncovered, big bets, mega opportunities, identification of leading indicators.
- what conclusions can we draw from the exercise(s)?
    - How might the future be different?
    - How does A affect B?
    - What is likely to remain the same or change significantly?
    - What are the likely outcomes?
    - What and who will likely shape our future?
    - Where could we be most affected by change?
    - What might we do about it?
    - What don't we know that we need to know?
    - What should we do now, today?
    - Why do we care?
    - When should we aim to meet on this?

Your scenario will be a good one if it inspires, engages and enables others to take action, breaks people's acceptance of current paradigms and produces plausible outcomes that can be turned into strategic responses.

Further reference

- Futures Research Methodology - Version 3.0, Millennium Project 2008 CD ROM
- Scenarios: The Art of Strategic Conversation, Kees Van der Heidjen, Wiley 1996
- The Art of the Long View: Planning for the Future in an Uncertain World, Peter Schwartz, Currency Doubleday 1996
- Scenario Planning: The Link Between Future and Strategy, Mats Lindren & Hans Bandhold, Palgrave McMillan, 2009
- Scenario Planning: Managing for the Future, Gill Ringland, Wiley 2006
- Structured Analytic Techniques, Richards J. Heuer Jr & Randolph H. Pherson, 2010, CQ Press

3.21 Technology sequence analysis

Overview

Technology Sequence Analysis (TSA) is similar to PERT (Project Evaluation and Review Technique) and is a probabilistic method of estimation of when future events might occur. TSA links intermediate technology steps into a network of cause and effect links. These links are assigned probabilities (PERT uses 'duration') to define the likely probable date of a technologies arrival.

Uses of the method

Used in quantitative estimation of when a technology could become available and in exploring associated policy questions.

Benefits

- Can handle many intermediate links.
- Useful for connecting analysis of separate but related technological developments sharing common elements.
- Establishes the key critical probability path and uncertainty associated with delivery of the end-technology.
- Allows simulation of different probabilities, connections of intermediate links and varying durations etc.
- Helps reduce risk and better ascertains the associated costs of delivery of the end-technology.
- Lays out a clear path and alternative routes for investment decisions.

Disadvantages

- Time
- Complexity
- Cost
- Expertise and training required
- Usually needs sophisticated software
- Experts required

Steps to complete

- Determine if software required
- Obtain software
- Decide on expert contributors
- Collect data from experts
- Construct the network
- Compute the result

Further reference

- Futures Research Methodology - Version 3.0, Millennium Project, 2009 CD ROM

3.22 Text mining

Overview

Text mining identifies patterns and breakthrough occurrences in large amounts of raw data and information gathered from internal or external sources. The goal is to discover previously unknown information to the researcher.

Text mining tasks include text categorization, text clustering, concept/entity extraction, production of granular taxonomies, sentiment analysis, document summaries, and entity relation modeling (*i.e.,* learning relations between named entities).

Uses of the method

- Key tool in Horizon Scanning content analysis where it is used to determine early warning of weak signals, emerging issues and wild-cards.
- Intelligence assessments.
- Basis for creating S-curves, trend extrapolations and growth modeling.

Benefits

- Can process large quantities of information and develop indicators of change.
- Increasingly can interpret meaning.
- Suitable for both unstructured and structured data.

Disadvantages

- Only yields a partial though highly relevant piece of the answer.
- May miss important sources or important keywords, people and organizations.
- Requires additional expert opinion.
- Complexity.
- Costs of access to subscriber databases and journals can be extraordinarily high though increasing transparency is significantly reducing the time it takes for ideas and discoveries to appear in the free press.
- Requires trained, analytical people.

Steps to complete

- Determine question to be answered.
- Create focused list of directly associated keywords.
- Search for these keywords.
- Use text mining software to find experts, authors, keywords, organizations and countries most associated with answering the question from Internet sources, databases and experts.
- Cross-impact people and organizations against keywords to discover their interests.
- Create time-lines of keyword usage in the form of S-curves to track mentions over time.
- Analyze and interpret.

Further reference

- Futures Research Methodology – Version 3.0, Millennium Project, 2009 CD ROM
- Text Mining, Wikipedia

3.23 Trend impact analysis *

Overview

Trend impact analysis is a forecasting which examines the cause, nature, potential impact, likelihood and speed of arrival of an emerging issue of change. Some trends are relatively predictable like global population growth but most trend extrapolations deteriorate over time the further out the projection goes. TIA seeks to look at the envelope of possibilities that deviate from the expected norm.

Uses of the method

- Forecasting
- Contingency planning
- Policy option analysis
- Impact analysis
- Strategic planning
- Scenario planning

Benefits

- Simple
- Cost effective
- Forces consideration of non-linear trend extrapolation
- Offers sensitivity analysis

Disadvantages

- Incomplete variables
- Relies on judgment

Steps to complete

- A trend is projected forward as a baseline scenario from historical data assuming no surprises.
- Experts provide alternative views and scenarios of how the trend can turn out based on likelihood occurrence and estimated future impact.
- A database produces models, visualizations or scenarios showing the bounds of probability and expected time to deviation from the surprise-free future.

Further reference

- Futures Research Methodology – Version 3.0, Millennium Project, 2009 CD ROM

3.24 TRIZ *

Overview

TRIZ (Theory of Inventive Problem Solving) is a methodology, tool set, knowledge base, and model-based technology for generating innovative ideas and solutions for problem solving. It can be used in many foresight projects such as technology forecasting, advanced SWOT and patent analysis.

Uses of the method

- Tools and methods for use in problem formulation
- System analysis
- Failure analysis
- Patterns of system evolution
- Solving manufacturing problems
- Creating new products

Benefits

- Known and unknown types of problems can be solved.
- Algorithmic approach to the invention of new systems, and the refinement of old systems.
- As experience grows, solutions for a class of know types of problems increase and exhibit a structure.

Disadvantages

- Complex
- Time consuming
- Requires training and/or facilitation

Steps to complete

- Define a specific problem
- Define the contradictions and specify the general problem
- Develop general solutions
- Specify best solution

Further reference

- TRIZ, Wikipedia
- TRIZ – What Is TRIZ - Katie Barry, Ellen Domb & Michael S. Slocum
- Triz Journal
- Southbeach Modeller (free software)

3.25 Visioning *

Overview

Visioning is method for determining a compelling vision of a preferred future. Visioning a desirable future is the first step in create a powerful strategy to achieve a particular purpose.

Uses of the method

- Corporate culture
- Strategic planning
- Project design

Benefits

- Visioning inspires, engages and enables most people.
- Excellent for generating ideas, encouraging interaction and agreeing common. vision, values, processes and goals.

Disadvantages

- Requires solid communication and continued strong leadership from the outset.
- Must be lived, shared, stretching but achievable and ethical.

Steps to complete

- Select participants in the initial exercise.
- Explore participants' satisfaction and dissatisfaction with the status quo and the past.
- Explore the future.
- Offer an opportunity to fantasize on what a new and better future might look like.
- Develop the most interesting ideas into solutions and outline projects.
- Rank and group the solutions and outline project into a strategic framework.
- Choose the best strategic framework to meet the purpose.
- Identify the best cultural fit, measures and processes to deliver the purpose through the framework.
- Refine with more stakeholders.
- Create excellent communication plan.
- Find quick wins after announcement.
- Reinforce with projects and initiatives that show determination and commitment to the vision.

Further reference

- <u>Time-lines into the Future: Strategic Visioning Methods for Government, Business, and Other Organizations</u>, Sheila R.Ronis, Hamilon Press, 2007
- <u>Built to Last</u>: Jim Collin and Jerry Porras, Harper Paperbacks
- Futures Research Methodology - Version 3.0, Millennium Project, 2009 CD ROM

3.26 Wild Cards *

Overview

Wild Cards are high-impact events that seem too incredible, or are considered too unlikely, to happen; yet many do e.g. September 11th or the recent Financial Crisis.

Considering the extreme impacts of a Wild Card, for instance, the potential break-up of the United States, rejection of new technology as harmful to society or the coming of Peak Oil far earlier than expected can lead to the discovery of new opportunities and risks and the establishment of simple early warning systems of their potential arrival.

The object of the exercise is not to predict a Wild Card but to use the learning from the exercise to strengthen an organization's ability to withstand or exploit similar shocks. Often, simple strategic and tactical changes made to the organization's contingency plans deliver sufficient spin-off benefit to make

this analysis worthwhile. For instance, identifying that oil supplies may peak early can help organizations reduce their needs and diversify sources.

Uses of the method

- Innovation
- Threat assessment
- Scenario planning
- Contingency planning
- Modeling

Benefits

- Help individuals and teams use extreme thinking to think the unthinkable about the world they inhabit.
- Learn lessons in how to adapt to be more resilient to future shock.
- Creative disruption through innovation.
- Reduces potential blind-spots.
- Spots potential discontinuities early.
- Questions trend exploration techniques.

Disadvantages

- May create a perception of questionable value among stakeholders
- Not a precise science more an art form today
- Limited monitoring available
- Requires technology for effective use

Steps to complete

Wild Cards can be found through brainstorming and/or systematic analysis of others ideas using this approach:

- Identify which surprises can happen that can affect the organization in extreme circumstances.
- Determine the most important potential Wild-cards that can impact the organization from this list.
- Classify the Wild-cards
    - Type I Wild Card: low probability, high impact, high credibility
    - Type II Wild Card: high probability, high impact, low credibility
    - Type III Wild Card: high probability, high impact, disputed credibility
    - Elephant in the room: happening now, disputed impact, disputed credibility
    - Monitor the most important for signals of growing strength.
- Determine contingency or avoidance plans that can be put in place.

Look for universally accepted paradigms that could break.

> *"That which defies the human spirit will eventually fail"*
> *- Margaret Thatcher, ex British Prime Minister in a reference to the Berlin Wall.*

For instance: the United States/Euro zone fragments; double-dip recession, machines take over, five working weeks are a thing of the past.

Further reference

- <u>Out of the blue: Wild cards and other big future surprises : how to anticipate and respond to profound change</u>, John L. Petersen, Arlington Institute 1997
- <u>A Vision for 2012: Planning for Extraordinary Change</u>, John L. Petersen, Fulcrum Publishing, 2008

- <u>Thinking Out Of The Box</u>, Dr. Karlheinz Steinmuller, Z_Punkt GmbH. 2006
- Futures Research Methodology - Version 3.0, Millennium Project, 2009 CD ROM