Value Chain Dynamics

Applying System Dynamics to Support Value Thinking

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Abstract

This paper provides an overview of an emergent need and a practical new approach to apply system dynamics (SD) in business. Potential opportunities and implications for consulting organisations and SD practitioners are examined.

The paper describes the convergence of SD and recent strands of resource-based strategic management thinking, broadly classified here as "value thinking", for which SD can undoubtedly provide unique support.

A suitable support methodology is described and named "Value Chain Dynamics" (VCD). Building on good SD practice, VCD is a project-based approach that establishes the interdependence of SD and value thinking as a means to assess the value implications of all kinds of change. The utility of the method is illustrated by reference to its potential to support business development and value initiatives within the business consulting industry.

The importance of competencies for organisations applying the methods is emphasised, and the need for internal competence development programmes highlighted.

Wanted: A Shift of Mind for System Dynamics

System dynamics practitioners have long believed that they have keys to the business kingdom - yet it is undeniable that to date, with exceptions, management has failed to listen. Forty years on from its creation *system dynamics* (SD) (Forrester, 1996) is still not widely appreciated in the business world and the name itself is enigmatic and even confusing to many managers.

Whereas management interest in feedback thinking has certainly been stimulated in the 1990's by qualitative system dynamics or "systems thinking" (Senge, 1990; Wolstenholme, 1990), quantitative system dynamics - the theoretical and practical underpinning to systems thinking - is little understood and still underused in business.

This is a great pity. For whereas the qualitative methods undoubtedly provide assistance for managerial thinking, proponents rarely allow that significant experience of quantitative modelling is required to interpret complex causal maps. Quantitative modelling adds significant value to qualitative mapping by allowing deeper and more rigorous analysis. An appropriate balance between systems thinking and quantitative system dynamics comprises a unique, powerful and much needed discipline to support analysis of a wide range of complex business issues. (Wolstenholme, 1999).

However, if SD is ever to become widely practised, there is a clear need to present a more convincing case to business managers that SD can indeed provide support for what they actually do. At the same time, a shift of mind is required from SD practitioners - to move away from a fundamentally academic stance in which SD is often seen as an end in itself, to ingrain SD as essential support for established and new mainstream management practices.

Fortunately, management thinking is moving, albeit slowly and perhaps unwittingly, to accommodate systemic thinking. The time is now very appropriate for new and more assertive packaging and marketing of system dynamics.

This paper briefly outlines the nature of some new opportunities, before proposing a new stance for SD within a practical business methodology that supports the new management thinking. The methodology, referred to here as "Value Chain Dynamics" (VCD), is described and illustrated by reference to the way it may support the very industry that could be instrumental in developing and applying it - the business consulting industry. Finally, implications for the development of appropriate competencies to support the methodology are discussed.

New Management Thinking - the Trend to "Value Thinking"

Recent "semi-systemic" developments in management thinking have significantly broadened needs and opportunities for system dynamics. Significant developments include value-based management, knowledge management, intellectual capital, asset management, human capital management and balanced scorecards. It is constructive to note the general nature and interdependence of these approaches.

Value-based Management and Resource-based Strategy

Value-based management (VBM) (Copeland et al, 1996; Price Waterhouse Cost Management Team, 1997), starts from the proposition that companies and business strategies should be judged by the economic value they can create for shareholders, i.e. by future cash flow-based economic valuations rather than historic accounting measures. In this context shareholder "value" has a precise meaning, i.e. the net present value of future free cash flows, discounted over a future period of competitive advantage. Value is now accepted as a most important (if sometimes elusive) management concept, providing an overarching focus for the evaluation of all kinds of change.

> *The first important issue here for SD is the move from past to future performance and hence a need for new tools to explore alternative futures and value implications.*

VBM has been aggressively adopted by most of the major strategy consultants and whereas there are distinct differences regarding philosophical and accounting measurement issues, it seems broadly agreed that most value drivers that can actually be managed are fundamentally operational and *resource-based* in nature.

Supporting this perspective, the resource-based view of strategy (Foss, 1997) suggests that sustainable competitive advantage depends on the nature and type of resources a company has and how they are amassed and deployed.

> *Thus the second important issue for SD is a need for analytical tools that can accommodate operational realities by describing the development and deployment of the major operational resources of the business, and interactions between them.*

System dynamics has much to contribute here, particularly in developing operational and resource-based value perspectives of future strategic alternatives. (Warren, 1996).

Complementing the value movement, a number of other resource-based management strands have also recently come together, concerned with understanding the nature and management of critical business resources, especially knowledge, intellectual capital, capital assets and people.

Knowledge Management

Knowledge management (Koulopoulos, Spinello and Toms, 1997) is rapidly growing in importance as many businesses recognise that knowledge and intellectual capital are the key to future success. Knowledge management is effectively concerned with gathering, sharing and developing both tacit and explicit knowledge into forms usable to assist and accelerate the future deployment of resources. It has much in common with organisational learning, i.e. organisations reflecting and learning from past actions, such that new initiatives need not start completely afresh each time.

In that the role of knowledge is to help shape the future development of the organisation, knowledge management is also an essential element of value management.

A problem with knowledge management is that most current approaches are technological and software driven and concerned with *explicit* knowledge only. There is a great need to develop business activities that help with the reflection and sharing of *tacit* knowledge. System dynamics modelling has significant credentials to fulfil that role.

Intellectual Capital

Overlapping with knowledge management, the measurement and management of intellectual capital (IC) is now regarded as critical to understanding the value and competitive positions of firms in many global industries. (Wolrath, 1996).

Intellectual capital adds significantly to the resource-based perspective of the firm and hence also underpins value management in knowledge-intensive industries. Products,

customers, brands, patents, etc., are all clearly intellectual resources that need to be managed *interdependently* over time. System dynamics provides a clear and powerful language to describe intellectual resources and a method by which to understand the development and destruction of intellectual capital.

Strategic Human Capital Management

It is impossible to do other than to note the vast amount of published thinking regarding the role of human capital in support of business strategy and the interdependence, as well as the independence, of intellectual capital and people. (Boudreau and Ramstad, 1997).

That people are a strategic business resource is evident but there is much uncertainty about how to measure and manage the quantity and quality of human resources relative to business strategies and over time. System dynamics provides powerful support to relate human assets and attributes to other resource-based perspectives of strategy and value.

Strategic Asset Management

Capital-intensive industries, such as utilities, create value by managing the acquisition, use and disposal of capital assets over extended life cycles. Strategic asset management (SAM) is concerned with understanding the interdependencies between asset productivity, serviceability, whole life costs, associated business risks and, hence, value created.

Whereas there appears to be growing interest in SAM there is evidently yet no clearly established strategic method. System dynamics provides a natural framework and method.

Performance Measurement and Balanced Scorecards

The concept of balanced scorecards (Kaplan and Norton, 1996) arose from the disappointing results achieved by many well intended but single-focus initiatives such as total quality management and business process re-engineering. A problem was that these initiatives were often not measured in terms of balanced financial and other economic and operational indicators, nor linked directly to the resource strategies of organisations.

Sustainable performance breakthroughs require balanced change across organisations, also requiring changes in performance management and measurement systems. Balanced scorecards measure change across four performance categories; internal processes, customers, learning/growth and finance. When value-based management is linked with balanced scorecards, future value itself also becomes a key performance measure; indeed the scorecard is a key component of VBM services offered by many consultants.

The significance of balanced scorecards is that they promote semi-systemic thinking, i.e. interconnected thinking about the whole organisation, not just one aspect of it. They encourage all resources of the organisation to be viewed in the way balance sheet items are viewed. For example it is possible to think of 'balance sheets' composed of stocks of both financial capital and intellectual capital (e.g. customers and products). Systems thinking provides a powerful means to develop balanced scorecards, helping to identify and to establish interdependencies between key performance indicators, and to track the creation or destruction of value.

A limitation of conventional balanced scorecards is that they provide only a static picture of organisational performance. Recently much interest has been expressed in developing dynamic scorecards and system dynamics is seen as having much to contribute here (Ferneau, 1997).

Value Thinking

The new thinking and methods outlined above can be grouped together under the term *"value thinking"* and systems thinking and system dynamics are seen here as a way to link the "semi-systemic" components of value thinking into a coherent systemic approach.

The relevance and magnitude of future performance and the generation (or destruction) of value, can only be tested by defining alternative operational levers and resource development (e.g. investment) strategies and by analysing the alternative futures these may create. High-level business simulation is the only way by which such testing can be achieved. Further, the process and rigour of the SD approach can itself be a major contributor to knowledge management and learning.

Value thinking means developing a broad understanding of how future cash flows can be impacted by management operational and investment strategies (note, "can be" not "will be"). This means integrating resource-based operational knowledge to assess how interdependent strategies may play out across all the resource elements of the organisation, through the value chain and into the future. Value thinking means thinking systemically and dynamically.

The remainder of this paper addresses the practical application of system dynamics to support current management thinking about value.

Value Chain Dynamics - a new method to support Value Thinking

The value chain (Porter, 1985) has been widely adopted by many consultants and organisations as a tool for understanding and communicating the structure and components of value creation in all kinds of organisations. It is, however, an essentially static tool.

It is suggested here that system dynamics may be applied in the value chain of business organisations to relate all operational resources (including intangibles such as knowledge and intellectual capital) and strategies to potential value (Corben, Stevenson and Wolstenholme, 1999). SD provides the means to test alternative futures in terms of potential value, through a process of knowledge capture, knowledge integration and application.

In light of the trend to value thinking, the term *"Value Chain Dynamics"* (VCD) is suggested as an appropriate way of describing the combination of system dynamics and value thinking. VCD will be used here to communicate a total methodology for applying systemic and dynamic thinking to support value thinking, within which system dynamics (SD) has a key role. To construct various ideas upon this theme, it is first necessary to clarify exactly what Value Chain Dynamics means here, and to clearly differentiate between SD (a discipline) and VCD (a project methodology).

Value Chain Dynamics defined

The idea of defining system dynamics as a methodology, rather than a technique is not new (Wolstenholme, 1983; Wolstenholme and Coyle, 1985). What is new here is the idea of recognising system dynamics as an "engine" and building a methodology around it.

Value Chain Dynamics (VCD) is defined as a *project methodology*, for the purpose of:

a) Synthesising organisational knowledge for performance improvement and the creation of value,

b) Developing and supporting a *sustainable capacity* for managerial issue structuring, problem solving and team learning.

At the core of the method are indeed the qualitative and quantitative tools and methods described by systems thinking, system dynamics and high-level business simulation. However, around this core tool set (at both front and back) additional elements and activities are added.

At the 'front end' is a structured method to assist knowledge capture and synthesis and to integrate and focus management learning and knowledge, in order to generate and test opportunities for performance improvement. This extension builds on the work of numerous system dynamicists who have contributed to the process of knowledge capture for model building (Vennix, 1996; Vennix et al, 1990; Richardson and Anderson, 1995).

At the 'back end' is a focus on performance measurement and, in particular, the measurement of future value.

Elements of Value Chain Dynamics

Fundamentally, VCD is a methodology for managing and progressing projects having defined purpose around issues of importance, by engaging management groups in a process to address the issues. The essential elements of the methodology (**Figure 1**) are:

1) *Tool set.* As outlined, this includes the qualitative and quantitative tools of system dynamics and systems thinking but may also include other tools as appropriate to particular purposes.

2) *Knowledge Integration Process.* A structured method by which the tools are applied *with management groups* to capture and synthesise knowledge around specific management issues, using models as the focus. One such method, successfully used by the authors, is "Intertwined Project Learning" (Wolstenholme, 1999).

3) *'Templates' or Accumulated Knowledge.* Just as the system archetypes represent highly condensed and generalised knowledge, industries and specific organisations generate their own insights and "templates" (e.g. models or model kernels) that may often be reapplied to accelerate learning in new situations. For example, oil exploration companies may reapply templates developed to model elements of oil fields to other similar oil fields.

Whereas the authors have developed and applied specific approaches (Corben, Stevenson and Wolstenholme, 1999), these first three elements of the VCD method have been independently described in different ways by many authors in the SD literature over

many years. The fourth and fifth elements, however, which are critical to building a successful and sustainable VCD capability, have been rarely or inadequately addressed in SD literature.

4) Balanced Measurement of Performance and Value Outcomes

A key purpose of the method is to assist with the definition and understanding of balanced performance measures to determine where value may be created or destroyed. Early in the process, qualitative causal maps help to identify linkages between key performance indicators. Later, SD models and flight simulators can be equipped with balanced scorecard interfaces, through which management teams may experiment with a wide range of operational levers to assess alternative strategies.

5) Competencies:

It is unfortunate that there is still no universally accepted definition of competence to practice SD. It is clear, however, that competence is developed both through training and by practice. VCD projects can provide both kinds of experience, and as SD competence develops in an organisation it may be progressively applied and developed to build further competence.

- *Individual Competencies.* The authors have developed definitions of progressive individual competence together with training and development programmes to support individual competence development. Such programmes, *ingrained within the VCD process itself,* support the individual competence agenda.

- *Organisational Competencies.* It is also implicit that the competencies required to apply and to sustain VCD at middle and senior management levels in business organisations go well beyond the technical competencies of systems thinking and system dynamics. Moreover, organisational competence also needs to be defined from management application perspectives, rather than purely from the technical perspective. *VCD is, in itself, a process for progressive development of appropriate competencies to support organisational capabilities and capacity to practice VCD.* This issue will be addressed further.

Figure 1 indicates how the various elements of Value Chain Dynamics are combined in the methodology. Note that the method is an 'open' method, i.e. it is intrinsic that the approach engages and involves management groups having interests and responsibilities for each specific issue addressed. The method is also eclectic, i.e. it uses both qualitative and/or quantitative methods as appropriate. Systems thinking and SD is unquestionably at the heart of the method but VCD is also able to accommodate other systemic tools, such as SSM (Checkland, 1981) and VSM (Beer, 1985) at the front end.

Value Chain Dynamics as Continuous Development

Whereas **Figure 1** indicates the general nature of the project methodology, it is suggested that VCD can become a powerful force for organisational development when adopted as a continuous programme. In this mode, associated infrastructure is provided to recycle

insights, knowledge and templates through a succession of projects that progressively build individual and organisational competencies.

Figure 2 outlines this continuous process and indicates some generalised inputs and outputs within the cycle. The authors describe this cycle as "Accelerated Business Learning" (Wolstenholme, 1999). In practice the process also yields, over time, a wide variety of intellectual capital and competencies that may be progressively applied across the value chain.

The remainder of this paper illustrates the utility of the Value Chain Dynamics approach with respect to the nature of, and market for, "business consulting" - the provision of (internal and/or external) advice services to support mainstream management thinking, strategy and operational activity. The current position of system dynamics within the business consulting industry is outlined and, finally, the issue of how to develop appropriate competencies in consulting firms is addressed.

Value Chain Dynamics and Business Consulting

Business consultants are a primary market for these new ideas. All the major consulting firms offer client services supporting the semi-systemic methods outlined above. However, relatively few of even the major firms yet have a significant system dynamics capability (although most probably claim to be conversant with the qualitative approach of systems thinking).

There is also a tendency to think that SD is applicable only at the delivery end of a consulting business. Whilst this is evidently a key area of applicability, when SD is viewed more broadly as a key component of Value Chain Dynamics, it also has important contributions to make throughout the business consulting value chain, or value cycle.

A Systems Perspective of the Consulting Value Chain - the Value Cycle

A first step in a VCD project implementation is to develop a "high level" picture of the value creation process for the specific business under review. Whereas the classical Porter value chain provides an open loop picture of value creation, in practice the value chain is *closed loop* by nature - i.e. a "value cycle".

The value cycle of consulting firms is outlined in **Figure 3**, which shows clearly that client assignments (delivery) are but one point within a whole cycle of activity. Consultants develop internal service propositions, together with the competencies and capacities to support these, and also develop external client sales pitches that ultimately generate deliveries to clients.

Delivery, in turn, yields both money (for investment in new capacity and competence) and new knowledge (which is reinvested in new and/or improved service offerings).

The entire cycle may be viewed as knowledge management in pursuit of financial value and the key resources are knowledge, intellectual capital, people and cash. Successful consulting firms maintain a balance between resource capacities and delivery demand that enables them to continuously recycle knowledge into their service portfolios.

The broad role of VCD in this process is to identify points in the value cycle where strategic and operational interventions may be made, and to test the value implications of alternative interventions.

Value Chain Dynamics and the Consulting Value Cycle

It should be clear from above discussion that there is significant potential to build SD and VCD into consulting service propositions supporting value thinking. What is perhaps less obvious is the potential to use VCD to design and support a wide range of consulting service propositions, sometimes using SD models as a 'test-bed' to validate and illustrate the potential value of services to client organisations.

VCD can also be applied internally within consulting firms, e.g. to assist in planning service capacity to support growth targets. VCD also has a role in generating client interest and attention (e.g. via seminars and model-supported sales presentations) and in developing client commitment to service propositions (e.g. via model-supported workshops).

Thus Value Chain Dynamics has serious and important contributions to make at every point in the consulting value cycle, by providing a means to synthesise, develop and apply knowledge in different and appropriate forms to support each activity within the cycle. Some examples of possible contributions from Value Chain Dynamics at each point in the consulting value cycle are shown in **Figure 4**.

The assertion here then, is that Value Chain Dynamics can play a key role to support many internal and external activities of consulting organisations. Viewed in this way, SD and VCD should logically be considered as a core capability of all consulting organisations, including internal consulting groups in larger corporations. The current position, however, is very different.

The Current Position of SD in Consulting Firms

The role of system dynamics to support strategic change and process improvement is increasingly recognised by a growing number of consulting firms. However, SD is still largely regarded as a specialisation. Thus it is rare to find SD ingrained in consulting training and rarer still to find SD embedded within mainstream consulting methods.

It is interesting to note and contrast the way that some of the major consulting firms have positioned SD, and some recent moves:

- One major international strategy firm recognises the important role of SD to support strategy consulting and has assembled a small core team of experienced system dynamics professionals in USA and UK. Beyond the core team, the firm claims to have, at any time, 200 to 250 staff world-wide who have basic training in SD and having worked on at least one SD project. Given the average tenure of consultants, this very structure implies that whereas competence of the core team is very high, the average level of competence and experience across the firm must be relatively modest.

The structure supports the firm's focus on pure strategy consulting with an apparent emphasis on "black box" SD modelling that contrasts with the more "open" style of VCD thought necessary to support value thinking.

- Another 'big five' firm has assembled a "Business Dynamics" group having, however, strictly limited SD capacity and experience. The group majors in other branches of modelling and has its own commercial agenda that is evidently not closely integrated with the firm's mainstream management consulting service offerings (strategic change, process improvement, and technology solutions).

- Some other major consulting firms recognise and apply the purely qualitative methods of systems thinking. At least one firm provides training in systems thinking for partners and managers and regards it as a core competence. This is a significant step but falls well short of VCD competence.

- Pockets of quantitative SD expertise exist within some of the other big five consulting firms. There is no evidence that any of these small groups have yet made any significant impact on mainstream consulting businesses.

- At least one 'second tier' firm in the USA has recently adopted a significantly different strategy with SD, regarding it as a core competence for front line consultants. Having initially engaged the services of a specialised SD firm for a year or so, the firm is understood to have employed several SD specialists to support a significant and ongoing internal development programme.

- Outside of the larger firms there are a growing number of niche specialist firms, especially in USA but some also in Europe, supporting systems thinking and system dynamics. Most of these firms are small.

From this (admittedly limited) sample it is possible to see distinct differences emerging in the way in which system dynamics is being regarded, developed and applied by consulting organisations.

What is evident is a growing awareness and interest in SD that has yet, however, to make a significant impact within the mainstream consulting service offerings. Moreover, it is clear that most consulting organisations have not even begun to grasp the nettle of building sustainable capacity and competence to practice system dynamics, still less to practice VCD.

Capacity Development – the Competence Conundrum

It is evident that if SD and VCD are to be applied more widely then many more organisations will need to develop appropriate competencies.

Figure 5 indicates the range of competencies required to apply VCD to support value thinking. The evident conclusion is that the competencies cover a wide range, from the technical (especially SD modelling) through knowledge-based (especially facilitation) to business-based skills and experience.

This picture challenges perspectives of the SD practitioner as a specialist. On the contrary, the best and most experienced SD practitioners have a very wide grasp of

strategic and operational business issues as well as deep technical knowledge and strong facilitative abilities. It goes without saying that they are rare and valuable birds.

Another common perspective is that SD practitioners require formal *quantitative* qualifications, preferably at degree or post-graduate level; an operational research (OR) qualification, for example. However, many (not all) such people lack facilitative aptitudes and broad business appreciation.

It is undeniable that truly 'expert' SD practitioners have strong quantitative skills and years of application experience. However, the beauty of SD and systems thinking (uniquely in management science) is that practising managers and consultants can learn to interact with the tools and methods quickly and beneficially, on a number of levels.

The *opportunity* here is that basic facility with the methods is quickly transferable to a wide audience. The *danger* is that because the methods are initially so amenable, managers and consultants may deny the reality that competence develops only slowly and through deep experience. So how can organisations start to build capabilities to practice SD and VCD?

Constraints on Capacity Development

It is inconceivable that firms could, even if they wished to, rapidly acquire or develop significant numbers of top-flight SD practitioners. Current reality is:

- Competent and experienced SD practitioners are not widely available in the market and as yet relatively few universities or business schools teach the subject. (Morecroft, 1999).

- Whereas the basic concepts of SD are appealing and can be readily assimilated through (e.g.) short course training, expert SD competence can only be gained via direct and extended practical experience, gained over a wide variety of projects.

- Only a very small minority of managers and consultants will have the interest, aptitude or time to become fully competent SD practitioners.

Internal Competence Development

A key implication of these observations is that most organisations (e.g. consulting firms) wishing to develop sustainable SD and VCD capabilities will need to adopt a pragmatic approach, interleaving selective recruitment with training and external support for internal development programmes to build teams with mixes of competencies appropriate to support defined service propositions.

For example, in the first instance it might be appropriate to provide basic VCD appreciation for all senior and front line consulting staff, possibly supplemented by more detailed introductory training for a limited number of staff, and supported by one or more specialist VCD practitioners.

Organisations will probably require outside help in the first instance to 'kick start' the competence development process (Kim, 1999), firstly via provision of training but particularly including expert support to minimise risk on early projects.

As already outlined, progressive competence development should then be a key outcome of a continuous VCD process. As organisations become more competent and confident with the tools and methods of SD and VCD, they will naturally develop their own approaches.

Conclusions

This paper has suggested that the applicability of system dynamics in business can be significantly enhanced by developing links between SD and semi-systemic resource-based thinking, termed here "value thinking", various strands of which are gaining rapid prominence in business.

A methodology has been defined around system dynamics and designated "Value Chain Dynamics". The aim of the approach is to formalise the combination of value thinking and system dynamics as a project method for synthesising knowledge to create value.

The utility of the VCD method to support consulting organisations across the entire consulting value cycle has been described.

Finally, the paper has suggested that that consulting firms and organisations intending to adopt SD and VCD will need to give careful consideration to the development of appropriate competencies to support specific service propositions. VCD itself provides support for the development of competencies.

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Ingredients

Activities

Outcomes

Benefit

Disparate & Disaggregated Organisational Knowledge

Knowledge Process

Toolset

Templates

Competencies

"Big Picture" development & business learning through: -

Knowledge Capture
Scenario Testing
Analysis & Synthesis

Using: -
- Teams
- Workshops
- Maps
- Models
- Simulations

Tested Strategies & Policies
Validated Operational Plans
Change Management Programmes
Organisation Knowledge Base

Teams with: -
- Common understanding
- Commitment to action

Value

Figure 1:   Value Chain Dynamics as a Project Methodology

Figure 2: Value Chain Dynamics as Continuous Development

Organisation Knowledge Base
including
Model and Scenario Libraries
Flight Simulators and Learning Environments

New Team Training Workshops

Project Reflection Workshops

Projects

* Issues
* Teams
* Templates
* Competence

* Value Insights
* Strategies & Plans
* Maps & Models
* More Competence
* Commitment

VCD projects as part of continuous improvement and value management programmes
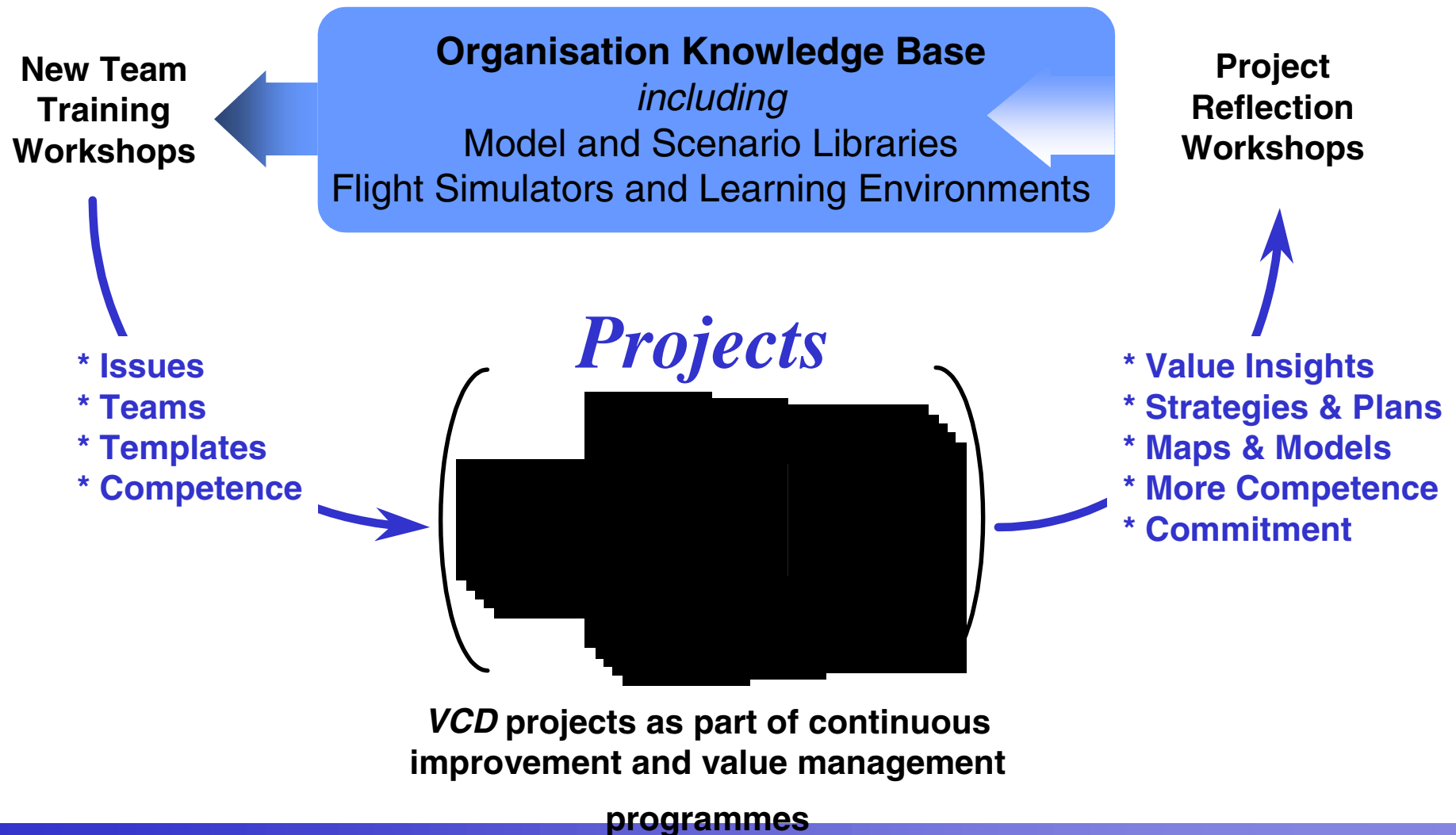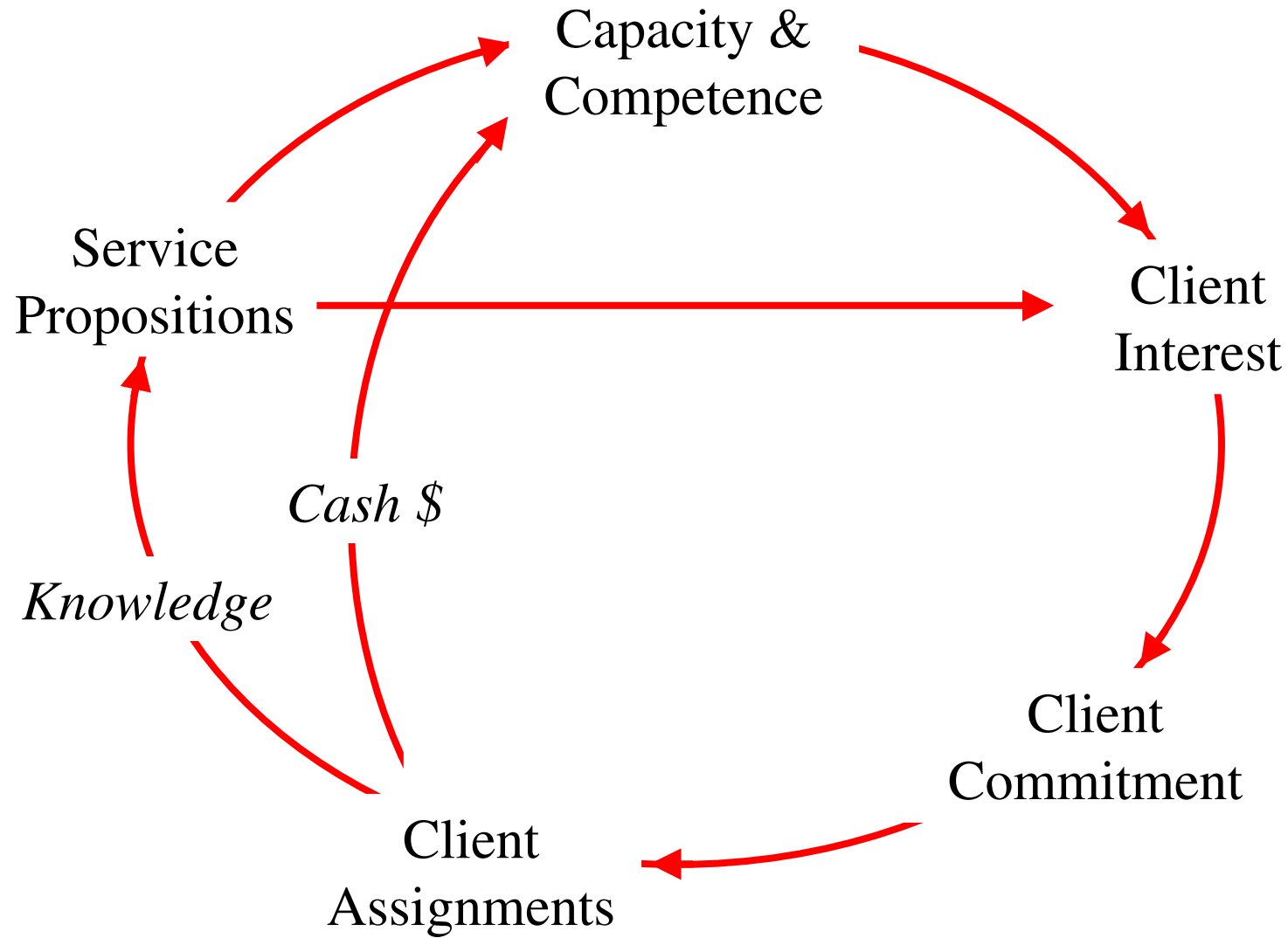
Figure 4: VCD Support for the Business Consulting Value Cycle

Internal Training and Competence Programmes

Alliances & International ST&SD Networks

Communications:
Books, News Internet

Internal Projects:
Service Development & Capacity Development

Capacity & Competence

Seminars:
ST&SD Workshops
Industry Seminars
Issue Seminars

Service Propositions

Client Interest

Knowledge Base:
Templates & Experience

Attention Grabbers:
Issue - specific Models

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Client Development

Issue-focussed Events:
Client Workshops

Client Training and Competence Programmes

Client Assignments

Business Strategy:
Scenario Development
Strategy Testing

Project Support for:
Business Learning & Knowledge integration

Project Support for:
Value Management
Balanced Scorecard
Knowledge Management

Project Support for:
Operational Business Improvement

Business Competencies

*Strategic
Thinking*

*Financial
Thinking*

*Operational
Thinking*

*Project
Management*

*Domain
Experience*

**Knowledge Capture &
Processing Competencies**

Team Building

Facilitation

Teaching

*Archetypes
&Templates*

*Explicit
Knowledge*

Technical Competencies

Tools and Methods