AnnL: The Tool for Planning for Viable Enterprises

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Abstract. This paper presents the Analysis of Networked Links (AnnL) tool that supports the principles and practices for the planning for viable enterprises, through such disciplines as Enterprise Engineering (including Enterprise Architecture, Governance, and Service Management). It shows how the software can be used throughout the lifecycle of Enterprise Engineering, providing synchronized reports not readily available in other tools.

Keywords. Enterprise Engineering, Systems Planning, Analysis of networked Links, Work systems

1 Introduction

This paper describes the use of a tool that can be used to plan an enterprise so that it is viable. This tool – Analysis of networked Links (AnnL) – can be used from strategic through to tactical planning; from enterprise-wide portfolio management to detailed service design. The design of the tool is based upon the experience of using it for over 15 years in preparing more than 50 strategic plans, Business Cases, tender evaluations, architecture risk analyses, and policy developments.

Every enterprise consists of a set of processes that convert inputs into outputs as products or services. These processes require people using resources to do their job within socio-technical systems, which we will call 'work systems' [1]. If the enterprise is to be viable then these work systems must be planned (decisions made and resources allocated) so that the enterprise as a whole can act in time to avoid the effect of risks or to take up opportunities.

We will consider how the AnnL tool supports general managers (as they are designers too [2]) or specialists such as strategic planners, Business Process Managers/ Decision managers, Enterprise Architects, or Service Managers - gathered under the label of Enterprise Engineering in either the European [2] or US [3] meaning- in their planning of work systems that make up viable enterprises.

There are five risks in the existing techniques and tools for Enterprise Engineering:

- Incomplete consideration of all resources – Until recently the most important resources, Who and Whom, were overlooked in the commonly used Enterprise Architecture frameworks. Recently, we have seen the emergence of Human Views, thankfully [5]. There is almost no mention of Worth in any framework, including

Zachman (as recently pointed out by [6]). Only one tool, Abacus [7], helps in determining the cost of ownership of architectures – despite the mention of Economic views in GERAM [8] (or ISO 15704, if you prefer). Even Archimate, which does provide a notation schema that applies to most of the layers (resources) in a work system, misses skills, worth, facilities, and time. We need techniques and tools that cover all of the resources.

- Insufficient consideration of alignment – Currently, Enterprise Architecting looks the wrong way. It concentrates upon integrating resources across processes - along the rows in Table 1. We do have Business Motivation Models or Enterprise Visions to give the 'big picture'. We do have diagrams that show the relationship between capabilities and functions (business services) and activities and, ultimately, data or physical resources. Unfortunately, most viewpoints cover only two layers in an architecture. It is hard to align the resources over all of the levels. There are some exceptions: service maps used in Service Management do show the top-to-bottom alignment of resources to objectives, with [9] giving such an example using Archimate notation. We need to be able to align all resources in this way.
- Lack of unified approach – There is confusion in the use of different notation, terms, and approaches. There are attempts to develop standards in notation - UML, SysML or Archimate [4] - but we still need notations that address all of the layers of planning; from business motivation to implementation plans, such as physical data models or network blueprints.
- Documentation rather than design – Although some tools, such as Systems Architect or Abacus, provide simulation, risk management, or costing support for the design of architectures, most tools are merely documentation aides (as noted also by [10]). They do little to help in planning, providing only views of the intended design for buyers and blueprints for builders.
- Addressing the wrong audience – Most Enterprise Engineering tools are intended for use by specialist enterprise modelers rather than by general managers. They produce detailed visual representations of possible systems to be considered by verbally skilled senior managers as part of their decisions about the acquisition of resources. We need to support the decision-making process of these managers rather than just feeding them incomprehensible models.

AnnL is designed to remedy all of these risks.

2 Use of AnnL Tool

All that is necessary to use AnnL is to list items (resources) then link them. AnnL uses the categories of the items, the initial estimates of their parameters, and the nature of the links between the items to prepare graphical, numerical, or verbal reports to decision makers so they can judge best what should be done.

These items and the nature of their links come from the data model in Figure 1.

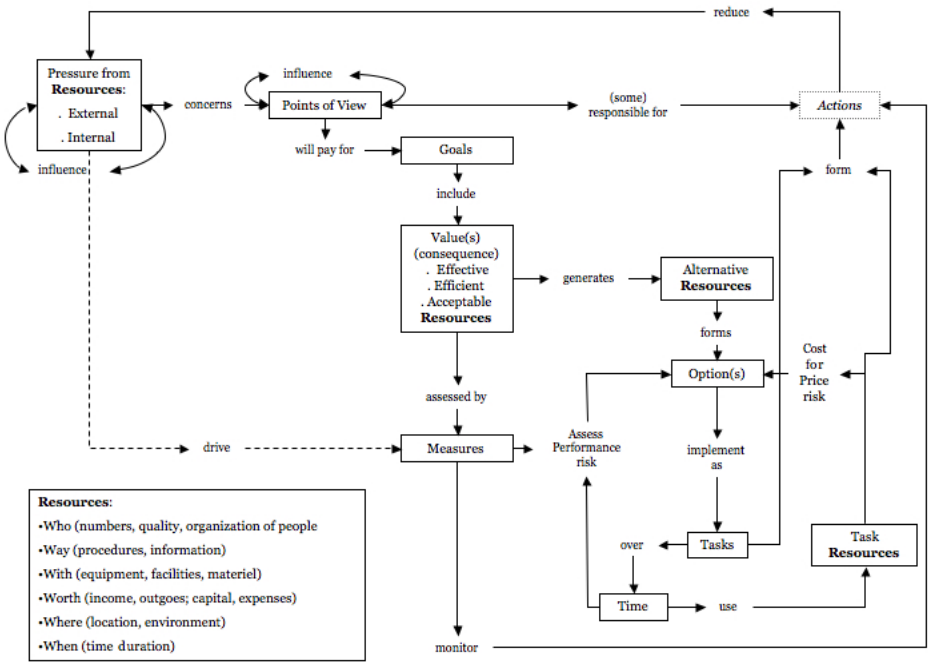

Fig. 1. Data Model for the AnnL Tool

The data model is derived from the need for AnnL to support the planning practices and the Principles of Planning that are given on the Systems Planning Mentor website at www.layrib.com, from where the software and its manual also can be downloaded.

Through this data model, AnnL enables a planner to consider the consequence of pressures that are of concern to the various key points-of-view; who are then willing to pay to have resources with requisite value (capability, capacity, constraints) to use to avoid the negative consequences and enhance the positive; to measure the risks of the options that have been generated from combinations of alternative resources thought to have the requisite capability; to determine the price risk of the options through a cost model of the resources needed to carry out the tasks that implement the options; and to describe the Action Plan for carrying out the tasks using these resources, according to blueprints ('viewpoints') that guide those people who are implementing that option with the least price and performance risk.

It is this list-link operation that is the key difference between AnnL and other Enterprise Architecture or data modeling tools. AnnL involves building a database (a linked list, of course) from which the diagrams or tables are generated rather than starting with a diagram and then building an 'encyclopedia'. This approach was also advocated by [11], independently from, and well after, the inception of AnnL. Their approach does not cover the range of resources or reports as AnnL.

Abacus from Avolution [7] also uses this approach, although mostly when building an architectural description from existing lists of resources rather than during the initial design process. As an aside, AnnL could be developed into a library within

Abacus, using it as the engine for producing the Reports rather than the current use of Excel macros, but there are sufficient differences in approach, outlined below, to warrant AnnL standing alone.

List Items. So, the first action in AnnL is to list the items to be linked. Figure 2 shows an extract from the Input sheet. The planners describe each resource or action or stakeholder in the left most column. They classify each item, according to the type of resource or action, in the middle columns. Then they give initial estimates (using low-likely-high values, if necessary) in the right most columns.

Item Description	Item Type	Re-source	Sub-resource	Low	Likely	High
Grow business	Values: capable	Way	Business service	1000	1500	2500
Increase cash flow for BUP	Values: capable	Worth	Income - Earnings	500	700	
Win new business	Values: capable	Way	Business service			

Fig. 2. Input for AnnL, showing description of items, their classification, and initial estimates (extract from Excel)

In order to ensure semantic consistency, the planner classifies each item by using a pick list that draws upon the checklist of resources in the data model. The pick list in the successive columns alters according to what has been picked for the higher classification. For example, if 'Way' has been chosen as the relevant resource for a value then the sub-resources in the next column are only those part of the 'Way' checklist.

Of course, this step is easier said than done. There are many planning practices, described on the Systems Planning Mentor website, that need to be used by planners to make sure this list is correct.

Link Items. The other main action in building AnnL is to link the items. These links show the nature and extent of the relationship between the different items.

The links are made through pick lists, as shown in Figure 2. The resource at the head of the link is picked; then the resource forming the tail is picked from a list tailored to the head. AnnL then automatically moves to the rows for the tail items. Finally, the link is entered in the rows corresponding to the tails of each link, using more pick lists to ensure that the nature of the link is semantically consistent for the items being linked.

As for listing the items, the planners need to draw upon their expertise and the planning practices to determine what these links should be.

One of the differences between AnnL and other Enterprise Engineering tools is that AnnL can use, encourages the use of, verbal input. The extent of the links can be numeric (0.1 – 1) or verbal (very weak, vw, – very strong, vs), for example. Similarly, as shown later, AnnL can report numerically or verbally; whatever the recipients of the Reports prefer.

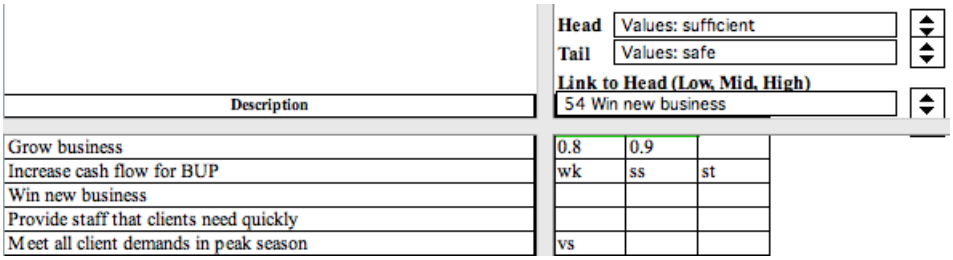

Fig. 3. List of Links, showing the pick lists that are used to link head items and row items (to the left), with the extent of the link inserted into the three columns to the right

That is all that has to be done by the planners. AnnL does the rest: carrying out the variety of analyses and producing the models that the planners need, in whatever format that they wish.

3 Applications for Enterprise Engineering

AnnL produces many different Reports, according to the application of planning. The Reports contain various versions of the trees, tables ('matrices' or 'catalogs' in TOGAF terms), or words that are the result of the calculations carried out by AnnL, using the type of items and the links between them.

One of the major advantages of AnnL is that it enables all of the many documents that make up a Business Case or the design of an Enterprise Architecture to be synchronized easily. Each time a planner changes an item or its link, AnnL will automatically update all of the Reports containing that item and link. That is, the new reports can reflect not only changes in editing of items, such as names, but also changes in the logic underlying the relationships between the components. This ability is rare in most Enterprise Architecture tools.

Examples of these Reports are given below. These examples show the variety of formats and results that can be produced by AnnL. The underlying algorithms used in the analyses are available from the Mentor site.

The following examples are taken from a case study (loosely) based upon an actual project. Anonymity is protected - as is the author. The case study involves a high-level strategic decision by Business Utility Providers (BUP) to take an initiative forming a new business line in hiring out specialist but redundant staff. There are a number of decisions to be made at the strategic, operational, and tactical level. After these decisions (whether to centralize or decentralize the business line or to outsource the IT, for example) have been made then AnnL can prepare the blueprints for the project managers or the systems builders.

There is not enough space to show the full portfolio of reports. The following viewpoints [12] were chosen because they show the results of techniques that only AnnL provides or bring out the versatility of AnnL or they are more compact than the diagrams that might be preferable in the actual case and so can fit in the page limit.

Consequence Chain. One of the techniques used in strategic planning is the modeling of the consequences of external or internal pressures upon the enterprise. The intention of this viewpoint is to assist planners in finding points of intervention that break the chain leading to risks or amplify the chain leading to opportunities. These interventions are values (descriptions of the required resource, such as a procedure for winning more business or a facility in a less risky location). The set of values that intervene in the chains describe the capability of the strategic initiative.

Figure 4 shows a consequence chain in the N2 or Design Structure Matrix [13] viewpoint. Of course, this example is but a very small subset of the full analysis. This viewpoint can be easier to use than the equivalent diagrammatic map for the more complicated circumstances in the usual architectural description [14]. This example shows how the value of 'Win new business' breaks the link to the risk of 'lose more staff'; nothing gets past this intervention. The numbers at the head of each column are a result of the modeling of the consequences from the cost of the risk back to the initial drivers of the risk (considering other drivers not shown in this example). So 'win new business' is an important capability.

	Scenario Opportunities	Politicans demand for reduce budget	Board suggests staff numbers be	Government changes legislation to reduce use of	Clients increasing demand for	Board directs increase in new business	have staff readily available on	Clients increase demand for	increase personnel available for	increase business in supplying	Win new business
	7280.00	7680.00	4600.00	-2800.00	2400.00	4000.00	2000.00	4000.00	4000.00	4000.00	12600.00
Scenario Opportunities											
Politicans demand for reduce bu	1.0										
Board suggests staff numbers be		0.8									
Government changes legislation	1.0										
Clients increasing demand for sk	1.0										
Board directs increase in new bu		1.0									
have staff readily available on ca			0.3								
Clients increase demand for plac				-0.7	0.6						
increase personnel available for h						1.0	0.5				
increase business in supplying p								1.0	1.0		
Win new business			1.0							1.0	
lose more staff											-0.4

Fig. 4. Consequence chain in N2 viewpoint. Intervening value shown in grey.

Influence of Points of View. Figure 5 shows the influence between the points-of-view (stakeholders). This analysis starts with estimates of the initial power of the stakeholders according to their position, entered on the list of items. AnnL combines this estimate with the extent of the influences, shown in the links, to determine who inherits the most power.

The viewpoint uses strings to represent the influence from one point-of-view to the next. The ditto (") marks represent a repetition of the item on a previous line.

The diagram shows that the PS Association representative influences the Politicians who influence the Government, and so on. There is a branch at Government, who influences both the Department of Labour and the BUP Board. The Suppliers start their own string, which intersects with the other at the BUP People CEO.

PS Prof Association [10]	Politicians[8]	Government[6]	Dept of Labour[2]	BUP Board [1]	BUP People CEO [1]	Finance Group [0]
"	"	"	"	"	"	BUP HR Department [0]
"	"	"		BUP Board [1]	BUP People CEO [1]	Finance Group [0]
Suppliers of services[5]					BUP People CEO [1]	Finance Group [0]
"					"	BUP HR Department

Fig. 5. Stakeholder Influence Diagram, using the Strings viewpoint

The numbers in brackets are the results of the calculations of cascading influence, which can be used to determine which point-of-views are key (Politicians and Suppliers in this case). AnnL does produce other tables with this information in more detail. It is dangerous politically to show this report to the actual points-of-view.

This analysis is essential for the proper design of a system [2, 5, 15] but it is not available in most Enterprise Engineering tools. Nor is the Strings viewpoint.

Values Statement. AnnL can generate values trees (or means-ends tree or Functional Decomposition Diagrams), as can most tools. More usefully, AnnL also generates verbal descriptions of values, for the senior decision-makers who are more comfortable with words than with diagrams, as shown in Table 1, AnnL uses the links between values and sub-values, and the extent to which the key stakeholders are willing to pay for each value, to determine the words ('must', 'should', ..) expressing the criticality of each value. It generates this table and the equivalent visual tree.

Table 1. Ideal State Description, listing the objectives and constraints that form the requirements of the system

In order to contribute to meeting the goal of winning new BUP business, the BUP CEO

a. Must increase awareness of staff capabilities
b. Should improve exposure to market
c. Might increase expertise of BUP staff

whilst meeting the constraints:

a. Must comply with corporate policy about …
   etc

Design Analysis Display. Although Enterprise Engineering should be about design, most Enterprise Engineering tools are useful for documenting a design rather than for designing. They rarely help in creating ideas for options. AnnL extends the powerful creativity technique of (General) Morphological Analysis [16] through the use of Design Analysis Displays (see www.layrib.com).

Figure 6 shows an example of a Design Analysis Display. The diamonds are design decisions formed by each of the capability values that intervene in the Consequence Chain. The boxes are alternative solutions for these design decisions. A path

through all of the alternatives is an option. In the example, there are 13 possible options.

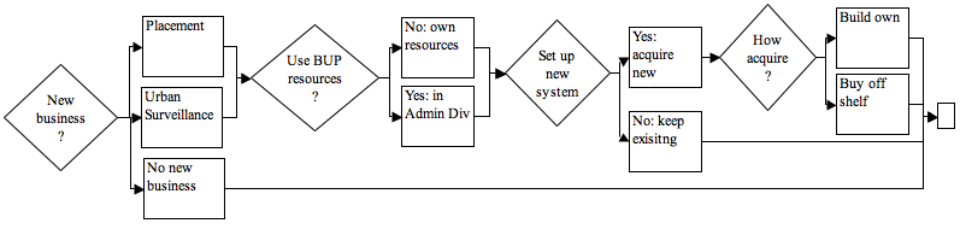

Fig. 6. Design Analysis Display

AnnL can use the judgment of the planners (shown in the links representing the assessment of the alternatives against the pertinent values) to show the 'best' paths.

Business case report. The design of work systems involves finding the option with the least performance and price risk. As shown in Table 2, AnnL produces a "Risk Picture" for decision-makers to use to trade off the performance risks of options against their total cost of ownership, adjusted for the time of expenditure. It shows the output in words or numbers, to fit to the cognitive style of the audience.

Table 2. Business Case Report, showing cost-benefit analysis, and description of risks

		Do nothing	Urban Surveillance Business	Placement Business
Price				
Income		$-	$-	$-
Outgoes		$(199,000)	$(248,000)	$(74,000)
Nett Present Value		$(199,000)	$(248,000)	$(74,000)
(Discount rate)		0%	5%	7%
Risk Cost		$2,443,182	$3,125,000	$2,386,364
Risk Adjusted Price		$(2,642,182)	$(3,373,000)	$(2,460,364)
Performance	Impact			
Grow business	essential	should not	should not	might not
Make use of staff	essential		might	
Comply with policies ..	essential	might not	should not	
Improve exposure	nice to have		might not	might not

The planner can use different financial metrics. They include cost-benefit ratios, Return on Investment, Internal Rate of Return, Nett Present Value, and (preferably) Risk-Adjusted Price – where the costs of failing to meet the values are added to the price. Abacus seems to be the only other tool to carry out such calculations.

Action Plan. AnnL can produce detailed Action Plans, as shown in Table 4. They list the tasks for implementing processes, who is responsible for the tasks, the assets

needed and the budget for them, and the measurement of the quality of these tasks. This Report is in a format more familiar to managers.

AnnL also produces associated Reports. They include the list of roles, grouped over tasks; total budget for each task; and consolidated list of qualities (performance measures). These other Reports are generated at the same time as the Action Plan.

Table 3. Action **Plan (incomplete)**

	Who does	**receives**	**Task**	**Detail**	**Assets**	**Budget**	**Time**	**Quality**
1.1	BUP Board	BUP People CEO	Approve Placement Business				Year 1	
1.2	BUP People CEO HR Group	PS Profes-sional Associa-tion staff	Notify staff of change in business	Pay off opponents			0.5 Year 1 0.5 Year 2	90% staff in-formed in 24 hours
1.3	Fi-nance Group	Suppliers of serv-ices	Buy equipment on eBay	Get guide-lines	Opera tors	-15000	Year 2	

There is feedback between the Action Plan and the Business Case. The Action Plan shows the task and resources needed to implement an option. The costs of these resources automatically appear in the pricing of the options in the Business Case.

Implementation Reports. AnnL can produce a number of reports that are useful builders of systems. Some Reports are to evaluate design options. Other Reports are produced after the Business Case has been accepted, as it is not very useful to worry about modeling something so we can do it better, if we do not need to do it at all.

These Reports could include a variety of Enterprise Architecture viewpoints. It is intended to extend AnnL to be able to produce all of the TOGAF viewpoints and the new AusDAF viewpoints (which include all of the MODAF v1.2.004 and DODAF 2.02 viewpoints plus some of its own).

4 Conclusion

The AnnL tool supports all of the planning needed to ensure an enterprise is viable. It uses a comprehensive checklist (WHAT) to provide a complete and consistent consideration of the resources at the various steps in the planning process.

All the planners need to do is to list and link items. AnnL then produces the Reports that support the design of architecture, in the formats that are most acceptable to the various audiences. These Reports are readily updated and synchronized.

If Enterprise Engineers use AnnL when planning work systems then they are free to use their insight and experience, systematically and with full analytical support, without being caught up in the drudgery of documentation.

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