Managing future and emergent strategy decay in the commercial aerospace industry

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Introduction

Firm's strategic choices are aging at an accelerating rate (Stewart and Hamel, 2000). Environment serving organizations' competitive postures are being eroded through strategic decay. As a result instilling strategic resilience is now businesses' highest priority (Hamel and Valikangas, 2005). Real time issue management systems designed to identify strategy decay, guide subsequent strategic response, and manage organizational behavior are essential in achieving long-term strategic resilience. The commercial aerospace industry has and continues to face significant strategy decay. The process of strategic management will be explored in the context of how one company in the aerospace aluminium supply chain has used resilience to carve-out competitive advantage.

Strategy formulation

Firms undertake strategy formulation to improve competitive posture. Preferred future competitive postures are built upon through the successes of the firm's strategic content intended to advance four basic business constituencies:

1. *Customer.* Achieve market differentiation creating value through new products and services, or business models that capture and occupy a greater space in the value chain (Porter, 1986).
2. *Process.* Manage product and technology lifecycles deploying advanced manufacturing techniques designed to drive best in class quality and lowest cost position (Ansoff and McDonnell, 1990a, b).
3. *Employee.* Invest in improving internal resources capabilities collecting strategic opportunities (Mintzberg and McHugh, 1985).
4. *Financial.* Fund strategic discovery processes identifying a large number of initiatives designed to achieve market. Fund and launch highest impact initiatives that the resource base can support (Pickard, 2002).

Strategy formulation represents the organizations greatest opportunity to investigate improving its competitive position at the lowest cost. Many organizations abandon the formulation process after moving on to strategy deployment, returning to formulation on a multi-year or annual basis (Kaplan and Norton, 2005).

Strategy deployment

Organizations' greatest challenges reside in the complexity of strategy deployment. Strategies typically do not fail for deficiency in strategic content, they fail because the organization resists or is slow to understand and adopt its new initiatives. The transformation of strategy from the formulation to deployment stage requires the firm to overcome

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organizational behaviors that would decrease the velocity of implementation diminishing the impact of strategy on competitive posture. As proposed:

$$\text{Impact on Competitive Posture} \propto \sum \text{Firms}_{\text{Strategies}} \left(S_{\text{Content}},\ V_{\text{Implementation}}\right).$$

Organizational surveillance and implementation delays contribute to the underperformance of strategies in high turbulence environments. Figure 1 illustrates the organization's adoption delays, shown above the strategic flow, and surveillance and system delays illustrated below. These delays reduce the velocity of strategic work and expose the firm to external forces that advance strategic decay.

Strategy decay

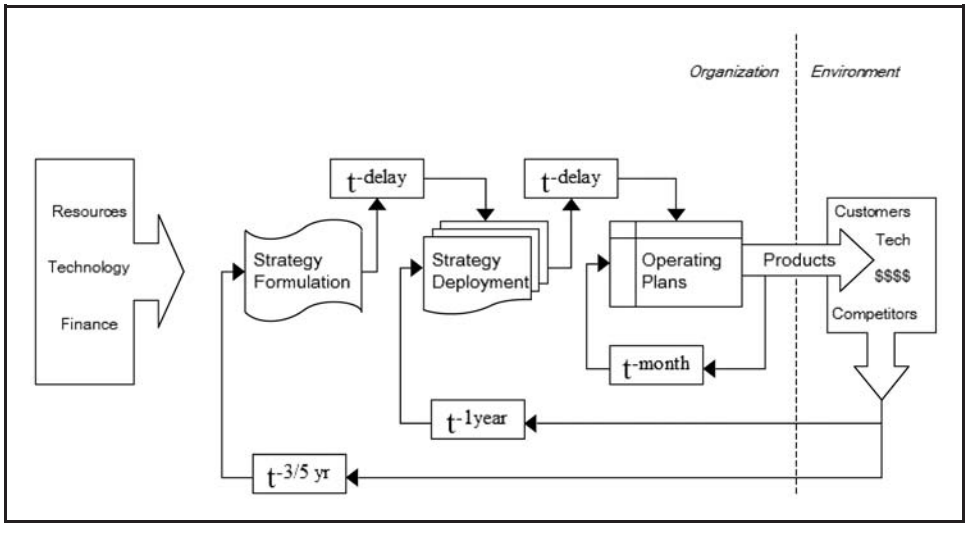
Strategy decay is the erosion of the firm's strategic capacity from a variety of environmental and competitive forces (Hamel and Valikangas, 2005). Strategic decay is continuously at work to diminish the firm's current and future preferred competitive postures. Hamel cites four areas of strategic decay:

1. *Replication factor.* Competition's ability to imitate the firm's strategies.
2. *Supplantation factor.* Represented by product, technology, or market discontinuities rendering the firm's strategies irrelevant.
3. *Exhaustion factor.* A measure of future diminishing returns from currently employed strategies.
4. *Evisceration factor.* Where margins deteriorate as customers gain bargaining power or change preferences.

Strategic decay's negative impact on competitive posture can be qualified as the summation of the strategic discontinuities and the velocity of change within the firm's environment:

$$\text{Impact Competitive Posture} \propto \sum - \left\{ \begin{array}{l} \text{Environments}_{\text{Replication Factor}} \left(S_{\text{Discontinuity}},\ V_{\text{Change}}\right) \\ \text{Environments}_{\text{Supplantation Factor}} \left(S_{\text{Discontinuity}},\ V_{\text{Change}}\right) \\ \text{Environments}_{\text{Exhaustion Factor}} \left(S_{\text{Discontinuity}},\ V_{\text{Change}}\right) \\ \text{Environments}_{\text{Evisceration Factor}} \left(S_{\text{Discontinuity}},\ V_{\text{Change}}\right) \end{array} \right\}$$

Figure 1 Tradition strategy planning system



Strategic resilience

In highly turbulent environments surveillance of the 4 strategic decay forces is critical. Future profitability and viability is at risk as businesses' strategies are eroded through decay. The interactions between competitive posture, strategy, and decay are illustrated in Figure 2.

Organizations' must overcome the forces of decay and realize the capacity for continuous reconstruction or strategic resilience (Hamel and Valikangas, 2005). To accomplish this, the firm must continuously monitor its strategic initiatives testing their relevance and measuring their velocity against the strategic discontinuity and velocity of change within the environment. Managing resilience can be defined as a continuous process that assures the firm's strategic content and velocity of implementation is great enough to overcome the negative effect of strategic discontinuity and the velocity of change:

$$\text{Strategic Resilience} \equiv \sum \text{Firms}_{\text{Strategies}}\left(S_{\text{Content}}, V_{\text{Implementation}}\right) > \left\{ \begin{array}{l} \text{Env}_{\text{Replication Factor}}\left(S_{\text{Discontinuity}}, V_{\text{Change}}\right) \\ \text{Env}_{\text{Supplantation Factor}}\left(S_{\text{Discontinuity}}, V_{\text{Change}}\right) \\ \text{Env}_{\text{Exhaustion Factor}}\left(S_{\text{Discontinuity}}, V_{\text{Change}}\right) \\ \text{Env}_{\text{Evisceration Factor}}\left(S_{\text{Discontinuity}}, V_{\text{Change}}\right) \end{array} \right\}$$

Aerospace supply chain strategy 1980-1990

North America dominated the global aerospace industry after the Second World War. From 1980 to 1990, Boeing and McDonnell Douglas delivered 87 percent of all commercial aircraft (see Figure 3). Airbus, a consortium of European countries, was not viewed as a threat as it struggled to develop aircraft and only began to penetrate the market in the late 1980s.

Figure 2 The strategic battlefield

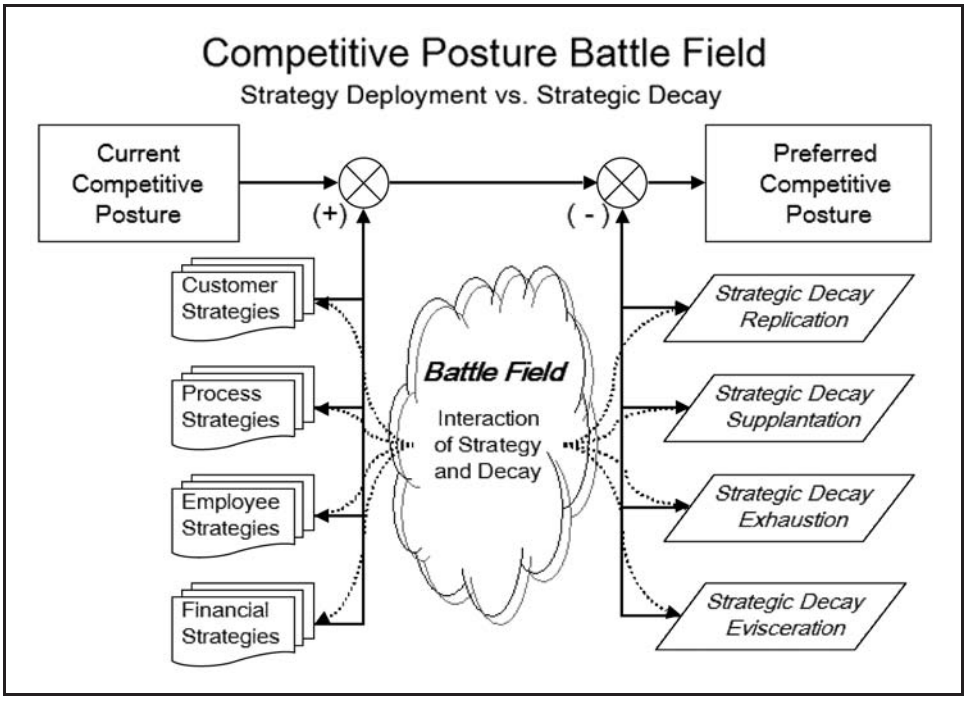
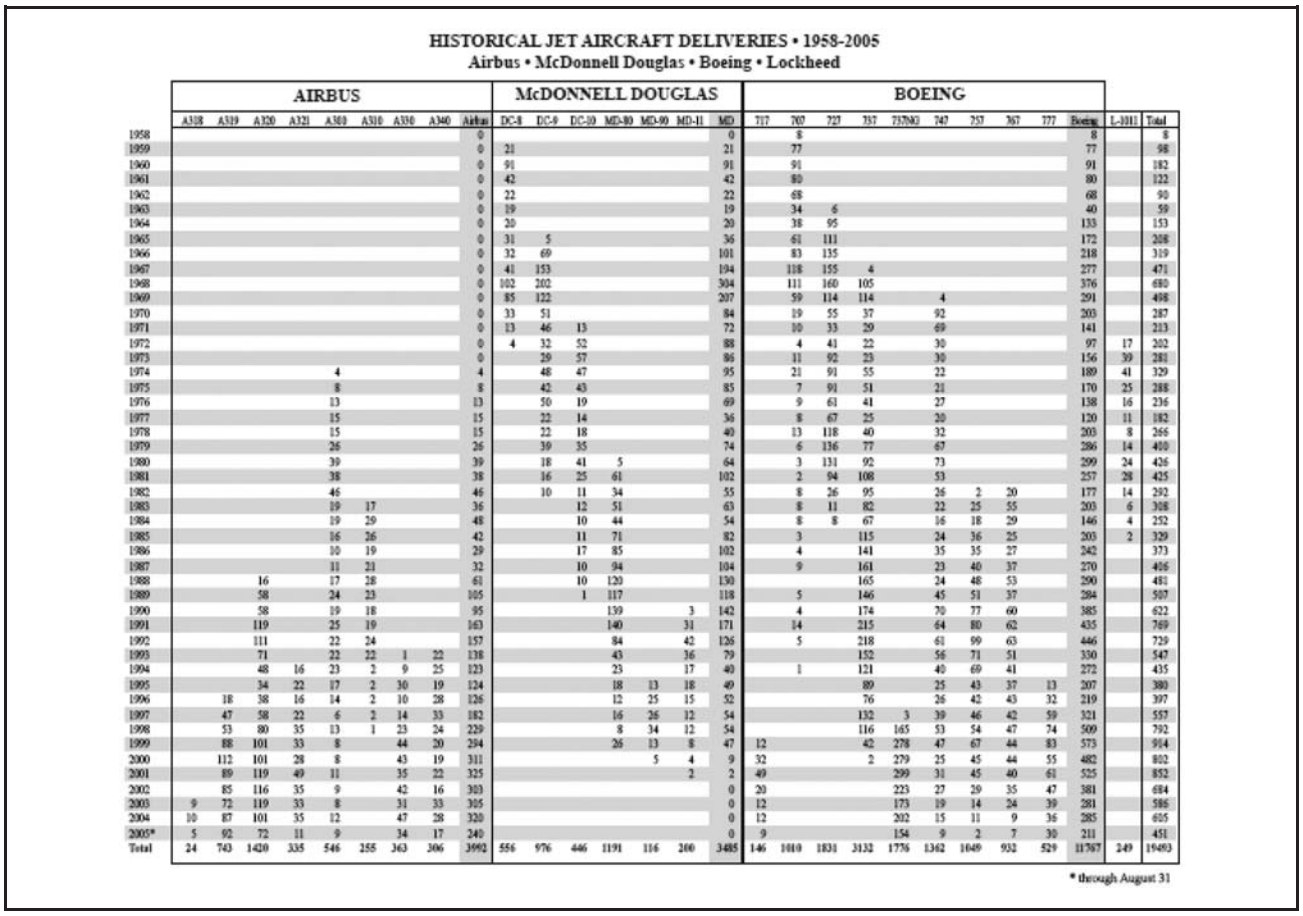


Figure 3 Historical aircraft deliveries



HISTORICAL JET AIRCRAFT DELIVERIES • 1958-2005
Airbus • McDonnell Douglas • Boeing • Lockheed

	AIRBUS									McDONNELL DOUGLAS							BOEING											
	A318	A319	A320	A321	A300	A310	A330	A340	Airbus	DC-8	DC-9	DC-10	MD-80	MD-90	MD-11	MD	717	707	727	737	737NG	747	757	767	777	Boeing	L-1011	Total
1958									0							0		8								8		8
1959									0	21						21		77								77		98
1960									0	91						91		91								91		182
1961									0	42						42		80								80		122
1962									0	22						22		68								68		90
1963									0	19						19		34	6							40		59
1964									0	20						20		38	95							133		153
1965									0	31	5					36		61	111							172		208
1966									0	32	69					101		83	135							218		319
1967									0	41	153					194		118	155	4						277		471
1968									0	102	202					304		111	160	105						376		680
1969									0	85	122					207		59	114	114		4				291		498
1970									0	33	51					84		19	55	37		92				203		287
1971									0	13	46	13				72		10	33	29		69				141		213
1972									0	4	32	52				88		4	41	22		30				97	17	202
1973									0		29	57				86		11	92	23		30				156	30	281
1974					4				4		48	47				95		21	91	55		22				189	41	329
1975					8				8		42	43				85		7	91	51		21				170	25	288
1976					13				13		50	19				69		9	61	41		27				138	16	236
1977					15				15		22	14				36		8	67	25		20				120	11	182
1978					15				15		22	18				40		13	118	40		32				203	8	266
1979					26				26		39	35				74		6	136	77		67				286	14	400
1980					39				39		18	41	5			64		3	131	92		73				299	24	426
1981					38				38		16	25	61			102		2	94	108		53				257	28	425
1982					46				46		10	11	34			55		8	26	95		26	2	20		177	14	292
1983					19	17			36			12	51			63		8	11	82		22	25	55		203	6	308
1984					19	29			48			10	44			54		8	8	67		16	18	29		146	4	252
1985					16	26			42			11	71			82		3		115		24	36	25		203	2	329
1986					10	19			29			17	85			102		4		141		35	35	27		242		373
1987					11	21			32			10	94			104		9		161		23	40	37		270		406
1988			16		17	28			61			10	120			130				165		24	48	53		290		481
1989			58		24	23			105			1	117			118		5		146		45	51	37		284		507
1990			58		19	18			95				139		3	142		4		174		70	77	60		385		622
1991			119		25	19			163				140		31	171		14		215		64	80	62		435		769
1992			111		22	24			157				84		42	126		5		218		61	99	63		446		729
1993			71		22	22	1	22	138				43		36	79				152		56	71	51		330		547
1994			48	16	23	2	9	25	123				23		17	40		1		121		40	69	41		272		435
1995			34	22	17	2	30	19	124				18	13	18	49				89		25	43	37	13	207		380
1996		18	38	16	14	2	10	28	126				12	25	15	52				76		26	42	43	32	219		397
1997		47	58	22	6	2	14	33	182				16	26	12	54				132	3	39	46	42	59	321		557
1998		53	80	35	13	1	23	24	229				8	34	12	54				116	165	53	54	47	74	509		792
1999		88	101	33	8		44	20	294				26	13	8	47	12			42	278	47	67	44	83	573		914
2000		112	101	28	8		43	19	311					5	4	9	32			2	279	25	45	44	55	482		802
2001		89	119	49	11		35	22	325						2	2	49				299	31	45	40	61	525		852
2002		85	116	35	9		42	16	303							0	20				223	27	29	35	47	381		684
2003	9	72	119	33	8		31	33	305							0	12				173	19	14	24	39	281		586
2004	10	87	101	35	12		47	28	320							0	12				202	15	11	9	36	285		605
2005*	5	92	72	11	9		34	17	240							0	9				154	9	2	7	30	211		451
Total	24	743	1420	335	546	255	363	306	3992	556	976	446	1191	116	200	3485	146	1010	1831	3132	1776	1362	1649	932	529	11767	249	19493

* through August 31

The aerospace aluminium industry evolved from the facilities built to supply the defense industry during the Second World War in the 1940s. Alcoa, Kaiser, and International Light Metals (ILM) operated seven large integrated facilities supplying the North American aerospace market. The collective supply chain strategy was formulated to protect the North American market share by creating significant barriers of entry for new competitors.

Aluminium industry strategies included:

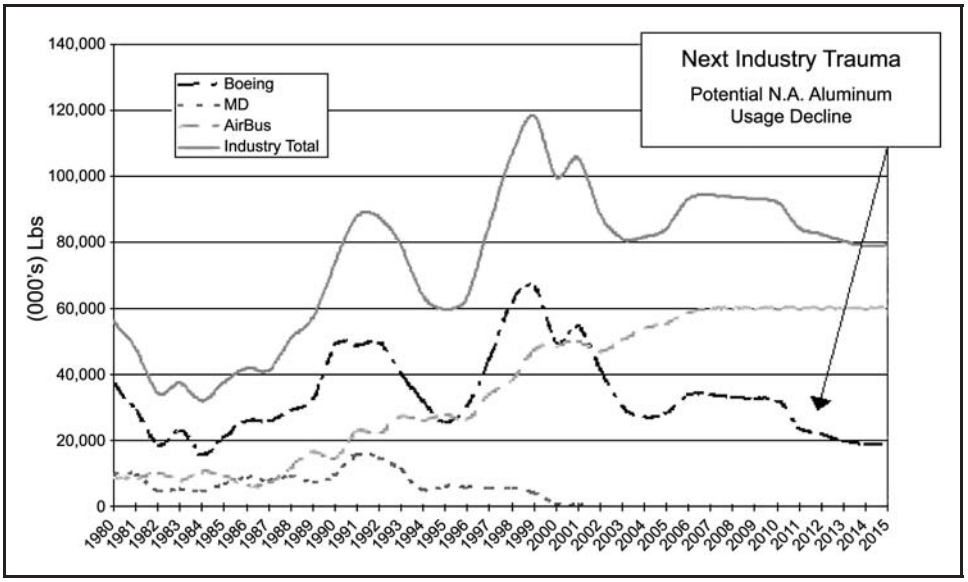
- on-going massive plant capital investments;
- geographic proximity to customer base; and
- intensive industry certification and quality systems requirements.

These strategies proved successful for the aluminium supply chain in the 1980s. As deliveries climbed from 402 aircraft in 1980 to 632 in 1990, Alcoa, Kaiser, and ILM expanded capacity anticipating 8 to 10 percent annual growth concentrated in North America.

Aerospace supply chain trauma of the 1990s

Boeing and McDonnell Douglas delivered 1,702 aircraft between 1990 and 1992. Airbus, having delivered only 415 planes, was still not seen as a threat or significant opportunity to the North American aluminium supply chain. Fueled by 138 percent growth in aerospace aluminium consumption from 1980 to 1992, Alcoa, Kaiser, and ILM continued strategic investment in North American capacity (see Figure 4).

Figure 4 Historical and projected commercial aircraft aluminium usage 1980-2015



Strategic decay began to erode the aluminium supply chain's competitive posture as the global economy slowed in 1992. As airline industry profitability stalled deliveries were cancelled. This marked the beginning of a highly turbulent period of strategic discontinuity within the raw materials supply chain.

Alcoa Kaiser, and ILM faced an excess-inventory crisis, deteriorating pricing, and a market where capacity dramatically outpaced demand. As the aerospace aluminium requirement fell from 65 million pounds in 1992 to 37 million pounds in 1996: Alcoa closed its Vernon facility, and reduced its workforce at Layefette, Indiana and Davenport, Iowa; Kaiser closed McCook, Illinois, would sell its Ravenswood, West Virginia facility, and reduced its workforce at Trentwood, Washington; ILM closed its southern California operation and ceased to exist.

Geographic demand shift accelerates strategic decay

The North American aerospace aluminium industry had not strategically prepared for the 1992 downturn or did it anticipate the subsequent geographic shift in supply as Airbus increased market share. A total of 22 million pounds of production tonnage would shift to Europe as Airbus tripled its output between 1996 and 2000 (see Figures 4 and 5).

UAC breaks down barriers and enters market

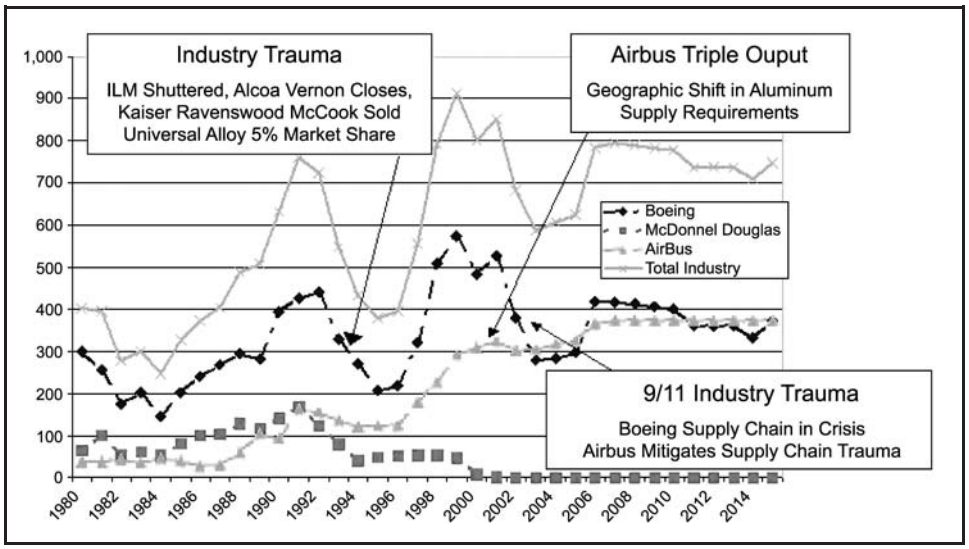
Universal Alloy Corporation, (UAC), entered the aerospace aluminium extrusions market during the 1992 through 1996 industry trauma. Boeing, faced with a reduced vendor base after multiple facility closures, engaged UAC to enter and grow its market share. Out of this strategic discontinuity, UAC grew from a 5 percent to a 40 percent aluminium extrusion market share by 2000. UAC's strategy of investing in production assets during the 1992 through 1996 down cycle positioned its capacity for dimes on the dollar.

How did strategic management fail prior to the 1992 trauma?

Alcoa, Kaiser, and ILM profited from the low turbulence environment prior to 1992. Management utilized historical and extrapolative forecasting methods to develop future three to five year strategic plans updated annually in what they believed to be a stable environment. The industries management capability and strategic aggressiveness did not adapt itself to the strategic discontinuities and velocity of change set into motion in 1992.

Ansoff and Sullivan's (1993) Strategic Success Paradigm predicts a loss of competitive position and posture when environmental turbulence exceeds management's capability and

Figure 5 Historical and projected aircraft deliveries 1980-2015



its strategic aggressiveness. The industry's long-standing strategic initiatives in 1992 failed due to unanticipated future strategy decay in the following areas:

- *Replication* eroded Alcoa, Kaiser, and ILM's strategic distinctiveness and competitive posture as new competition appeared from focused extruders (UAC).
- *Supplantation* superseded the industry's strategies as supply discontinuities created by the entry of Airbus geographically shifted the manufacturing base.
- *Exhaustion* led to the obsolescence of the large integrated mills, their high cost structure, and inability to flex capacity to match market requirements.
- *Evisceration* of Alcoa's extrusion market occurred as Boeing's increased UAC's commercial participation.

Creating and sustaining resilience

The environmental turbulence of today presents the need for a Chief Strategy Officer or even an Office of Strategy Management (Kaplan and Norton, 2005). Achieving strategic resilience requires continuous environmental surveillance and management of internal organizational behaviors. A Real Time Strategic Management System designed to monitor the firm's internal and external environment will call for dedicated strategic resources. As such, strategy will become the next critical support function in the executive suite.

Ansoff and McDonnell (1990a, b) cite three Real Time Strategy Management System components: Strategic Issue Management (SIM), Weak Signal Detection, and Surprise and Emergent Change management. SIM is the instrument for managing the organizations strategic work between strategy formulation cycles and is vital to entrenching strategic resilience. The SIM would:

- assess the firm's and competitor's changing competitive postures;
- continuously measure the organization's strategic initiatives, content, and implementation velocity;
- quantify the impact of decay's external strategic discontinuities and the velocity of change;
- manage internal adoption and eliminate or reduce delays associated with the translation of strategy from formulation to deployment and deployment to operating plans; and
- support management capability improving the organization's resource base.

A Weak Signal Detection System provides a continuous flow of information to the strategy formulation process. Surveillance of future opportunities and threats across the four components of strategic decay affords the organization time to assess the appropriate strategic response and its urgency. The Weak Signal System attempts to eliminate environmental surveillance filters that will reject or delay the assimilation of critical strategic information.

The Surprise and Emergent Management System must prepare and organize the systems required to formulate and deploy actionable operating strategies when the firm is in crisis. Strategic surprise can be expressed in the terms of strategic decay possessing infinite velocity. As expressed below, emergent change overwhelms the firm's strategic content and implementation velocity immediately threatening the firm's competitive posture and potential future viability:

$$\text{Surprise}(S_{\text{Discontinuity}}, V_{\text{Change}}) >> \text{Firms}_{\text{Strategies}}(S_{\text{Content}}, V_{\text{Implementation}})$$

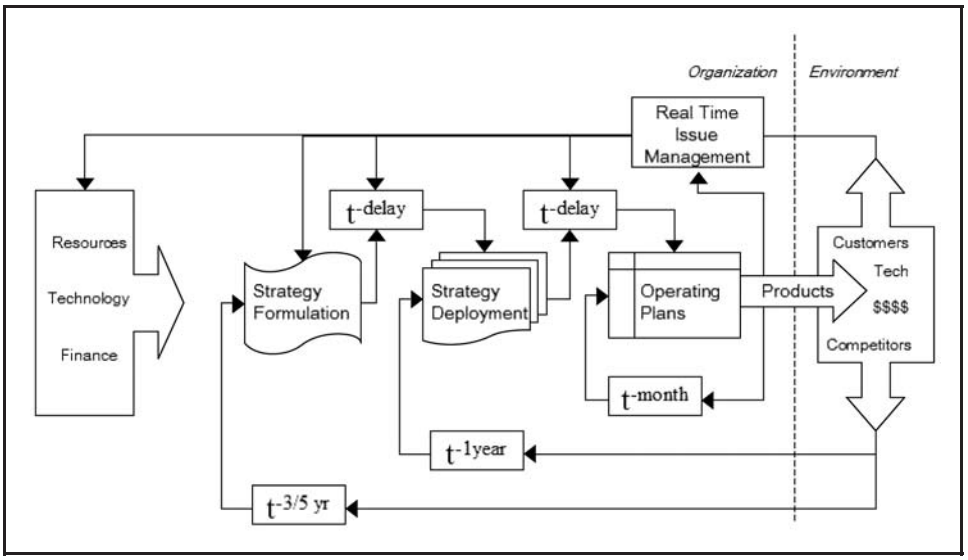
The Real Time Strategic Management System illustrated in Figure 6 provides the required channels into the organization's resource base, strategy formulation, deployment processes, and operating plans needed to disseminate and promote immediate strategic thinking and response.

9/11 – UAC faces emergent strategy decay

Weak signals were present in the aerospace industry during 1999 and 2000 suggesting a slow down in commercial aircraft sales. In spite of Boeing's substantial order backlog, the industry's memory of previous downturns and the subsequent trauma for the unprepared impelled some firms to anticipate and prepare for future strategy decay. UAC detecting weak signals of future strategy decay in 2000 deployed a graduated strategic response in anticipation of future higher environmental turbulence.

The Surprise events of 9/11 resulted in an acceleration of strategy decay. Emergent Decay created the immediate need within both organizations to adapt and redeploy its management capability, organizational responsiveness, and strategic investment. As UAC re-evaluated its management structure in November 2001 to increase organizational responsiveness, a Strategic Issue Management System (SIM) was implemented at the executive level to capture critical issues as related to expanding market share, protecting market pricing, and reducing manufacturing costs.

Figure 6 Real time strategy management system



UAC completed three strategy formulation and deployment cycles in the 18 months following 9/11 benefiting from the SIM's flow of strategic information.

(11/01) UAC's first strategic response cycle included the following initiatives:

- redeploy personnel across non-aerospace markets to develop new customers;
- adapt cost accounting reporting to manage product mix and pricing at order entry to achieve desired margins and overhead coverage; and
- reorganize internal support staffs around the operating and sales structure.

(2/02) UAC SIM System's continuous environmental surveillance detected a fringe competitor's financial instability as non-aerospace customers seek delivery reliability.

(3/02) UAC's second strategic response:

- UAC retools presses to accommodate fringe competitor's work statement; and
- UAC develops plan to attempt to purchase key assets from fringe competitor that could be fully deployed within the aerospace market during the next upturn.

(8/02) UAC begins negotiation for purchase of 16,000 ton extrusion press from fringe competitor.

(10/02) SIM System detects pending financial failure of competitor and withdraws asset purchase offer.

(2/03) UAC's third strategic response:

- prepare legal stalking horse position to acquire press assets out of competitor's bankruptcy;
- develop potential customer base and aerospace sales model for future press acquisition;
- bridge capability integrating new customer orders into current press resources; and
- sell non-operating assets to finance press purchase and installation.

UAC successfully leveraged the impact of strategic decay within the aluminium aerospace industry from 1992 through 2000 to increase its market share. UAC quickly re-adapted its management capability and strategic aggressiveness as the aerospace industry reeled from the impact of 9/11. As supply chain requirements disappeared, UAC developed new markets and laid the foundation to acquire complementary press assets to enhance its future aerospace competitive posture. UAC increased productivity measurements and returned to profitability within nine months of 9/11 demonstrating strategic resilience through commitment to continuous environmental surveillance, persistent validation of the firm's strategic content and velocity, and an unrelenting pursuit to identify areas for future strategy decay.

Sustaining resilience into the future?

Aerospace aluminium suppliers' current strategies have focused on the development of high strength patented alloys. These ''boutique metals'' have been engineered into new airframe structures to carve-out and lock-up market share for the patent producer. Alcoa and UAC have enjoyed greater margins through this strategy and created a greater barrier to entry for new competitors.

Recognizing that the increasing boutique aluminium prices were the result vendor consolidation, Boeing selected composites as the basis for its future airframe structures. The fuel efficient 787, to be launched in 2008, has leveraged composite technology to reduce the aluminium content in each aircraft to 20 percent of its weight. Compared to all previous Boeing models averaging 80 percent aluminium content by weight, this technology shift will have a dramatic impact. Figure 4 illustrates the potential decline in aerospace aluminium usage assuming the 787 is commercially successful and leads to a composite redesign of the oldest and largest selling Boeing aircraft the 737.

One of Boeing's largest customers, Southwest Airlines, has formally requested of Boeing a fuel-efficient redesign of the 737. This request may be the trigger for future strategy decay precipitating significant industry change. The aluminium industry may again fall victim to decay's supplantation and evisceration.

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