Facilitating Emergence of an ICT Industry Cluster

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EVOLUTIONARY BIOLOGY OF SPECIES AND ORGANIZATIONS

http://www.orgs-evolution-knowledge.net/

Econ-KM

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Who we are

- Bill Hall
  - PhD Harvard 1973 – Evolutionary Biology
  - 25 years working with technical documentation
  - 17 years documentation and KM systems analyst in Tenix
  - Currently researching theory of organizational knowledge
    - **Bill Hall's travel sponsored by Concentric Systems/Imag Australia (for the benefit of cluster development)**
- Susu Nousala
  - 10 years archivist & records management (national and state archives)
  - 5 years operating records management company
  - 7 years as international community of practice facilitator & consultant
    - FEAST (Forum for European Australian Science & Technology Cooperation)
    - IMS (Intelligent Manufacturing Systems)
    - ITS (Intelligent Transport Systems)
  - Tenix KM Intern in 2005 (community of practice development)
  - PhD RMIT 2006 Aerospace Mechanical Manufacturing Engineering – Soft Systems Engineering

Introduction

- Working to establish "cluster" dynamics
  - Unfunded part time activities of two people
  - Details available in our conference paper
  - Some background
  - Update on progress
- Aims of the work
  - Learn about industry clusters
  - Explore constraints and attractors affecting emergence of new levels of organization in complex systems hierarchy
  - Establish university lab able to explore use cases and integrate KM systems useful in an engineering enterprise
  - Increase Australian balance of payments by improving export of ICT applications and systems for engineering and heavy industry

Industry cluster theory

- Porter (1990) The Competitive Advantage of Nations
  - Proximity of "related" organizations may cause dynamics that can improve international competitiveness even to whole nation level
  - Relationships involve
    - Economic links
    - Knowledge
  - Local competition improves world competitiveness
- Contributing factors (Johnston 2003)
  - easy exchange of knowledge
  - access to generic qualified labour
  - access to markets
  - access to new ideas
  - access to specialised services or facilities
  - access to highly skilled and specialised staff
- Dynamics may not develop even if factors exist

Recipe for successful clustering (we wish!)

- Examples
  - The prototypes: Silicon Valley, Boston Route 128
  - Nokia (Finland) mobile telephony
  - North Jutland (Aalborg) mobile coms cluster
- Common factors
  - Disruptive technologies addressing new standards
  - Geographic proximity
  - Working together on projects with shared goals
  - **Conditions facilitating tacit exchanges**
    - Shared educational institutions
    - Shared R&D facilities
    - Social facilitation
- Can we do it in Melbourne Australia?

What Melbourne had in late 2004

- Large Australian projects
  - Tenix's large defence product life-cycle projects
    - Shipbuilding, armored vehicles, airframe & electronic systems
    - Design, engineering, production, doco, training, logistic support
  - Other Australian Defence/heavy industry/mining projects
- Several locally managed PLM systems implementers
- Local small/medium sized (SME) software developers
  - exporting world-leading IT products to niche markets
  - Actual/potential applications for engineering enterprises
- Tenix in-house developments with commercial potential
- Integrations within Tenix of some of these applications
- Tenix need to rationalise enterprise software

What Melbourne had in late 2004 (continued)

- Important new standards
  - International S1000D standard for electronic technical doco
    - Modules linked to product breakdown structure
    - Managed in Common-Source (i.e., CM) DataBases (CSDB)
  - Australian Defence Technical Regulatory Framework (TRF):
    - Engineering change management and authorisation
    - Knowledge management
- World leading research/education
  - 8 local universities (4 ranked in Times HES world top 200)
    - Perth, Adelaide & Melbourne metro regions have world's highest per capita ratios of THES top 200 ranked universities
    - Univ Melbourne is top 20, RMIT and Monash in top 100
  - CSIRO / Defence Science & Technology Organisation (DSTO)
- Notable dynamics developed in other Australian clusters:
  - Northern Adelaide: defence engineering (ICT from Melbourne)
  - Fremantle/Henderson (Perth): medium shipbuilding & refit
  - Mining & metallurgy

Tenix ANZAC Ship Project

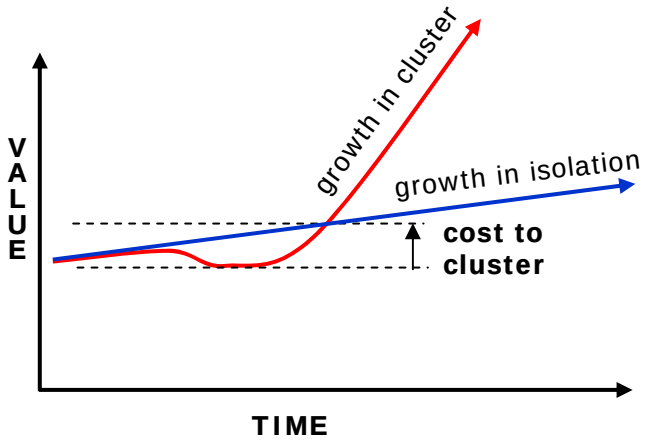
- AUD 5 BN fixed-price contract at Nov 1989
  - Total support package + spares
    - Engineering technical data and all operating/technical documentation
    - Crew training
    - Test, evaluation and validation (TE&V) requirement to prove package met contractual availability requirements
- Client selected locally developed Computerised Maintenance Management (CMM) system
  - Electronic delivery of technical data/documents to work in CMM
  - Configuration Mgmt (CM) of data and documentation absolutely critical, otherwise CMM wouldn't work
- To comply Tenix needed state of the art IT for data, information & knowledge authoring and management

ANZAC/Tenix as a cluster attractor

- Long term in-house needs for engineering KM
- **17 yr ANZAC Ship Project delivered all ships on time, on budget for 1989 fixed price (subject only to currency & escalation)**
- Made possible by:
  - Integrating authoring, engineering design, production CM & CMM
  - Class System Analysis & Reporting System to prove Tenix met ANZAC TE&V requirement
  - Crossbow data normalisation, validation, integration & navigation from 15 legacy engineering systems
- Best IT systems benefit from 3 generations of learning
  - In-house implementation
    - Structured authoring technologies
    - Product Data Management for configuration control
  - Most implementations outsourced to local suppliers

Up to 2004: little cluster dynamics

- Tenix activities not structured to favour cluster dev't
  - Tenix's primary focus is large project performance
  - KM IT not a core business deserving eng. line mgmt. attention
  - Siloed nature of Tenix projects discouraged knowledge transfer
  - Line contracting by Tenix / other major enterprise gives little opportunity for SME knowledge transfer
- Governments need industry leadership & matching funds
- Rich Melbourne environment gives SMEs little incentive to provide "cluster cost"
  - Full order books
  - Principals fully occupied
  - Surplus skills from uni's
- No key projects demanding integrated solutions



2005-2006: Laying the groundwork

- Changing Tenix from within
  - Facilitated emergence of Support Engineering CoP
    - Association with industry/standards conferences
    - Trade studies towards rationalising 7 PLM/portal systems
  - Commercialization presentations
- Industry workshops
  - Tenix system integration trade studies (Tenix R&D)
  - Tacit/explicit knowledge transfer (invitations, venue, & snacks)
- One on one knowledge transfer meetings with principals
- Explicit statements of cluster benefits statements
  - this paper
  - ACSIS Occasional Paper No. 1
- Tenix/university + R&D institute collaborations
  - Student internships
  - Collaborative research (gradually more cluster focussed)
  - Tenix staff involvement in university activities

May 2007: poised close to point of inflection

- Tenix making decision to rationalise PLM systems
  - CIO task to standardise on best practice – considering Tenix's existing TeamCenter, InSync and MatrixOne Implementations
  - Eg., CMIS: world state-of-the-art S1000D 2.2 & TRF compliant integration
    - Dassault Systèmes Enovia MatrixOne (CM & PLM) and Catia (CAD)
    - SAIC TeraText (TeraText : text :: Oracle : tabular data)
    - Existing implementation by Imag Australia in Tenix Land Division
  - Support Engineering CoP developing financial business case
- Possible cluster involvement from international backers of local developers/implementers
  - SAIC acquisition of RMIT / Melbourne Uni developed TeraText
  - Dassault Systèmes (3DS) support of Imag Australia/Concentric Systems implementers of Enovia MatrixOne PLM & Catia CAD?
  - Tenix state-of-the-art CMIS offers SAIC & 3DS access to world
- Strong interest from key SME developers to add further value
  - Exari (precedents based XML authoring)
  - KDR Creative Software (ANZAC Ship CMM)
  - TurnKey Systems (text output formatting engine)

May 2007: poised… (continued)

- Possible cluster benefits for Tenix's own ICT developments
  - Crossbow data integration engine
  - CSARS operational maintenance data analysis system
  - Datagate interactive link IT system data security
- Current discussions for Univ. Melbourne involvement
  - 'Breadth' subjects in personal and enterprise KM
  - Enterprise systems integration lab
    - R&D
    - Support for university and special managementtraining programs
    - Knowledge transfer
- **Still needs a formal project to provide the nucleus for crystallization**
  - Government export funding
  - Contract requiring collaboration
  - University lab establishment
  - Industry investment
  - Industry consortium activity

Conclusions

- Clusters emerge spontaneously given right conditions
  - Necessary conditions often don't exist
- Melbourne cluster has many favourable conditions
  - A single unfavourable ingredient can block dynamics
  - Only minor interventions may be required to fix block
- Any of the following scenarios would unblock emergence
  - Tenix project to integrate 4th generation solution
    - Next large project contract will demand such solution
  - Investment in University to establish systems R&D + training lab to build use cases and prototype integrations
  - Enterprise systems vendor(s) could provide cluster cost to benefit own product sales
- Time will tell…