Software Tool Assessment - an Australian Perspective

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Abstract

A national perspective on software tool assessment can be derived by comparing objective economic needs with the interests of the software tool community. Australia's unique combination of size, small population and small location suggest a preference for open tools that support distributed development, which compares interestingly with actual practice.

Introduction

The purpose of this presentation is to outline how a national perspective on software tool assessment can be derived, and then to compare the requirements following from the perspective with current practice.

Software tool community dimensions

The needs of a community, both as tool developers and users, can be calculated by locating it in a "requirements space", defined in terms of three dimensions as follows.

Economy - size

The size of an economy affects the diversity of tool development that can be sustained: economies with access to large markets can afford to become involved in a larger range of tool development; very small economies may not be interested in some products.

Economy - geography

Additional physical characteristics of an economy may have effects as follows. Small-economy countries located near large-economy countries may be able to integrate their economies into the larger; small remote countries may find such integration more difficult. Big (in area) countries face issues of decentralisation and distribution of effort that small-sized nations do not.

Technical interests and capabilities

Finally, needs as calculated above must be compared against the tools that a population seems to be interested in using, developing, or in the training of users.

Australian economy - size

Australia has relatively few inhabitants: some 17 million, about that of a good-sized state of the US! This by itself is not a useful characterisation, unless seen in the light of other geographical considerations as follow.

Australian economy - geography

In the light of its small population/internal market, the following characteristics are distinguishing. Australia is almost the size of the continental USA (Canada, Russia and Brazil are also larger in area). Australia has no land borders with another economy. Australia continues to manifest considerable social and cultural diversity with its neighbouring economies.

Australian interests and capabilities

Cultural connections to North America and Europe influence the interests and goals of the intelligentsia, possibly at least as much as the demands of the free market. I merely identify the current technical interests of the Australian teaching and research communities, and later compare them to the needs identified above.

Information systems development

Information systems education in first-rate institution appears state-of-the-art, with emphases on requirements analysis and use of relational DBMSs. Limited exposure to CASE tools is given in university education because of the expense, and also because of the conflict between the demands of an education in general principles vs. the peculiarities of a particular tool.
Systems development

“Software engineering” is becoming a dominant paradigm in computer science education, with emphases on process, life cycle, formal specification, CASE, object-orientation and “advanced” implementation tools (C++/Ada).

Enabling Research and Development

Australia has a sophisticated R&D community. Its members are well-travelled, the products of North American and European culture are widely-available, and most recently the dependence of North American and European communities to use the Internet for communications has bound our R&D community more tightly to its international counterparts.

What tool activity is supported by this R&D community? Looking at submissions to the 1996 Australian Software Engineering Conference, current hot topics include:

- object-orientation
- formal methods
- requirements analysis
- metrics
- reuse and reengineering

In addition, there exist major research centres concentrating on distributed systems enabling technology and their support for information systems.

Synthesis I: assessing software tools for Australia

Independent of the identified interests, what sort of software tool support does Australia actually need, i.e. what are national-based software tool assessment criteria? I propose the following.

Distributed tools

Software tools should support distributed development. A low, widely-distributed population makes it difficult to form large, expert software development teams in single locations.

Open tools - use

Software tools should support the addition or replacement of components. This is beneficial to a country like Australia in two ways. First, while the Australian economy is not large enough to support a software industry that can develop all our software needs, there remains the requirement of adapting imported software systems for Australian conditions (e.g. adapting financial software for local legal requirements).

Open tools - development

The second way in which open tools advantage Australia is that it provides for niche markets focussing on concentrations of technical rather than product expertise. Say, for example Australia wanted to contribute to software reengineering tool development. Rather than develop complete products combining high-level transformational language, parser generator, code generator and persistent object store, Australia might build upon expertise in logic programming to develop a better transformational language for expressing origin-target language conversions, which could be combined with other open parser, generator and object base components.

Synthesis II: a tool teaching and research prescription

How to reconcile the above external forces with the internal demands, of the interests of individual teachers and researchers, of Australian students’ rights to an international-quality education, and the traditions of general education and free enquiry in research?

Surprisingly, the current state of technological development gives cause for optimism that profound, e.g. politically-coerced, change may not be necessary:

- the current national focus on distributed computing matches one of the derived assessment criteria;
- distributed computing may also serve as a means of binding Australia’s economy closer to those of other nations;
- distributed computing is a leading congruence with open systems;
- the widespread achievement of open systems provides an opportunity in principle for the internally-selected products of Australian software technology to compete internationally.

The one additional criterion that should however be applied to Australian R&D is that it either be ready to exploit open systems, or particularly contribute to their advent.

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