

Canadian Avalanche Data System (CADS) concept – for discussion purposes

Core Functionalities as “common to all”

- Terrain Atlas: zones, mtn features / ski runs, individual avalanche paths; data unique, (inserted by each client), geo-referenced and GIS compatible
- Weather, base and field
- Snow, base and field
- Avalanche occurrences data

**Integrated functionality through all modules; image attachment, cross referencing capacity, geo-referencing (requires population), data base queries and report generation. Data visualization and graphing capabilities to be developed as quickly as funds permit.*

Additional “plug in” modules specific to sector needs, developed over time as funds become available. Examples of plug in modules include:

- AM / PM team meeting format
- Snow profile graphing
- Image sharing, “write on” functionality
- Avalanche Control, explosives use, inventory
- Sightings – wildlife, snowmobile use, ski tourers, etc records
- Run lists
- Group lists, vertical (flt hrs) accumulated
- Helicopter revenue, non revenue flight times
- Skier use data, use by locations
- Zone, run, road, rail closure records
- Daily conditions reports to operators websites
- Incident / accident records
- Employee, training records
- Others, as requested by clients

Why should the CAA undertake this initiative?

- To provide a service requested by our members and the Canadian avalanche community. The proposed service supports at least three of the CAA’s purposes as stated in our constitution; specifically,
 - To establish and maintain high standards of professional competence and ethics for persons engaged in avalanche-related activities.
 - To exchange technical information and to maintain communications between persons engaged in avalanche-related activities.
 - To promote research and development in avalanche safety.
- Once operational, the system will move the CAA (and the Canadian avalanche community) closer toward our vision, *To be a world leader in avalanche awareness, education and safety services.*
- The CADS initiative builds on work already completed in the InfoEx – CAIS project, and uses intellectual properties proprietary to the CAA.

- For clients that are also InfoEx subscribers, CADS can be fully integrated with InfoEx or any other CAA data exchange groups. This will facilitate data analysis and simplify daily operations.
- CADS revenues accruing to the CAA will pay for required ongoing upgrades to national avalanche data standards (OGRS, CAAML, etc) that presently have no income stream to cover the costs for this work. These national standards for avalanche operations are vital to all operators, demonstrating professionalism and “due diligence”

CAA brings to the CADS project

- Observation Guidelines and Recording Standards (OGRS) for Snow, Weather and Avalanche Observations – the national data standard for avalanche work. Value \$150,000
- CAIS – InfoEx system, code, associated intellectual properties. Value \$200,000
- CAA Markup Language (CAAML) as open source data transfer protocol, fully GML compliant and certified. Value \$50,000
- Historical subscriber InfoEx data to populate each clients system with all of their own specific InfoEx submissions since they began subscribing (up to 15 years of data). Immediate realization of the benefit of having a comprehensive historical database that the operator can access and use for their own benefit.
- IT infrastructure (web servers) and staff capable of supporting these services
- Proven project management expertise
- Proven software development team (Atkins, Larson, Haegeli)
- Experience with InfoEx as “industry service” operational support tool. Proven ability to bring stakeholders together for collaborative endeavors.
- Reliability and credibility. CAA is a not-for-profit organization with proven business skills, serving and supporting front line operators and avalanche workers for 25 years; we’ll still be here down the road.

Clients bring to the CADS project

- Pooled financial resources; development fee on entry and annual licenses.
- Operational expertise and experience; many clients know what they need and want.
- Essential input into functionality, design, future needs.
- Annual listings of priorities for “next steps” through surveys, face to face meeting, etc.
- An advisory group comprised of selected “sector” leaders to serve as a sounding board and provide perspective on developmental and operational issues.

Proposed CADS operating principles

- Clients share a common desire for a comprehensive, integrated information management system for avalanche and other operational data. The sole purpose for CADS is to serve the operational and information management needs of the clients.
- Clients agree that it is far more economical and in the long run more functional to develop CADS as a collective effort, rather than developing individual data management systems that are incompatible with each other, InfoEx and the CAIS.

- CADS will use CAA Markup Language (CAAML), an open source standard for structuring and transferring data.
- CADS will be fully integrated with the CAA's InfoEx – CAIS functionalities.
- CADS must be structured to be fully integrated with commercially available GIS software. This will be achieved by ensuring CAAML is certified compliant with the GML (Geographical Markup Language), an international standard for GIS data and commercial software applications
- To ensure effective CADS management and system security, the CAA will be the sole owner and custodian of the CADS and all associated intellectual properties. CADS source code, system architecture and other system programming will be proprietary to the CAA, and will not be shared with any third party.
- Each client will be the sole owner and custodian of all data they accumulate in their CADS program.
- Clients may develop customized extensions to their individual, licensed CADS programs in circumstances where the CADS source code is not required, and CADS core functionality is not compromised.
- To join, this year and at any time in the future, clients must contribute a minimum specified "entry fee" to the CADS development fund.
- Clients may contribute more than the minimum specified entry fee to the CADS development fund. They may be compensated for their over-contribution through:
 - A 1/3 reduction in their annual licensing fee (the portion of that fee dedicated to annual CADS system development) until the amount of their over-contribution has been redeemed.
 - A 50% reduction in the rate charged by the CAA for system support.
- Clients will be licensed to use CADS through an annual fee to the CAA. One third of the license fee will go the CAA as repayment for CAIS contribution to CADS; one third will go to the CADS development fund for system development work in the upcoming season, and one third will go the CAA to cover off CADS system management.
- If one or more clients wishes to see a specific module or functionality developed, and pay for the work involved, the CAA will contract with the development team to do the work requested, and bill this work back to the client(s).
- All CADS system modules that are developed will be available to all clients.

The CADS business case

- Clients collectively pay for CADS development. By July 15 at least \$20,000 (8 clients) must be pledged by clients for development to begin and a beta version of CADS to be available for use in winter 2006-07.
- Recommend minimum entry fee of **\$2500?** per company / "decision node"
- **\$1000? \$1500?** annual license fee (1/3 CAA CAIS, 1/3 dev fund, 1/3 CAA mgt exp)
- CADS systems support available through CAA at competitive, less than market rates.

CADS (Canadian Avalanche Data System) Planning – Roger Atkins
June 29, 2006

The following is a discussion paper from Roger Atkins, project manager for the InfoEx/CAIS initiative. We've asked him to put together this information to try and clarify what the development of this project will look like and the timelines for various components of the programs functionality. (I. Tomm)

This is a VERY PRELIMINARY DRAFT document to start the CADS planning process.

We need a good name before CADS sticks!!!

By investing in the cooperative development of CADS, operators will benefit not only from the amount of funds generated by pooling their resources, they will also benefit from the fact that they are investing in a system with a future. It is a system designed to be flexible and extensible that can grow and change as the world changes, and it has 'critical mass' because of the combined commitment of the users. Also, it has a benefit in that it may become a standard, and employees that are familiar with it can transfer those skills from one company to the next. So, if you hire a someone who is familiar with the system, then you will not have to train them on how to use your specific system. These are ways that the investment in the CADS system can be leveraged over time.

\$2500 to start and \$1500 a year may seem like a lot in this world where you can get amazing software for word processing and spread sheets etc. for next to nothing, but this is custom software. This kind of expense looks really cheap compared to the hundreds of thousands of dollars spent on custom snow/avalanche software by virtually everybody who has gone down that path.

General Concepts:

- The CADS should be built to use as many existing CAIS components as possible, and/or add or enhance components for use in CAIS. Duplication of effort should be kept to a minimum.
- In the first year of development, CADS should be introduced as a test version only to selected organizations that are willing to use the software as a beta test.
- In the first year of development, the data components available in CADS should be restricted to data components already implemented in CAIS. In subsequent years, data components should be added simultaneously to both CAIS and CADS when possible.
- CADS will interface to CAIS by producing CAAML packets for data submission, initially via the InfoEx web service. It is possible that future CADS users will not be InfoEx subscribers, and they may be subscribers to other information exchanges or may be stand-alone systems.

- CADS needs to be capable of functioning as a stand alone installation that is not dependent on any CAIS information exchanges and is not dependent on any internet connectivity.
- Existing SnoInfo installations can be easily converted to CADS installations, with the user CADS database being created from the CAIS database built from past two years of SnoInfo submissions. This means that CADS users (testers) can start the season with the past two year's of their data already in the database, including location data. It also means that any InfoEx users that convert to CADS in the future can start their installation with all of their historical data from the CAIS. This also extends to InfoEx data that is older than two years, once the historical data is imported into the CAIS database. (Bonus!)
- CADS installations that are interfaced to the CAIS via the InfoEx web service can be re-created from the CAIS database at any time. This is not recommended as a substitute for making back ups, but it is a feature of the system.

CAIS/CADS Shared Components:

- Database structure can be shared. The database is designed such that it will evolve into a geo-database that is directly accessible to ESRI GIS systems.
- DAOs (data access objects) to transform data between business object, CAAML, and database representations can be shared.
- SnoInfo can evolve into a shared user interface component for data entry.
- Time profile graphics components can be shared between CADS and CAIS. If the time profile graphics module is capable of operating from CAAML files, then the time profile graphics can also be used by external systems that are capable of producing CAAML files (eg. MoT)

First Year Objectives:

- Run CADS in a basic configuration for a limited number of test users.
- Use an extension of SnoInfo for data input.
- Provide some form of interface to the local CADS database tables (not a sophisticated interface, but allows tabular access to data)
- Interface CADS to the CAIS InfoEx web service to submit observations.
- Provide capability to produce printed daily observation reports from CADS

- Use SQL Server MSDE (or Express) database for local data store, with identical structure to the CAIS database
- First year key functionality:
 - **Terrain** – Allows maintenance of local terrain location hierarchy, including existing terrain feature classes (operating area, operating zone, weather sites, avalanche paths, ski runs, etc). Interface will be much improved from existing SnoInfo interface. A terrain image catalog will probably be possible, but without capability to draw overlays. No support for spatial data (GIS component) at this time, that will be in one or two years depending on funding and priorities.
 - **Weather** – Manual weather observations as per OGRS will be supported for multiple weather sites. Data entry is via SnoInfo derived forms, weather data can also be viewed in tabular form. Automated weather data is NOT supported at this time, that will be in one or two years depending on funding and priorities.
 - **Field Observations** – Field observations for multiple regions will be supported, analogous to existing field obs in SnoInfo. Data entry is via SnoInfo derived forms. Field observations will also be accessible in tabular form.
 - **Snowpack Structure** – Snowpack structure summaries and stability assessments will be supported. Data entry will be via SnoInfo derived forms. Snowpack structure and stability summaries will also be accessible in tabular form. Snow profiles will not be supported this year, that will be one or two years depending on funding and priorities. Possibly snow profiles entered via 3rd party software can be catalogued by date.
 - **Avalanche** – Avalanche observations and avalanche activity summaries will be supported. Data entry is via SnoInfo derived forms, and avalanche observations and activity summaries are also accessible in tabular form. Avalanche control record keeping is not yet supported, that will be in one or two years depending on priority. It will be possible to catalog images related to avalanche observations or summaries, but without capability to draw overlays. Avalanche incident/accident reporting may or may not be supported this year, but it will be possible to tag events as notable.
 - **Outside Information** – The CADS system will be compatible with the InfoEx web service to allow submission of data by InfoEx subscribers and will include links to the InfoEx web portal for access to InfoEx reports and products as well as additional third party postings (eg. MoT data) on the InfoEx web portal.
 - **Database** – The CADS system will be built on a database in identical structure to the CAIS database. Information in the database will be accessible through non-CADS methods (such as export to excel, etc) to allow additional analysis. For existing InfoEx subscribers, their database will contain their past two year's data. Their entire data history can also

be made available (perhaps a fee could be charged for this and that could fund the effort to capture the historical InfoEx data into CAIS?)

- **Presentation** – Some graphic presentation of data might be possible, but the system will not be very sophisticated at this time. That will improve over the coming years.