ALL FOR ONE: DESIGNING THE NEXT GENERATION OF CANADIAN TOPOGRAPHIC MAPS

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Abstract
Visual communication design is the work of producing structure, order and meaning from a seemingly unrelated mass. When design is done well, organization, focus, beauty and simplicity will replace disorder. When design is done very well, it will look as if no one has been hard at work. This paper will shine a light on the design of the new CanTopo map, the cartographic product of the MapGen project at the Centre for Topographic Information-Ottawa (CTIO), Mapping Information Branch, Natural Resources Canada.

This paper will examine the research that grounded the reading of the original brief and the influences which informed the shape of CanTopo. Specific instances of inspiration which have served the work of designing CanTopo will be detailed here. The paper will also discuss the cartographic typologies which together constitute the formulation of theories which give buoyancy to the final result.

The methodological underpinnings for the work provided the collective and individual investigations of the team with transparency, honesty and purpose linked directly to finding rational solutions to design problems. Purpose and meaning became the focus of the work, rather than the technology installed to produce it.

The design of CanTopo represents the next generation of Canadian topographic maps with a new visual identity and well-considered organizational strategies. It is a responsible, authentic response to complex problems and the interactions and intersections of various forces. This paper will include working sketches and details from CanTopo as illustrations of this.

The fresher look of CanTopo fits into the wider branding strategy for all CTIO products such as indexes, information brochures and our on-line presence. With a firm grounding in design theory and rigorous design practice, it also represents the alignment of design at CTIO with the wider visual communication project.

The Design Brief

The design of CanTopo maps must respond to the needs of a disparate audience which includes, but is not limited to, the wider public, students, librarians, hikers, military, hunters and anglers. The design needs to be reproduced on plotters at retail outlets. Production of CanTopo maps must happen with minimal interactive editing. The design needs to make a visual break with the art direction protocols of the former map series.

Exceptional design is born from a deeper reading of the brief, placing the nominal ideas within broader lines of creative intersection. The art director located points of coincidence, inertia and association/dissociation, and imagined how to maximize these potentials. This lead us to design CanTopo as an open ended and elastic system, rather than being enclosed within rigid definitions and unbending specifications. This is important because it not only provided a flexible framework for the growth of the design, but will afford possible development of more finely tailored iterations, and for the possibility of an interactive Web product.

Collaboration

The working relationship between art direction and database/GIS software was very collaborative. While each area had separate, specific tasks for which it was responsible, the questions we were seeking to answer were essentially the same: How can the information be delivered to serve both the human audience and the information in the best possible way? Ideas were sparked in the conversations surrounding the work, and formed out of the words that were spoken in the conversational space.

The methodological underpinnings for the work provided the collective and individual investigations of the team with transparency, honesty and purpose, producing a rich mix of the creative energies of the entire team. Art direction distilled the ideas which were generated by these explorations into precise graphic forms.

Ideas or Technology

The relationship between art direction and work on the GIS software was not one of reliance, but one of dialogue. Rather than be constrained by the defaults of the system, true design praxis intervened. This position was critical to let CanTopo move past limitations of the production software and reach standards of organization and design that would produce successful and meaningful communication.

The design drawings that were produced by the art director were not a set of blue prints to be reproduced by the GIS software. The drawings were presented as an intent for clarity, communication and organization. Intentions represented by design drawings were combined with the possibilities of the software, to produce agreement rather than compromise. The exceptional skill and inventiveness at work on the GIS software may not have always reproduced the drawings, but always reproduced the intent contained within. This insured that purpose and meaning became the focus of the work, rather than the technology installed to produce it. This way of working is best summed up by: “Cutting edge ideas are more interesting than cutting edge technology.”

Research and Creative Energy

Looking at past and current solutions to similar cartographic problems is a basic component of cartographic design research. However, the researcher needs to be critically engaged to determine how the elements being examined fit within their larger cartographic narrative, how they promote harmony, or how they serve as settings for other narrative devices. Without this engagement, research would only result in a cataloging of the work of others, rather than knowledge of how and why the work succeeds or fails; such new insight can be used to advantage on the design questions at hand. These critical assessments informed the search for answers to design questions for CanTopo, moving the work toward a successful solution. In addition, our work extended its view to other fields of creative work to take advantage of fresh approaches found there.

International standards were an important consideration. Much time and care was devoted to understanding how these specifications might influence our designs. Rather than adopting any of these specifications wholesale, we were careful to consider how those graphic forms may be used in CanTopo. In this way, we were able to understand why certain devices were successful within their own specific context, and put this new information to work when formulating solutions that would meet the needs of our product. This way of working avoided conflicts of purpose (when the specifications dictated by one user group is contrary to the needs of another) and allowed us to merge essential yet disparate components into a consistent cartographic language that responds to the needs of our information, and our users.

The creative process is sustained through learning from the experiences of others immersed in creative work; not just from the remarkable objects they make, but through learning of the ideas that fuel their creative pursuits. Through this research, ideas surface and move through a transformative trajectory, yielding a polish that illuminates possibilities in the work at hand. Inspiration was found outside of cartography: in architecture, industrial design, typography and graphic design, painting, fashion, and in the converging mixes and expressions of new media. It is this sweeping look across the spectrum of art and design that will help connect cartographic design at CTIO with the wider field of creative enterprise.

Inspirations from Designers

Some lessons in design come from being critically engaged and watchful in everyday events. Other lessons are more specific and need to be sought out. By either means, moving toward answers to design questions yields a stronger, more lively solution when we reach beyond cartography to imagine how the lessons of these encounters might be applied to map design. While re-invigoration and inspiration was achieved by looking outward, the technical skills and practical knowledge of senior map makers at CTIO provided valuable advice that grounded the work in the traditions of the agency.

Paula Scher's work as a graphic designer is directional. Scher also paints maps which are composed almost entirely of type. The intensity of the layers of hand-rendered type, somehow, does not obscure meaning. In fact, the shapes and surfaces seem even more available to us because of the colours and textures of the letter-forms and the movement in the arrangement.

Steve Fick is the man responsible for the extraordinary maps in Canadian Geographic magazine. Conversations with Steve suggest that ordinary events become attached to his creative subconscious and are revealed in his work in subtle ways. Music and painting are prominent in Steve's creative process [http://fick.ca/biography (accessed June 15, 2009)].

Dieter Rams' ten commandments for good design set out a perfect path for working [http://www.ghostinthepixel.com/?p=199 (accessed June 15, 2009)]. While all of Rams' principles lead to good design praxis, four of these commandments were constants in propelling the CanTopo design forward: Good design makes a product useful. Good design is honest. Good design is consequent down to the last detail. Good design is as little design as possible.

Richard Serra's monumental sculptures in Cor-ten steel challenges the viewer's understanding of space, balance, compression, perspective and scale. The strength of Serra's work is predicated on exploiting and expressing the material's physical properties, rather than insisting the metal become a surrogate for painting.

The architect Louis Kahn began his work by searching for the meaning of the project. He wanted to find the central meaning of the institution that it would house. Once this was discovered and embodied in a suitable symbolic form, Kahn could give this meaning a material shape [Curtis, 1996]. Kahn's distinction between form and design seemed like a very relevant way to conduct our investigations.

Design Process

The project team adopted a process that allowed the work to continue toward the elimination of obstacles between the map designer and the idea, and the idea and the observer. This provided us with a design program through which our best efforts could promote clarity through the removal of visual apprehension. This was mediated by subject matter and style through careful, consistent art direction.

The central strategy that guided the design needed to have strength, logic, flexibility and scope. The idea of establishing a cartographic language and grammar from which rules of syntax could be inferred, met these requirements very well. Design efforts reached for a dynamic design which would allow multiple possibilities and different types of circulation through the information space. This has resulted in a summary of spaces and functions that became our point of reference. As each design element was conceived, it was assessed to understand how it lent itself to the (anticipated) needs of other map symbols. The syntax of a graphic language yielded a means with which to measure the viability of preliminary sketches and to suggest a direction for further refinement. It was through this art direction that the stability and integrity of the whole design project was insured [Francis and Williams, 2007].

Designs for new topographic map symbols entered the design process through thumbnail sketches. These initial ideas were first organized on the basis of directional drift and distributed densities. The preliminary graphic phrases were then distilled into re-circulated primitives; confluences emerged and key points were discovered and built upon. As they surfaced, the forms were further shaped into indexical, grammatical identities by functional and typological considerations [Francis and Williams, 2007].

Each design sketch was a proposal to be measured against the whole in an iterative exchange which stayed in play throughout the design process. This continuous weighing and assessment is bound to all the choices made in the design of CanTopo. It served to articulate the map's immediate responsibilities and also anticipated future uses and prepared a foundation for those activities.

The CanTopo design bypasses the claim of being "user-centered" and takes advantage of an activity-centered design approach. In activity-centered design, activities are comprised of tasks which are comprised of operations. The outcome is a product which is organized to make its use easier and feel more natural. Taking an activity-centered design approach highlights the coincidences between map design and interface or map surround design. The map surround mediates between user and information, affording avenues into the information, and suggesting approaches to the user that make accessing the information easier.

Point symbols

Previously, a generic point symbol served several dozen map features which were differentiated only by their text labels. The new design shifts the responsibility of communication from feature labels to unique point symbols. The explorations to find

these new point symbols were informed by the process employed by Louis Khan. Designing a symbol for a map feature began as a search for the idea that holds the meaning of the feature for which we could give a graphic form.

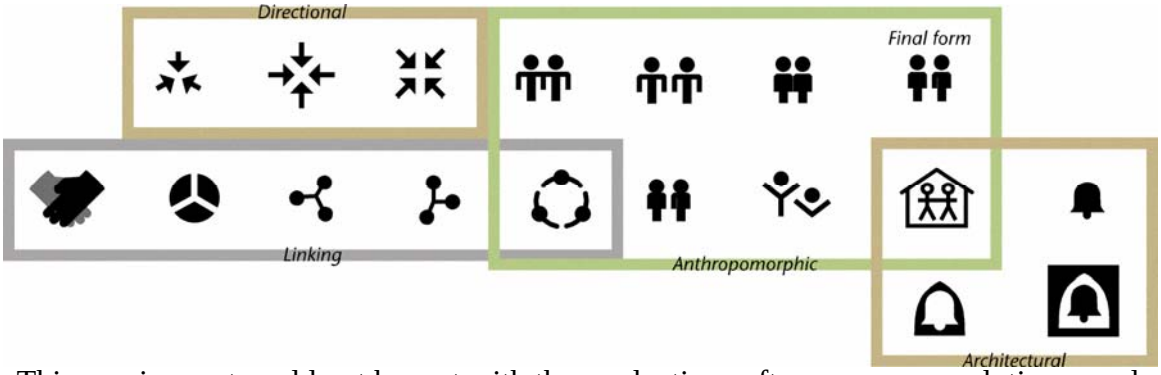
Using community centre as an example, we explored notions of how “community centre” might be understood. Through this investigation, the ideas of “cooperation”, “gathering”, “coming together” and “joining” came to the surface. It was then that the search for a graphic form for this idea began (Figure 1).

Much of this exploratory work was a collaboration between art director and a project team member who has interests in photography and dance. These perspectives (ideas of framing, flow and rhythm) furnished fresh understandings when producing and evaluating thumbnails sketches.

We extended our examinations to map features which already had a cartographic representation, making interventions where needed. This was necessary to improve legibility, and to allow the art director to mark all symbols with a unified visual style.

Previously, the coast guard symbol was the nested letterforms of an upper case ‘G’ and an upper case ‘C’. The composition is presented more as graphic rather than offering a discursive reading. Furthermore, being rendered in black failed to suggest any relationship with ‘water’. What has taken its place produces a clearer meaning with a more economical footprint. An anchor is secured within a shield, a shape we associate with emergency response personal. The new symbol is blue, making the coast guard’s relationship with water unambiguous (Figure 2). The shield is a shape we have used and reused in our new symbol designs. It also makes an appearance in the symbols for “police station” and ‘fire station’ to collectively represent emergency response agencies.

The previous specifications prescribed context dependent orientation for some symbols.



This requirement could not be met with the production software, so new solutions needed to be designed. Disappearing stream had been an arrow at the end of a stream that was oriented to point toward the direction of water flow. The new symbol’s circular form produces a non-directional circumstance. It sits with the end of the stream at its center, marking where we notice the flow of water has disappeared (Figure 3).

Figure 1. Drawing an idea: sketches for the “community centre” symbol (400%)

Figure 2. Old and new “coast guard” symbols; new symbols for “fire” & “police” (400%)

Figure 3. Old and new symbols for “disappearing stream” (400%)

Lines

As many as 10 line symbols suffered from a lack of differentiation (Figure 4). Clarity was improved by inserting signals that gave focus to their meanings. The example of ‘power transmission line’ borrows from the point symbol whose shape is an expected and recognized signal. This linked basal element creates a new signature, different from its antecedent and closer to describing the meaning of its map feature (Figure 5).

The ‘pipeline’ symbol benefited from a similar re-examination. The former symbol was a generic dashed line which produced no relationship with the feature it was meant to represent. Our new symbol incorporates an abstracted ‘container’ form which punctuates the line. The colour of the content describes what the pipeline carries, removing the need for a label. It is a clean, economical articulation which solves two problems (Figure 5).

The boundary symbol library had contained 13 lines, 10 of which were dominated by a grey backer. The intent was to make boundary classes explicit, but with this came a complexity which was difficult to penetrate (Figure 6). A new streamlined articulation was borrowed from investigations done in 1996 at CTIO [NTS 41A/10, 1996], where boundary classes were abandoned in favour of giving voice to boundary types: geographic, administrative and recreational. Our interpretation of this system left those categories in place and made adjustment to resolve the colours used to characterize each boundary type. Now, rather that wrestling with the meaning of a boundary, the map reader may now know, at a glance, the boundary type and, by extension, know more about the land contained within (Figure 7).

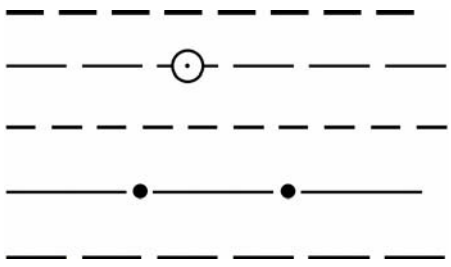


Figure 4. Trail, aerial cableway, ninth class boundary, underground pipeline, power transmission line (400%)

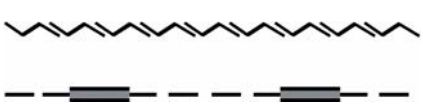


Figure 5. New symbols for power transmission line and pipeline (400%)

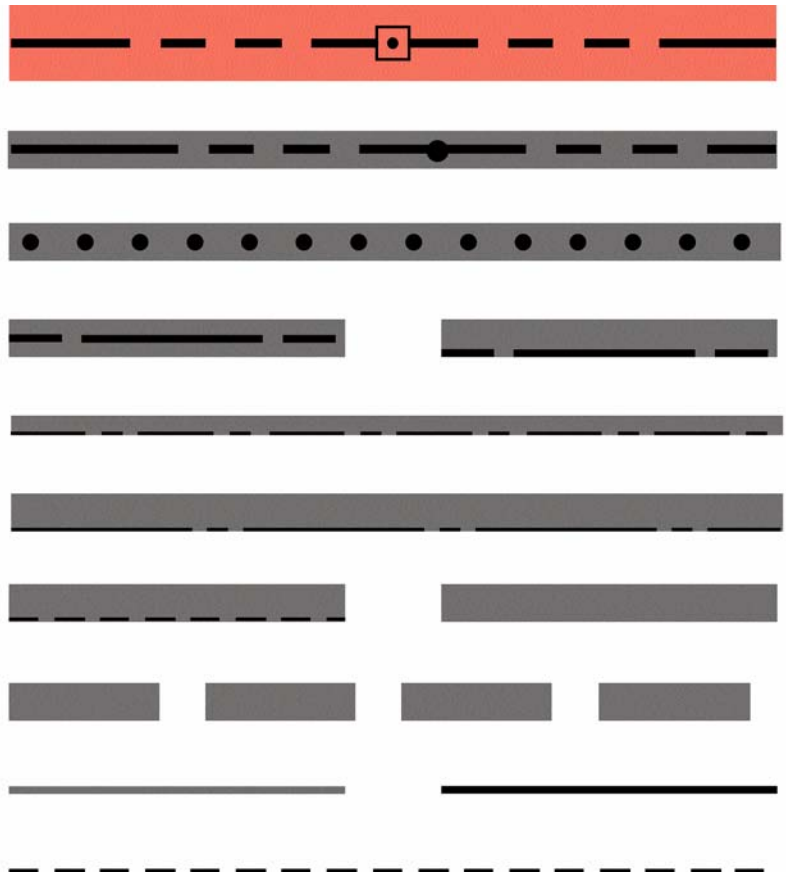


Figure 6. Former boundary library (400%)

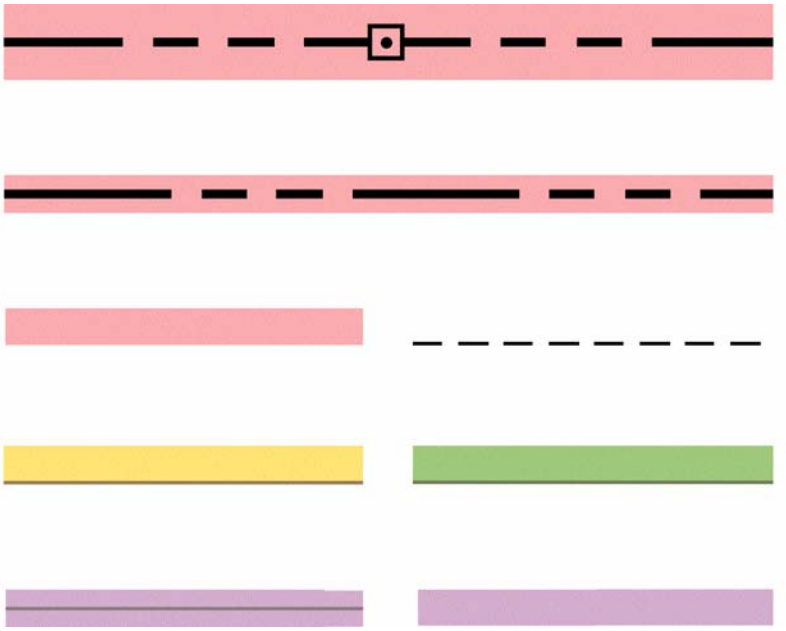


Figure 7. New boundary symbol library (400%)

Areas

Designs emerging from the Memphis Group [http://www.designmuseum.org/design/memphis (accessed 15 June, 2009)] favoured patterns in bright colours to decorate their furniture and ceramics (Figure 8). These textures create surface interest, but say nothing about themselves, acting as a reflection for the meaning of the design. The American painter Jasper Johns fills expanses of his canvases with a texture which has similar neutrality. It serves as a field onto which other meanings may be transferred (Figure 9). It is this neutrality that seemed useful for constructing textures for use as area fills in CanTopo.

Textures for CanTopo were based on this idea of neutrality. The area fill for glaciers borrows from a Johns' painting (Figure 10). Variations of size and density of basal units produced a palette of textured fills that can respond to many anticipated needs. Changing the colour of either figure, or ground, or both, can produce many iterations with the possibility to describe many land cover types (Figure 11). Our expectation was that the studies themselves would suggest possible applications of the texture variants produced.

The production of neutrality remained in place for all textures except 'rapids' and 'fish pound'. These were drawn to speak to the particular characteristics of the land features they represent (Figure 12).

When possible, existing vernaculars were maintained with precise graphic interventions to address issues of surface tension, density and cohesion. Swamp and marsh both benefited from these adjustments. Such determinations were dependent on the overriding formal language. Art direction then, falls to a proposition of the authorial intentions of the vocabulary and the grammatical allowances of the formal language.

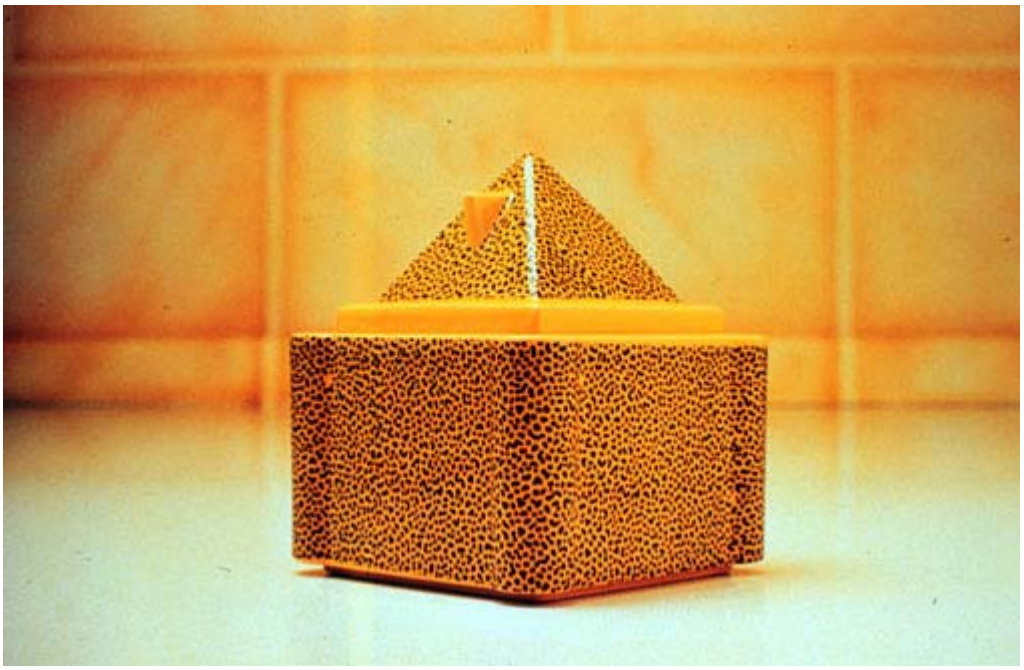


Figure 8. Memphis Nefertiti ceramic piece, 1981 Design: Matteo Thun

Figure 9. Tantric Detail I. 1980 Oil on canvas 50 1/8 x 34 1/8" (127.3 x 86.7 cm)
Collection the artist © 1996 Jasper Johns

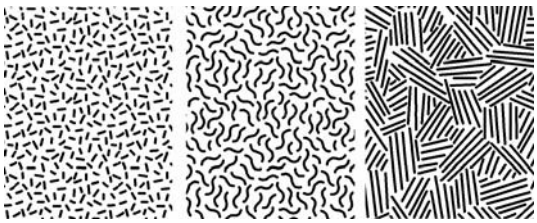


Figure 10. Selection from the palette of textures designed for CanTopo (100%)

Figure 11. Studies for texture fills (100%)

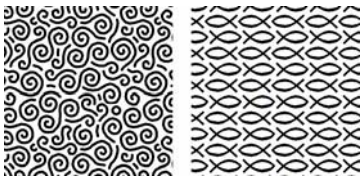


Figure 12. Rapids and fish pounds (200%)

Figure 13. Stone Sans Bold 36pt

Figure 14. Stone Sans Bold 36pt & Stone Humanist 36pt

Typography

One of the key points in the brief for MapGen was that CanTopo would be reproduced on plotters at retail locations. Without the crisp delivery of the offset printing press to insure legible type, a new typographic treatment was designed to cope with the less fine resolution of plotters. The principle concern was serif type degrading and impairing legibility, particularly at smaller point sizes and when curved along a path. A sans serif typeface solves this problem. We also knew there would eventually be a soft-copy delivery of CanTopo. Clarity and legibility in soft-copy maps is better assured with sans serif type, as the integrity of letter-forms is maintained in a pixelated environment. However, the choice of type family went beyond meeting this simple mechanical requirement.

CanTopo is the next generation of Canadian Topographic Maps and needed typography that reflected this new beginning. The crisp, modernist architecture of Stone Sans helps to tag a distinctive and recognizable signature on the CanTopo design. It proved to be an ideal choice as it served to align the typography with the art-director's new formalism, found both within the neat-line and in the surround. Designed by Sumner Stone in 1988, Stone Sans is friendly and welcoming without relinquishing an authoritative voice. It has a broad palette of stylistic variants to furnish all the typographic categories on our map. It has a moderately large x-height that ensures legibility at small point sizes and distinguishable letter-forms that minimize ambiguity (Figure 13). Titling for CanTopo shifts from Stone Sans to Stone Humanist. Stone Humanist is a bit more formal with a crossing apex on the 'W' and a cross bar on the 'G'; and more decorative with extended tails on the 'R' and 'Q' (Figure 14). Still, its voice refuses to be fussy.

Certain received ideas of cartographic type design have been transgressed in the new map design. This is a movement toward a pragmatic end, and an informed aesthetic process. Type has now been unified through two operations: a single type family used throughout, and a strategy which is clearer about hierarchical positioning. Divergent type styles give way to a unified, consolidated approach.

The Surround

The complex of information associated with the neat-line has been reconsidered and rearranged into a more streamlined articulation. The approach to this rearrangement is centered around separation, accommodation and association. Physical space allocations prepare the separations for multiple information types. Furthermore, colour codification helps avoid conflicts throughout this complex of grids, numbers and notations. Association is achieved through identical typographic treatments; accommodation is

assured through completion of notations.

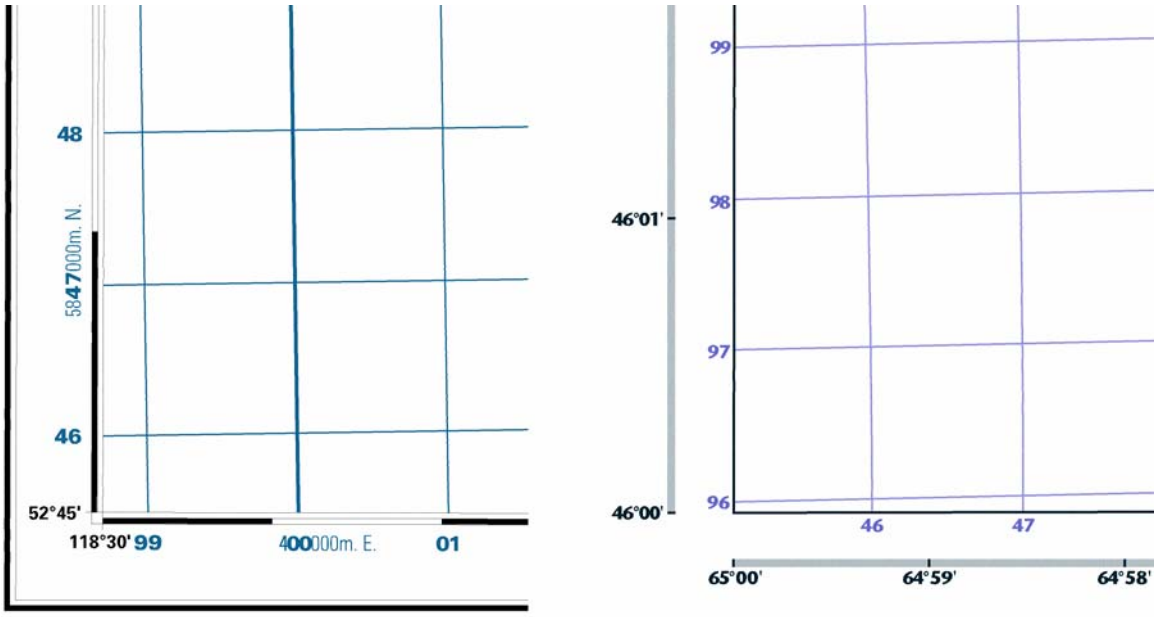


Figure 15. Former and new neat line structures (100%)

The redundant neat-line and the double line border have been removed. This was a move to eliminate what Tufte refers to as “chartjunk” [Tufte, 1983]. Now, with the visual and spatial separations removed, a tailored precision is revealed. By dissolving this arbitrary barrier of the double line border, geo-information space is now coincidental with map space, exchanging cartographic coverage and marginalia in a fluid movement under the same operation (Figure 15).

The primary UTM grid numbers appear at the neat-line, separating them from the lat/long numbers. Longitude and latitude have been given a secondary role to the UTM grid as reflected by the shift in their location away from the neat line. They are shown on a pale grey bar with black ticks to mark every minute. This new position affords counts of longitude and latitude to be completed, with notations given in full for each minute. The secondary UTM grid numbers have been moved to a zone once occupied by the outside double border (Figures 15).

Within the south margin, notes are arranged as logical groupings, offering information in digestible portions. Precise activation of the negative space assures natural, comfortable phrasing making the total composition a readable, well-articulated whole. The organization of the map legend has been fully re-considered to locate it entirely within the map surround. A number of organizational strategies were employed in this considerable task. Geographical occurrence, physical attributes and hierarchical placement all were factors that helped determine the ordering of the legend list.

Relocating the legend to the west margin anticipates a possible interactive, Web-delivered, derivative of CanTopo. As the formal convention of the Web places navigation on the left side of the page, this locational shift of the legend from left to right helps normalize the user’s expectations. The mechanics of delivery dissolves, letting the user reset his focus on the information. It is a move informed by the idea of operational exchange and supported by user experience design.

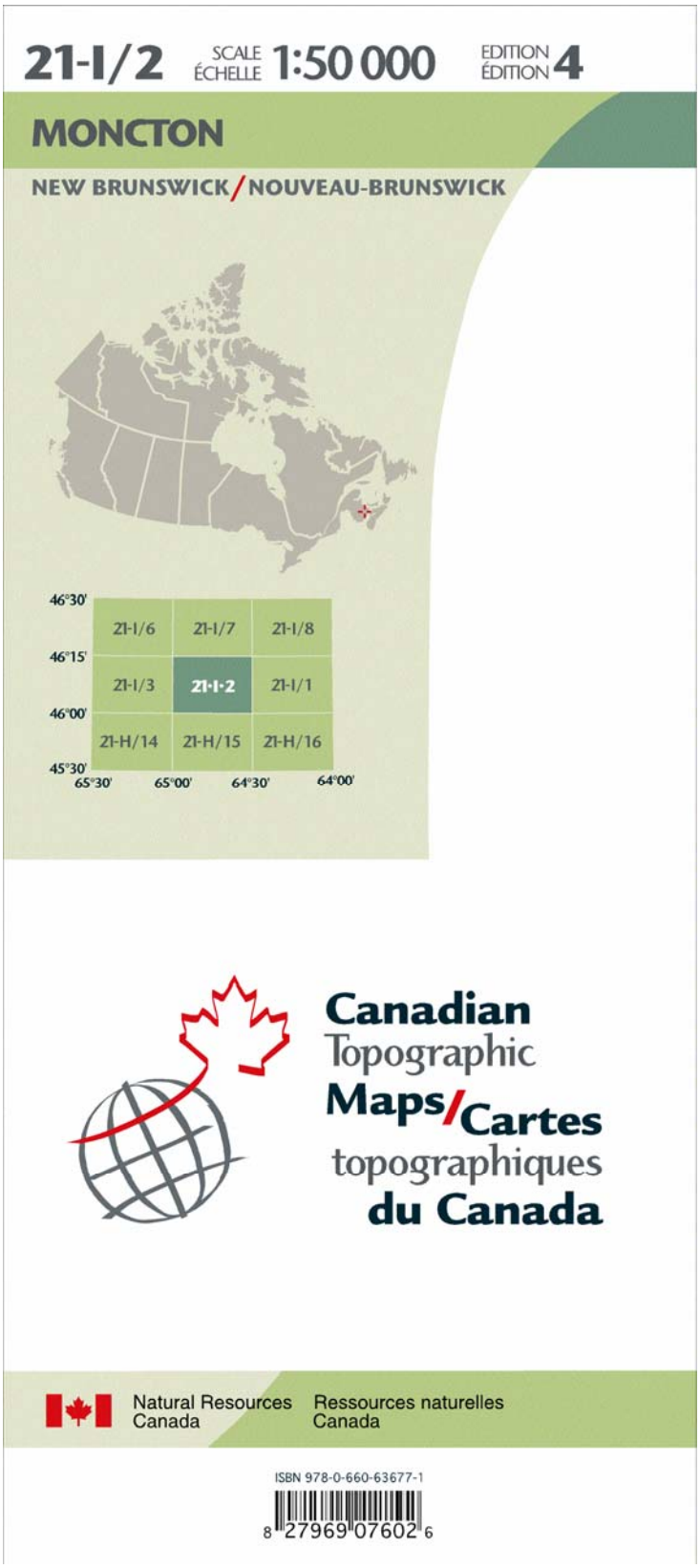


Figure 16. CanTopo cover (90%)

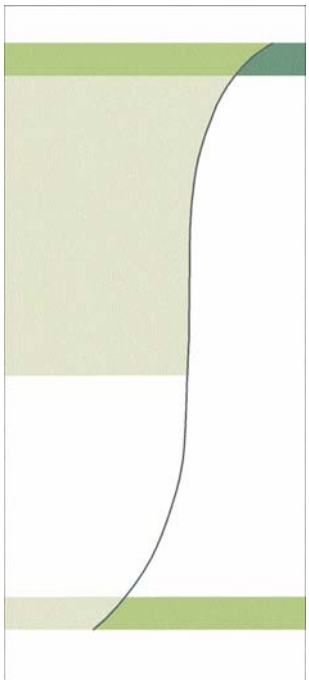


Figure 17. Hogarth’s Line of Beauty

The map cover has a new design, and a new location. Its dimensions (9"x4") allow a CanTopo map to be folded and displayed in racks at retail outlets. However, the cover design is more than a retailing detail. Now sitting in the west margin, it anchors the vertical composition and is the primary avenue into the map. Information is organized around many layers of identification: specific, general, national, serial, editorial and governmental (Figure 16).

The green bands at the top and bottom of the cover make references to the previous design, as does their colour story. A colour field carves out spaces for the index to adjoining maps and the thumbnail map of Canada. Taking on the shape of Hogarth’s line of beauty [Hogarth, 1971], this colour field curves into the band at top of the composition and insinuates its shape on the band at the bottom, setting up opportunities to vary the colour composition when these devices appear elsewhere in the surround (Figure 17). Collectively, these devices serve as connective forms, receiving the eye and compelling movement across the plane of the map. The effect is the creation of numerous permeable edges, allowing for multiple connections to the information within.

Drawing on the value of the activity-centered design approach, all map identifiers have been collected in a curated composition in the southeast corner of the map (Figure 18). This “librarian’s block” contains information which is particularly useful to librarians such as the ISSN and ISBN numbers. Being snugged into the southeast corner of the map, the librarian’s block facilitates the activity of finding a map by thumbing through maps stored flat in a drawer.

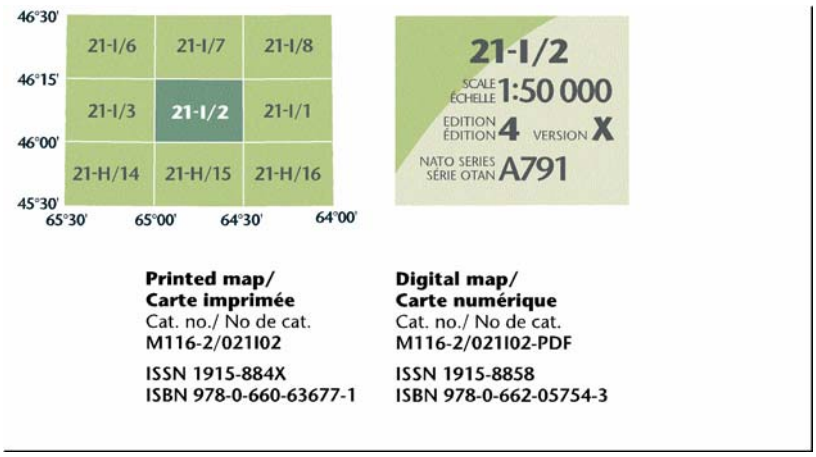


Figure 18. The "Librarian's Block" (100%)

The Canadian topographic map series has been given a new logo (Figure 16). The logo shows a play of kinetic energy in its loose gestural forms. Grey is used to render a graticule in easy calligraphic strokes which move beyond the circle of the globe. The energy is amplified in a red, ribbon-like line of the northern parallel that moves upward and folds onto itself, forming a maple leaf. Graphic hygiene is achieved through avoiding the recondite references and undue tightly packed codings of the previous logo. The visual rhetoric of the logo provides a literal examination of its subject, providing a one to one graphic definition. The logo can be easily and clearly read as "Canadian maps".

The new logo is part of a branding strategy that serves to unite all products from CTIO. The typography, palette of colours and graphic devices used to collect and present information in the map surround, were further developed into a visual identity program to be applied to map indexes, information brochures, displays panels, power point templates and our on-line presence.

Recursive Categorical Insertions

Map data was reorganized based on constructed graphic signatures. Each information type was collected and represented through a meaningful graphic form and an appropriate colour story.

There were reassignments of some components and full shifts of colour for entire categories. An illustration of this strategy at work is the intervention that realigned all 'land' features. Formerly, a texture of small black dots was used for sand that occurred at the shoreline in water; a texture of small brown dots was used for sand that occurred at the shoreline on land. The correction unifies sand and sandy land features through a palette of textures based on small brownish grey dots.

Precise interventions produced variations on the idea of sand that then serve other 'land' features such as alluvium through selected changes in size and colour, as well as moraines and glacial debris through selected changes in colour and variation of shapes (Figure 19). Eskers and pingos are captured within the category when they take up the same brownish grey colour. Further to this, those map features that are built but maintain a close relationship to 'land' (dykes and causeways) are also inserted into the category of 'land' with the same graphic signature. The largest 'land' feature, contours, has also been reassigned to the graphic signature, now appearing as a soft grey.

Figure 19. Recursive insertions in the ‘land’ category: sand, gravel, alluvium and moraines (600%)

These categorical insertions operate recursively, with one meaning (colour) being embedded with another meaning (form) to produce an easy to read compound meaning. This is an open system that is able to absorb further amendments and anticipated needs.

This method served as an organizational strategy, rather than as a totalizing theory. Full integration was not possible for some information categories. Several forces were in play when the road network symbol library was built: the colours needed to be red-light readable; the internal hierarchy needed to be given clearer expression; the full symbol library needed separation from other cartographic line symbols. With these forces acting on the symbols, an ideal solution was elusive. After several attempts using various combinations of line colours from ochre to reddish-brown, the result works well enough, within its circumstances, to remain a viable response to the design question.

Conclusion

Art direction for CanTopo took full advantage of design theory and design research to distill, organize and present geo-information, freeing it from the machine and making it ready for the considerations of a human audience. CanTopo makes a conscientious break with any reliance on technique-of-the-moment. Advances in communication quality relies on well-considered and meaningful design, rather than abrogating those responsibilities in favour of any technological “solution in search of a problem”.

The work benefited from the advice of the senior technical staff. Our investigations were able to take advantage of the momentum represented by that knowledge. This grounded our work in the traditions of the agency, thus making CanTopo a relevant part of trajectory of the Canadian topographic mapping project.

Activity-centered design was critical when redesigning the surround. This strategy moves beyond only providing the information. It extends its concern to creating clearly defined performance paths and avenues of approach for users. We searched for ways to open up paths of approach for users and design devices to promote the ease of use of the map. The “librarian’s block”, the curated map cover, and connective devices, the newly articulated neat line, are all examples of this activity-centered design effort.

New type for CanTopo was highly considered. Plotting at retail outlets is a critical part of the new distribution process; the choice of Stone Sans and Stone Humanist serve to solve the technical limitation of plotter resolution. Additionally, Stone’s friendly and welcoming character helps position CanTopo as the next generation of Canadian topographic maps.

Operational exchange is a proposition for a new relationship with geo-information. With the dissolution of metaphor as performative idiom, and the refusal of medium as visualization determinant, maps return to being vehicles for information, rather being disassociated products. Meeting the reader’s expectations of the information is what is

essential in this new approach. It is what will let the user of CanTopo products reset their focus on the information rather than the mechanics of delivery.

The communication potential of CanTopo was advanced by extending our research into creative fields other than cartography. This engagement with the broader design arena enriched our perspectives as participants/users in both material and non-artifact contexts. When framed by a rigorous critique, this new insight had great currency in propelling the design and art direction of CanTopo forward. It is hoped that the design praxis represented by CanTopo will inspire others to make design praxis an essential component of their work.

References

Canadian Geographic, Fick S., cartographer, Harris E., editor, Ottawa, Canada

Curtis W. (1996). *Modern Architecture since 1900*. Phaidon Press, London p 520

Dieter Rams, head of design at Braun for more than 30 years, works according to a strict functionalist edict which he sums up very succinctly: “Less, but better.” His ten commandments for good design are listed here. 1. Good design is innovative; 2. Good design makes a product useful; 3. Good design is aesthetic; 4. Good design helps a product to be understood; 5. Good design is unobtrusive; 6. Good design is honest; 7. Good design is durable; 8. Good design is thorough to the last detail; 9. Good design is concerned with the environment; 10. Good design is as little design as possible.

Francis K., Williams P. (2007). ‘dancing_without_gravity: a story of interface design’. In: Gartner G., Cartwright W., Peterson M. (eds) *Location Based Services and Telecartography*. Springer, Berlin pp 317-328

Hogarth W. (1971). *The Anaysis of Beauty*. Scolar Press, Menston, UK p 49

NTS 41A/10, Owen Sound Prototype, Her Majesty the Queen in Right of Canada, 1996

Scher P. (2005). *Make it Bigger*. Princeton Architectural Press, NYC p 134

Tufte E. (1983). *The Visual Display of Quantitative Information*. Graphics Press, Cheshire, CT p107

Rampley M. (2005). *Exploring visual culture: definitions, concepts, context*. Edinburg University Press, Haymarket, Australia p 58