Taking gCOAST Innovations to the Marketplace

Full Presentation for the gCOAST Workshop

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This is a Detailed Summary of a Presentation in Words

- This is a short, point-form, version of a paper
- It does not have pretty pictures
- It does not have fantastic graphics
- It is not visually appealing…and for these weaknesses we apologize….

...but what we present here contains a great deal of what we hope will be useful information!

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The Basis of this Presentation

- Formal and informal assessments of the growth of industry in remote sensing and geomatics over the past 30 years
- Studies of the movement of research into the commercial domain in remote sensing and geomatics - both in general and specifically (including contracts for GEOIDE)
- Direct involvement in the establishment and funding of new ventures, including serving on Boards of Directors, advisors to investors, consultants to various parties, and as investors
- The academic study of the enterprise and new ventures with a science and technology focus including MBA S&T course materials from Queens University: "The Entrepreneurial Venture" Harvard Business School Press, "Some Thoughts on Business Plans" by William A. Sahlman (Readings for the Harvard MBA Program).

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Some Words of Caution

- We are not going to turn you into business people or entrepreneurs – we are not even going to try!
- This is a only brief introduction – but the main lessons are easy to learn
- It is putting all of this into practice that is the hard part!
- While we hope some of you will be excited and start your own businesses, we also hope that some of you will be convinced not to do so – being an entrepreneur is not for everyone!

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Overview of the Presentation

- gCOAST background
- What is “commercial”
- Ways to take research commercial
- Stages of development of the commercial idea
- Some examples
- Advantages of various ways to take research commercial
- Determining the potential for successful commercialization
- Some questions to ask yourself

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gCOAST Scientific Objectives in the Commercial Context

- Improved coastal models for calculating extreme sea levels and shoreline changes
- Provide probabilities of extreme sea levels and lake levels
- Provide erosion and flood maps for critical regions
- Enhance models for flood prediction, emergency response, natural hazards and disasters
- Quantify the impact of environmental hazards on critical road transport
- Produce GIS maps showing human perception, response and vulnerability to identified hazards and risks in urban areas

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Are these the same as the objectives presented on the gCOAST web page?

Yes and no!

- Yes, they cover many of the essential topics.
- No, the words are changed and the text shortened to be more easily understood by:
  - People with problems like the project's focus
  - People with money
  - Potential industry players
- Why the changes? To attract commercial interest, to get more news coverage, & to avoid scaring off potential supporters…you must speak the other person's language!

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What is commercial?

- Something the market (consumers, other companies, governments, NGOs) will pay for
  - Can be a product (e.g. software or hardware)
  - Can be a service (e.g. making maps)
- Usually sold by a company or business
  - Requires investment (of time, people, money)
  - Usually strive for a profit
  - Requires an on-going market to make a sustainable enterprise
- New ideas for products or services are often taken to market by entrepreneurs
  - Risk takers
  - Low % achieve high success (under 10%)
  - Techno-entrepreneurs

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The Most Important Single Lesson You Can Learn from our Experience

- Read information on being an entrepreneur…it is not easy to be one!
- The key factor leading to success appears to be early contact with industry players at both the **corporate** and **operational** level to determine what the real strategic operational problems are.
- The researchers who then direct their research teams to **solve the underlying research questions** building on but not duplicating other research seem to have results that are commercial sooner, with better and earlier uptake from industry. A further benefit is that students from such teams are hired faster, leading to even more research.

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In other words….

- There are no easily identifiable winning areas or topics in geomatics, only winning approaches

Having said that….

- Technology related to making things more efficient – including identifying precise location, tools and services related to the environment, and decision-making all seem to be promising
- While society may "need" them tools and services related to the "public good" tend to be less well supported in the business environment

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Step # 1

Before you decide to spend money or do anything else…
Decide what stage of development the idea is at

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Stages of Development Moving Towards Commercialization

- Theory/idea - the first step – take it in the right direction!
- R&D
- Prototype designed (service or hardware)
- Prototype built (service or hardware)
- Prototype tested
- Engineering version built
- Beta test
- Fully functioning, ready to be sold or used

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Is the Supporting Technology ready?

The fundamental question before assessing stage of development – is the supporting technology in place to make the R&D work in an operational setting?

Two examples

- The case of Bob Ryerson's Ph.D. – only R&D
  - Approach to image analysis developed
  - Worked with visual analysis
  - Computers not ready until 15 years later
- The case of Dr. El-Sheimy's GPS System - Prototype
  - R&D done, prototype designed, built and tested
  - The prototype requires a van to carry the equipment
  - Must be miniaturized and engineering system must be built

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Three Ways to Take Ideas Commercial: License, Use Existing Company, Build a New Company

- License software or hardware or other intellectual property (royalty returns to inventor or inventor's agency)
- Approach an existing company to build/sell software, hardware, or service based on the research (may be on a license)
- Start a new company to build/sell software, hardware, or service based on specialized technology or a specialized understanding of a process coming from the research

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Some Canadian RS/GIS Examples of Researchers Taking Ideas to Market by Forming Companies

- MDA – Dr. John MacDonald, University if British Columbia
- Optech – Dr. Allan Carswell, York University
- DIGIM etc – Prof. Guy Rochon, Laval University
- Caris – Dr. Salem Masry, University of New Brunswick
- Itres – Dr. Cliff Anger, University of Calgary
- Geotango – Dr. Vincent Tao, York University

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Advantages and Disadvantages of Approaches

- Royalties/license benefits
  - Lowest cost, lowest return, least risk, least change, lowest probability that significant use will result
- Existing company
  - Low cost, low return, risk reduced (reputation?), success will depend on company's management
- New company
  - High cost, high risk, significant change in personal life (even if company not a full-time" endeavour), but some find it a wonderful experience!

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Licensing

- The intellectual property (IP) resulting from research is used under license – the user pays a set fee for each product sold, each use, or access to the IP
- Based on protection of unique IP - technology or ideas: patents, copyright, etc
- Examples:
  - CCRS work on geometry of imagery by Dr. Toutin
  - Radar processor sold by MDA

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Find An Existing Company

- Identify a partner/company in the private sector with which to work to take the idea commercial
- Finding the right partner can be difficult – they must be:
  - the right size (not too big, not too small)
  - Be in the right market
  - be committed to your idea (…need your idea)
  - have sufficient resources to make the opportunity work
- Partners can change objectives, strategies, and level of commitment to an idea – and do so very quickly
- You have to evaluate partners using many of the same criteria that investors use to evaluate an investment…and you need contracts and lawyers.
- The easiest way to explain this is though the study of some examples.

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Two examples

- A good result – river environmental assessment
  - Company with appropriate resources to commit, interest and supporting in-house capability (GENIVAR > 1200 employees)
  - Operational and senior corporate level support
  - Good fit with existing business and client interest
  - Willing to invest time, effort, and money
  - Successful new business area supporting further R&D
- A not-so-good result – natural resource modeling
  - Small company with interest and operational support
  - Good business fit
  - Management and client support
  - When software found not to be operational on their systems – no resources to invest in modification
  - Company and client lost interest, support waned
  - Opportunity lost – to the company, researcher, and the industry that would have been made more efficient

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Starting a New Company

- This is the topic we will follow for most the rest of this presentation
- Many books and papers have been written on the subject
- We have read many thousands of pages
- We have been involved in studying hundreds of companies and ideas, involving many millions of dollars of investment – some of it our own!
- We hope to show the problems …and joys… of starting a business

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A Framework for Determining the Potential for Successful Commercialization

- The People (inside and outside the venture: employees, suppliers, backers, etc);
- The Opportunity (what you are investing in in the hopes of an eventual return);
- The External Context (law/regulation rules of the game, macro industry trends);
- The Deal (relationships among and between the venture and resource providers – money, ideas, management).

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Most researchers may not believe what I am going to say, and certainly will not like the next thing I am going to say,

but even if you don't,

it is still true….

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People matter most…

Prospects for success in a business have relatively little to do with the actual idea, and much more to do with the people on the team, the dynamics of the environment, and the quality of execution.

A good team can fix a bad idea, but a poor team will end up in failure no matter how good the original idea was. Remember the natural resource example!

To repeat, your idea is not as important as the people involved in taking the idea commercial, including you!

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The People in the Company

- This is where anyone looking at your business plan starts. They do NOT care what business you're in or how good your idea is.
- Most successful entrepreneurs have two key characteristics: they are KNOWN, and they KNOW. You need contacts – good ones.

Some Quotes from investors:

- "I'd rather back an A team with a B idea than a B team with an A idea."
- "I invest in people, not ideas."
- "If you can find good people, if they're wrong about the product they will change products - so what good is it to understand the product that they're talking about in the first place?"

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Some Questions to Ask Yourself:

What are your long term goals?

- Focus on research
- Turn new opportunities over to others to exploit commercially
- Continue research while developing commercial interests
- Leave research to enter the business world
- Develop a commercial entity – become an entrepreneur
  - Part-time
  - Full-time
- Retain some commercial income to fund further research
- Spin off commercial activity and obtain royalties to make some quick cash
- Build an enterprise that will grow and prosper after I'm gone
- Build an enterprise for medium-term sale to someone else so I can come back to research or try something else

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Some Questions to Ask Yourself

What risks and changes are you willing to accept to meet your business goals?

- I am comfortable doing what I do now
- I am willing to take some time to work on my ideas
- I would consider leaving research to risk a new business full time
- I would invest my own savings / borrow money / mortgage my home to get started
- I like the idea of becoming a manager, hiring and firing others, and making decisions
- I look forward to the idea of spending time on organization, procedures, mentoring, and building a positive culture
- I am willing to work long hours to get over the inevitable hurdles
- I'm ready to depend on others (investors, marketers, suppliers) to develop my ideas into a business

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Some Questions to Ask Yourself

(if you have not been scared away already….!)

What measures have you taken to build the team?

- We're hoping people will be attracted to us once we've raised money
- We've got plans and resumes but no commitments yet
- Our engineers are among the best in the world
- The best engineers in the world are lined up to join us once we launch
- A world-renowned expert has leant his name to our business or product
- Some of the key players in the industry are on our Advisory Board
- What's an Advisory Board?
- We're comfortable sharing the glory and profits with all the people we'll need to hire once we start growing

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Some questions You will be asked about the people in the new venture (or company)

- Who are the founders?
- What have they done in the past?
- What directly relevant experience do they have for the opportunity?
- What skills do they have?
- Who do they know, and who knows them?
- What is their reputation?
- How realistic are they?
- Can they adapt as circumstances warrant?
- Who is missing from the team, and can they be found?

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Some more questions You will be asked about the people in the new venture (or company)

- Are they prepared to recruit and accept high quality people?
- How will they respond to adversity?
- Can they make the inevitable hard choices that will have to be made?
- What are their motivations?
- How committed are they to this venture?
- How can I gain objective information about each team member?
- What are the possible consequences if one or more team members leave?
- What "sweat equity" have they demonstrated?
- Have they shown that they have "Skin in the Game" (i.e. Personal stakes)?

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The Opportunity

- First, general question - is the total market large and/or rapidly growing?
- Second general question, does the market have the potential to be structurally attractive?
  - How many possible customers are there?
  - What is their size relative to suppliers - large customers tend to squeeze their suppliers.
  - How many competitors are there and what is their typical profit margin?
  - How long are product life cycles, and how much must be spent on R&D on an ongoing basis?
  - What will happen in the event of a major shift in technology or customer base?
  - How fierce are existing rivalries?
  - How much front-end investment is required?

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Viability

How VIABLE is this opportunity? If we're successful, how far could it go? Is there a good chance that what we make will be more than what it costs to get there?

- There are only a few potential customers, and they can't afford or won't pay much
- There are plenty of possible customers, but the yield from each one won't be huge
- There are a few niche players who want our product, but they'll pay big bucks
- There are really a lot of clients who need this, and they'll pay handsomely for it – they have no choice!

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Attractiveness

How ATTRACTIVE is this opportunity? We're looking for low investment with high payoff, multiple chances to win, and varied exit opportunities.

- There's not that much up-front investment required, we'd be making money (cash flow positive) almost right away!
- If it doesn't work the first time, we're finished…you only get one shot
- We need a lot of help to get going, and it will be slim pickings for quite a while
- It's a big upfront investment but the upside is HUGE once customers catch on!
- If the first version fails, we can re-jig it for another use or another market
- Low start-up costs, but there's a lot of competition and the pressure is fierce
- The product is so good that even if we can't compete with the big guys, one of them will buy us out anyway

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Specific Questions to Ask About the Opportunity

- Who is the customer?
- How does the customer make decisions?
- To what degree is the product a compelling offering for the customer – will they want or need to buy?
- How will the product be priced?
- How will you reach the identified customer segments?
- How much does it cost (time and money) to acquire a customer?
- How much does it cost to produce and deliver the product?
- How much does it cost to support a customer?
- How easy is it to retain a customer?
- When do you have buy resources?
- When do you have to pay for them?

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Some More Specific Questions to Ask

- How long does it take to acquire a customer?
- How long before the customer pays?
- How much investment is needed to support a dollar in sales?
- Who are the current competitors?
- What resources do they control? What are their strengths and weaknesses?
- How will they respond to our arrival?
- How can we respond to their response?
- Who else might be able to observe our entry and exploit the same opportunity?
- Can we co-opt actual and potential competitors by forming alliances?
- Can entry barriers be built and maintained?
- ……and there are many more questions one will be asked!!!

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The External Context: Political

- Politically:
- No concerns about interference
- Lenient/stable politic regulatory framework
- Aggressive and highly scrutinized political concerns
- Doing business in the industry is heavily politicized
- Government openly and aggressively competes

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The External Context - Economic

- Companies are going broke in this industry
- There's renewed or growing interest from customers and competitors
- No change really, year over year
- Investors are lining up to back new ideas and new starters
- The other players are getting rich
- In a downturn the market for what we sell gets better, not worse!

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The External Context - Social

- It is a hot new trendy area in which to work
- Enough people are interested to keep the industry growing slowly
- Our business is a household word…we're on the cover of the national newspaper
- People are leaving the industry for better money or better jobs elsewhere
- Like the dinosaurs, this business area is almost extinct

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The External Context - Technology

- Nothing new, but we can do the same thing better or cheaper
- There's some innovation to keep the R&D department busy
- New trends are sparking new businesses and spin-off ventures
- Every new development comes sooner than the last
- Any new technology immediately destroys the market for the old stuff

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The Deal

- simple
- win-win
- short documents, based on trust more than lawyers
- robust enough to survive if conditions change somewhat
- do not provide perverse incentives to make any party act destructively
- do not foreclose on possible valuable options

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Characteristics of Successful Businesses

- World class managerial team from top to bottom across all relevant functions;
- People whose skills and talents are directly relevant to the opportunity
- Ideally a team that has worked together in the past
- An attractive, sustainable business model: they can create a competitive edge and defend it;
- Multiple options to expand the scale and scope of the business, ideally these options are unique to this opportunity and team;
- Multiple ways to extract value by harvesting positive returns or liquidating negative outcomes
- A favourable regulatory environment and macroeconomic situation
- Simple, robust deals that bind people to the enterprise with the right incentives
- Backers who add value in addition to capital – and additional staged capital when needed

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Returning to you, the researcher…

Some things to think about…

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What role has industry played to date?

"No role" is the wrong answer!

- Advisor on key "real" problems to be solved
- User of outputs
- Partner and source of in-kind funding
- Partner and source of cash funding
- Full participation
- Contracted research work to us
- Hired our students

If none of these – get industry involved, but only after you know how you will protect your IP!

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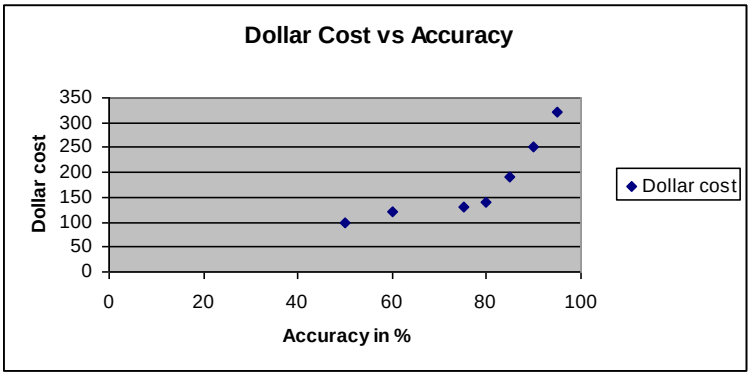
When to Take an Idea Commercial

- As early as possible…avoid the perfection trap!



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What customer involvement has taken place to date?

- They haven't seen it yet
- They've expressed interest in general terms
- They like the idea, but haven't sent any money yet
- They're lining up to place pre-orders
- We've got prototypes or beta versions in customers hands
- We've got letters of support and interest
- We've got customers willing to help us financially
- We've got customers helping by spreading the word and showing off our product

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Conclusion

Researchers in geomatics and geo-information can make their research more useful and their work more rewarding – both financially and intellectually, by trying to solve the real needs of real people. Industry is a good place to start, as are customers.

You do not need to start a company to benefit from this approach…but starting a company can be rewarding and fun!

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