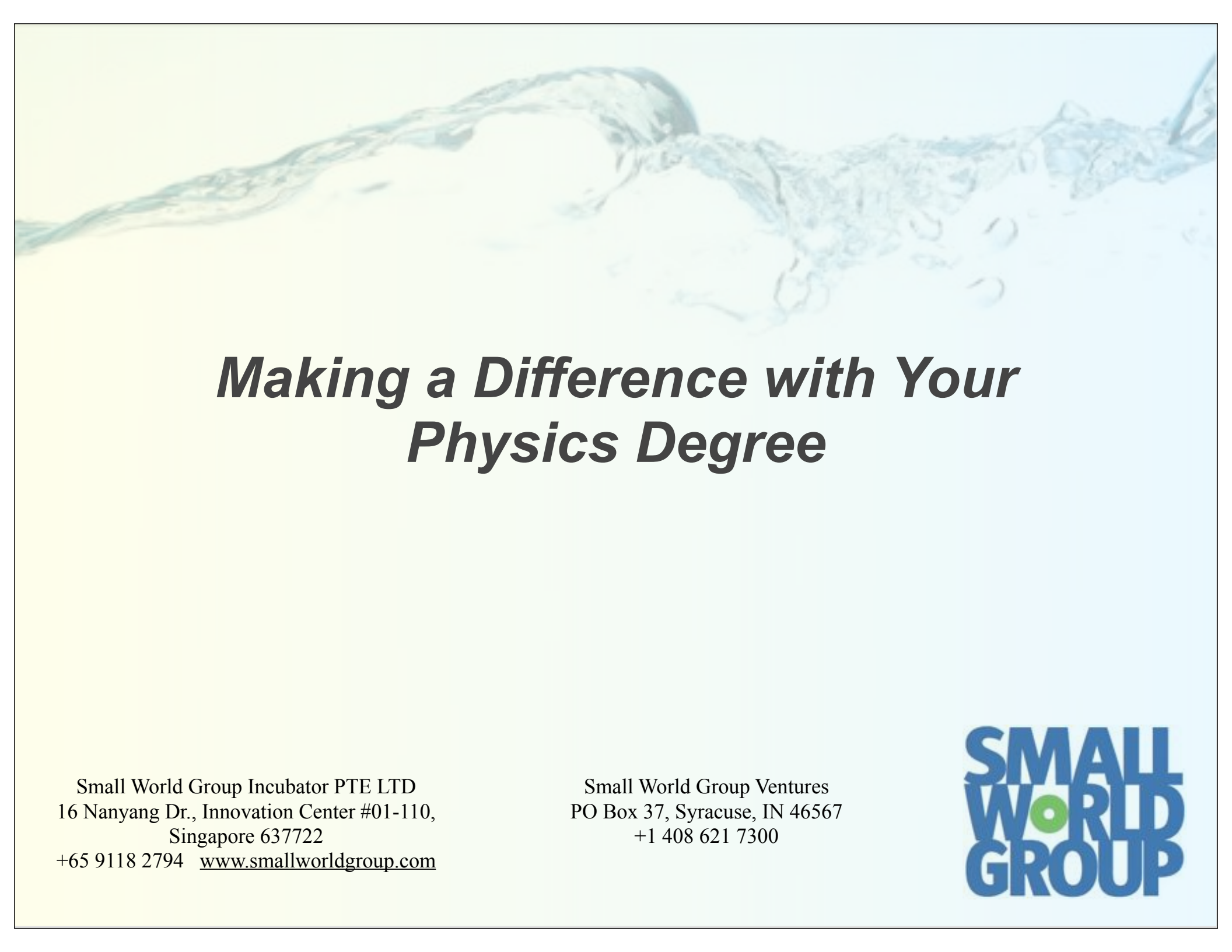


A dynamic splash of water in shades of blue and white, creating a sense of movement and energy, serves as the background for the slide.

Making a Difference with Your Physics Degree

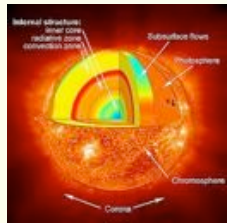
Small World Group Incubator PTE LTD
16 Nanyang Dr., Innovation Center #01-110,
Singapore 637722
+65 9118 2794 www.smallworldgroup.com

Small World Group Ventures
PO Box 37, Syracuse, IN 46567
+1 408 621 7300



There are many ways to make a difference!

where are you along this continuum?



Astronomers knew the sun did not work by any known physics around 1880.

But they did nothing more than tell physicists.



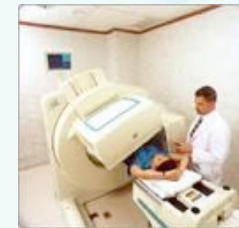
Theoretical physicists had a reasonable framework for this by around 1920s

They told some experimentalists.



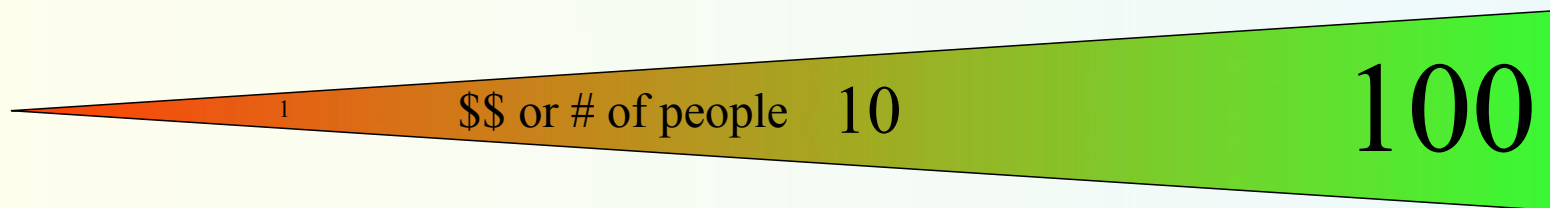
The experimentalists made some limited but practical devices.

And then speculated that much more was possible.



Engineers took over and built many useful inventions and sold them at a profit.

Though there are still some bugs.



FHL Personal Timeline

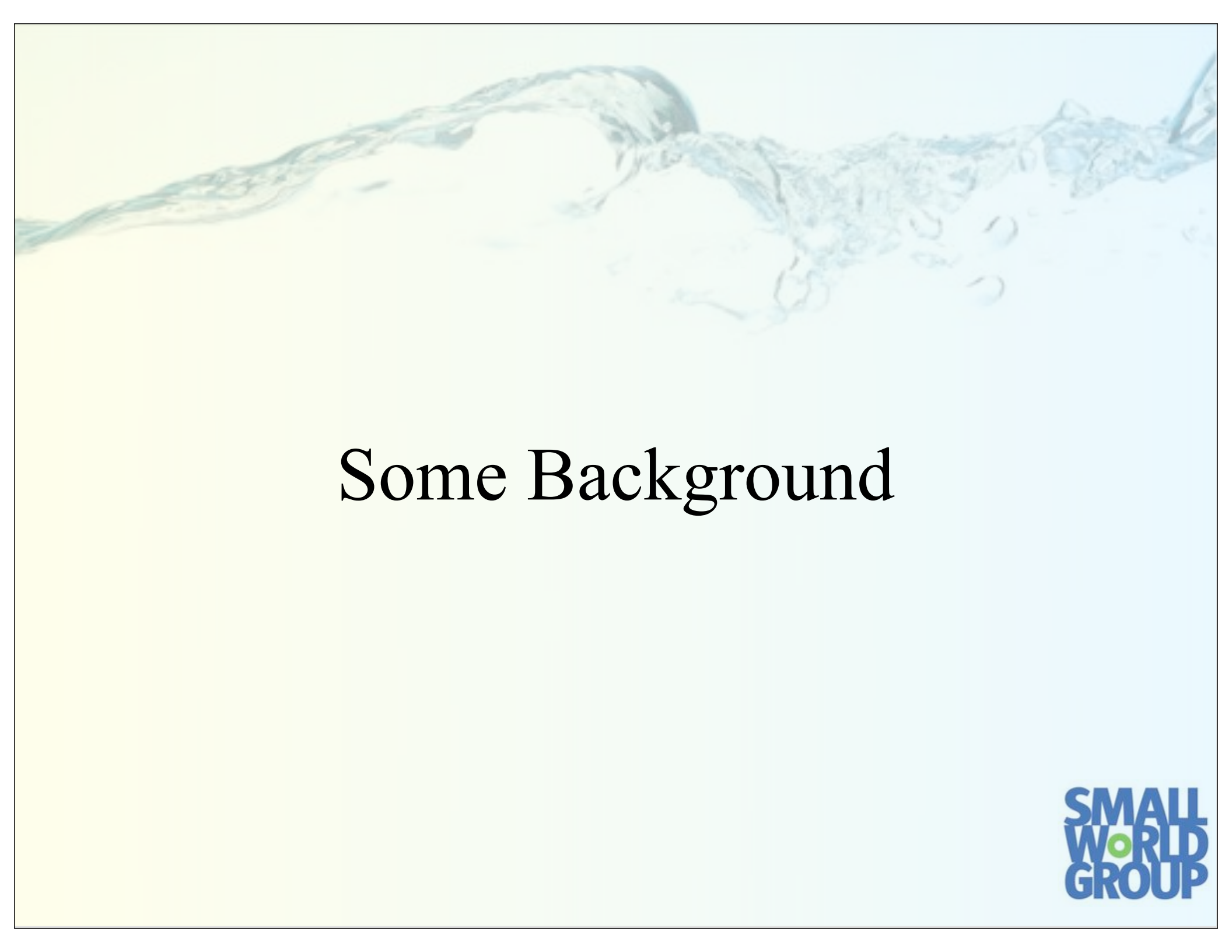
1970s

1980s

1990s

2000s

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A background image showing a dynamic splash of water, with droplets and ripples, set against a light blue and white gradient.

Some Background

- 71-75 BS in Physics and Mathematics, Butler University
- 75-80 MA, PhD in Astronomy, Virginia
- 80-84 Bell Labs, Fiber Optic Components
- 84-85 Netek - failed startup, well funded!
- 85-88 Raychem/Raynet - great Silicon Valley Introduction
- 88-06 Finisar
- 06-xx Small World Group



A background image showing a dynamic splash of water, with droplets and ripples, set against a light blue and white gradient.

Small World Group Ventures (SWGV) invests in companies . We focus on CleanTech, optics, communications and materials.

Our -

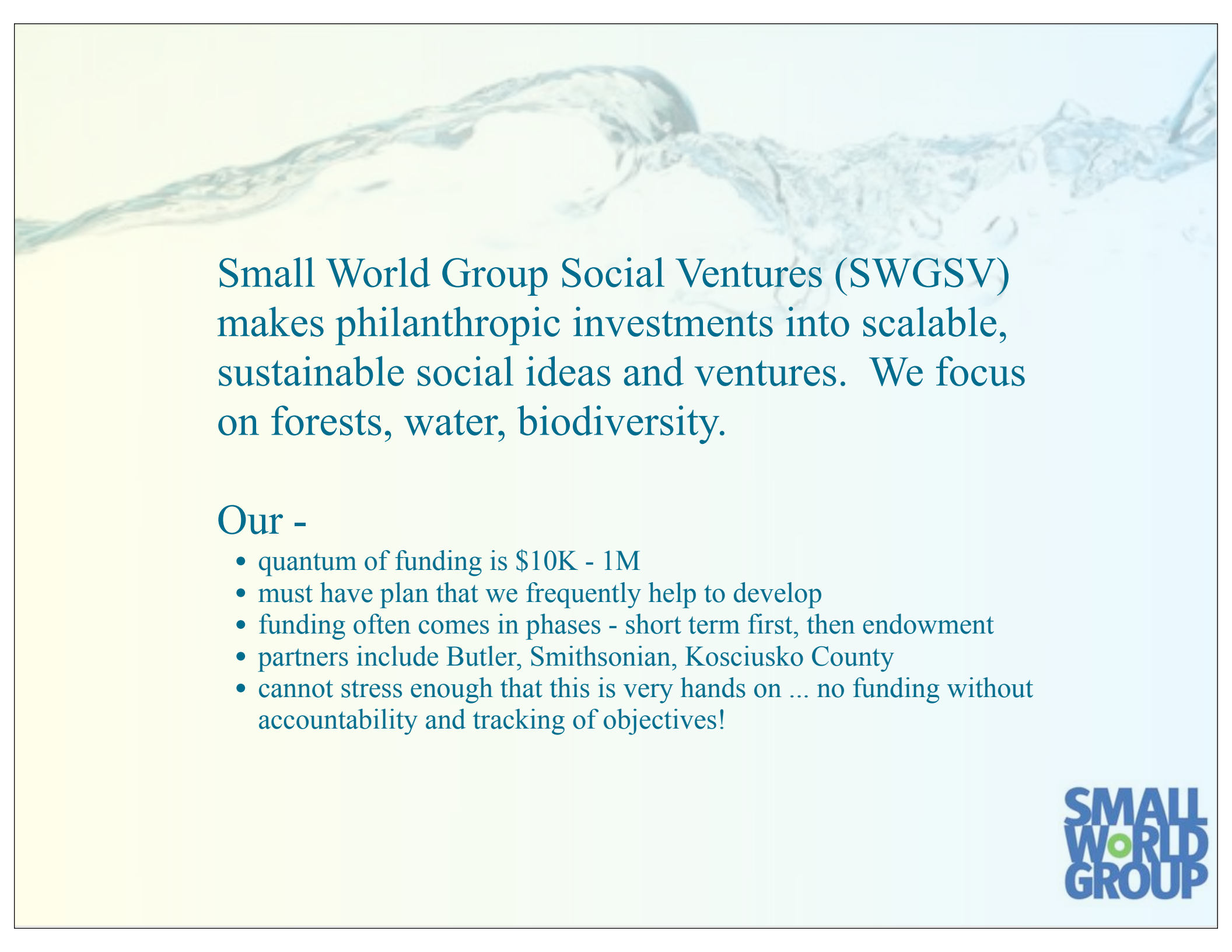
- quantum of funding is \$250 - 500K
- have invested in companies in IN, CA, PA, UK
- almost always co-invest with others
- companies achieve first product as well as first revenue

A background image showing a dynamic splash of water, with droplets and ripples, set against a light blue and white gradient.

Small World Group Incubator (SWGI) operates a start incubator in partnership with the Singapore government. We focus on CleanTech, optics, communications and materials.

Our -

- quantum of funding is S\$600K
- team size is 4-6 people
- funding typically lasts 12-18 months
- companies achieve first product as well as first revenue
- rate of funding is now about 1 company per month

A background image showing a dynamic splash of water, with droplets and ripples, set against a light blue and white gradient.

Small World Group Social Ventures (SWGSV) makes philanthropic investments into scalable, sustainable social ideas and ventures. We focus on forests, water, biodiversity.

Our -

- quantum of funding is \$10K - 1M
- must have plan that we frequently help to develop
- funding often comes in phases - short term first, then endowment
- partners include Butler, Smithsonian, Kosciusko County
- cannot stress enough that this is very hands on ... no funding without accountability and tracking of objectives!

A background image showing a dynamic splash of water, with droplets and ripples, set against a light blue and white gradient. The water appears to be moving from the top left towards the right.

Are You Right For This?

Key Questions!

Have You Worked ?



McDonalds



Old Navy



Home Depot



Walmart

Did you work in businesses where you engaged with the public every minute of the job?

Could you handle it?

Business starts with customers and that means you must like engaging with people you have never met.

Do You Like to?



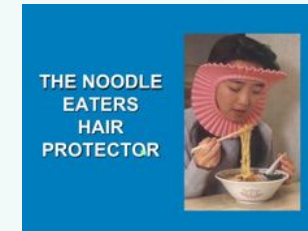
Repair your car



Code S/W



Design your home



Invent

Physics can be training for your head ...

That you take to different fields. The rules of physics apply everywhere. Right?

But you have to like playing with ideas and interacting with people called customers



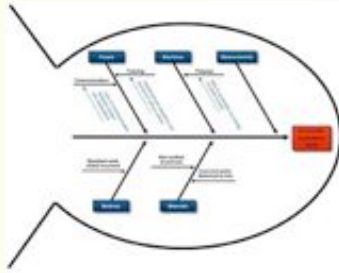
Can You Sell Yourself?



Be less professorial -

- what you don't know you can learn; I learned nearly all of fiber optics (no classes ever)
- you bring a fundamental perspective to every problem
- you can quickly help groups see the key issues and focus efforts on proving feasibility
- cutting through problems like this can bring products to market faster!

Must Want to Work on Other's Problems



First of all, the problem you will work on will be specified generally by others = bosses, customers



In general, your work will only be a piece of a larger puzzle or solution.

Others in your group can help you with your work, collaboration is no longer “cheating”



You cannot retreat to a cave and work in isolation until you like the solution.

You will have deadlines, reviews, partners and others who need your work to be on time.

A background image showing a dynamic splash of water, with droplets and ripples, set against a light blue and white gradient. The water appears to be moving from the top right towards the left.

Challenges & Solutions

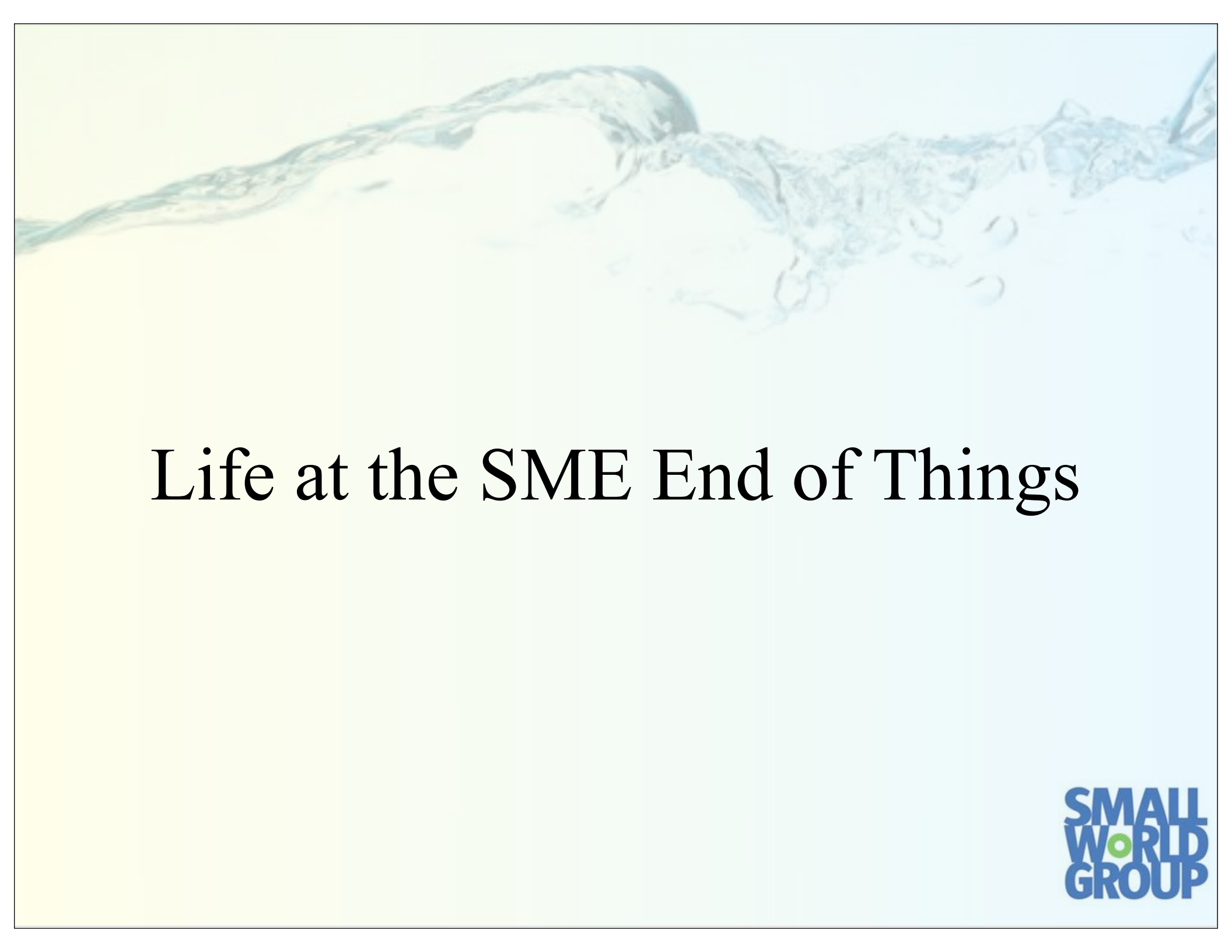
GM/GE or SME!



Highly structured big companies with large existing markets are not driven to innovate into these new areas. They stand to lose existing business.



Little start up companies are places where this can happen. We are looking for such companies and entrepreneurs to work with and fund.

A background image showing a dynamic splash of water, with droplets and ripples, set against a light blue and white gradient.

Life at the SME End of Things

We Form and Work with International Teams



There is opportunity for professors, engineers, students interns to work in our startups, especially if they want to work in areas of the world where much help is needed.

Small energy, water, waste solutions have more value in areas where the needs are greater. This does not mean they have lots of money to spend, but the value of 1 watt of solar power is much higher in 3rd world off-grid areas.

There is a “Medici Effect” when smart people from one area confront problems new to them in another region ➔ Creativity happens!

We Re-Architect Systems



We forget that the first cars had all sorts of different steering systems. Inventors tried reins (horse & buggy), handle bars (bicycle), foot pedals, and finally steering wheels like in large ships (unexpected if you think about it)

It will be the same with CleanTech and other needs in the world today.

We must look for non-traditional ways to re-imagine how energy, water, waste and agricultural systems can work.

Early adopters will more likely be people and cultures who need to take a risk to advance; less interesting markets in Europe and USA, more interesting in Africa and South Asia.



We Question Fundamental Assumptions



Someone told me once that toilet paper may not be sustainable ...



That was something that I never EVER considered.
What things do we have today that may not be a sustainable practice? How do we change our thinking and invent new ways to become sustainable?

Incubator Deal Pipeline

Concept Selection	Concept Validation	Deal/Team Formation	Due Diligence	Funding	Invested
Bio-Machines	Improved IC Engine	Unique Internet Use	Water Storage & Use System	Power Device for deep 3rd World	Energy Monitoring
BoP Communications	Env Monitoring System			Energy Storage Device	Building Energy Modeling
Bio-Harvesting Improvement					Wild Sports Gadget
					Water Use Monitoring
					Mfg Eng for CleanTech

early
effort

serious
concern

caution

full speed

operating

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Summary

There is plenty of room for physics and creativity outside of pure science.

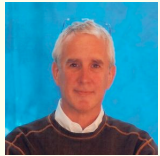
One interesting place is to look carefully at the “bottom of the pyramid”

Erase old ways from your thinking, re-envision how things can work

Both large and small companies can make contributions

Go for it!

Questions?



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