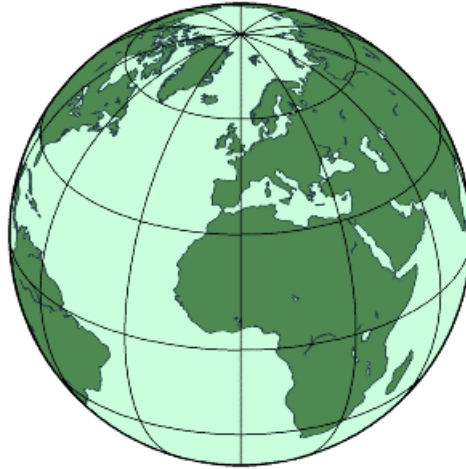


# Equations for Change



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# 1. Using equations to solve problems

# Problems faced by Brazilian farmers

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- The following anecdote is taken from:
  - Chapter 3 (“The Light in My Head Went On”) of *How to Change the World* by David Bornstein
- Small farmers in Brazil in the 1980s faced two problems:
  - Most dams and irrigation channels were owned by large land owners
  - They charged small farmers a lot of money for access to water (three times the world average)
  - Electric companies supplied power cost-effectively to cities
  - But they charged \$7000 to connect a rural farm (5–10 year’s income for a small farmer)
- These problems created a poverty trap for small farmers

# Equations

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- Fábio Rosa thought of a way to tackle the first problem:
  - He knew there was water under the farm land
  - Wells could be dug to access the water
  - The water could be pumped from the wells and used for irrigation
  - Farmers could then afford to use *water seedling*, which is a water-intensive but effective way to grow crops
  
- However, water pumps are *electric* pumps:
  - So he needed a way to *cheaply* connect farms to the electricity grid
  - He eventually found such a way that cost only \$400 (read the cited chapter for details)
  
- He expressed his ideas as equations:
  - Inexpensive electricity + wells + pumps = cheap irrigation
  - Cheap irrigation + water seedling = more efficient land use and more income

# Lesson to be learnt

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- When you want to solve a problem:
  - You might discover “X will solve this”
  - Your equation is:  $x = \text{solution to problem}$
- That is a problem with a simple solution. Great
- Many problems are more complex:
  - They may require a more complex set of equations:
    - $a + b + c = z$
    - $x + y + z = \text{solution to problem}$
  - You won't solve a complex problem if you focus only on “x”
  - This can be frustrating if you have great x-related skills but lesser skills related to other parts of the equation(s)

# Advice

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- Do *not* assume:  $x$  = solution to problem:
  - Try to determine if there are other components in the equation
- Developing an equation helps you to develop a “to do” list:
  - It helps you identify the sub-problems you have to solve
  - It also helps you identify skills you may need to develop (or find other people who have those skills)
- Explaining your equation to others can help:
  - They might spot flaws in the equation
  - If they agree your equation solves a worthwhile problem then they might get excited enough to help you solve some of the sub-problems

## 2. Using equations in your career



# Unplanned career changes

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- Fred might use the following tactic in his career:
  - Initially, he works doing job X
  - When he does not achieve success with X, he switches to (unrelated) Y
  - And when Y fails, he switches to (unrelated) Z
- That approach has two drawbacks:
  - It has a slim chance of making Fred successful
  - If Fred finally finds success with Z then he may regret the time he wasted on X and Y
- There is a better approach:
  - Think of a long term goal
  - Find an equation that leads to that goal:  $x + y + z = \text{long term goal}$
  - Choose jobs that move you towards that goal

# Reuse

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- Another way to view equations is as a guideline for reuse
- Example:
  - Fred writes a paper on a subject about which he is knowledgeable
  - Then he writes a few more papers on related subjects
  - He realizes:  $\text{paper}_1 + \text{paper}_2 + \text{paper}_3 + \text{a few more papers} = \text{book}$   
(each paper can be reused as a chapter in the book)
  - After writing the book, he realizes:  
 $\text{book} + \text{complementary slides} = \text{training course}$
  - Then he realizes:  
 $\text{training course} + \text{"I'm an author" credentials} = \text{lots of paying students}$
  - Through these steps, Fred can start a new career for himself

# Seek out opportunities for reuse

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- Always look for ways to achieve reuse:
  - “Can I reuse previous projects in this new project?”
  - “Will I be able to reuse this current project in future projects?”
- Implement a project in a way that *enables* it to be reused.  
Example:
  - A teacher’s writings on a chalk board cannot be reused
  - A teacher’s writings in a word processor document or PowerPoint slides *can* be reused
- Make sure the project can be reused by others:
  - A teacher can reuse his own *badly-written* lecture notes next year
  - But *well-written* lecture notes could be reused in a variety of ways:
    - By students, or by other teachers
    - Published in the form of a book
    - Incorporated into another, overlapping training course

# Jamie Oliver's career

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- Jamie Oliver is a well-known TV chef in England
  - A look at his career shows how he reused existing skills in new projects
- He had a popular TV cooking programme for 3 years:
  - Then the TV station dropped him
  - Here are ways he reused his existing skills to earn a living:
    - He made a cookery DVD and sold it to the public
    - He went on tour, giving a live 2-hour cooking show in theatres
    - He recorded the live cookery show and released it on DVD
- You can think of those as equations (“???” denotes new skills he had to acquire):
  - Cooking skills + TV presenter skills + ??? = cookery DVD
  - Cooking skills + TV presenter skills + ??? = tour of live cookery show
  - Tour of live cookery show + DVD-making skills = DVD of the tour

## Jamie Oliver's career (cont')

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- Jamie learned that English school dinners were junk food
  - This was causing widespread health and behavioural problems
- Summary of how he tackled this problem:
  - He worked with one school's catering staff to analyse the problem
  - He invented nutritious recipes within the limited catering budget
  - He trained the catering staff to cook his recipes
  - He convinced politicians to roll out his plan nationwide
- Of course, he recorded this project:
  - This was shown as a six-part TV show and then released on DVD (*Jamie's School Dinners*)
  - The widespread viewing of the show helped apply pressure to politicians and schools to roll out his healthier school dinners
- The steps he took can be viewed as an equation

### 3. Summary

# Summary

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- Old phrase:
  - “If all you have is a hammer, everything looks like a nail”
- If you have skill “x” then you might be tempted to think you can use *just* “x” to solve a problem
  - But there are probably other (missing) parts of the equation
- Learning to think in terms of equations is beneficial:
  - Helps you to develop a “to do” list:
    - Sub-problems to be solved
    - New skills to be acquired
  - Helps you to convince others to work with you
  - Helps you to plan your career
  - Helps you to proactively seek opportunities for reuse