



Innovation - The Human Factor

Putting innovation into practice

Dr Iarla Kilbane-Dawe

Yesterday...

We discussed two key principles that distinguish an innovation from a good idea:

1. Innovations need only be novel to the market in which they operate.
2. Innovations have to meet a market need.

Today you'll hear about **processes to develop innovations** and the critical role of **human factors** in market research and presenting your ideas.



OK so I've got an idea....

How do I turn it into a real innovation?

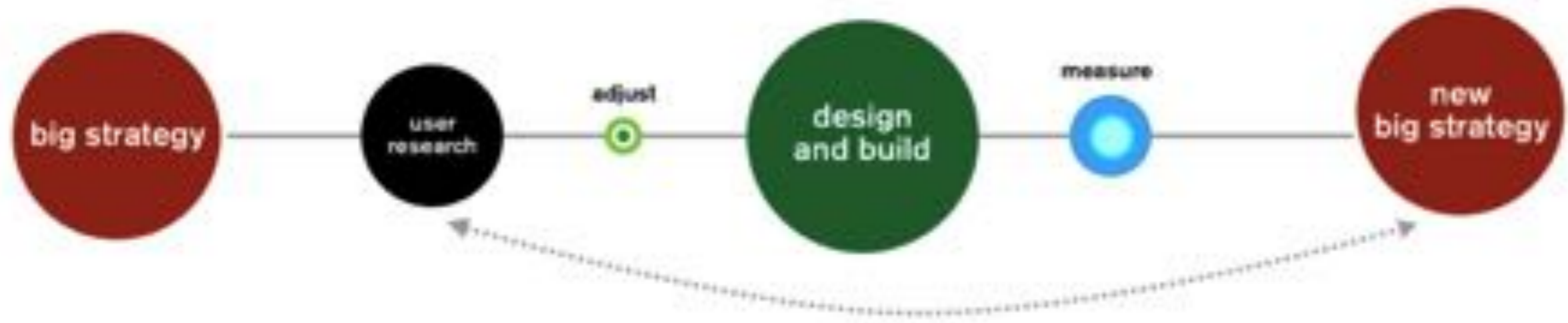
Basic steps to turning your idea into an innovation via a startup

1. **Research the market for your idea** - see if it's already being done and whether you can do it any better.
2. **Find business partners**, whose knowledge and skills complement yours (e.g. marketing, design, delivery, sales, accounts, legal, advertising)
3. Prototype the proposed innovation, **investing your own time and money** in building the prototype. It might only be a mock-up if you have little or no money.
4. Test the prototype **with real customers**. Adjust it based on lessons learned.
5. Approach **friends and family** for investment or loans. Maybe also something like Kickstarter. Develop a better prototype and test it again.
6. Approach investors. They will expect you to **invest most or all of your own savings and all the money you raised in (4 & 5)** before investing in your idea.
7. From then, you will **follow a development process**, probably decided for you by your investors.

How does innovation happen?

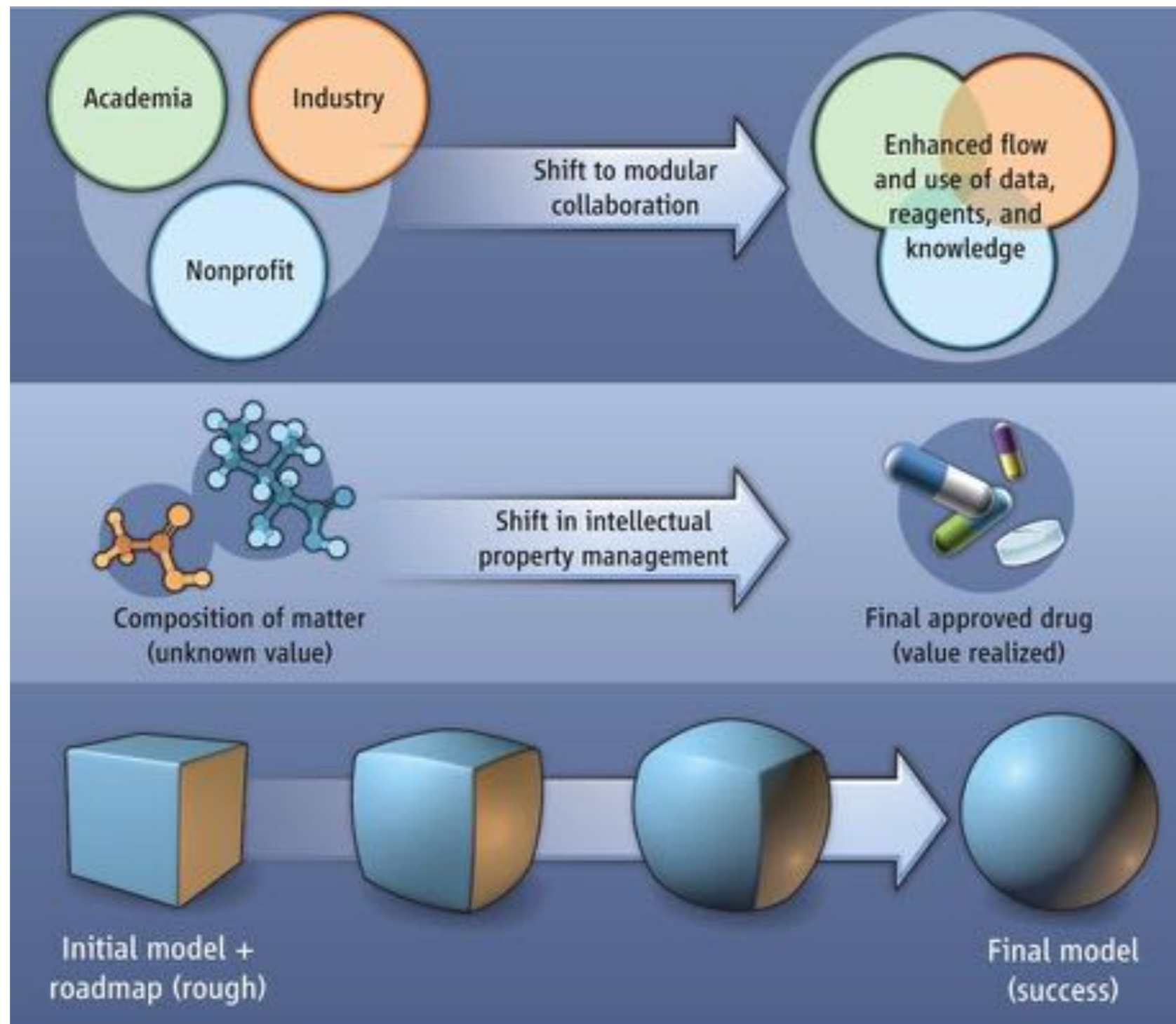
Conventional, linear development process

Big ideas, big bang launch, big budgets



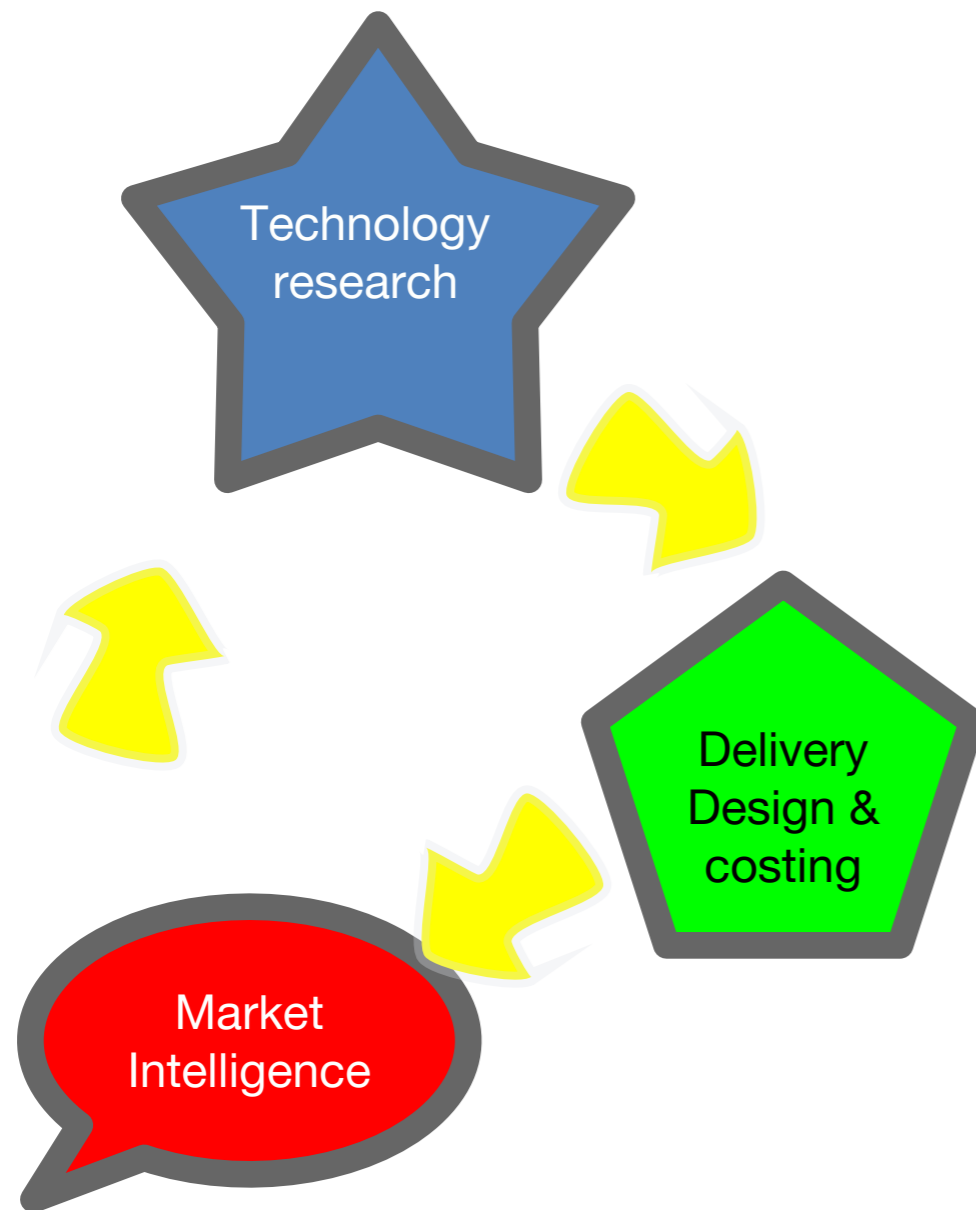
Another example

An **improved** drug discovery process



Another example

MIT **iterative process** based on IT history



1. Researching the **technology** of the new product.

2. Under what is required to **manufacture and deliver the product and what that will cost.**

3. Researching how the new idea meets **an unmet need** of customers **and what they are prepared to pay to have that need met.**

Fitzgerald, Wankerl & Schramm, 2011

Innovations take time...

**Average time to market for a disruptive innovation
in 2011 was 15 years.**

Fitzgerald, Wankerl & Schramm, 2011

At every stage of creation, refinement and testing
we incur additional costs.

- Market research
- Prototyping
- Testing
- Product design
- Process design
- Tooling
- Raw materials
- Manufacturing
- Marketing & Advertising
- Cost of selling

Innovation is expensive! And yet despite the huge investment, still 95% fail. Why?

Often because somewhere along the way people fail to research their market, or ignore the research because it says something they don't want to hear.

Good ideas are often ignored



Vertical stacks on buses

Reduce air pollution concentrations by up to 90% downwind.

- Used in US and South America since the 1980s
- Australia since 1990s
- Europe since 2000s
- UK refuses to consider this because of pre-investment in other failed approaches.

But when people listen to their customers...

High-res air pollution forecast maps

In 2003, CERC developed an air pollution forecasting system that generated daily forecasts down to 5m resolution. These used an early GMES data chain that assimilated satellite data and used high resolution inventories of traffic emissions to deliver forecasts for a persons individual location. These were **state-of-the-art** in terms of science, accuracy and utility.

Nobody bought one ...

But when people listen to their customers...

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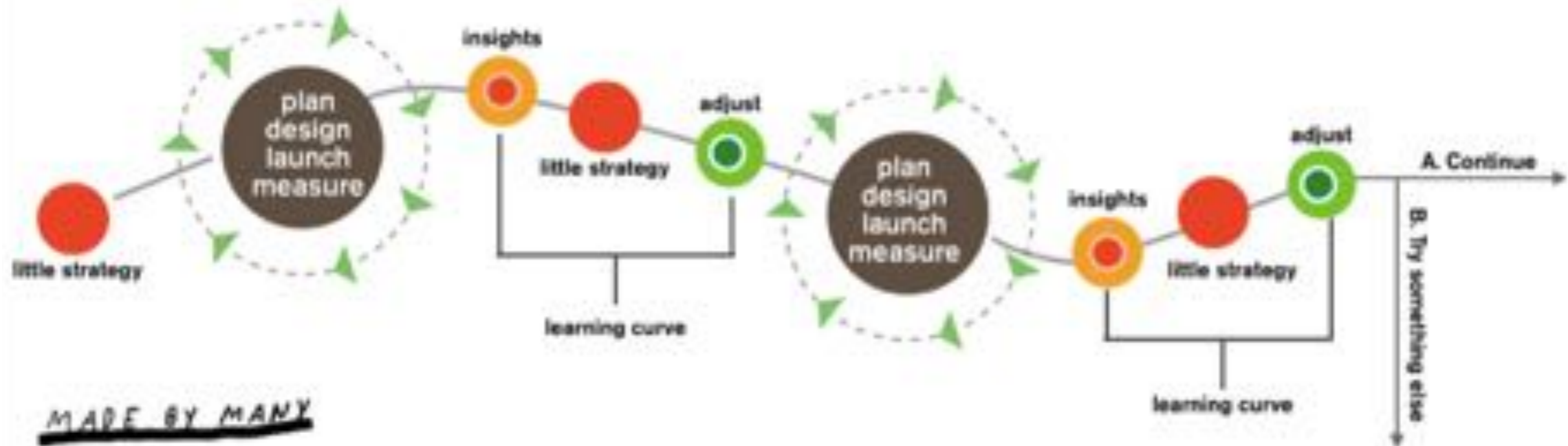
Nobody bought one ... because they wanted SMS alerts not maps! airTEXT now operates across London, Vienna, Beijing and was used for the Beijing Olympics.



Agile development process - typically used in startups

Iterative, Agile, emergent development process

Micro-strategies, big insights, rapid iterations



Exercise - using focus group research ...

How can you adapt your idea to win €100k?

| Proposed Innovation | Wednesday Score |
|---------------------|-----------------|
| Weather or Not | 29 |
| Sat-BIO Food | 22 |
| TreeDMap | 19 |
| IDAR | 18 |
| MEFITIS | 18 |
| Dr Happy | 15 |
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| MUSSEL | 11 |
| ForMore Time | 9 |
| Playground | 7 |
| Tresorometry | 7 |
| D-SEAS | 1 |

Focus group exercise (10 minutes, 5 mins each way)

Objective: Test your idea in more depth with people.

Pair with the team to your left or right and break into sub-groups of 2 or 3 from each. Take turns to be the product developers and the focus group.

First, **pitch your product to** them. Then ask them what they think. **Don't try to convince them it's good.** The point is to **learn what your clients want rather than what you want to sell them.**

Use some or all of these questions:

- How convenient would it be to use our product?
- Do they think other people would use our product?
- Does your product give them more control in some way?
- What are the consequences of not using your product?

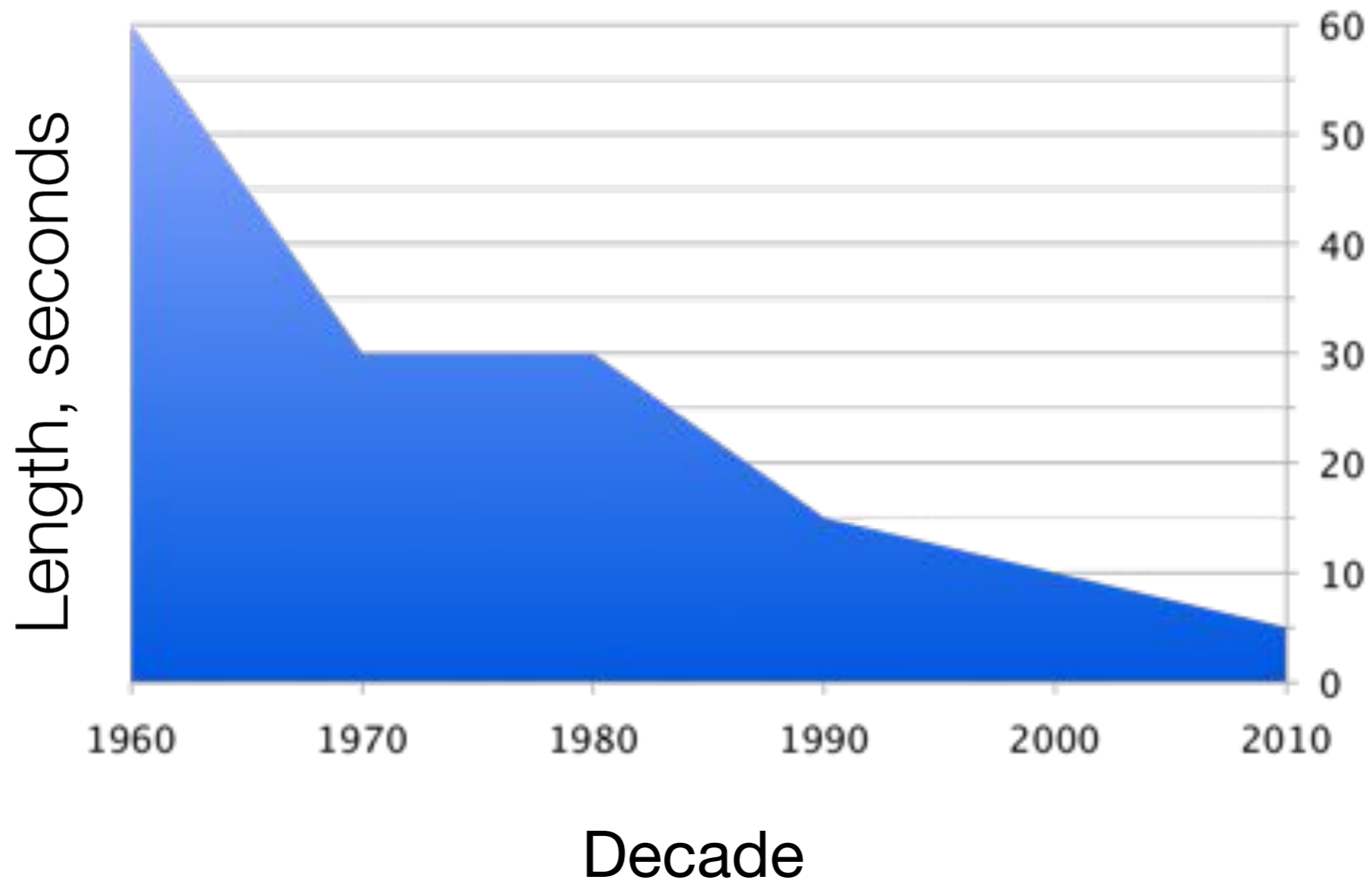
In science we are used to ...

- Being listened to for long periods and taken through detailed and often obscure explanations.
- Having an audience that is highly literate and prepared to make an effort to comprehend what we are telling them.

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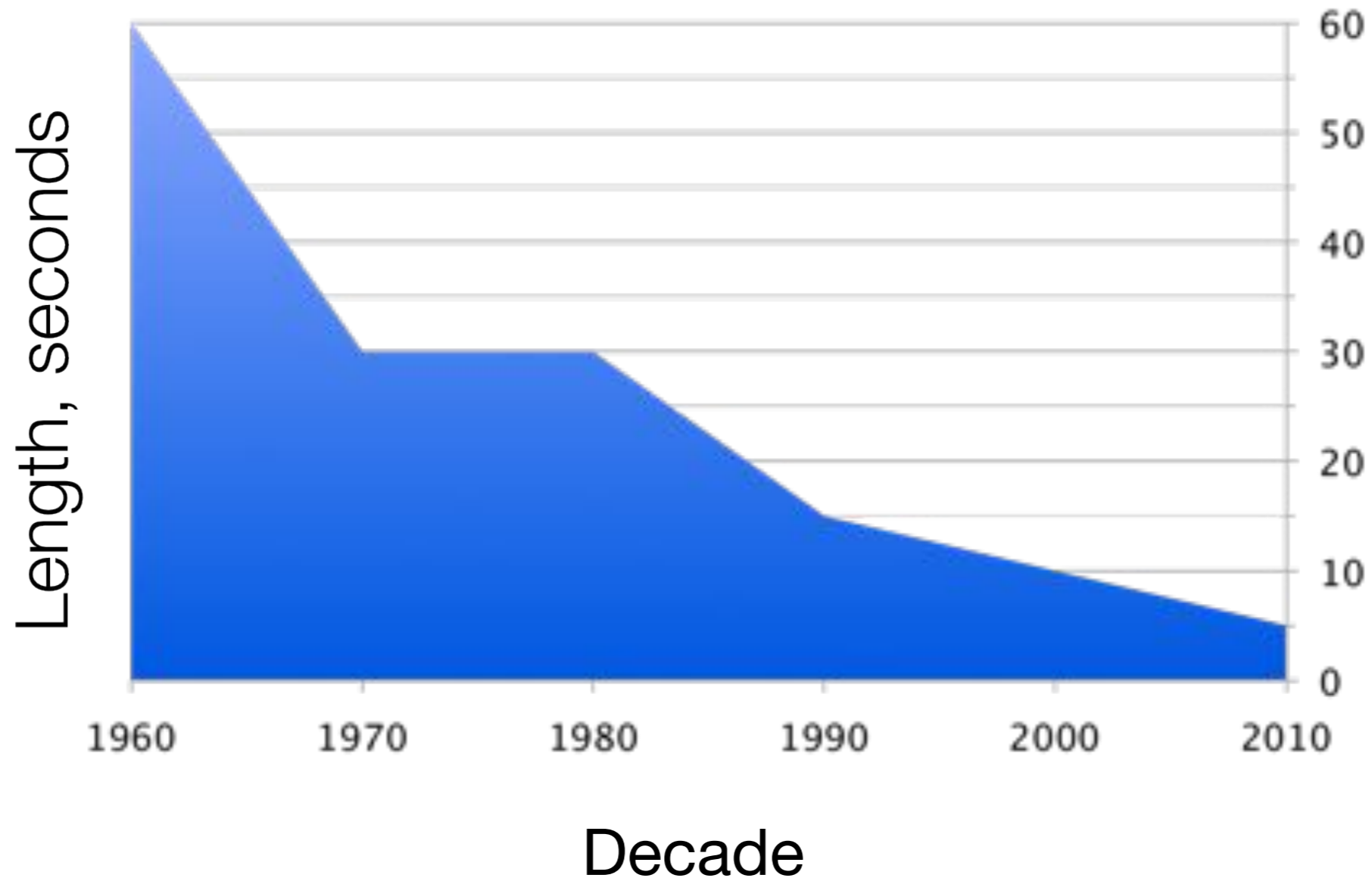
- Being listened to for long periods and taken through detailed and often obscure explanations.
- Having an audience that is highly literate and prepared to make an effort to comprehend what we are telling them.
- **The rest of humanity behaves nothing like this.**
- The rest of this talk is about how you can express your ideas so they are more compelling to a non-scientific audience.

Can anyone suggest what this graph shows?



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Minimum length of TV Commercials



Do you think you're any different?



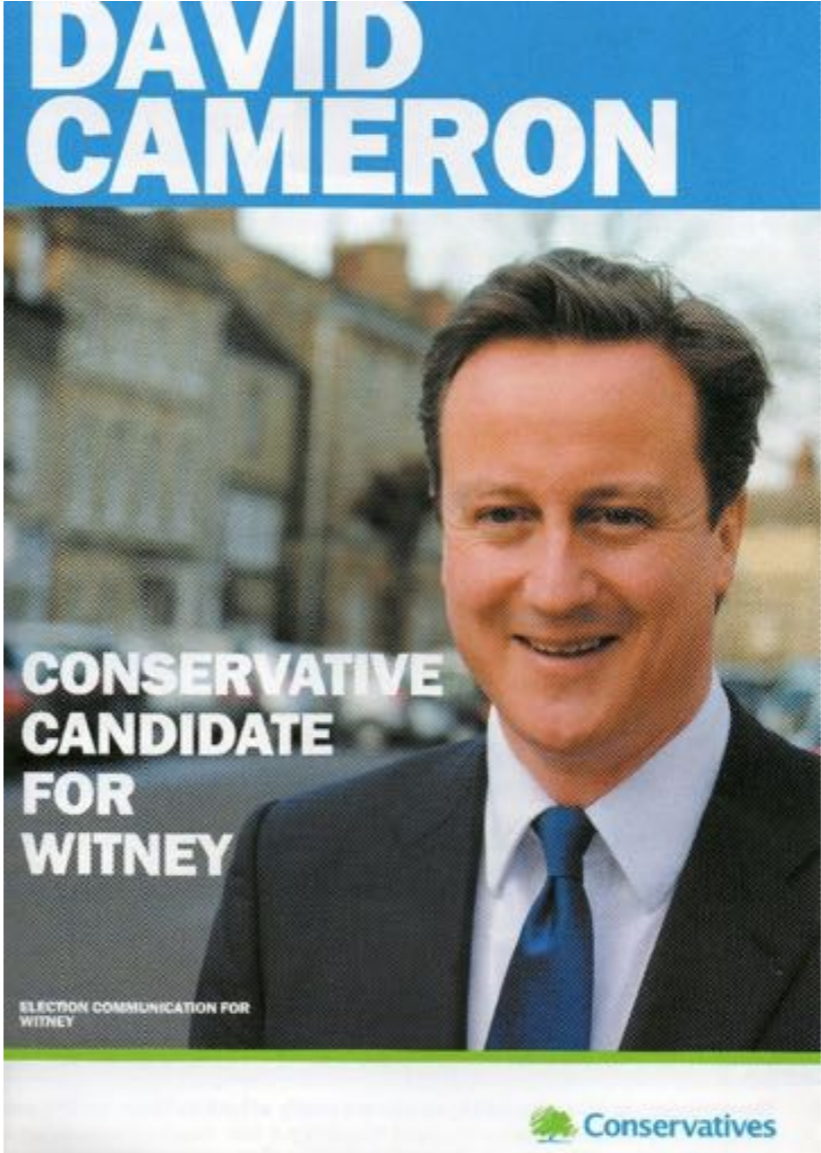
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DAVID CAMERON

CONSERVATIVE CANDIDATE FOR WITNEY

ELECTION COMMUNICATION FOR WITNEY

Conservatives

In the UK  of people don't understand percentages. A similar proportion cannot understand sentences longer than 23 words.

In the UK 70% of people don't understand percentages. A similar proportion cannot understand sentences longer than 23 words.

Example

Recent research I led for UK Government

What fact about air pollution is most engaging for the general public?

1. About **10% of deaths in London** are attributable to air pollution.
2. The main health outcomes of air pollution are **cardiovascular disease, strokes and cancer**.
3. Air pollution includes exhaust gases, bits of brakes and tyres, and ground up stuff on the road. This coats the inside of your lungs and travels to other organs in your body.

To gain the attention of most people ...

- You must communicate effectively & quickly
- Use simple language
- Use short sentences
- Avoid any numerical or mathematical data
- Appeal to emotions as well as, or instead of, logic
- Cite social pressure to conform
- Use language that directly conveys your message, but subtly

Example: greenhouse effect vs climate change

Key things to look out for

The Theory of Planned Behaviour, Ajzen (1990)

A model (there are many others) of factors people consider in planning and executing their actions. **Can explain ~40% of behaviour - the other 60% of behaviour is not planned at all...**

Attitude

Is this behaviour **favourable** or **unfavourable**?

Subjective norm

Is there **social pressure** to perform this behaviour or not perform it?

Moral norm

Is performing this behaviour **right** or **wrong**?

Past Experience

When I did this before, was the **outcome** **satisfactory**?

Perceived Control

How much difference do I **think it will make**?

Situational

How convenient is it?
How well does it work?
Can I afford it? Can I buy it easily?

Consequences

Can be **knowledge based** or **emotive**: does it **do you good** or does it **make you feel good**?

Example

Tell me what you think is on offer here

Millions of people enjoy [REDACTED] because of its crisp, clean taste that really quenches your thirst. But [REDACTED] also has an honest, straightforward attitude that sets it apart from other soft drinks. [REDACTED] encourages you to be true to who you are and to obey your thirst.

Example

Tell me what you think is on offer here

Millions of people enjoy Sprite because of its crisp, clean taste that really quenches your thirst. But Sprite also has an honest, straightforward attitude that sets it apart from other soft drinks. Sprite encourages you to be true to who you are and to obey your thirst.

Example

Looked at through the lens of Theory of Planned B'r

Millions of people enjoy Sprite because of its crisp, clean taste that really quenches your thirst. But Sprite also has an honest, straightforward attitude that sets it apart from other soft drinks. Sprite encourages you to be true to who you are and to obey your thirst.

Consider factors of Theory of Planned Behaviour

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Tell me what you think is on offer here

If you're ready to build a movement -- based on the issues you care about, and to change the political process itself -- now's the time to get involved locally.

If people like you decide to take control of this campaign locally, we'll be able to win this election and do what must be done: end this war in Iraq, make sure everyone has health coverage, make our economy fairer, and rebuild America's leadership role in the world. But it all starts with changing our politics.

If you decide to own a piece of this campaign and take it to the next level locally, we will win this election. We'll also prove that mass participation at the grassroots can change the dynamic of a political system -- a system that too often leaves the people behind.

VOTE FOR
CHANGE

Analyse this text – what do you see?

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Notice repetition of the key TPB factors being applied.

Compare and contrast

airTEXT sends SMS alerts to vulnerable individuals when air pollution is expected to be high. airTEXT users can ensure they have their medication and take appropriate action. The service is provided for free by London's 33 Councils.

Remember the last time your asthma flared up? Over 6000 people in London have decided to use airTEXT, because it gives them more control of their condition, by warning them when pollution could worsen asthma. airTEXT is the right choice for you and your children because it's always with you on your mobile phone.

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Compare and contrast

Climate change is expected to increase global average temperatures by 2-4C by 2100 and is driven by anthropogenic forcing. Significant losses of biodiversity are expected to reduce crop yields and ecosystem services, with substantial effects on economic growth around the world.

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You and I cause climate change and by the time we're 50 heatwaves like 2003 could happen most years, with thousands dying every summer. Our lives will be badly affected by droughts and refugees fleeing famine and war. But millions of people like you have decided to make changes to stop it. It's easy to do, and the right thing to do for you and your children, so act now!

Final exercise - revise your 100 words using The Theory of Planned Behaviour based model

In the next 5 minutes, revise your 100 words to include each of these factors:

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The grand finale...

Presenters please come up!

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Key messages

- Innovation is about using **your skills - scientific and otherwise** - to meet the **needs of others**.
- This means **understanding what those needs are, as efficiently as possible**.
- The **greatest benefit** comes from innovations that **are disseminated effectively**.
- **Very few of us have all the skills needed** - that means it needs teamwork!

My final message to you

The human race faces the greatest challenge in its history – Climate Change. We are scientists who understand Climate Change. The rest of the human race does not.

If we want the World to make the radical changes needed to mitigate dangerous Climate Change, it is incumbent on us not only to develop the solutions to the problem, but to communicate our knowledge in ways that the rest of the human race can understand and in ways that address their needs.