



Teachers in Residence

The Heart

Primary Level Lesson Plan



Centre for Research in Medical Devices

“Breaking Barriers”

THE PHILOSOPHY BEHIND OUR LESSON PLANS

Teachers participating in CÚRAM’s Teachers in Residence programme have developed a ‘learning module’ on MedTech in Ireland that links with multiple streams and themes in the primary and junior cycle curricula. The primary and secondary lesson plans were created **by teachers for teachers** and are accessible online to use in classrooms all over the world.

During their residencies, teachers developed the contents of the lesson plans by working directly with CÚRAM researchers, while learning about the medical device research being carried out at CÚRAM. Primary teachers were paired with secondary teachers to create plans covering five major themes: biomaterials, heart, brain, musculoskeletal system and stem cells. The partnership between the primary and secondary teachers ensured that the materials created follow a natural progression from one age group to the next.

The lesson plans were further designed and formatted by a Visual Artist who used various teaching methodologies to suit the multiple intelligences and range of learning styles and abilities present in classrooms. By using a range of teaching approaches we hope to engage all children at all levels whatever their natural talents or interests may be.

We hope that you and your students find these resources an enjoyable way to learn about our research centre and the MedTech industry!

Sincerely,

Dr. Sarah Gundy

Programme Manager-Teachers in Residence

Medical Devices & the Heart Introduction

Lesson ♥

Primary School Curriculum Links

Strand:

Environmental Awareness and Care

Strand Unit:

Science and the Environment

Content Objectives:

Children should be enabled to:

- Appreciate the application of science and technology in familiar contexts.
- Recognise the contribution of scientists to society.

Strand:

Living Things

Strand Unit:

Human Life

Content Objectives:

- Develop a simple understanding of the structure of some of the body's major external and internal organs.

Learning Outcomes

Children should be enabled to:

1. Describe basic heart anatomy and function.
2. Develop an awareness of the conditions that can affect the heart and the treatments available to treat these.
3. Appreciate what a medical device is.
4. Understand the need for medical devices and their advantages.
5. Recognise how medical devices are manufactured.
6. Develop an awareness of the range of careers involved in manufacturing medical devices.
7. Manufacture a medical device.

Keywords and Definitions

	Keyword	Definition
1.	Medical Device	A medical device is a material used to diagnose, prevent, monitor and treat the effects of illness.
2.	Coronary	Relating to the heart and especially to the vessels that supply blood to the heart.
3.	Stent	A stent is a tiny tube that keeps blood vessels open.
4.	Catheter	A long, thin tube that can be inserted into the body.
5.	Diagnose	Identify the nature of an illness or other problem by examination of the symptoms.

6.	Treat	Give medical care or attention to.
7.	Atherosclerosis	Narrowing of arteries due to build-up of cholesterol.
8.	Angioplasty	Opens a blocked vessel and restore normal blood flow.
9.	Design Engineer	Develops the device to make sure it functions.
10.	Manufacturing Engineer	Makes sure the manufacturing line is working in the best way to make device.
11.	Quality Engineer	Makes sure the device meets acceptable standards.
12.	Line Supervisor	Manages staff on the production line to make the device.

Learning Activities

Children will:

- Watch a video to introduce the topic: kidshealth.org/en/kids/csmovie.html?WT.ac=en-k-heart-center-a#catheart
- Learn about basic heart anatomy and function through a PowerPoint presentation.
- Engage in talk and discussion on medical devices.
- Appreciate the workings of a manufacturing line and the various careers associated with manufacturing.

- Participate in group activities to construct their own medical device.
- Evaluate their work.

Extra Info / Files

	Web Address	Brief Description
1.	www.youtube.com/watch?v=e13TGGccvT4	Angioplasty animation
2.	www.youtube.com/watch?v=p3z9FLYijrQ	Angioplasty animation
3.	www.youtube.com/watch?v=4owpAvYFX8c	How to Mend a Broken Heart animation

Resources

- Teacher Lesson Plan
- PowerPoint to guide lesson
- Evaluation sheet
- Medical Device design hand outs (four)
- One set of materials for each group constructing a medical device:
 - Medical Device design hand out
 - Straws
 - Balloons
 - Toilet rolls
 - Scissors
 - Taper
 - Timer (optional)

- Pump for balloons (optional)

Methodologies

- Talk and discussion
- Active learning
- Guided and discovery learning
- Collaborative learning
- Free exploration of materials
- Investigative approach

Assessment

- Self-assessment – evaluation sheet
- Teacher observation – construction of medical devices
- Teacher questioning – talk and discussion

Linkage and Integration

- **Maths** – problem solving
- **STEM** – I.T. / Engineering
- **Art** – construction
- **S.P.H.E.** – working together co-operatively
- **English** – oral language through talk and discussion and presenting their work

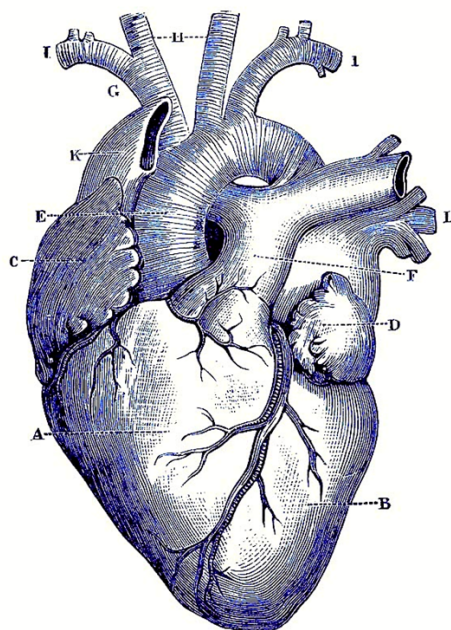
Differentiation By:

- Teaching style
- Support
- Task

Power Point Presentation - The Heart ♥



Slide 1



Teachers in Residence Programme
Deirdre Halleran and Sinéad Ní Mhullaoidh

Slide 2

How do **WE** mend a broken heart?

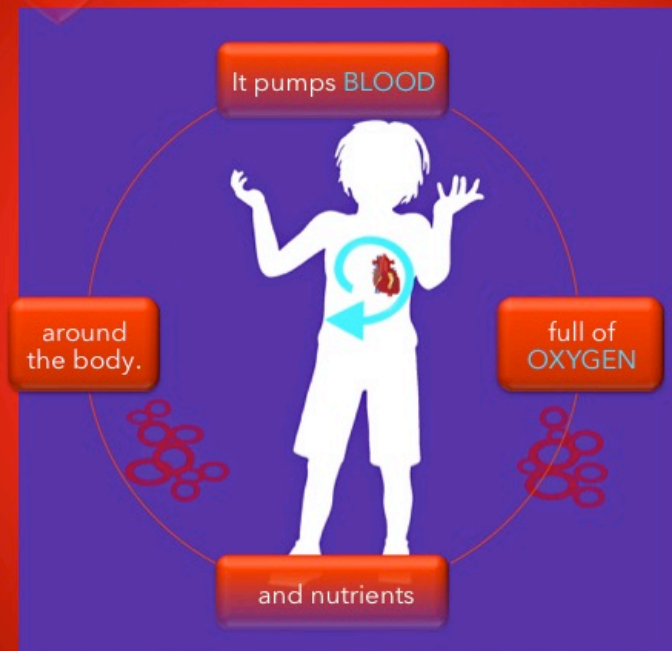


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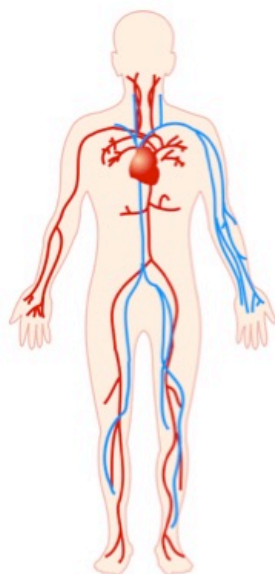
Today **WE** will build a
medical device to fix a
broken heart!

Slide 4

The heart is a muscle in the middle of your chest.



Slide 5



There are small blood vessels in the body that are called **arteries** and **veins**. They connect your heart to all the areas in your body.

Each time your heart beats it pumps blood through the **arteries** to all parts of your body.

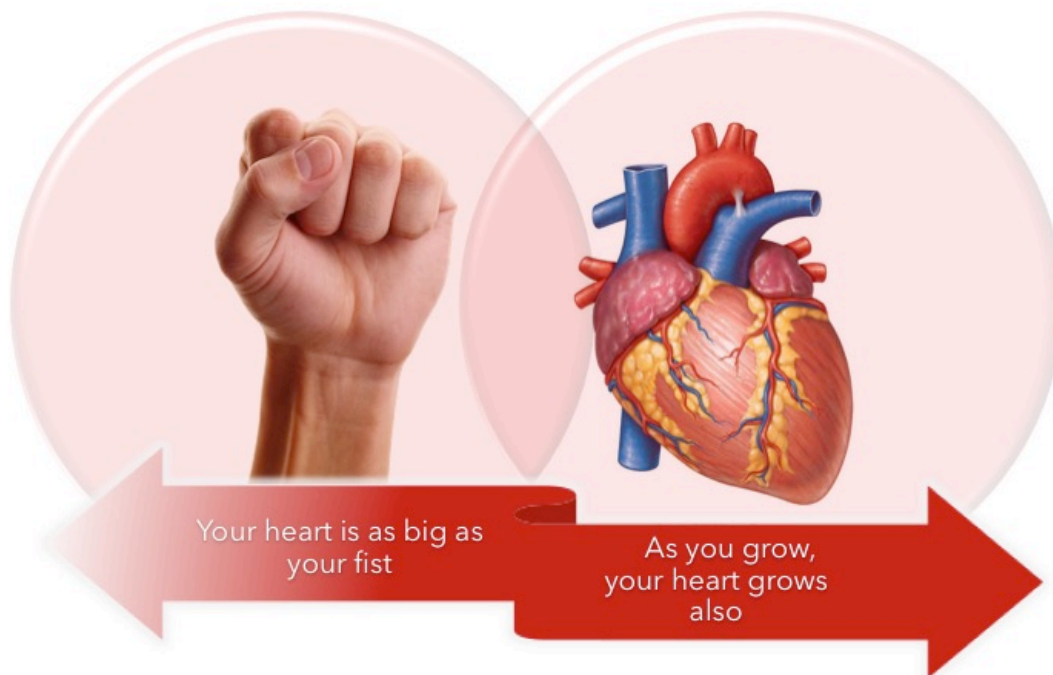
Slide 6

Look at this video which shows how the heart works.

https://www.youtube.com/watch?v=_eVG45_iF9U.



Slide 7



Slide 8



The doctors say if we look after
our heart, it will look after us.

Slide 9

How can **YOU** take care of your
heart?



Slide 10

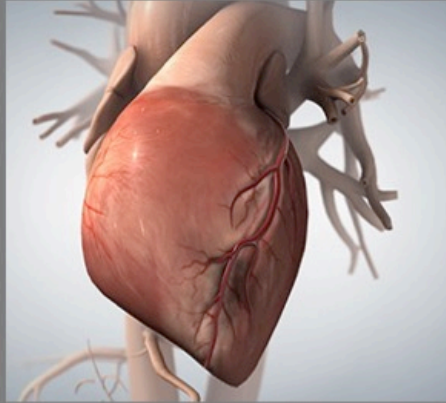


Slide 11



Slide 12

Problems with the heart:



When there is a lot of fat and cholesterol in the arteries, they get blocked and blood can't go through them.

This condition is called **atherosclerosis**.

A heart attack happens when blood can't move through a **coronary** artery.

An **angioplasty** is a procedure used to treat **atherosclerosis**.

Slide 13

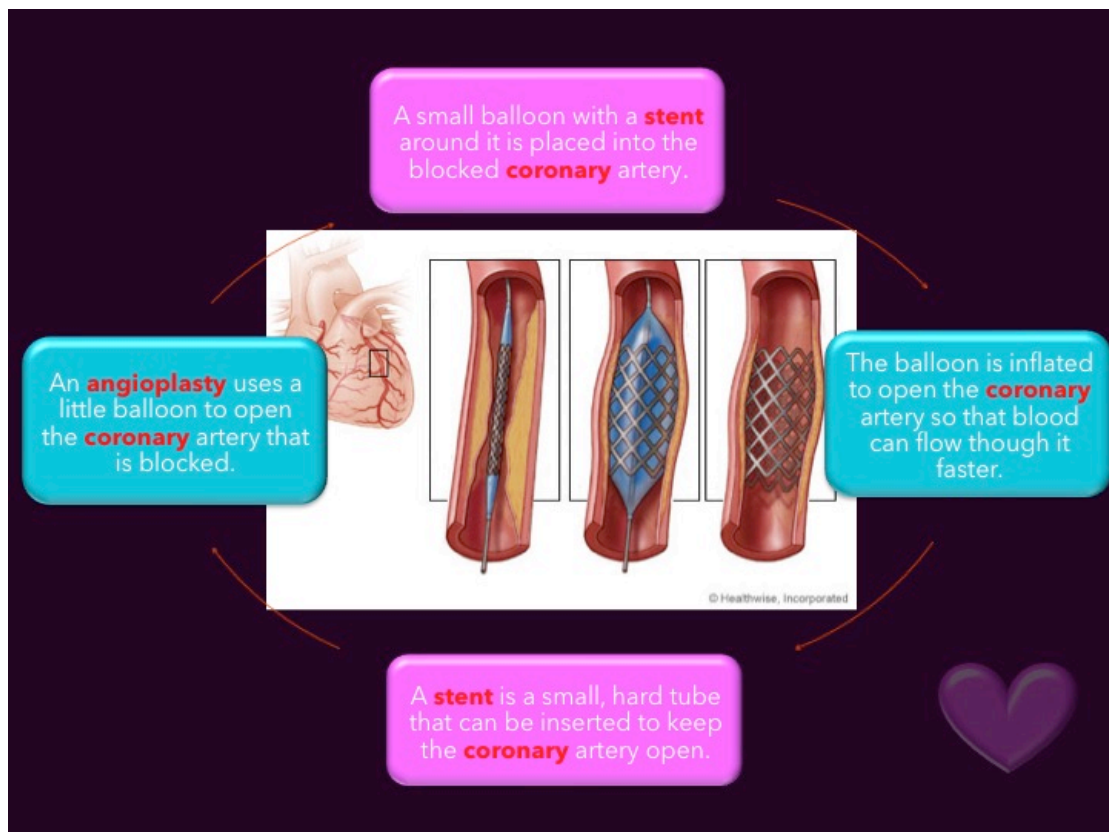


MEDICAL DEVICES

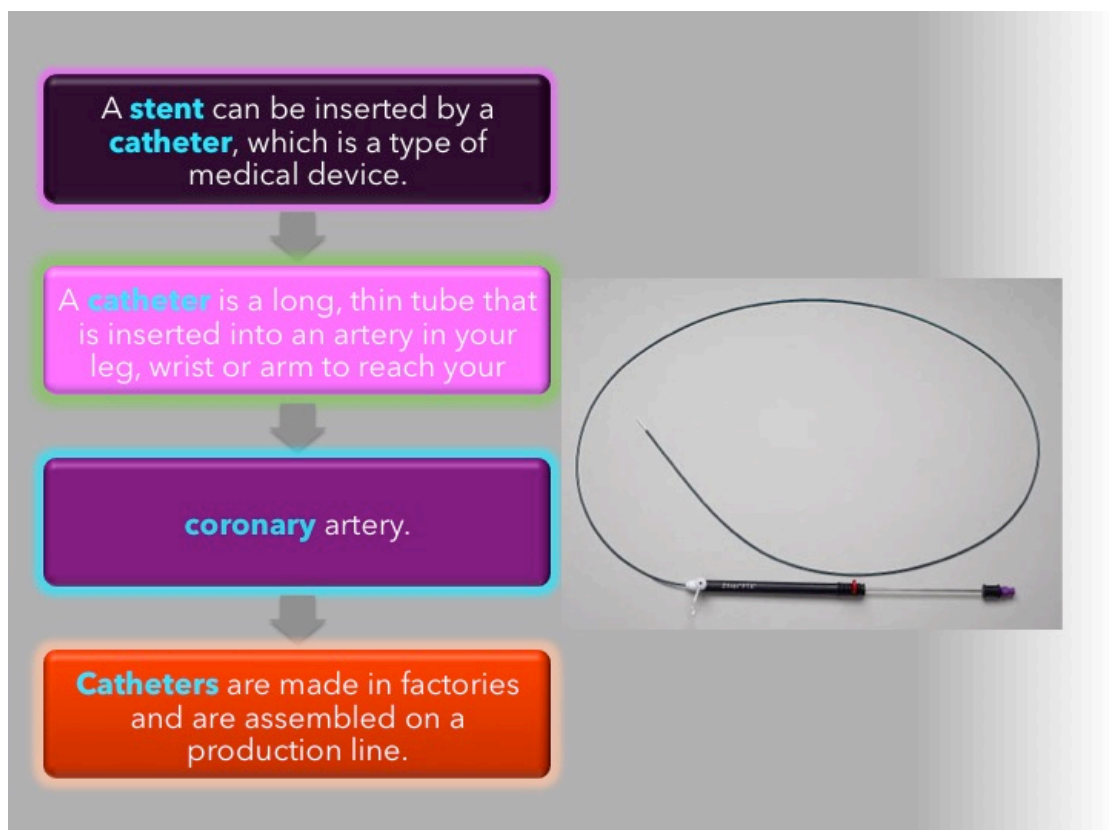
A medical device is a material that is used to diagnose, treat, or monitor an illness.



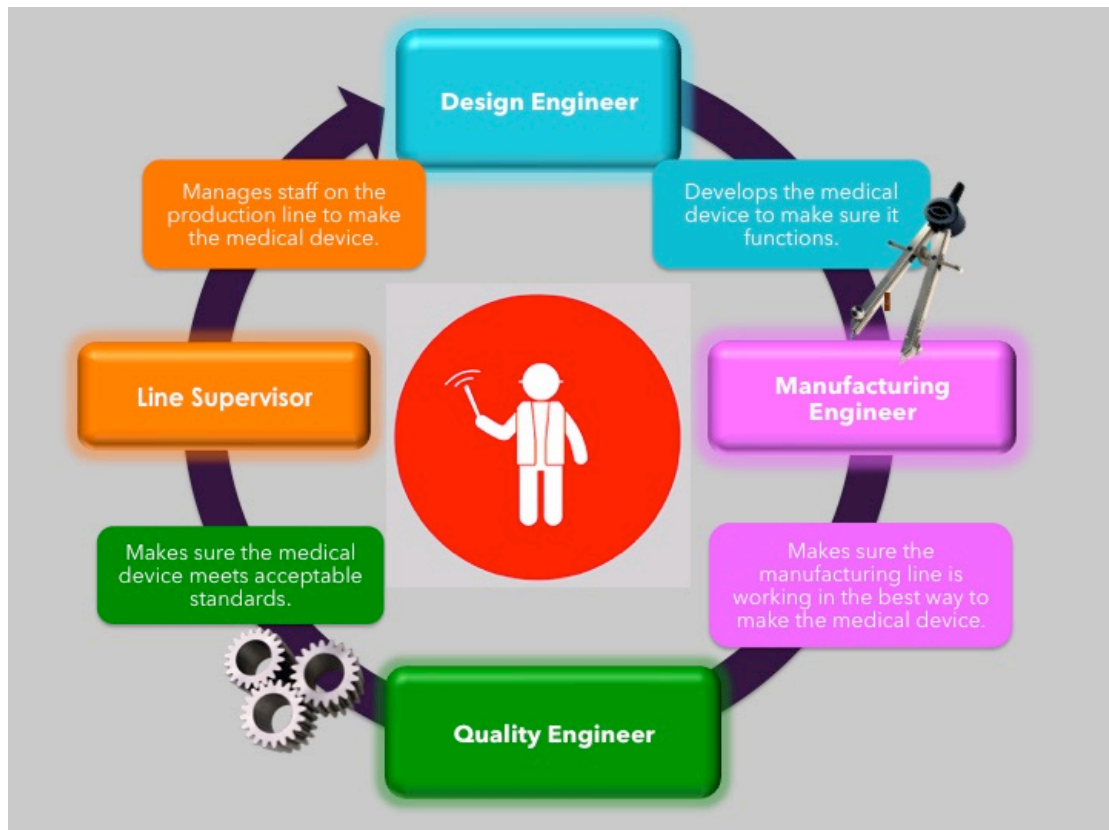
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Slide 15



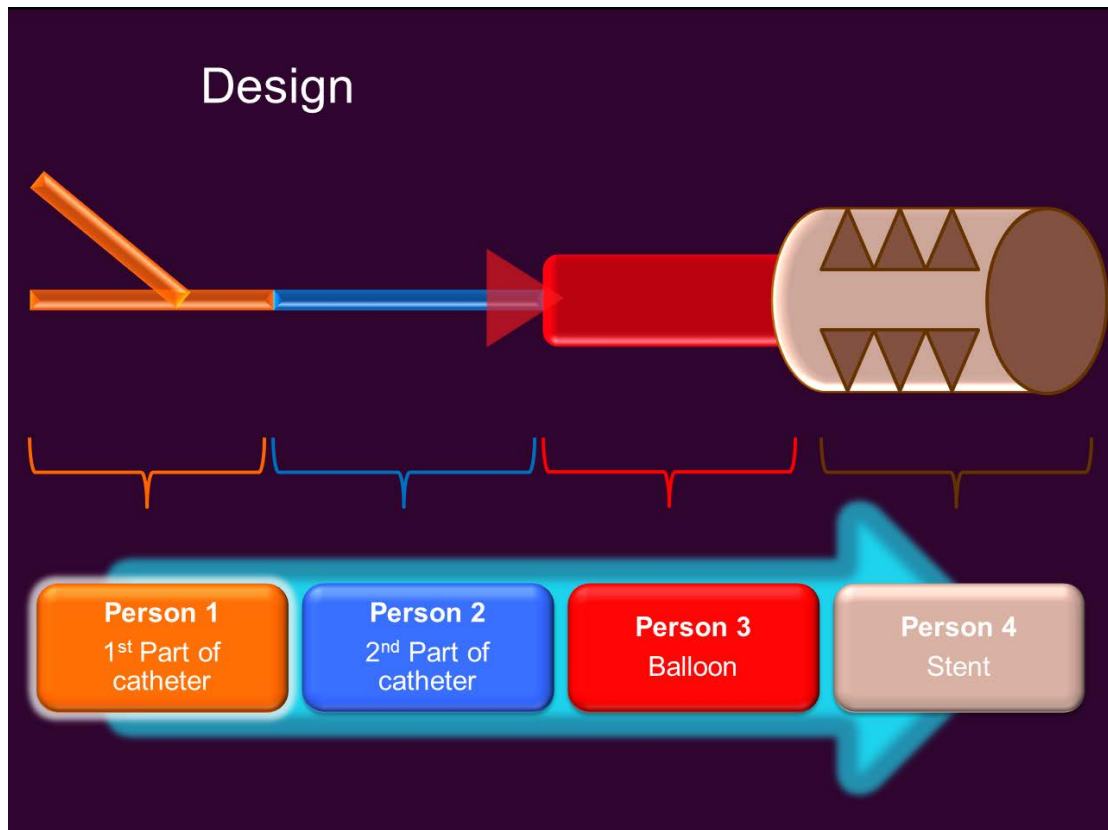
Slide 16



Slide 17



Slide 18



Slide 19



Slide 20

References:

1. Féach thárt: Eolaíocht, Rang 4, An Gúm
2. www.kidshealth.org
3. Gray's Anatomy
4. Pearson Education

Acknowledgements:

Sincere thanks to all of the researchers who gave lectures and generously gave their time throughout the course.

Thanks also to all the participating teachers who very kindly shared ideas and resources.

Slide 21

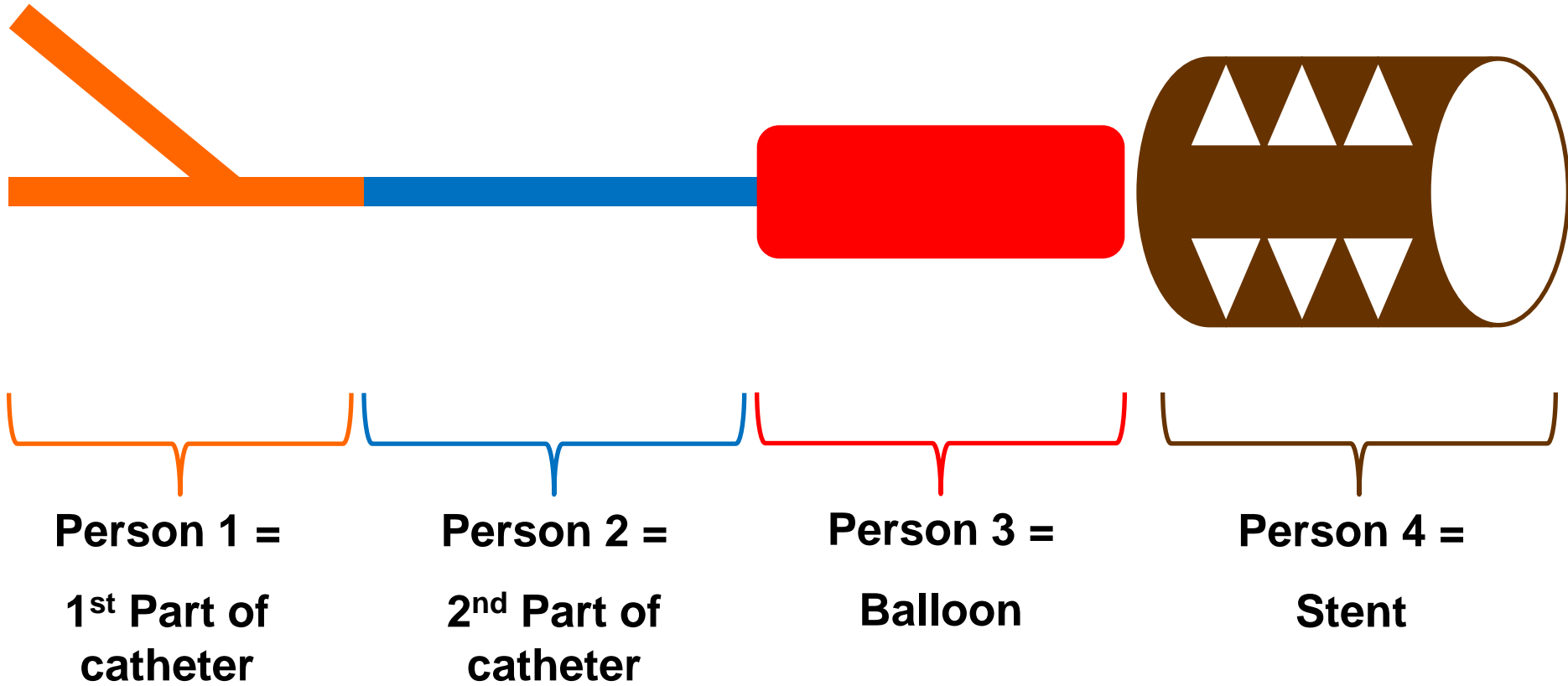
This publication has emanated from research conducted with the financial support of Science Foundation Ireland (SFI) and is co-funded under the European Regional Development Fund under Grant Number 13/RC/2073.

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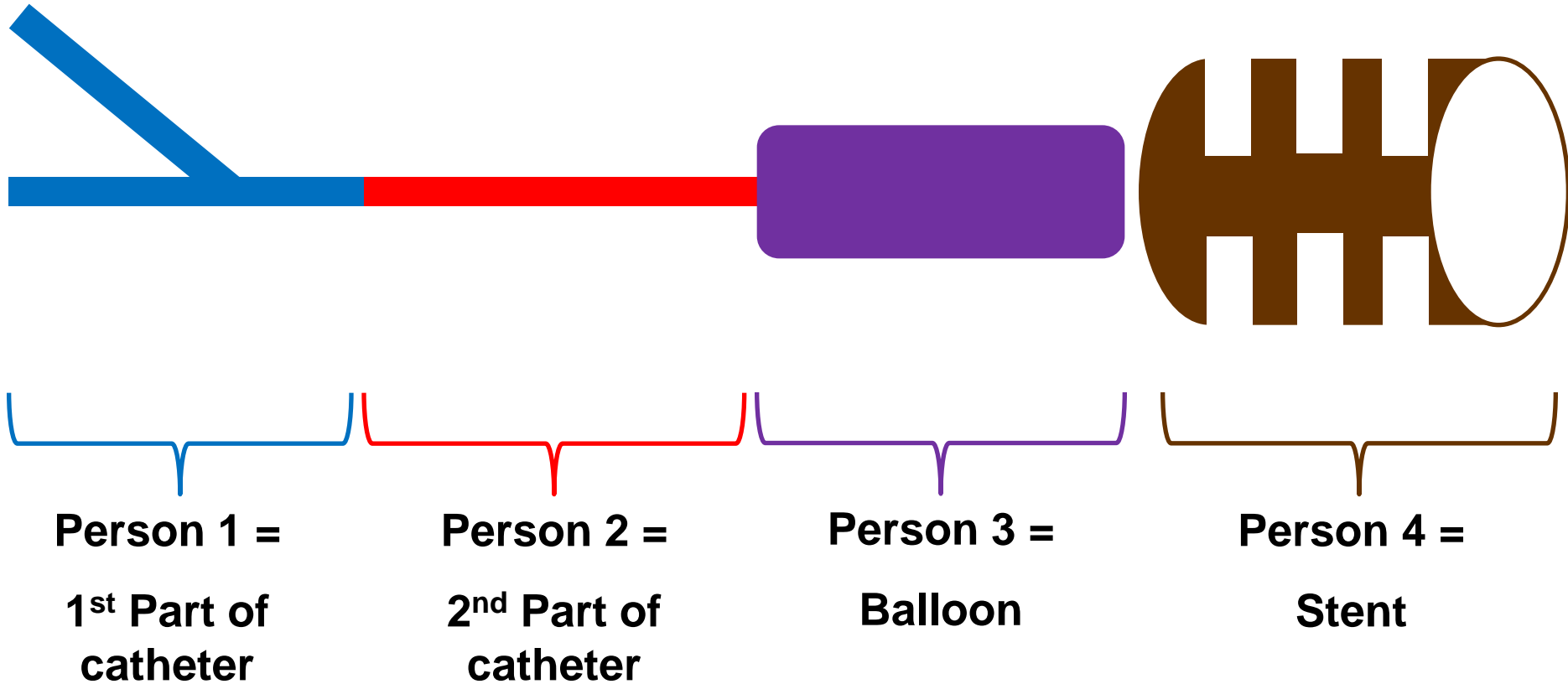


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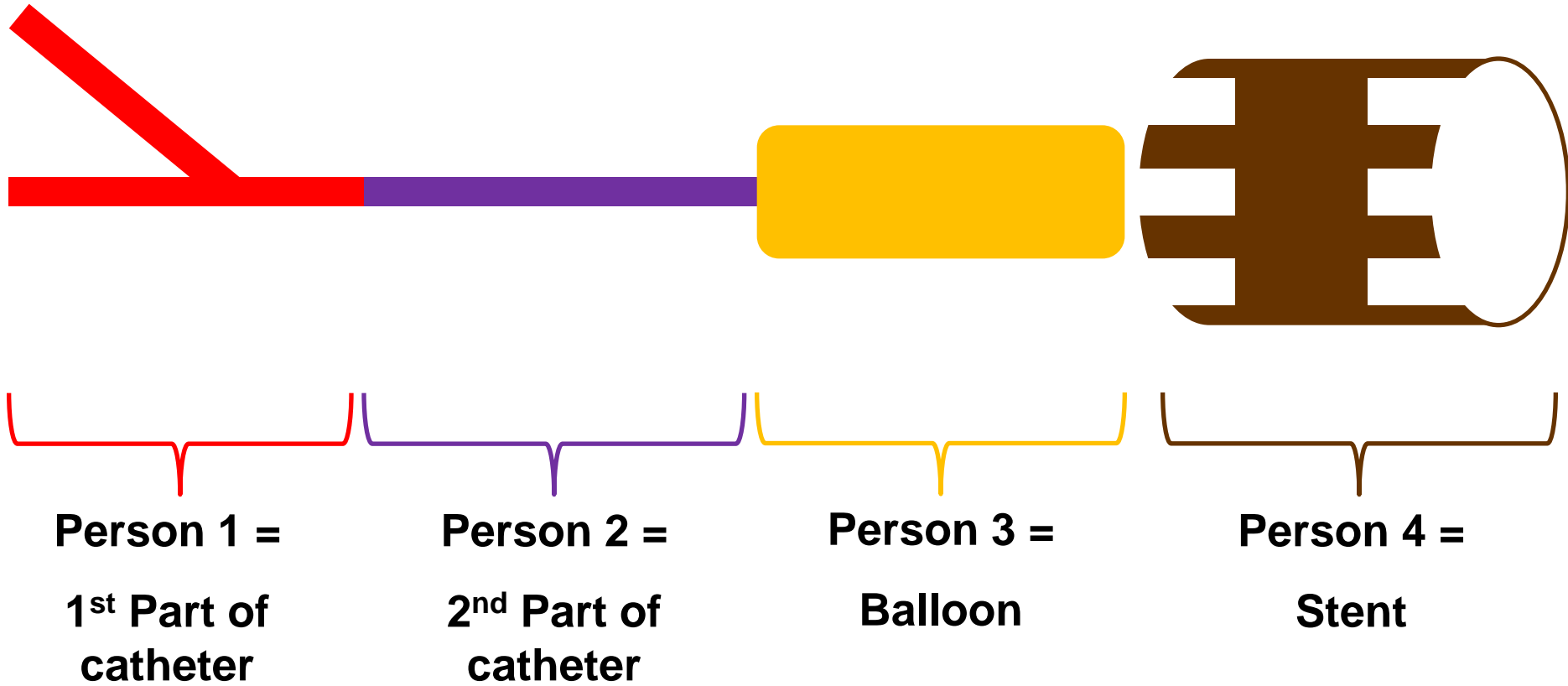
Design 1



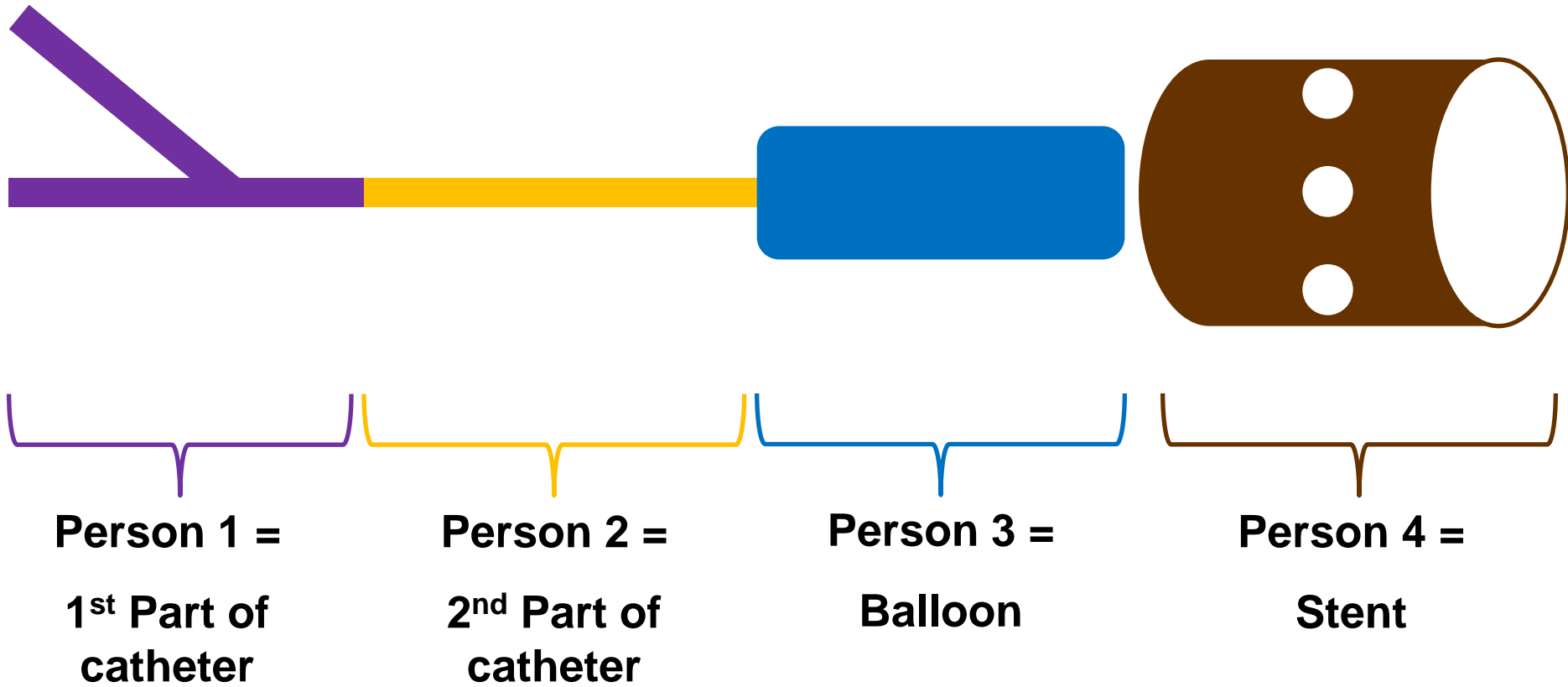
Design 2



Design 3



Design 4



THE HEART-EVALUATION SHEET ♥

Draw a picture of the medical device that you created.



Do you think your medical device is successful? Why or why not?

If you were building the medical device again, what would you do differently?

State three things that you learned today:

1. _____

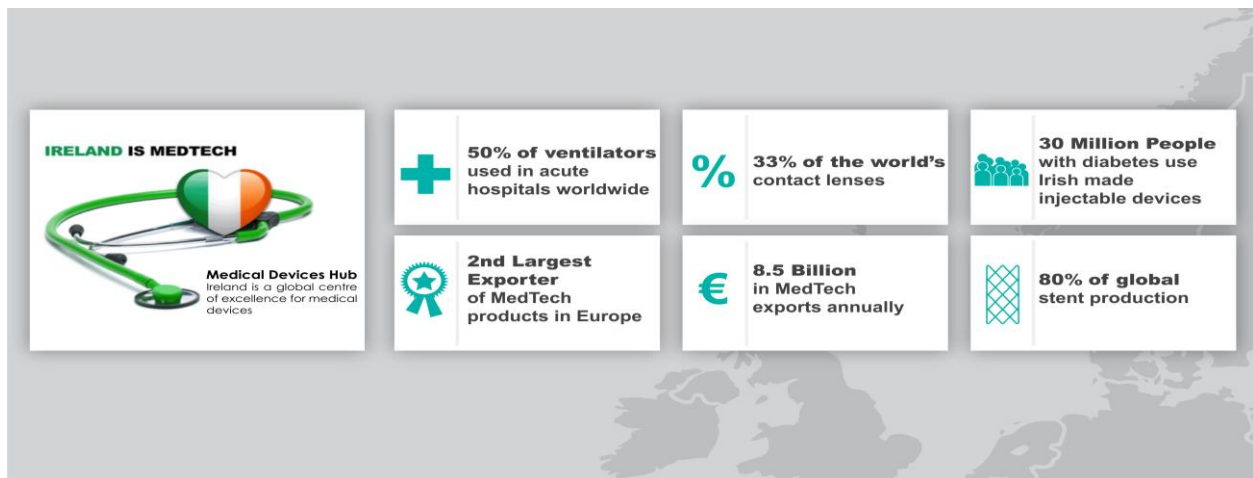
2. _____

3. _____

FACTS ABOUT MEDTECH IN IRELAND

- Ireland is the second largest exporter of MedTech products in Europe.
- Ireland's MedTech sector employs 29,000 people across 450 companies.
- Ireland has the highest number of people working in the MedTech industry than in any other European country, per head of population.
- 18 of the world's top 25 MedTech companies have a base in Ireland.
- Galway employs one third of the country's MedTech employees.

80% of global stent production is carried out in Ireland. The two largest employers within the Galway region are Medtronic and Boston Scientific, employing over 4000 individuals. Due to the influential presence of these two companies, many companies in Galway are involved in cardiology-related devices, particularly drug-eluting stents and their components, such as guide wires and balloon catheters. This has resulted in Galway becoming recognised for its specialisation in coronary devices, producing the highest levels of R&D and High Tech Innovation worldwide.



Source: IDA Ireland, 2017

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