

# Innovation, regenerative medicine and redistributed manufacturing: a social science perspective

Targeted Healthcare Production Workshop  
April 28 University of Nottingham

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# Outline

**1. Understanding innovation as a socio-technical process**

**2. Advanced therapeutics and Cell/Tissue based therapies:  
innovation spaces/niches**

- knowing your product (the relation between classification and regulation)
- understanding biovalue and markets
- knowing the UK reimbursement system
- understanding the adoption space in  
creating an effective niche

**3. Implications for Feasibility of Re-distributed manufacturing?**

# ***Targeted Healthcare?***

# Understanding context within which innovation occurs

Innovation and the Scrabble metaphor: 'A market is like a Scrabble board: there is no point in wanting to place an innovation that does not correspond to the possibilities it affords...no point in keeping aside the perfect word' (Callon TCS, 2007)

Distributed (non-linear) model of innovation



Institutional workability

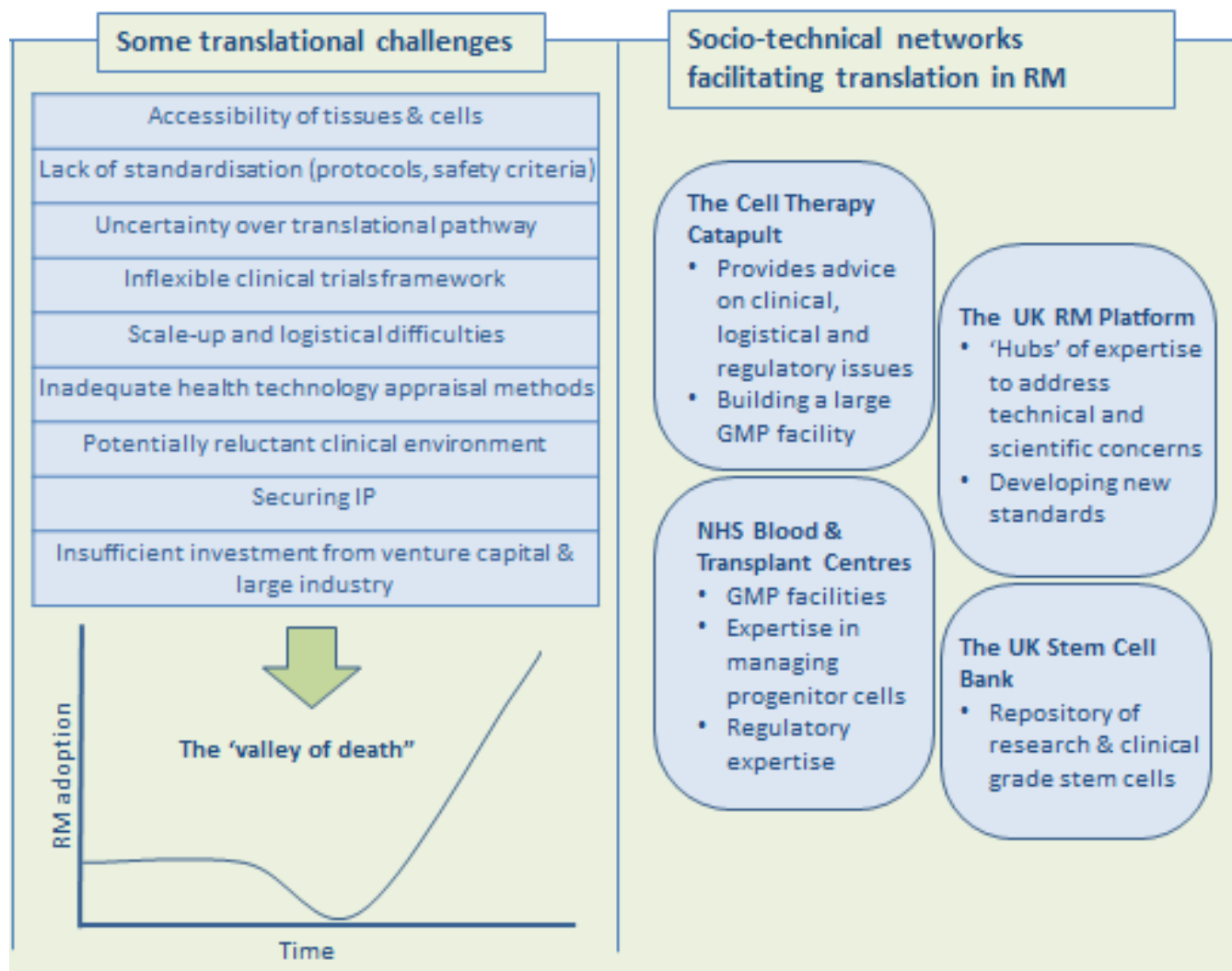
# Innovation as a socio-technical process

**Organisational** – move from ‘technological readiness’ to ‘institutional readiness’ in the healthcare system

...from ‘*technically working*’ to ‘*institutionally workable*’ technology

(Govt response to HoL inquiry: establish a Regen Medicine Expert Group whose task is to develop ‘delivery readiness’)

# Innovation challenges/ niches *enabling* RM



Source: Gardner and Mahalatchimy, 2015



Institutional readiness and preparing for regen medicine:  
establishing *innovation niches* ...*opening spaces* for  
*novel/radical innovation*

- e.g.
- biological niche – new clinical trials models
  - regulatory niche – ATMP/ and NICE ‘mock appraisal’
  - institutional niche – CTC and NHCEngland’s proposed sites for ‘combinatorial innovation’

# **Advanced therapeutics and Cell/Tissue based therapies: what spaces/niches do we need to consider**

**Know your broad market niche:** different possibilities for local, flexible, targeted medicine/healthcare because of different value chains:

- disease modelling
- drug screening and testing
- therapeutics
- services (reagents/materials)

SMEs said to be (have to be?) more flexible: typically one product and need to reconfigure this according to changing circumstances



# REGenableMED database of RM organisations



REGenableMED database - companies and organisations engaged in regenerative medicine and cell therapy

Version 2.0 (10 March 2015)  
Contact: graham.lewis@york.ac.uk

Company/Organisation: T2Cure GmbH

Type of Organisation: SME (Private)

City/Town: Frankfurt

Country: Germany

Region: Europe

US State:  Enter if appropriate

Country-2:  Enter Country-2 where second site exists. If >2 enter extra note in Comments

Year Founded: 2006

Year Closed:

Merger and Acquisition?  MA Details:

Organisation Defunct?  Enter "yes" if NO M&A

Firm/Organisation Size: unknown Size refers to RM and EU criteria

URL: [www.t2cure.de](http://www.t2cure.de)

Comments: 02/15: - development of novel progenitor cell-based regenerative therapeutics to provide new treatment options to patients suffering from cardiovascular diseases like myocardial infarction or peripheral vascular diseases.  
=====  
02/06/10: autologous bone marrow-derived progenitor cells as regenerative therapeutics for CVDs including ischemic heart disease (acute myocardial infarction and chronic

Product Type - Other? eg GT  Medical Device?

Product Type - Service/Material?  Immunotherapy?

Product Type - Autologous Cell Therapy: (brief description) Autologous adult bone marrow-derived progenitor cells for cardiac disease and diabetes. The new therapeutics consist of autologous progenitor cells

Product Type - Allogeneic Cell Therapy: (brief description)

Product Type - Other Therapy or Device: (brief description)

Product Type - Service: (brief description)

Therapeutic categories: cardiovascular  cancer   
musculo-skeletal  ophthalmology  haematological  neurological  other

Clinical Trial Activity?  Clinical Trial Phase: Phase 2  CT brief details: See Additional Info. for  
Tick only if trial underway, approved or definitely planned

CAT classification ATMP claimed Yes  CAT classified?  CAT classification Not Known

CAT extra details CAT certification received - claims 'first time certification system has been used in the EU' Additional info

Other regulatory info?  Double click to file(s) shown

Product(s) On Market? 25/05/10: most advanced project (t2c001-AMI) successfully passed Phase II of And "is commercially available to treat patients in Germany" [GL: but does not of 06/10] .

Lead Product: [i.e. product(s) under development] 02/15: on verge of entering Phase III CTs for severe infarcts based on results of AMI and REPAIR-AMI studies. Phase I/II clinical proof-of-concept studies have completed in chronic heart diseases: ischemic heart failure and non-ischemic

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# **Know the product you are manufacturing**

Different classifications of product/different markets:

different product classification leads to different innovation paths and patterns of possibilities for 're-distributed manufacture'

# Healthcare products: overview

## Medicinal Products

Primary mode of action: chemical

## Medical Devices

Primary mode of action:  
physical

## Biological

Primary mode of action:  
chemical

## Tissue-based products

Primary mode of action:  
physical

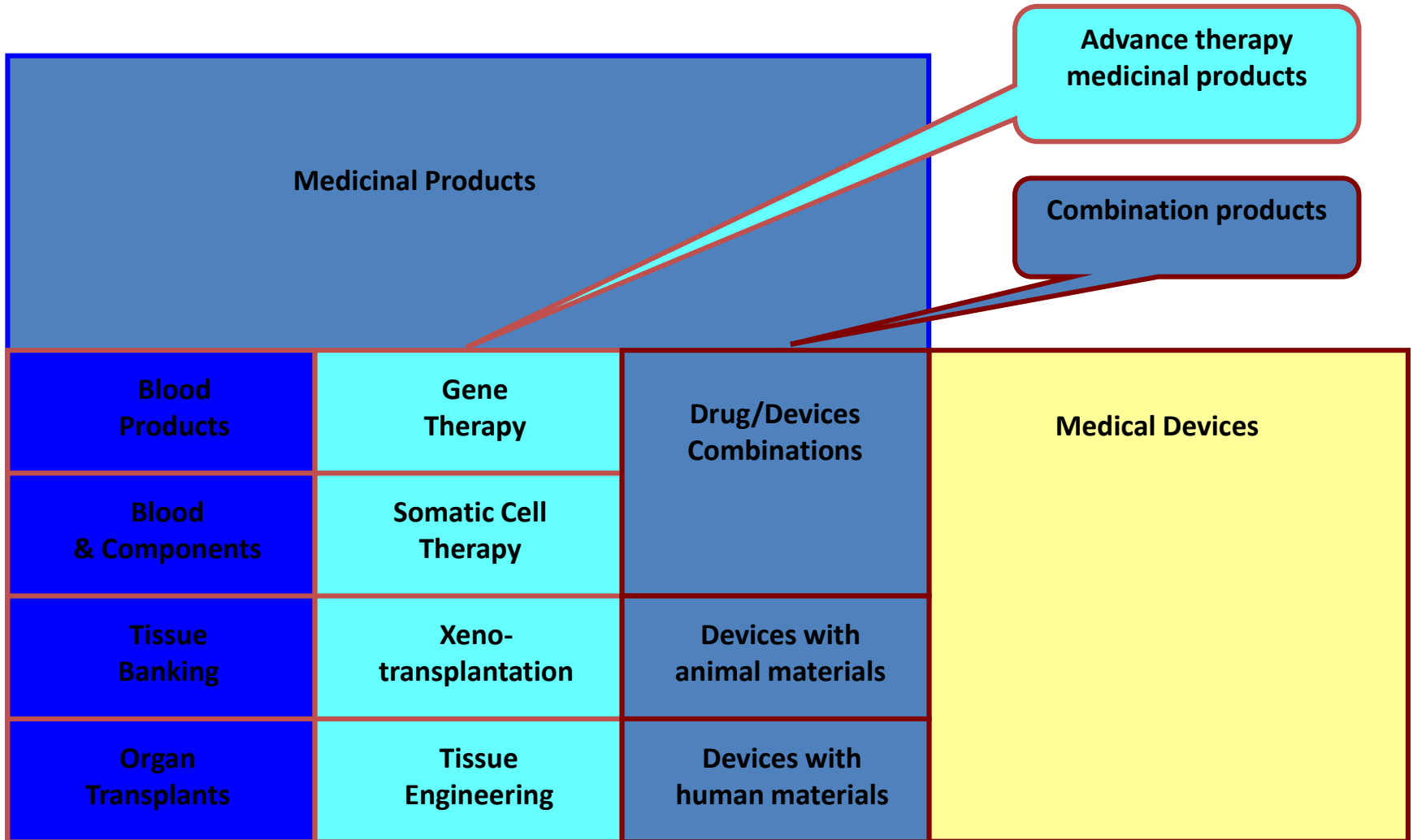
# Healthcare products: overview

<b>Medicinal Products</b>		<b>Drug/Devices Combinations</b>	<b>Medical Devices</b>
<b>Tissue Banking</b>	<b>Blood Products</b>	<b>Devices with animal materials</b>	
<b>Organ Transplants</b>	<b>Blood &amp; Components</b>	<b>Devices with human materials</b>	

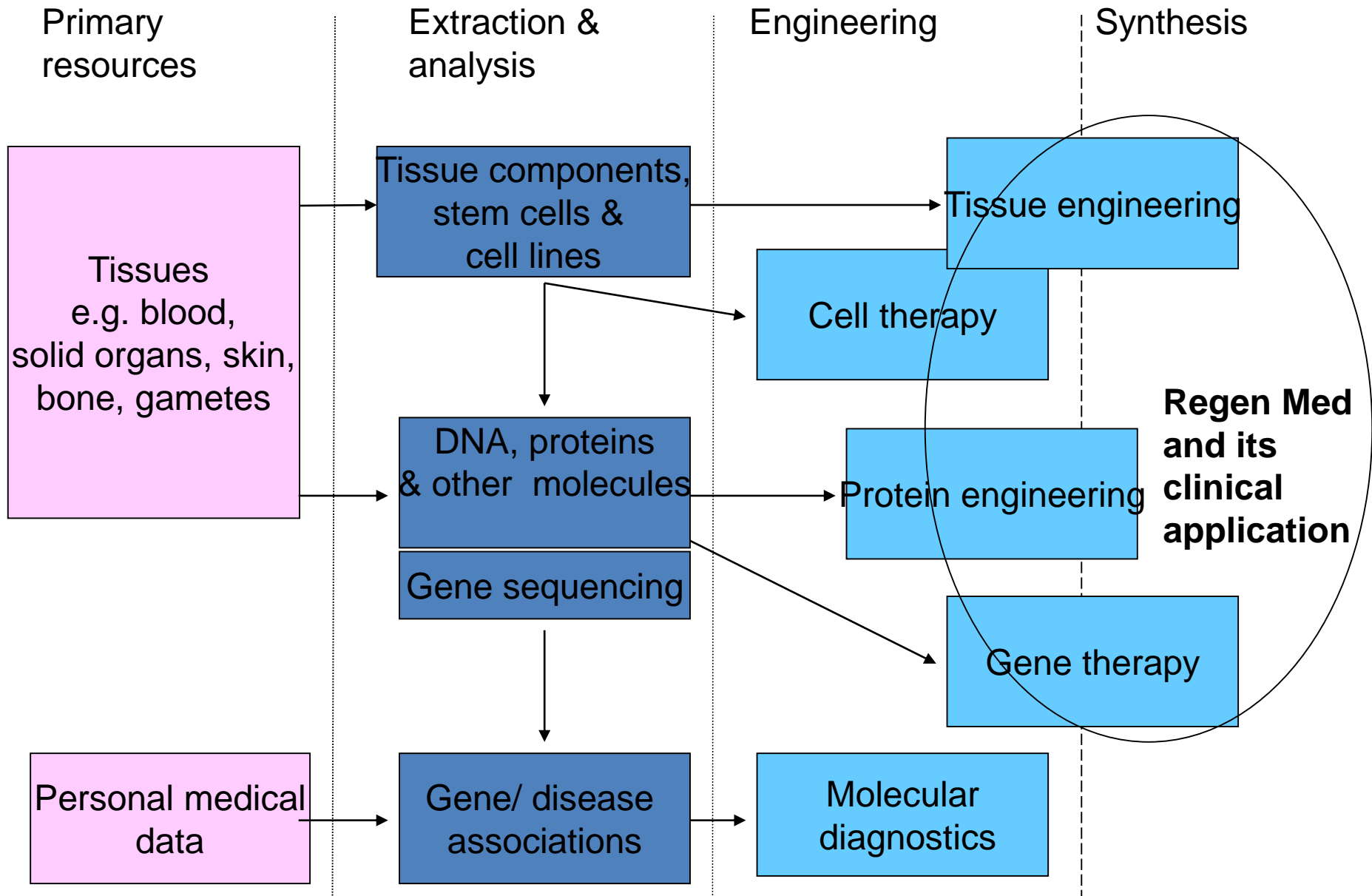
Combination products

<b>Gene Therapy</b>	<b>Xeno-transplantation</b>
<b>Somatic Cell Therapy</b>	<b>Tissue Engineering</b>

# Healthcare products: overview



# Vertical and horizontal chain of economic biovalue creation – bioeconomy market spaces for RM healthcare products



# Regulatory spaces in the EU for tissue/cell products

- Centralised ATMP route
- Hospital exemption (national variation)
- ‘Unlicensed medicines’ (‘Specials’ in UK)
- Orphan designation
- Compassionate use
- ‘Medical device’ – decellularised/acellular product/process

# The biological identity of Apligraf

-Viable human cells (keratinocytes and fibroblasts) cultured from neonatal foreskin on a bovine-based collagen matrix



# The regulatory identity of Apligraf

## Regulation

FDA – ‘medical device’

European Medicines Agency - ATMP

# Effects of the ATMP Regulation

## Hospital exemption route

Hospital-based

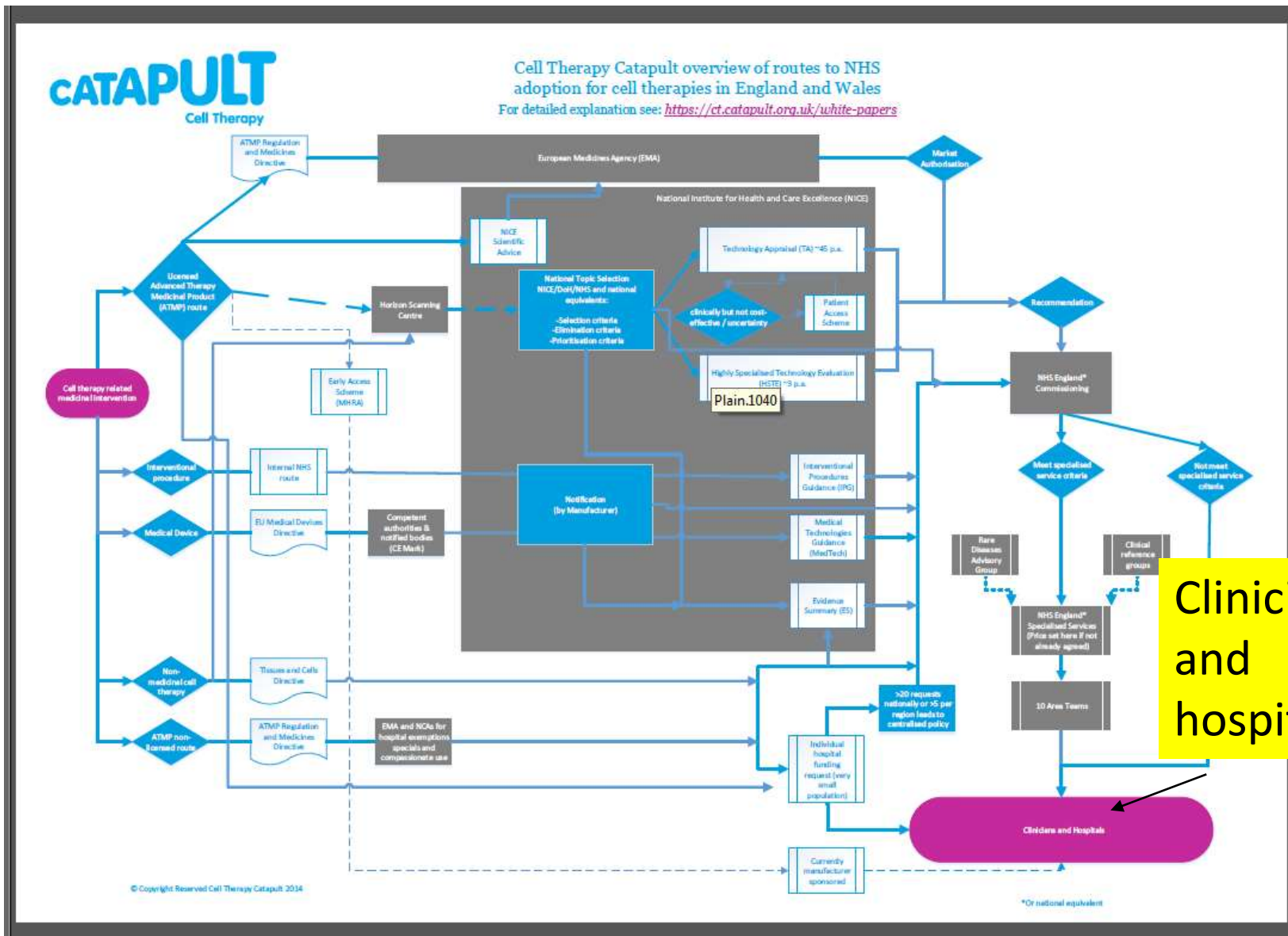
One-off

Individually prescribed

Non-standardised

Non-industrial

# Knowing the reimbursement environment



Clinicians and hospitals

## ‘Clinicians and hospitals’: Differing ‘adoption spaces’

		Robot	Spinal device	Cells	Coag	Pumps	Ultrs	ECG	CRP
Biography	Plausibility		?						
	Distinc/novelty	+		-			+		
	Visibility	+		-	(SM) -			-	-
	Rationale		-	+		+	?	-	
	Scope	+	-	-		+	?	+	
	Substitute or component	Subst	Comp	Comp	Subst	Comp	?	Comp	Comp
	Future	+			?	+	+		+
Effectiveness	Clinical			?	+	?	?	?	?
	Cost	-							
Utility	Clinical			?		?	?	?	?
	Organisational	+			+	+	?		
	Patient related	+	+		+		+	+	+
Risks	Clinical		-		(SM) -	?			
Requirements	Financial	-	-		(SM) -	-			-
	Use related			-	?		-	-	
	Organisational				(NPT)-	-	?	-	

(+): positive impact; (-): negative impact; (?): uncertain identity/impact; (SM): self-monitoring;(NPT): near-patient testing

Source: S. Ulucanlar , A. Faulkner, S. Peirce, and G. Elwyn, *Social Science & Medicine* 98 (2013) 95e105

# Implications for Feasibility of Re-distributed manufacturing? *Distributed into what?*

Determining product classification as AT/CT

Demonstrating its stability (and comparability with approved reference cell line?) and clinical value

What location in the RM value chain?

Understanding regulatory implications (eg safety and efficacy requirements) and classification

Navigating pathway to and adoption space in the clinic



**[www.york.ac.uk/satsu/regenablemed](http://www.york.ac.uk/satsu/regenablemed)**