Synthetic Biology in the UK: Roadmap Landscape

		2012	Short term	2015	2015	Medium term	2020	2020
S	Social and ethical	Satisfying public conce	erns		Ethical framework for SB es	tablished Informed policy for SB		public recognition of value
Irive	Technological	Technology and IC	T capability grows Many disciplin	es combining Embedding areas of bios	synthetic biology in other science			
Trends & d	Environmental		Clima	ate change/green technologies		Addressing new disea human, animal and pla	se threats to ant health	
	Economic			Materials security, costs and scarcity	Need to reduce he	althcare costs	Oil security,	costs and scarcity
	Political & legal		Land use decisions e	e.g. food or fuels Food securit	y >	Global adoption of standards		
Value chain perspectives	Consumers/users				Genuine market	pull for product exists		Increased high value ap
	Channels to market		Disruptive	products start to appear	Channels to market dev	veloped Reduced developm	ent time to market	
	Existing (big) industry						Adoption & s	cale-up by large industries
	Technology cos/start-ups		Need to attract investment	Increasing nur	nbers of SMEs & spin-outs dri	ive innovation	Successfu	I growth of SMEs
	Science base	Innovation with	academia		Strengthened UK scie developing new appli	ence base cations	UK R&D recognised as leadir	lg edge
	Regulation & approval			Public Funding	Stable	regulatory framework		
	Competition			UK sxcels applicatio	in target ns	Added-value of SB appro Increasingly apparent	Jach	nternational competition
	Energy			Microbial fuel cells/bio-hydrogen	\geq	Bioenergy/biofuels (energy from microbial cell factories)		
Ś	Environment				Waste stream mining		Bioremedia	tion
nitie	Food processing				Beneficial novel crops e.g wheat gain acceptance	J. N-fixing cereals or perennial		
opportui	Health & medicine				Healthcare & medicines:	drugs, therapies, vaccines		Persona
	Materials							
ion e	Manufacturing processes			Algal/bacterial/micro-organisms - manufacturing processes	Biocatalysts develop	ed and in use Conversion of existing biomass feedstocks	ng and new	
/alues creati	Sensors					E	Bio-sensors	
	ICT		Bio-CAD / Bio-parts cor	mpanies Novel his solutions	gh-value software s for SB			
	Chemical		High value cher surfactants, flav	micals: yours, cosmetics, catalysts		Speciality chemicals	s >	
	Enabling			Bioparts & other enabling to	ols New chassis	and industrial strains		
	Other							
	Bio parts, devices & systems			More, targeted, hosts/chassis		Usable databases of information for improved design		
کر ا	Design methods and tools	Analytical method	is	High-throughput screening				Improved decor
olog	Synthesis techniques			DNA synthesis techniques	s	equencing DN	A synthesis technologies	
schn	Analysis techniques		Genomics					
ty/te	Underpinning (bio/chem/eng)	Proteomics	Repositories: bio-parts, databases, construction	rules Metabolic models	& pathways Systems	biology		Fi
abili	Computation, modelling & data		Bioinformatics	Engineering/computational modelli	ing			
Cap	Demonstration		Demonstration fac	cilities	>	, , , , , , , , , , , , , , , , , , ,		
U	Risk m'gmt, safety & bio-security				Biose	curity		
	Other		Low-cost, acce	essible R&D consumables		Readily available sca	ale-up facilities	
	People & skills			Strenghtened chemistry & bi	skills base (incl. ochemistry)	Interdisciplinary graduate training & careers		
	Research		Good bioformatics biochemistry	backed up with Multicentr	disciplinary research & research	ch	The UK R&D in	as the best place to carry out SB
Enablers	Funding & investment	Bor	ost research investment Se	eed funding Spin-out	s backed by angels / VC	Increased funding streams for co		
	Regulation, approval & ethics		International Stand	dards	Sensible regulatory f	ramework IP framework for	commercialisation	
	Public engagement & education		Public engage	ement & education Uncontrove	rsial visible early products	Government awareness of opportunities and development needs	Establish a UK entrepr	eneurial culture
	Facilities & infrastructure				DNA synthe sector or co	besis infrastructure: public Big incommercial Big incommercial	dustry take-up at scale	Investme
	Supply chain							
	Networks & collaborations	Active, developed,	, funded SB network Encoura out - aca	ge industry / SME / Spin- ademic links	ess sector collaboration (virtua sters/knowledge centres)			

Long to	erm	2	2030						
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lications in commercial (use								
\rangle									
Water security: impr water, including des	oved access alination	to clean drin	king						
ised medicines and drug	ls								
Bulk chemicals									
Custication control s	ystems								
Synthetic genot	mes								
ly integrated bio, chem,									
gineering and other appr	oaches								
Moving into eurkarvotes	3	\sum							
	-								
Scale-up/scale-out pro	ocesses								
Acceptance by public of SB as the norm									
Self-sustaining invetsment from industry									
nt in large-scale facilities									
	Operationa	I supply cha	in						