# AI EARLY DETECTION

Raj Jena | For the SHERLOC consortium

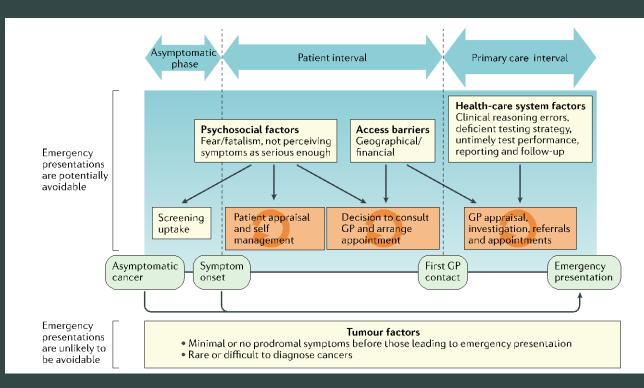




- Build an AI platform for the early detection of cancer using both clinical and non-clinical data
- Learn from clinical records, medications, loyalty card and search histories from patients diagnosed with lung, bowel, oesophagus, pancreas and brain
- Explore Ethical, Legal, Societal issues
- Pilot the study using the Greater Manchester Connected Health Cities initiative

# SHERLOC motivation

• Reduce emergency presentation of these five cancer types





WP4: Discovery cohort of **consented** cancer patients – questionnaires & interviews

#### Medical history

Prescribed & OTC medication

Internet search & information seeking behaviours

Shopping & OTC data from loyalty card schemes from CDRC

WP5: IQVIA Discovering undiagnosed patients using ML based linkage of THIN and HES databases

WP4: Behaviour & risk factors from systematic literature review and key opinion leads

Cancer registration data from National Cancer Registration and Analysis Service

Population demographics, socioeconomic data and health access information from Office of National Statistics MALTHUS Model

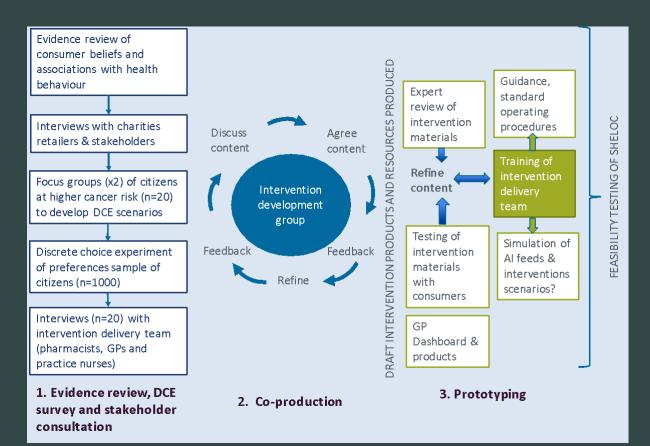
Tier 1 ML Model

Sainsbury's PLC: Time series linked shopping data for 2 years from anonymised Nectar card holders. Microsoft Search Team: Anonymised search engine queries for cancer information from Bing Tier 2 ML Model CHC Pilot

Output for pilot study

LHS such as Manchester Connected Cities SHERLOC Data Network **Commercial Data Cloud based analytics engine** SHERLOC Research Platform **Decision Support** Azure | Power-BI | Ethereum | ML Health avatar Care Quality Reports Secondary Primary Shopping / Care Care Malthus discrete OTC Rx data event simulation **Research Engine &** engine **Reporting Interface FAIR Station** Prescribing data Linked data curation NCRAS / ONS data **Authorisation Gateway** Search Mandatory audits

### Engagement with patients and citizens



#### DCE for 1000 patients and citizens

**5.6** A Patient has been diagnosed with Lung cancer (non-small-cell lung cancer). His doctor asks him to decide between treatment A and treatment B. Which treatment would you choose?

Characteristic	Treatment A		Treatment B	
Time without tumor progression	Medium	11 months w/o progression	Medium	11 months w/o progression
Side effect of Skin	Moderate		None	
Nausea and Vomiting	Mild	ŝ.	Severe	ĥaĥaĥa
Diarrhea	Moderate	<i>i</i> , i	Moderate	<i>à</i> à
Tiredness/Fatigue	Mild	г <b>ћ</b>	Severe	<b>เ</b> ล้าสำส้า
Tumor related symptoms	Severe	à à à	Mild	ìř
Mode of Administration	Infusion	<b>P</b> .	Tablet	œ
	$\bigcirc$		$\bigcirc$	

Mühlbacher, A.C. & Bethge, S. Eur J Health Econ (2015) 16: 657. https://doi.org/10.1007/s10198-014-0622-4

# SHERLOC consortium

- NPL / University of Surrey : Sara Faithfull, Rebecca Nutbrown
- University of Stirling : patient approach and questionnaires
- University of Cambridge : ML development
- Microsoft : Search queries and cloud integration
- Sainsbury's : Loyalty card data
- Maastricht : Open data, interoperability, ELSI