

ENGLISH LANGUAGE (WELSH LANGUAGE, BELOW)



Swansea University
Prifysgol Abertawe

ORGANISATIONAL RESILIENCE & LIFE SCIENCE ENTERPRISE OPEN INNOVATION

This handbook summarises the results of the research collaboration between the Life Sciences Hub Wales (government) and Swansea University (academia), to influence further projects, policies, and procedures at the Hub and their partner enterprises (industry).

With your help, 71 Welsh life science small-to-medium enterprises were sampled, mainly (but not exclusively) in the medical technology subsector. These formed part of a wider UK sample, for the original doctoral research conducted by Michael Winn at the School of Management, Swansea University. Therefore, please cite this research as:

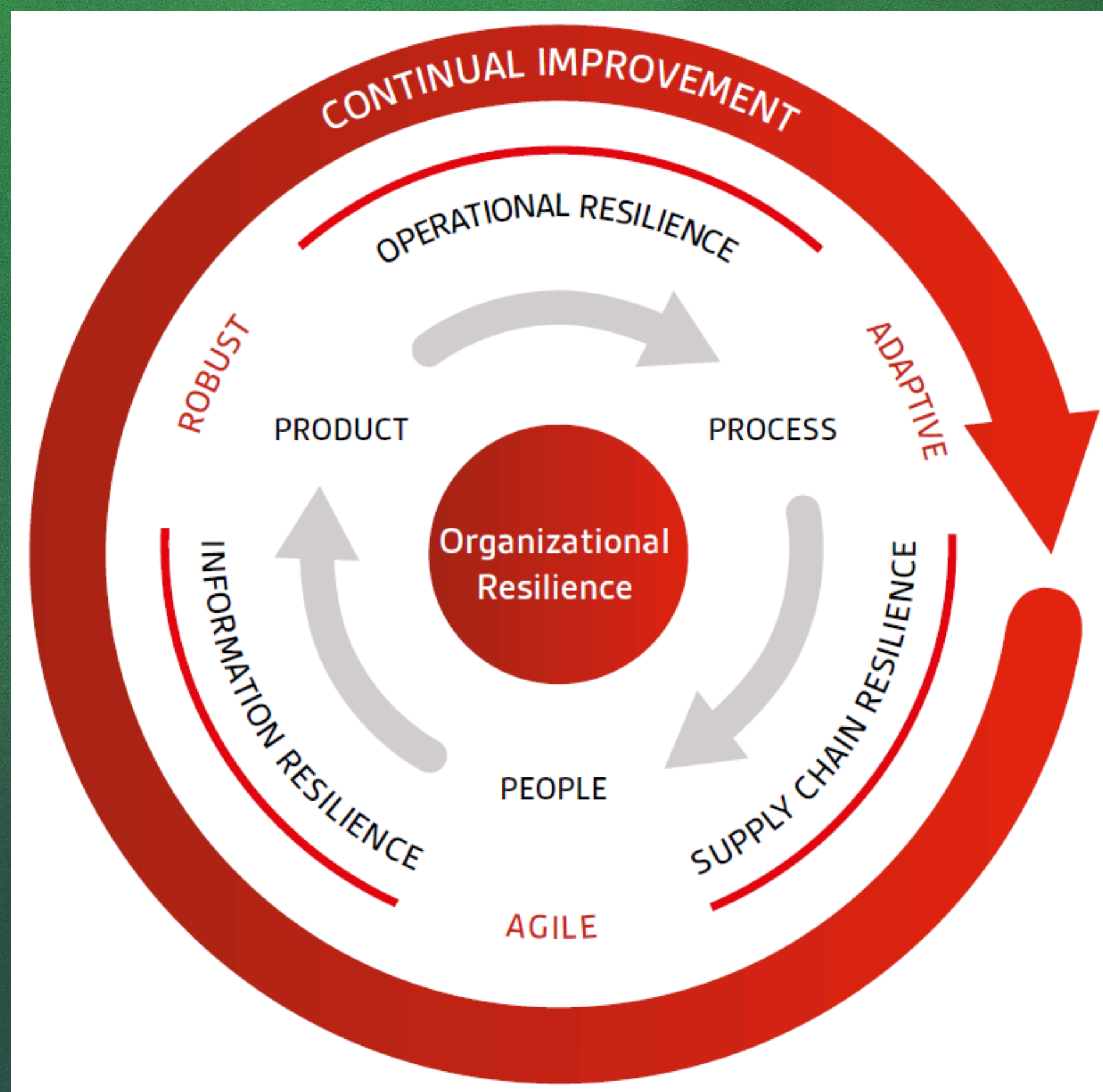
WINN (DUE 2023).

Special thanks to Dr Gareth Healey (Programme Lead for Precision Medicine and Head of Accelerate at the Life Sciences Hub Wales) for his supervision and survey promotion.

RESEARCH THEME 1: ORGANISATIONAL RESILIENCE

“The ability of an organization to anticipate, prepare for, respond and adapt to incremental change and sudden disruptions in order to survive and prosper” (British Standards Institute; see figure below sourced from their blog by Mehmi).

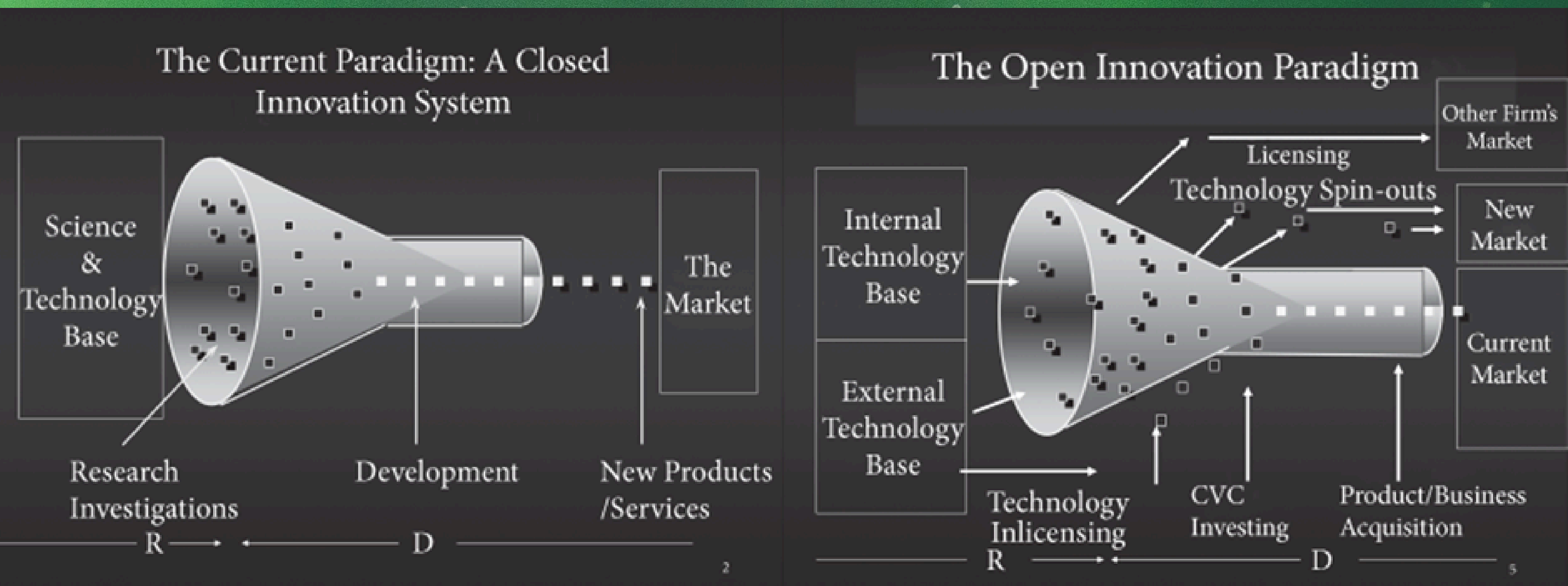
Pescaroli et al. (2020) proposed a four-tier resilience framework to measure this theme, from no to high resilience. On average, Welsh enterprises perceived themselves to have a *medium* level of organisational resilience, which matches the UK average.



RESEARCH THEME 2: LIFE SCIENCE ENTERPRISE OPEN INNOVATION

“A distributed innovation process based on purposively managed knowledge flows across organizational boundaries” (Chesbrough, 2019; see figures below).

Nilsson & Minssen (2018) proposed a six-tier openness framework, specific to life science enterprises. The scale ranged from completely closed (internal only resources) to completely open (internal and external resources). On average, Welsh enterprises perceived themselves to practice a *partially open* model of innovation, which, again, matches the UK average.

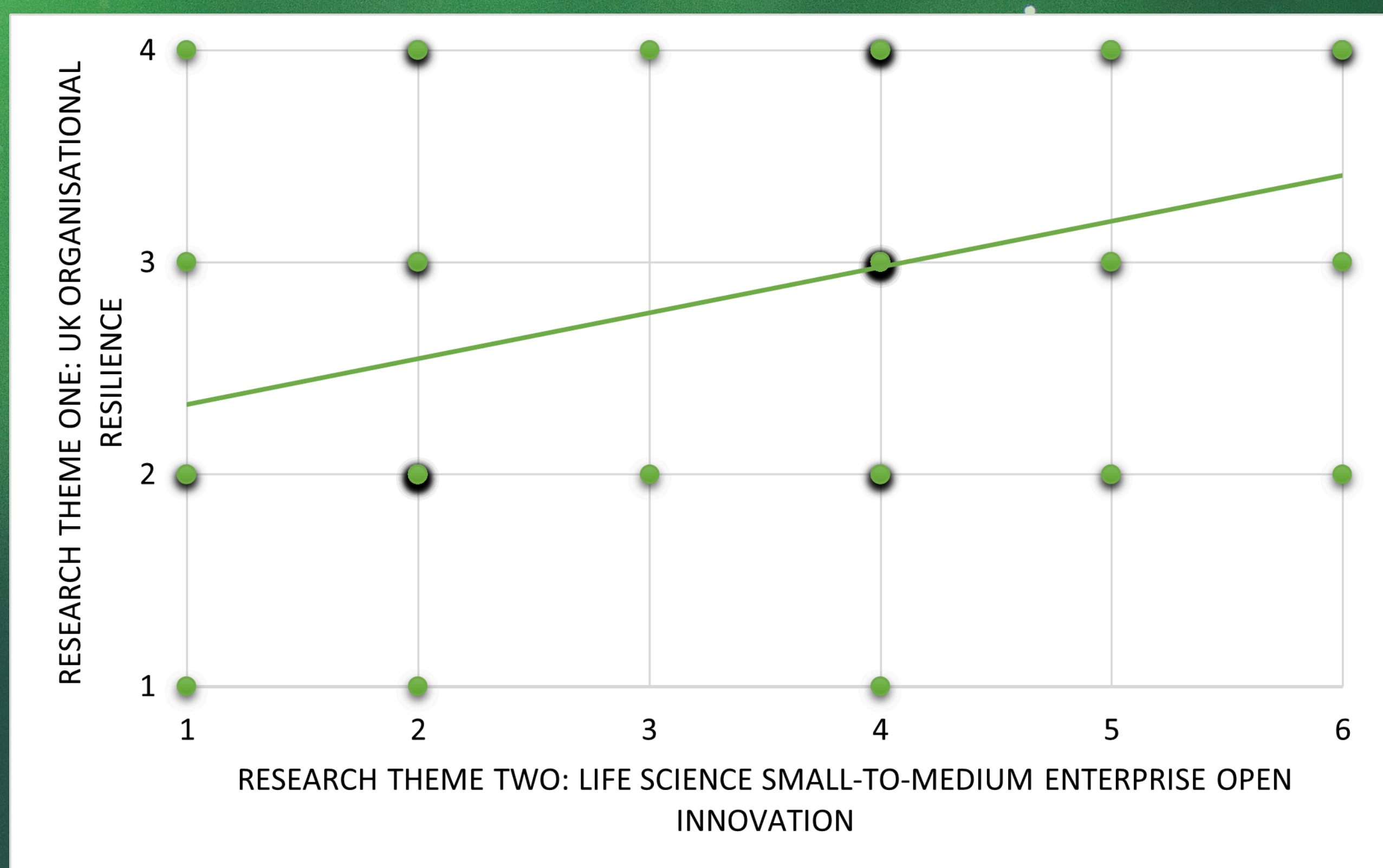


Following a review of current business management research, gaps in academic knowledge were identified to form the two following research questions. A structured, online survey was designed to answer those overarching research questions.

This survey was then shared by the Life Sciences Hub Wales and other agencies to capture, and then statistically analyse, quantitative data upon the research themes, by life science small-to-medium enterprises.

RESEARCH QUESTION 1: WHAT IS THE *ASSOCIATION* BETWEEN THE RESEARCH THEMES?

A positive linear relationship was calculated between the two themes, meaning that they increase together: the more resilient your enterprise, the more open your innovation processes. However, their association had lesser significance when applied to the wider population. Due to the nuance and complexity of enterprises, this requires further research in the form of qualitative online interviews.



RESEARCH QUESTION 2: WHAT *INFLUENCES* THE RESEARCH THEMES?

Factors found in the current peer-reviewed literature were allocated to the following components:

Macro: Exogenous (external) factors of the enterprise

Meso: Demographic factors of the enterprise

Micro: Endogenous (internal) factors of the enterprise

A multivariate linear regression calculated the following top three influences of each theme (as listed below), and can therefore be recommended to be prioritised to enhance your enterprise.

RESEARCH THEME 1: ORGANISATIONAL RESILIENCE	RESEARCH THEME 2: LIFE SCIENCE ENTERPRISE OPEN INNOVATION
MOST INFLUENTIAL: Life science qualifications represented in your management team	MOST INFLUENTIAL: Size of your management team
Speed in which you can get your innovation to market	Life science qualifications represented in your management team
Dedicated innovation staff	Concurrent enterprises run by your management team

The top three influences of both themes feature at the *micro* level, meaning that enterprises should look to developing their endogenous (internal) factors to achieve organisational resilience and/or open innovation. Technical life science knowledge, rather than business management or engineering qualifications also score highly for both themes.

**THANK YOU FOR YOUR PARTICIPATION AND INTEREST
IN THIS RESEARCH.**

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WELSH LANGUAGE



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**GWYTNWCH
SEFYDLIADOL AC
ARLOESI AGORED
MEWN MENTRAU
GWYDDOR BYWYD**

Mae'r llawlyfr hwn yn crynhoi canlyniadau'r ymchwil ar y cyd rhwng Hwb Gwyddorau Bywyd Cymru (y Llywodraeth) a Phrifysgol Abertawe (sefydliad academiaidd), gyda'r nod o ddylanwadu ar brosiectau, polisïau a gweithdrefnau pellach yn yr Hwb a'u mentrau partner (diwydiant).

Gyda'ch help chi, cafodd 71 o fentrau gwyddor bywyd bach i ganolig o Gymru eu samplu, yn bennaf (ond nid yn gyfan gwbl) yn yr is-sector technoleg feddygol. Roedd y rhain yn rhan o sampl ehangach o'r DU, ar gyfer y gwaith ymchwil doethurol gwreiddiol a wnaed gan Michael Winn o Ysgol Reolaeth Prifysgol Abertawe.

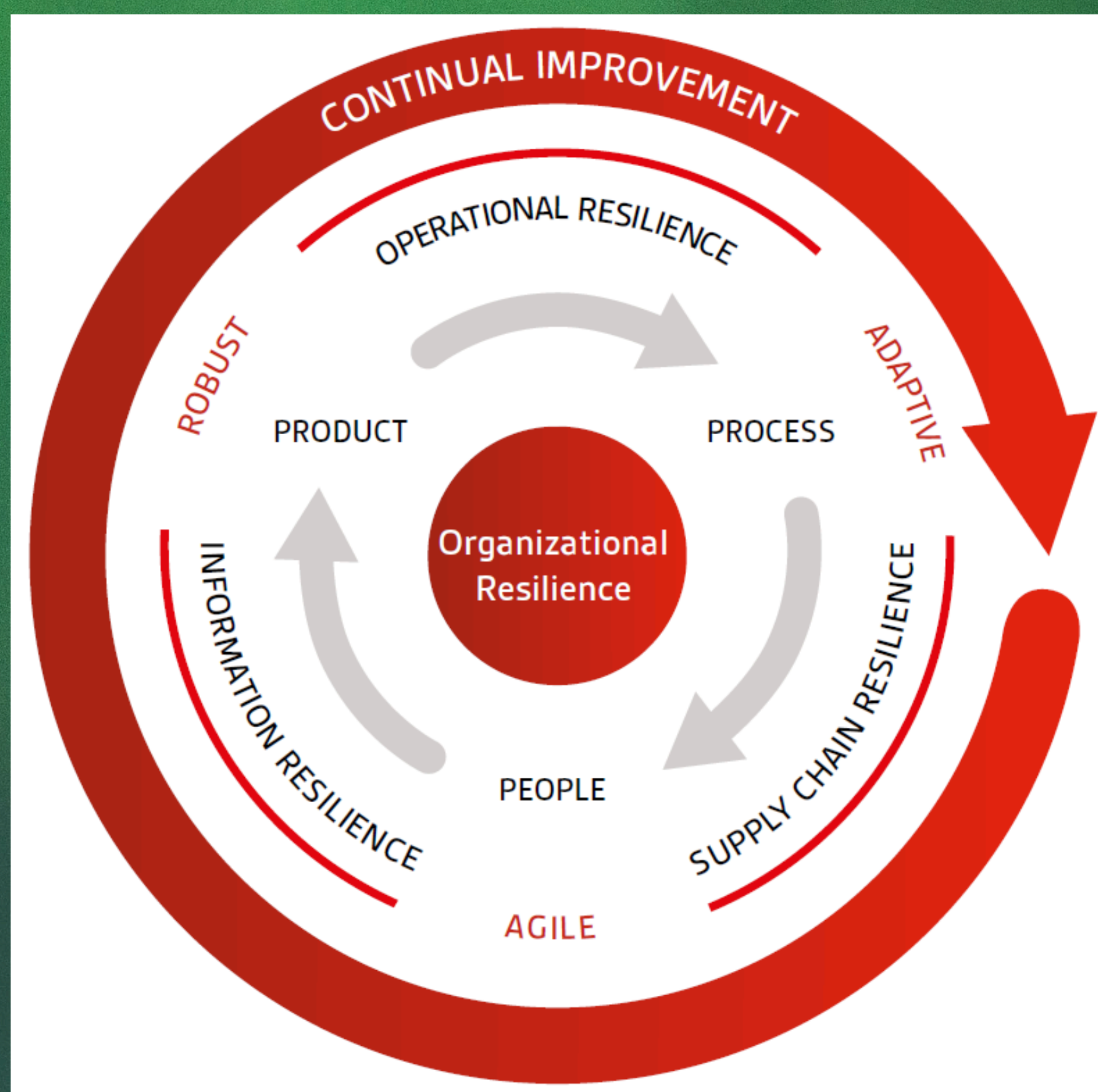
Felly, dyfynnwch yr ymchwil hon fel a ganlyn: **WINN (DISGWYLIR 2023)**.

Diolch yn arbennig i Dr Gareth Healey (Arweinydd rhaglen meddygaeth fanwl a Phennaeth Rhaglen 'Cyflymu' Hwb Gwyddorau Bywyd Cymru) am ei oruchwyliaeth ac am hyrwyddo'r holiadur.

THEMA YMCHWIL 1: GWYTNWCH SEFYDLIADOL

“Gallu sefydliad i ragweld newid graddol ac amhariadau sydyn, paratoi ar eu cyfer, ymateb ac addasu iddynt er mwyn goroesi a ffynnu” (Sefydliad Safonau Prydeinig; gweler y ffigwr isod sy'n dod o'u blog gan Mehmi).

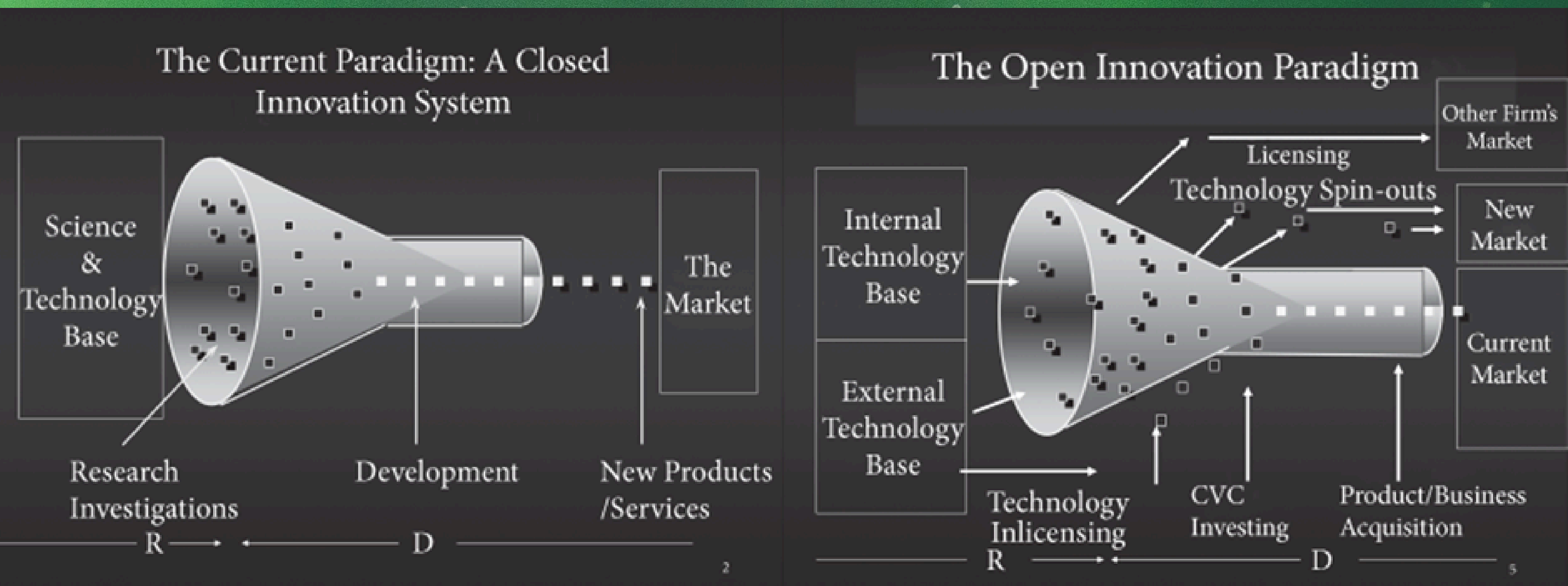
Awgrymodd Pescaroli et al. (2020) fframwaith gwytnwch pedair haen i fesur y thema hon, o ddim byd i wytnwch uchel. Ar gyfartaledd, roedd mentrau yng Nghymru o'r farn eu bod yn meddu ar lefel ganolig o wytnwch sefydliadol, sy'n cyfateb i gyfartaledd y Deyrnas Unedig.



THEMA YMCHWIL 2: ARLOESI AGORED MEWN MENTRAU GWYDDOR BYWYD

“A distributed innovation process based on purposively managed knowledge flows across organizational boundaries” (Chesbrough, 2019; gweler y ffigyrau isod).

Cynigiodd Nilsson a Minssen (2018) fframwaith chwe haen, yn benodol i fentrau gwyddor bywyd i asesu pa mor agored ydynt. Roedd y raddfa'n amrywio o fod yn gwbl gaeedig (adnoddau mewnol yn unig) i gwbl agored (adnoddau mewnol ac allanol). Ar gyfartaledd, roedd mentrau Cymru o'r farn eu bod yn ymarfer model arloesi sy'n rhannol agored, ac mae hynny, unwaith eto, yn cyfateb i gyfartaledd y DU.

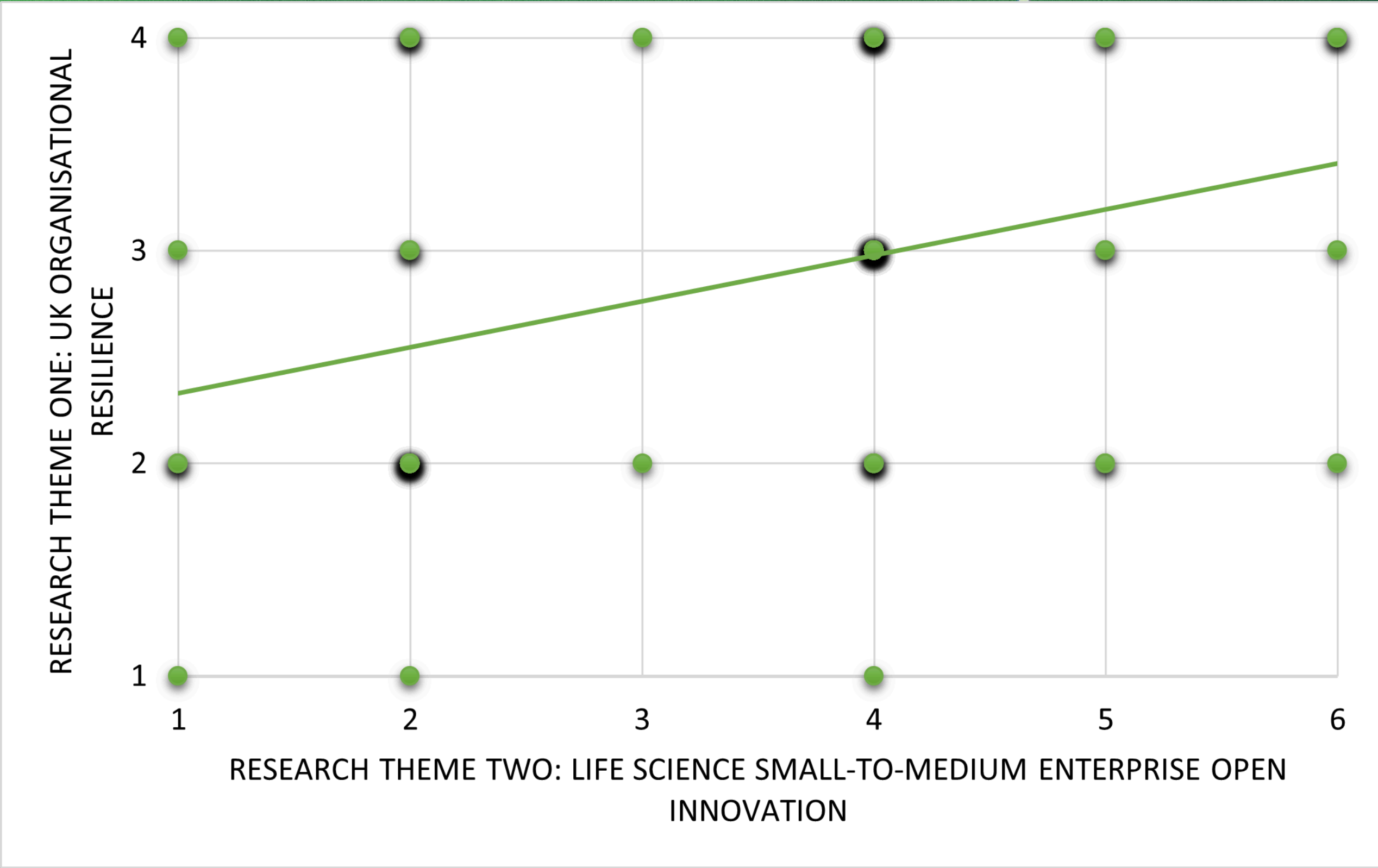


Yn dilyn adolygiad o'r ymchwil presennol i reolaeth busnes, nodwyd bylchau mewn gwybodaeth academiaidd er mwyn llunio'r ddau gwestiwn ymchwil canlynol. Dyluniwyd arolwg strwythuredig, ar-lein, er mwyn ceisio ateb y cwestiynau ymchwil cyffredinol hynny.

Yna, rhannwyd yr arolwg hwn gan Hwb Gwyddorau Bywyd Cymru ac asiantaethau eraill er mwyn casglu, ac yna dadansoddi yn ystadegol, ddata meintiol ynghylch y themâu ymchwil, gan fentrau bach i ganolig ym maes gwyddor bywyd.

CWESTIWN YMCHWIL 1: BETH YW'R CYSYLLTIAD RHWNG Y THEMÂU YMCHWIL?

Cyfrifwyd perthynas linol bositif rhwng y ddwy thema, sy'n golygu eu bod yn cynyddu gyda'i gilydd: po fwyaf gwydn eich menter, mwyaf agored fydd eich prosesau arloesi. Fodd bynnag, roedd y berthynas hon yn llai arwyddocaol wrth ei hystyried yng nghyd-destun y boblogaeth ehangach. Oherwydd naws a chymhlethdod mentrau, mae hyn yn galw am ymchwil bellach ar ffurf cyfweiliadau ansoddol ar-lein.



CWESTIWN YMCHWIL 2: BETH SY'N DYLANWADU AR Y
THEMÂU YMCHWIL?

Rhannwyd y ffactorau a ganfuwyd yn y llenyddiaeth bresennol a adolygir gan gymheiriaid i'r categorïau canlynol:

Macro: Ffactorau alldarddol (allanol) y fenter

Meso: Ffactorau demograffig y fenter

Micro: Ffactorau mewndarddol (mewnol) y fenter

Trwy ddadansoddiad atchweliad llinol amlamrywedd canfuwyd y tri ffactor mwyaf dylanwadol ym mhob thema (fel y’u rhestrir isod), a gellir felly argymhell blaenoriaethu’r rhain er mwyn gwella eich menter.

THEMA YMCHWIL 1: GWYTNWCH SEFYDLIADOL	THEMA YMCHWIL 2: ARLOESI AGORED MEWN MENTRAU GWYDDOR BYWYD
Y MWYAF DYLANWADOL: Cymwysterau gwyddor bywyd sydd gan eich tîm rheoli	Y MWYAF DYLANWADOL: Maint eich tîm rheoli
Pa mor gyflym y gallwch chi gyflwyno eich syniadau arloesol i'r farchnad	Y cymwysterau gwyddor bywyd sydd gan eich tîm rheoli
Staff arloesi pwrpasol	Mentrau cyfochrog sy’n cael eu cynnal gan eich tîm rheoli

Mae tri dylanwad uchaf y ddwy thema yn ymwneud â'r lefel micro, sy'n golygu y dylai mentrau geisio datblygu eu ffactorau mewndarddol (mewnol) er mwyn cyflawni gwytnwch sefydliadol a/neu arloesi agored. Mae gwybodaeth dechnegol ym maes gwyddor bywyd, yn hytrach na chymwysterau rheoli busnes neu beirianeg hefyd yn sgorio'n uchel ar gyfer y ddwy thema.

DIOLCH AM EICH CYFRANOGIAD A'CH DIDDORDEB YN YR YMCHWIL HON.

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