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Archwilydd Cyffredinol Cymru
Auditor General for Wales

Review of Arrangements that Supported the Cardiff Capital Region City Deal's First Investment Decision



WALES AUDIT OFFICE
SWYDDFA ARCHWILIO CYMRU



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Mae'r ddogfen hon hefyd ar gael yn Gymraeg.

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What this report is about

- 1 In March 2016, ten Welsh Council leaders¹, the Secretary of State for Wales, the Chief Secretary to the Treasury and the First Minister for Wales all signed a Heads of Terms². This Agreement established the Cardiff Capital Region City Deal ('the City Deal'); Wales' first such partnership³.
- 2 Over a 20-year period, as stated within the Heads of Terms, the City Deal aims to invest £495 million within the Region to:
 - increase connectivity;
 - improve physical and digital infrastructure; and
 - improve regional business governance.

The £495 million comprises contributions from the ten constituent local authorities totalling £120 million, together with £375 million from Her Majesty's Treasury (HM Treasury).

- 3 In addition, the Welsh Government is procuring the South-East Wales Metro Scheme, which is outside the Cardiff City Deal Joint Working Agreement. The £734 million cost of the Metro brings the City Deal fund total to £1.229 billion.
- 4 After signing the deal, the ten local authorities established a joint committee ('the Regional Cabinet'), comprising the ten council leaders. This Regional Cabinet is the decision-making body for the City Deal partnership.
- 5 The Regional Cabinet established a Programme Office to support it and determined that Cardiff Council should be the 'Accountable Body' ([Appendix 4](#) provides further details of the governance structure). The Accountable Body manages the financial, legal and governance arrangements of the Regional Cabinet.

1 The ten local authorities are: Blaenau Gwent, Bridgend, Caerphilly, Cardiff, Merthyr Tydfil, Monmouthshire, Newport, Rhondda Cynon Taf, Torfaen and Vale of Glamorgan.

2 The document setting out the main areas of the agreement between the constituent local authorities and governments.

3 Further partnerships have now been established with the Swansea Bay City Deal and the North Wales Growth Deal.

- 6 In May 2017, the Regional Cabinet made its first investment decision. It invested £38.5 million to establish a compound semiconductor⁴ manufacturing facility in Newport and lease it to a leading-edge technology company⁵. The investment in CSC Foundry Limited, a company created for the project, amounted to around 8 per cent of the total investment fund. This was the first project investment undertaken by a City Deal or Growth Partnership within Wales.
- 7 Joint committees fall within the definition of ‘local government bodies in Wales’ provided by section 12 of the Public Audit (Wales) Act 2004 (PAWA 2004). Joint committees, therefore, fall within the Auditor General’s duty to audit the accounts of local government bodies under section 13 of PAWA 2004. Under section 17 (2) (d) of PAWA 2004, the Auditor General is also required to satisfy himself, by the examination of the accounts and otherwise that the bodies concerned have made ‘proper arrangements’ for securing economy, efficiency and effectiveness in their use of resources.
- 8 We undertook a review to determine whether appropriate governance arrangements were in place to support the Cardiff Capital Region City Deal decision to fund the compound semiconductor foundry project. In addition, we sought to identify whether there were any lessons and areas for improvement for future City Deal decisions.
- 9 This report sets out our conclusions about the arrangements that supported the City Deal’s decision to invest in the project, together with useful lessons for this and other City Deals and Regional Growth Partnerships. We did not examine whether the investment decision itself was the right decision or not, as the Auditor General’s statutory remit does not include examining the merits of policy decisions.

4 Devices made of semiconductors, notably silicon, are essential components are most electronic circuits – see Appendix 5 for more detail.

5 Established as Epitaxial Products International Limited in Cardiff in 1988, IQE PLC was incorporated in April 1999 with headquarters at St. Mellons, Cardiff. It is a leading global supplier of advanced wafer products and wafer services to the Compound Semiconductor industry.

Key findings






- 10 Our review found that due to commercial and political considerations, the newly formed Cardiff Capital Region City Deal partners decided they had to move quickly to take advantage of the compound semiconductor foundry investment opportunity before its own agreed assurance framework was fully in place. Although the City Deal partners were satisfied that high level risks were identified and mitigated, there are lessons to be learnt for future investment decisions by the Cardiff Capital Region City Deal and other similar partnerships.
- 11 We came to this conclusion because:
- the foundry project presented the Regional Cabinet with what they saw as a compelling opportunity which is consistent with its priority to invest in the compound semiconductor sector. The City Deal partners felt that the timescale for the decision to invest was tight due to commercial pressures and the impending local government elections ([paragraphs 1.16 to 1.24](#)).
 - aspects of the City Deal's investment decision-making process were compromised, and reporting and record keeping were not consistently comprehensive or transparent ([paragraphs 1.25 to 1.38](#)).
 - the accountable body and a member of the Programme Board recorded their concerns about whether the City Deal partners had sufficient time and enough information to come to a sound decision ([paragraphs 1.39 to 1.41](#)).
 - the Regional Cabinet felt unable to make a final decision on 2 May 2017; instead they agreed in principle to invest in the foundry, subject to resolving outstanding matters, and made the final decision on 14 July 2017 ([paragraphs 1.42 to 1.50](#)).
 - most of the City Deal partners felt that high level risks were managed appropriately to enable them to make an informed decision, however they had very limited time to consider large amounts of complex information ([paragraphs 1.51 to 1.61](#)).
- 12 We recognise the ambition of the City Deal partners to take advantage of the compound semi-conductor foundry investment opportunity, especially at a time when the partnership was still in its infancy, to work with the private sector to secure a project which has the potential to deliver significant benefits to the region.

- 13 For the City Deal partners, the experience of going through the foundry project investment decision-making process has helped the Partnership to mature and the City Deal partners identified a number of key benefits from going through this process. These are set out below in **Exhibit 1**:

Exhibit 1: key benefits identified by City Deal partners



The **City Deal Partners** identified **5 key benefits** arising from making the Cardiff Capital Region City Deal's **1st investment**

1		'Getting a project under our belt' and the focus necessary to achieve this helped the relationships within the partnership to mature and gave it a sense of purpose, and of achievement.
2		Regular briefings and updates for Chief Executives and Leaders outside of the usual meeting cycle gave all councils the opportunity to discuss any concerns and come to an agreed position.
3		Making a significant investment outside Cardiff itself helped the City Deal focus on regional benefits and wider opportunities, despite the differing political administrations.
4		The decision was made quickly by public sector standards, showing that it is possible to take well-managed risks.
5		The deal was an investment rather than grant model, which means that the money invested will be returned to the Deal and therefore it can be used for other projects in the future.

- 14 The City Deal is an enormous investment vehicle and the level of public monies involved is significant. The deal will be used to attract at least £4 billion of investment from local partners and the private sector by 2036 on top of its £1.2 billion investment fund, as set out in the Cardiff Capital Region City Deal Heads of Terms. Given the scale of public monies involved, it is important that City Deals adhere to the principles of good governance as set out in [Appendix 1](#).
- 15 The City Deal partners interviewed acknowledge that there are lessons to be learnt from the process of going through the first investment decision for future investment decisions. Our consideration of the arrangements in place at the time of the investment has highlighted areas for improvement. These are relevant for other City Deals and Growth Partnerships, as well as future projects undertaken by the Cardiff Capital Region City Deal. The lessons we have identified are set out in [Exhibit 2](#):

Exhibit 2: lessons identified from making the first City Deal investment.



8 lessons

arising from making the
Cardiff Capital Region City Deal's
1st investment

1		Provide written rather than verbal updates to meetings, whenever possible
2		Maintain a record of all amendments to reports and detailed records of meetings
3		Members receive all reports within an adequate timeframe to be able to read and understand them
4		Ensure opportunities for challenge and scrutiny in between proposal development and the due diligence processes
5		Ensure that there is sufficient capacity to deliver projects
6		Allow Senior Officers within its partner organisations the time to complete appropriate tasks for the Deal or Partnership
7		A thorough assessment against HMT guidance and adherence to the Assurance Framework
8		To ensure that WFG is considered throughout the project appraisal process rather than after the event

- 16 The key questions that our review sought to answer are set out in [Appendix 2](#), and [Appendix 3](#) shows a timeline of key events.
- 17 [Appendix 4](#) describes the governance structure of the City Deal, including the roles played by the advisory bodies, [Appendix 5](#) explains what a Compound Semiconductor is, and [Appendix 6](#) provides a map of the Cardiff Capital Region City Deal area.

The Cardiff Capital Region City Deal was first considered in 2011 and was established in 2017

- 1.1 In 2011, the then Welsh Government Minister for Economy, Science and Transport⁶ set-up a task and finish group to consider evidence for city regions as economic drivers. The group's first recommendation was:

'The group strongly recommends that a City Region be recognised in South East Wales on the basis of existing patterns of movement and the potential for increased interconnectivity together with the tradition of both social and economic interdependence.'
- 1.2 In response, in November 2013 the Welsh Government commissioned a South-East Wales City Region Board, comprising individuals drawn from the public and private sectors. This advisory Board met each month up to January 2015 and provided leadership, vision and strategic direction.
- 1.3 In March 2015, the Chancellor of the Exchequer announced in his Budget Statement that:

'We're giving more power to Wales. We're working on a City Deal.'
- 1.4 On 21 May 2015, the Chief Executive of Cardiff Council wrote to the nine other South-East Wales local authorities, see [Footnote 1](#) suggesting that they collectively formulate a City Deal proposal to submit to the UK Government.

- 1.5 On 15 March 2016, the ten council leaders, the First Minister, the Welsh Government Minister for Finance and Government Business, the Secretary of State for Wales, and the Chief Secretary to the Treasury signed the Cardiff Capital Region City Deal Heads of Terms. This represented a significant step towards a City Deal for South East Wales. The Heads of Terms identified that City Deal projects must fit within one of these strategic themes:
- connecting the region;
 - innovation;
 - regeneration and infrastructure;
 - skills and employment; and
 - a commitment to developing a compound semiconductor cluster within the region.

After signing the Heads of Terms, joint shadow cabinet arrangements were put in place.

- 1.6 The joint shadow cabinet signed off the Joint Working Agreement ('the Agreement') on 18 January 2017. Incorporated within this document were the City Deal's Heads of Terms, the Assurance Framework and the 2016-2020 Implementation Plan. The Assurance Framework details arrangements for governance and decision making on project appraisal, selection and management.
- 1.7 Between 25 January and 9 February 2017, Full Council approval was received from each of the ten partner local authorities for the establishment of a Cardiff Capital Region Joint Committee to deliver the Agreement.
- 1.8 The ten partner councils formally ratified the City Deal on 1 March 2017 and then formed the Joint Committee, which approved a plan to move from joint shadow cabinet arrangements to a full Regional Cabinet. The Regional Cabinet considers investment projects for approval in accordance with the Agreement.
- 1.9 The Regional Cabinet set up a programme office with a programme director to support the City Deal. During the first year of the City Deal, known as the 'transition year', an outline staff structure was developed.

- 1.10 As part of the governance arrangements, the Regional Cabinet set up a Programme Board to act as a sounding board for potential investment projects. The Programme Board is made up of Strategic Directors and subject experts, but Chief Executives have a standing invitation to attend.
- 1.11 The City Deal partners agreed that Cardiff Council would be the accountable body, given its capacity and experience of large capital projects. Cardiff Council also had experience of procuring expert advice through its framework contracts, which the City Deal could draw upon, avoiding the need for fresh tenders. Further information about the governance structure of the City Deal is set out in [Appendix 4](#).

The £1.229 billion Cardiff Capital Region City Deal comprises investment from UK Government, Welsh Government and the ten Cardiff Capital Region City Deal partners

1.12 The City Deal agreement between the UK Government, Welsh Government and ten constituent local authorities totals £1.229 billion over a 20-year period. The City Deal has confirmed that £734 million of the £1.229 billion is for the South-East Wales Metro Scheme⁷. The balance of £495 million is available as the 'Wider Investment Fund'. The City Deal receives the UK Government's funding contribution (totalling £375 million) via the Welsh Government in annual tranches, as follows:

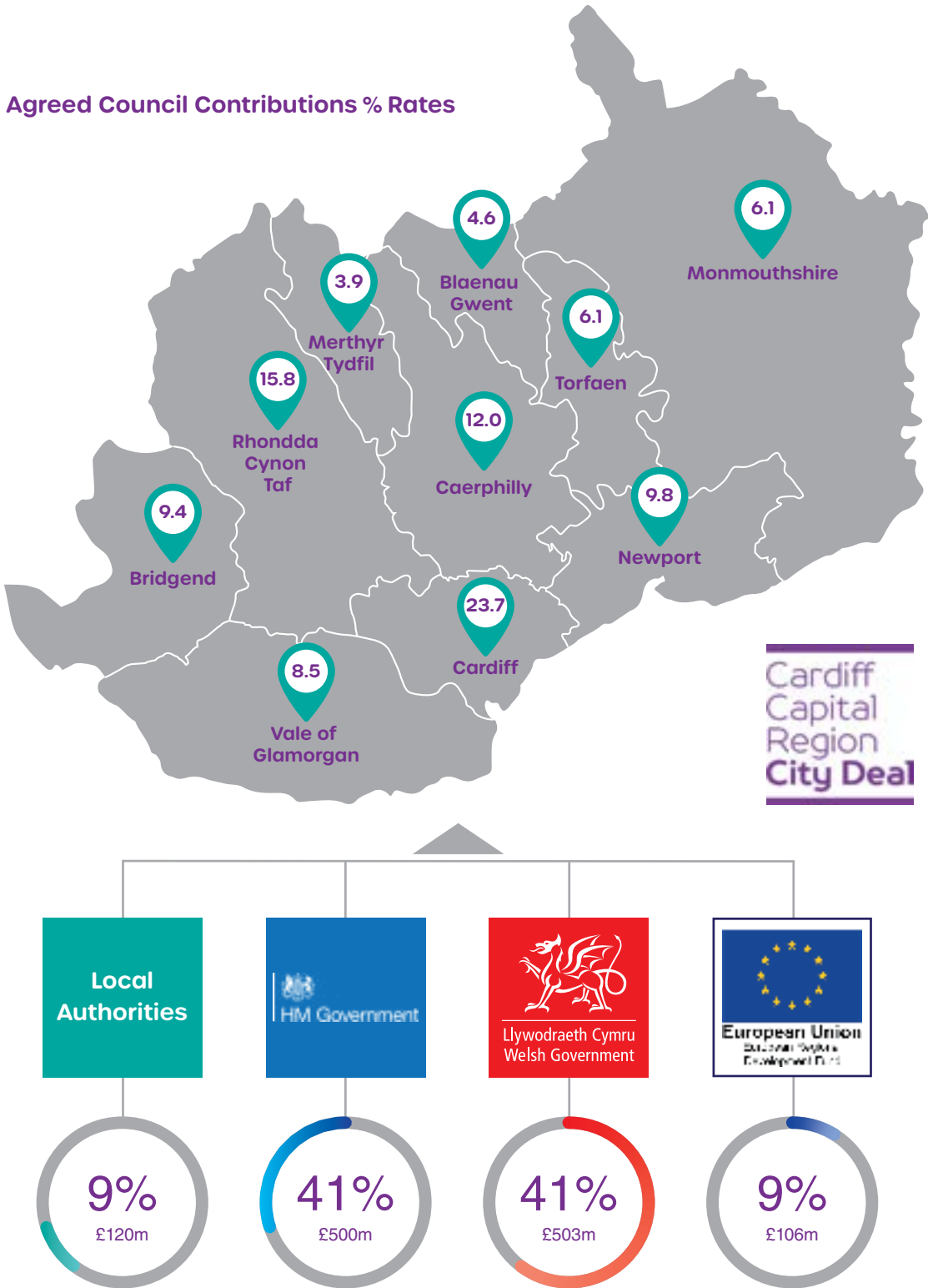
- 2016-17 to 2020-21: £10 million revenue funding per year (£50 million total)
- 2021-22 to 2030-31: £22 million capital funding per year (£220 million in total)
- 2031-32 to 2035-36: £21 million capital funding per year (£105 million in total)

The balance of the City Deal funding (£120 million) is provided by the ten local authority City Deal partners as required.

1.13 **Exhibit 3** below shows how the funding is broken-down per organisation. In line with the City Deal ethos of local accountability, the Welsh Government did not impose any additional terms and conditions on the City Deal's use of its funding beyond those required to ensure financial propriety and good governance.

⁷ The South Wales Metro is a major rail infrastructure investment project to link people and jobs across South East Wales in a fast, efficient and environmentally positive way. There will be better integration with other modes of transport, including buses, and flexible ticketing options. Travellers will be able to move easily across the south-east Wales region with improved capacity, improved quality and improved passenger information. Source: City Deal documentation.

Exhibit 3: the breakdown of funding per organisation



Source: Cardiff Capital Region City Deal Heads of Terms

- 1.14 The UK Government stipulated that the Wider Investment Fund should create 25,000 new jobs and £4 billion of private sector investment to support the City Deal's objectives. The UK Government's expectations are that any City Deal investment decisions would have regard to the 'Green Book'⁸, based upon the HM Treasury five-case business model. The City Deal's Assurance Framework is designed to reflect 'Green Book' requirements.
- 1.15 Cardiff Capital Region will be required to evaluate the impact of the Investment Fund in order to unlock funding that has not been pre-allocated to the South East Wales Metro programme. This will be comprised of gateway assessments every five years. To underpin these gateway assessments, an independent review will be commissioned to evaluate the economic benefits and economic impact of the investments made under the scheme, including whether the projects have been delivered on time and to budget. This assessment will be funded by the Cardiff Capital Region, but agreed at the outset with the UK Government. The next five-year tranche of funding will be unlocked if the UK and Welsh Governments are satisfied that the independent assessment shows the investments to have met key objectives and contributed to national growth.

8 The 'Green-Book' is guidance issued by HM Treasury on how to appraise policies, programmes and projects and to help officials develop transparent, objective, evidence-based appraisal and evaluation of proposals to inform decision-making, based on a **five-case model**.

The foundry project presented the Regional Cabinet with what they saw as a compelling opportunity which is consistent with its priority to invest in the compound semiconductor sector. The City Deal partners felt that the timescale for the decision to invest was tight due to commercial pressures and the impending local government elections

- 1.16 Before the City Deal was finalised, in January 2016, the Chancellor of the UK Government had announced £50 million of funding support, to back cutting-edge science and innovation by establishing a national semiconductor innovation centre, the Compound Semiconductor Applications Catapult, in Wales. Earlier, in November 2015, the Welsh Government announced a £12 million funding package and the UK Research Council Partnership Investment Fund invested £17.3 million. The Centre, spearheaded by Cardiff University and IQE⁹, was established to develop and build next generation compound semiconductor technologies. The City Deal recognised that these investments aligned with one of its priorities and therefore reflected the semiconductor industry within its Heads of Terms.
- 1.17 On 5 January 2017¹⁰, the Chief Executive of Monmouthshire Council informed the Programme Board that IQE was considering expanding to a vacant factory in Newport, owned by the Welsh Government. The expansion would establish a compound semiconductor foundry and create approximately 4,000 to 5,000 jobs with a salary range of between £40,000 and £50,000. The project would also bring in £375 million private sector investment and would generate returns on public investment for use on future other City Deal projects. The project was, therefore, consistent with the City Deal Heads of Terms.
- 1.18 The minutes of the 5 January 2017 Programme Board meeting stated ‘... timescales are tight as investors will need to commit in 2017’. The Programme Board agreed to put the foundry project forward for discussion by the shadow cabinet on 6 January 2017. However, the shadow cabinet minutes do not indicate that any discussion took place. We have been unable to establish why this was the case.

⁹ Established as Epitaxial Products International Limited in Cardiff in 1988, IQE PLC was incorporated in April 1999 with headquarters in St Mellons, Cardiff. It is a leading global supplier of advanced wafer products and wafer services the Compound Semi conductor industry.

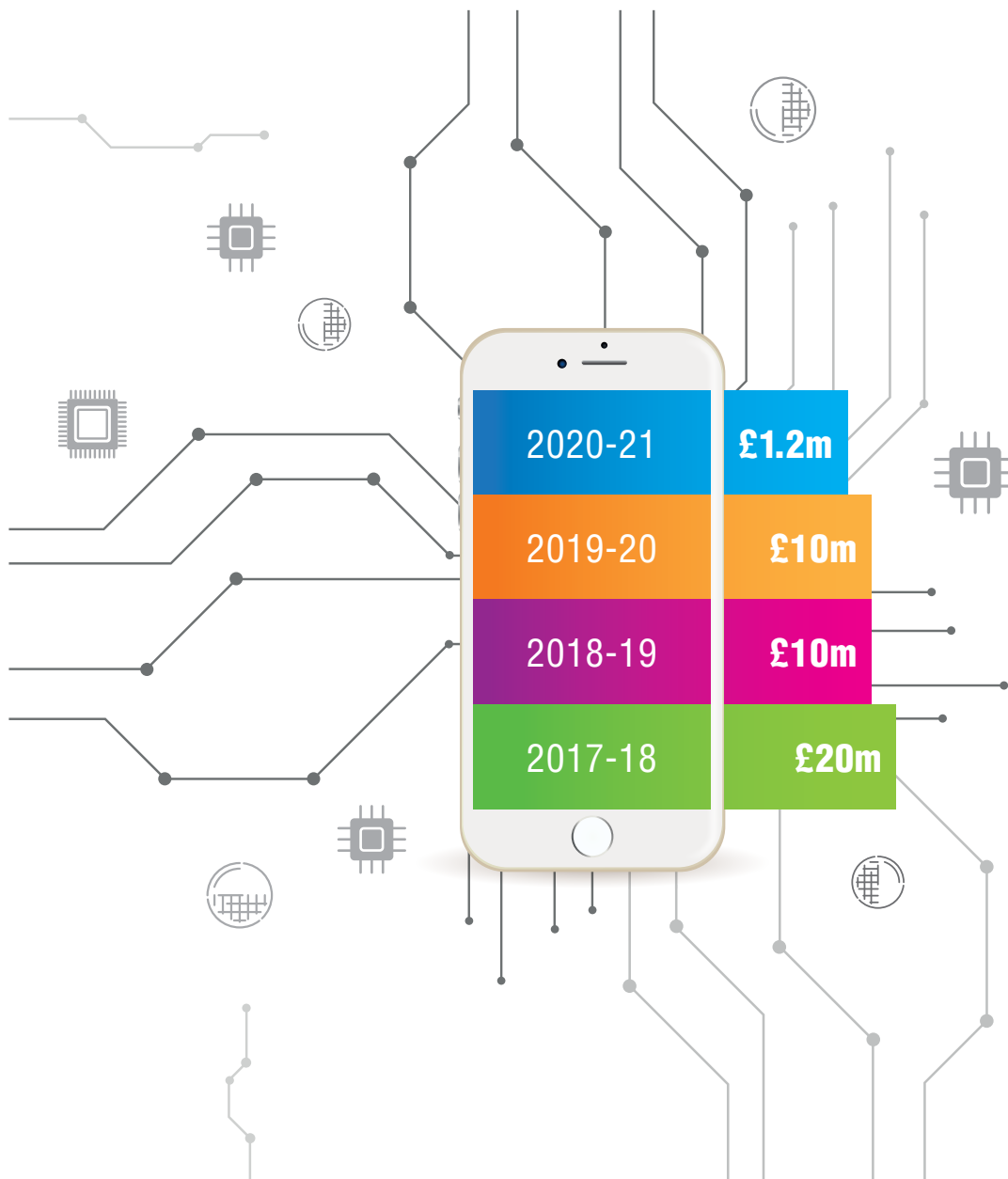
¹⁰ Before the City Deal was ratified.

- 1.19 On 10 February 2017, the Chief Executive of Newport City Council presented a briefing paper on the compound semiconductor cluster concept to the Programme Board. The paper provided information on reasons for establishing a compound semiconductor cluster, the current position and the potential way forward given the limited timeframe. The paper also listed potential risks and mitigations associated with the compound semiconductor industry and the foundry project, and an associated timeframe.
- 1.20 Monmouthshire Council agreed to take on the lead authority role in relation to the foundry project, as it had chief officers with prior knowledge of the compound semiconductor concept. Monmouthshire had also led on the early stages of the work and developed the proposal with key stakeholders.
- 1.21 On 17 March 2017, the Regional Cabinet agreed a Transition Plan 2017-18, which provided Regional Cabinet with details of the tasks and activities required in the coming year to efficiently address the requirements of the Joint Working Agreement and the Assurance Framework. At the same meeting, the chief executive of Monmouthshire Council presented a paper covering:
- the need for the Regional Cabinet to make a quick decision, as IQE had secured a major contract with one of the leading global technology giants. IQE therefore required a production facility to be set up by July 2017, in readiness for testing and validation of the technology.
 - the size and timeframe of the deal. The City Deal would invest between £37 million and £40 million over 3 years to acquire and fit-out the property; including installing a specialist 'clean room' facility.
 - confirmation that the Joint Working Agreement allows the Regional Cabinet to make the decision.
 - the Regional Cabinet could decide during the period preceding the Local Government election in May 2017.
 - value for money considerations. The foundry investment would represent value for money because it would yield annual interest and would be repaid in full when the building is sold. The project would create 4,000 – 5,000 jobs and would signal the City Deal's clear intent to invest in industries of the future.

- 1.22 A specially convened Programme Board meeting on Friday 21 April 2017 considered the foundry investment, which required City Deal investment to convert the former LG Packaging & Testing building in Newport, into a Compound Semiconductor foundry. The Programme Board would need to recommend the proposal to the Regional Cabinet for it to approve, as required under the Assurance Framework.
- 1.23 The City Deal partners recognised the importance of deciding in the period before the local government elections in May 2017. This was because of the possibility that the election results could affect the Regional Cabinet's composition¹¹. The City Deal was concerned that the opportunity to invest in the foundry project could therefore be missed, due to the tight approval timetable necessitated by the commercial pressures. However, although the in-principle decision was made prior to the elections, the actual approval was not given until July 2017.
- 1.24 IQE had commissioned a comprehensive building survey and a leading firm of accountants had produced an independent commercial and financial due diligence advice report. The four-year investment is shown in **Exhibit 4**.

¹¹ If any of the existing council leaders lost their seats, then their councils would need to appoint new leaders before they could participate in the City Deal, most AGM's for appointment were scheduled for July. The new leaders would then have to be brought up to speed in relation to the potential investment. This would result in delaying a decision for potentially several months, thus missing the July 2017 deadline.

Exhibit 4: the compound semiconductor foundry project four-year investment requirement from the City Deal, as per the 21 April 2017 Programme Board minutes, these differ to those discussed at the March 2017 meeting



Source: Programme Board minutes, dated 21 April 2017

Aspects of the City Deal's investment decision-making process were compromised, and reporting and record keeping were not consistently comprehensive or transparent

1.25 The City Deal is required to follow the same rules, regulations and principles of good governance as all other Welsh Local Government bodies, including in relation to transparency, reporting and accountability. We found that:

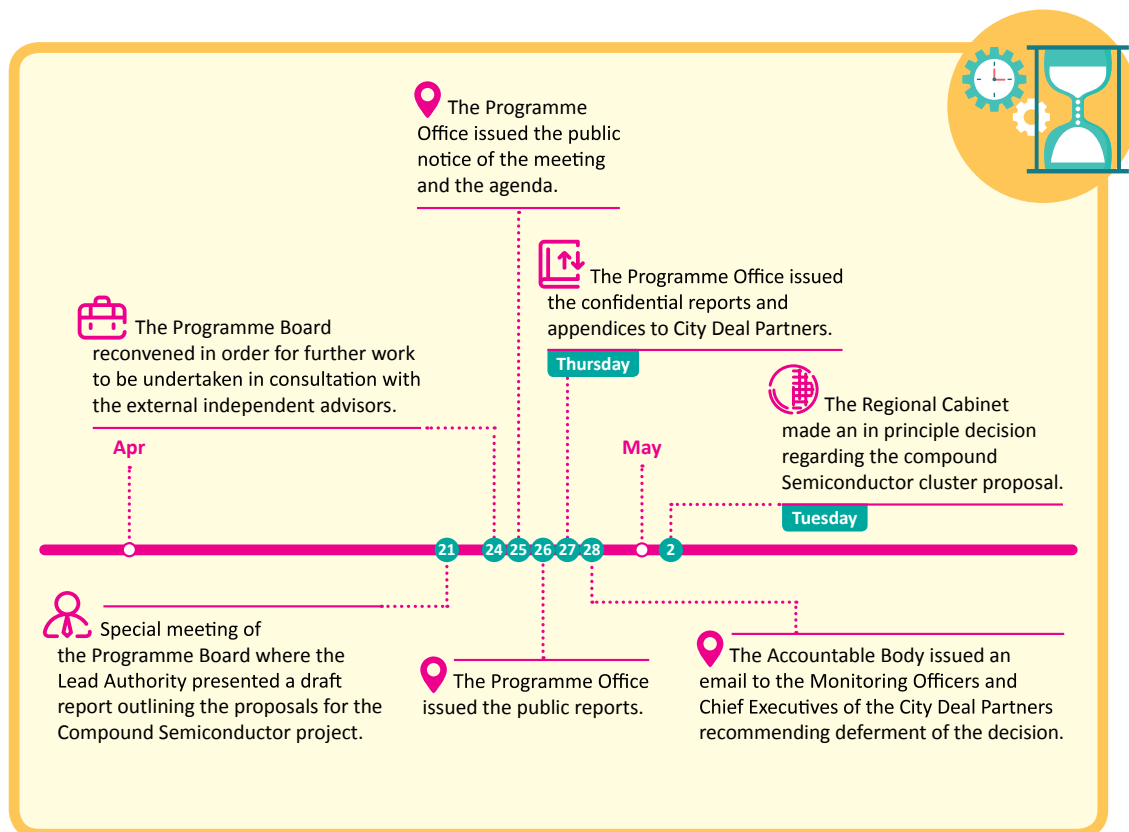
- the on-line record of meeting minutes is incomplete;
- updates to key meetings were provided verbally and discussions were not recorded appropriately and consistently;
- information was provided to the Programme Board without supporting documentation ([Exhibit 6](#));
- complex expert opinions were provided to the Regional Cabinet without adequate explanatory reports from the Lead Authority, Programme Board and Accountable Body¹²;
- risk assessment ratings¹³ were reduced without the documentation clearly showing what assurance had been received;
- elements of the decision process that should have been undertaken sequentially were undertaken simultaneously ([paragraph 1.37](#)); and
- the same officers from the Lead Authority were significantly involved in both developing and appraising the project proposal rather than there being a separation of responsibilities.

1.26 A specially convened Programme Board met on Friday 21 April 2017 to consider whether they could recommend the foundry investment to the Regional Cabinet. The Programme Board felt they did not have enough information to be able to recommend the investment to the Regional Cabinet. The Lead Authority and Programme Office agreed to work over the weekend to provide the Programme Board with further information for another meeting on Monday 24 April 2017.

¹² The City Deal's Annual Governance Statement 2017-18 recognises that 'on occasions the draft [officers'] reports had been provided with insufficient time for the written comments included in the reports to be as comprehensive as is ideal'.

¹³ The City Deal's Annual Governance Statement 2017-18 acknowledges that 'the City Deal has a limited level of assurance of its risk management arrangements and that this is an area for improvement'.

Exhibit 5: timescale of the compound semiconductor foundry investment decision



Source: Programme Board and Regional Cabinet minutes

1.27 On 24 April 2017, the Programme Director reminded the Programme Board that the City Deal was unable to adhere strictly to its agreed Assurance Framework¹⁴ because the Assessment Toolkit¹⁵ was still in development and the Advisory Bodies (see [Appendix 4](#)) were yet to be put in place. She stated:

‘...in this transition period the Board are requested to prepare their observations and recommendations based on the available information within the Candidate Scheme Observation Record¹⁶ and Project Proposal Assessment’.

1.28 The partnership was very new, relationships were still developing and the governance arrangements to support the City Deal were not all in place, specifically:

- five-year business plan¹⁷ and regional economic strategy¹⁸;
- assessment toolkit;
- advisory and consultation groups; and
- the Programme Office, which supported the Regional Cabinet was not fully staffed.

1.29 The City Deal partners, therefore, recognised that the foundry investment decision would not fully follow the processes set out in its agreed Assurance Framework.

1.30 The minutes of the Programme Board held on Monday 24 April 2017 provide an example of how verbal updates were given in relation to key risk areas and the level of information recorded in the minutes, see [Exhibit 6](#).

14 The Assurance Framework agreed within the Joint Working Agreement, sets out a wider investment fund scheme appraisal framework against which candidate schemes like the foundry project should be assessed. The Assurance Framework also identifies a Gateway system, which includes a three-stage business case: development; consultation, assessment process; and a decision-making protocol. These are sequential, with proposal, business case development and due diligence needing decision following on from each other only if a project is successful at each stage. This is in line with HM Treasury Green Book requirements.

15 The Assessment Toolkit measures the extent to which a project supports delivery of Joint Working Agreement Business Plan targets and assesses value for money.

16 The “Candidate Scheme Observation Record and Project Proposal Assessment” is the form used to record comments from the Programme Board.

17 The Regional Cabinet and each of the 10 constituent local authorities agreed the five-year joint working agreement Strategic Business Plan on 28 March 2018.

18 The Assurance Framework states:

‘The main factor in assessing candidate schemes will be the extent to which they contribute to the targets detailed in the Regional Economic Strategy and their value for money.’

Exhibit 6: verbal updates provided to the Programme Board at its meeting on 24 April 2017

Update

State Aid



Expert legal advice on State Aid, including on meeting the Market Economy Investor Principle Test¹⁹.

The City Deal would receive the written advice on letterhead shortly.

Legal advice on the ability of the Regional Cabinet to create a Special Purpose Vehicle.



Procurement



Legal advice on the City Deal procuring a building; there is no time to issue an Official Journal of the European Union (OJEU) notice²¹. However, the Board can consider a Voluntary Ex Ante Transparency²² notice.

¹⁹ The Market Economy Investor Principle Test is applied to establish whether the recipient of an aid will derive a “selective advantage” from receipt of an economic advantage which could not have been obtained under normal market conditions.

²⁰ A Special Purpose Vehicle (SPV) is an off-balance sheet legal entity created to fulfil a temporary objective. SPV’s can disaggregate risks and reallocate them to investors willing to take them on. This allows investors access to investment opportunities and provides a new source of revenue generation for the sponsoring firm.

²¹ The OJEU is the publication in which all tenders from the public sector, which are valued above a certain financial threshold according to EU legislation, must be published.

²² A means of advertising the intention to let a contract without opening it up to formal competition.

Impact of land value increases in reducing financial risk. Use of prudential borrowing²³ by the ten constituent local authorities to cover a potential funding gap.

It was noted that it was important to have sight of the assurance obtained from Welsh Government relating to the acquisition of the building.

Questions were raised on the due diligence report specifically with reference to agreements with a high-street bank.



The Lead for Place²⁴ confirmed that the project sponsor was IQE and that officers from Monmouthshire and Rhondda Cynon Taf councils were carrying out an assessment role. Therefore, no declarations of interest or involvement were required.

On the matter of compliance with the Assurance Framework, the Lead for Place stated that the report to Regional Cabinet must include the observations and recommendations of the Programme Board.

The Programme Office must publish the report tomorrow afternoon, if the meeting is to go ahead on 2 May. Therefore, the Board must undertake an assessment of the proposal in line with the Assurance Framework on the assumption that, and subject to, the Board receiving positive responses to the further information requested (see paragraph 1.42).

Source: Minutes of the Cardiff Capital Region Programme Board

²³ The Local Government Act 2003 sets the legal framework within which local government may undertake capital expenditure. The Act also empowers the National Assembly for Wales to further regulate capital finance matters as appropriate. Section 3 of the Act requires all borrowing to be subject to an affordability assessment by a Local Authority. Section 12 also provides for a general power that allows an authority to invest resources in support of their services or for sensible treasury management activities.

²⁴ An officer from the Programme Office.

- 1.31 The Programme Board minutes record that four queries relating to the verbal updates were raised at the meeting. These queries could have been dealt with before the meeting if timescales had allowed papers to be provided and considered properly:
- a one member wanted the Board to see the State Aid legal advice.
 - b one member suggested that the Special Purpose Vehicle may need to be considered by individual Authorities. Therefore, the Board can only agree in-principle at this time.
 - c one member wanted the Board to see the Welsh Government assurance relating to the building acquisition.
 - d the Board raised questions on the accountant's due diligence report, specifically in relation to the high-street bank agreements.
- 1.32 At the meeting on 24 April 2017, the Programme Board received a lot of information verbally and still had several queries. As the agreed Assurance Framework was not fully in place, the Programme Board undertook a high-level assessment of the foundry project proposal against HM Treasury's Five Case Business Model (see [footnote 8](#)) at its meeting on 24 April 2017.
- 1.33 The Programme Office led the Programme Board through the Five Case Business Model, explaining that it was usual for there to be three iterations²⁵ of a business case to support a proposal. However, due to time constraints the Programme Office and Lead Authority had moved directly to the final iteration, a full business case²⁶, for the foundry project proposal. The Programme Board's assessment of the proposal against the Five Case Business Model is set out in [Exhibit 7](#).

25 The three iterations are: Scoping the proposal and preparing the Strategic Outline Case; Planning the proposal and preparing the Outline Business Case; and Procuring the proposal and preparing the Full Business Case.

26 In its Annual Governance Statement 2017-18, the City Deal recognises that business case development is an area for improvement.

Exhibit 7: the Programme Office’s assessment of the foundry project proposal against the five-case business model as recorded within the Programme Board minutes of 24 April 2017

Case	Risk Assessment presented	Following discussions
Strategic	Clearly established	No change
Economic	Three red rated areas: <ul style="list-style-type: none"> • only one option has been considered and developed • had a value for money assessment of the preferred option been undertaken? • lack of benefits/realisation plan 	All reds moved to amber or green, subject to receiving written responses.
Commercial	Considered positive	No change
Financial	Two red rated areas: <ul style="list-style-type: none"> • is the scheme affordable? • impact on income/ expenditure on the overall budget specifically related to development and implementation of other proposals 	Given the considerations earlier on in the meeting all reds moved to amber.

Source: Minutes of the Cardiff Capital Region Programme Board 24 April 2017

- 1.34 Only four of the five business case areas in the model were assessed according to the minutes. It is not clear why the management element of the five-case business model was not considered. In addition, we have not seen the evidence to support the changes in red ratings for:
- options appraisal and opportunity costs²⁷; and
 - scheme affordability, value for money and benefits realisation.

These missing elements focus on whether the preferred option can be delivered, benefits realised, and risks managed. It is noted, however, that the papers provided to the Regional Cabinet on 2 May 2017, included the management case aspect of the five-case business model.

- 1.35 After reassessing their compliance, against the five-case business model on 24 April 2017, the Programme Board recommended the foundry project investment to the Regional Cabinet for their consideration on 2 May 2017²⁸. This was because red ratings, showing areas at risk of non-compliance with the five-case model ([Exhibit 7](#)), were amended to amber or green.
- 1.36 The five-case model is intended to test all aspects of a funding proposal from inception through to delivery and benefits realisation. The model requires each stage to be completed satisfactorily before proceeding to the next. The model ensures that decisions are transparent because they are based upon complete information, proper documentation and a robust process.
- 1.37 The City Deal moved straight to a full business case, without a preceding outline case ([see paragraph 1.33](#)) and undertook due diligence at the same time as developing the final proposal. Because these stages were taken simultaneously rather than sequentially, each stage was not fully documented, compromising the City Deal partners' ability to robustly scrutinise and challenge the proposal. This affected the transparency of the decision-making process. Furthermore, the Assurance Framework anticipated, and the HM Treasury Green Book advises, separation between project sponsorship and appraisal processes, to safeguard independence. However, the same officers from the Lead Authority were significantly involved in both developing and appraising the foundry project proposal.

²⁷ Opportunity cost is the benefit that the City Deal would miss out on when choosing one alternative over another.

²⁸ The Board also decided to put back the Regional Cabinet meeting to 2 May 2017 to comply with the three-working day statutory publication requirement (Local Government Act 1972 s100B).

1.38 In line with the HM Treasury Green Book, organisations should identify a range of options and assess the viability of these against an intended outcome or objective, value for money, affordability and achievability. However, the City Deal focussed solely on the foundry project investment proposal and did not consider any other options other than IQE as the private sector provider. Other options were not considered because of the risk that benefits would be lost to Wales if IQE established overseas production to fulfil a supply contract with a leading global technology firm.

The Accountable Body and a member of the Programme Board recorded their concerns about whether the City Deal partners had sufficient time and enough information to come to a robust decision

- 1.39 On 28 April 2017, the Accountable Body (Cardiff Council) wrote to the 10 Chief Executives stating that it would support a proposal made by a member of the Programme Board to defer the Regional Cabinet decision on the foundry project investment. By deferring the decision for a short while, the Accountable Body was confident that the highest standards of governance would be more attainable. The Regional Cabinet would be able to ensure that the decision was robust and defensible in the face of any reasonable challenge. The length of deferral was not specified in the letter, but any delay would have meant that the decision could not have been taken until after the local government elections on 4 May 2017. Given the need for councils to hold annual general meetings after the elections, it is likely that the decision would then not have been taken until the early summer.
- 1.40 Two members of the Programme Board informed us that the Programme Board considered the letter and weighed-up the legal advice obtained by the Accountable Body.
- 1.41 After consideration, the Programme Board decided that the Regional Cabinet meeting to consider the proposal scheduled for 2 May should go ahead. The Accountable Body's letter of 28 April was not considered at the Regional Cabinet meeting on 2 May 2017, according to the agenda or minutes.

The Regional Cabinet felt unable to make a final decision on 2 May 2017; instead they agreed in principle to invest in the foundry project, subject to resolving outstanding matters, and made the final decision on 14 July 2017.

1.42 The Lead Authority, Monmouthshire (see paragraph 1.20) supported by the Rhondda Cynon Taf Chief Executive prepared the foundry project decision report for the Regional Cabinet to consider on 2 May 2017. This report highlighted the matters material to the decision that had not been resolved sufficiently for a final decision to be made at the 24 April meeting. These were:

- Ministerial approval had not yet been received of:
 - the Welsh Government contribution to the project;
 - the Welsh Government full agreement to transfer the factory and allocate land to the Cardiff Capital Region City Deal; and
 - the lease agreement with the foundry.
- finalisation in writing had not been received for:
 - gas safety storage (Welsh Government); and
 - utilities and future power supply beyond phases 1 and 2 of the project (tenant and private energy provider).
- advice around Corporation Tax, Value Added Tax and Stamp Duty Land Tax implications required to ensure the most tax efficient structure for the Special Purpose Vehicle and the City Deal had not been finalised.
- details of the breakdown of expenditure within the £37.9 million required for the project had not been finalised; and
- external experts' reports had not been signed-off and agreed.

1.43 Instead of deferring a decision, on 2 May 2017, the Regional Cabinet agreed (with Cardiff Council abstaining), to support the foundry investment, subject to the matters recognised within the Lead Authority's foundry project decision report being addressed satisfactorily.

1.44 The Regional Cabinet also agreed, in principle, to establish a Special Purpose Vehicle to implement the proposal and that the Lead Authority would report the detailed arrangements to it for approval later.

- 1.45 Rhondda Cynon Taf County Borough Council agreed to provide £9.9 million of bridging finance to meet a cash flow shortfall, which would arise because the full contributions from the constituent local authorities could not be accessed until the five-year business plan had been agreed. This was also in recognition that the HM Treasury contributions were in annual tranches and only years one and two (£20 million) could be accessed.
- 1.46 On 14 July 2017, the Regional Cabinet met to consider whether sufficient progress had been made against the outstanding matters, which the 2 May 2017 decision to invest in the foundry project was subject to, **Exhibit 8** shows whether the papers and minutes reflect progress against the outstanding matter.

Exhibit 8: this table shows how the matters identified at the 2 May 2017 Regional Cabinet meeting were addressed at the 14 July 2017 Regional Cabinet meeting

Outstanding matters from the papers and minutes of the 2 May 2017 Regional Cabinet meeting	Evidence of discussion from the papers and minutes of the 14 July 2017 Regional Cabinet meeting
Ministerial approval of: the Welsh Government contribution to the project; the Welsh Government full agreement to transfer the factory and allocate land to the Cardiff Capital Region City Deal; and the lease agreement with the foundry.	Yes, Point 1 completed. Points 2 and 3 in progress.
Finalisation in writing had not been received for: Gas safety storage (Welsh Government); and Utilities and future power supply beyond phases 1 and 2 of the project (tenant and private energy provider)	Yes. Point 1 completed. Points 2 in progress.
The City Deal partners had not yet approved its five-year business plan, so could not access the £120 million of councils' contributions required to finance the foundry project.	No.

Outstanding matters from the papers and minutes of the 2 May 2017 Regional Cabinet meeting	Evidence of discussion from the papers and minutes of the 14 July 2017 Regional Cabinet meeting
Advice around Corporation Tax, Value Added Tax and Stamp Duty Land Tax implications required to ensure the most tax efficient structure for the Special Purpose Vehicle and the City Deal had not been finalised.	Yes, for Corporation Tax. No for Value Added Tax or Stamp Duty Land Tax.
Details of the breakdown of expenditure within the £37.9 million required for the project had not been finalised.	Yes, but not clear whether the breakdown has been finalised.
External experts' reports had not been signed-off and agreed.	No.

Source: Minutes and papers from the Regional Cabinet meetings dated 2 May 2017 and 14 July 2017

1.47 It is clear from the documentation that some outstanding matters were complete, and some were in progress. However, for a few matters it is unclear from the documentation whether they were resolved or not. The paper presented at the 14 July 2017 Regional Cabinet, identifies further matters in addition to those outstanding on 2 May 2017 and sets out progress to date against them.

1.48 Notwithstanding these issues, on 14 July 2017 the Regional Cabinet agreed:

- that sufficient progress had been made on the outstanding matters detailed on 2 May 2017 to finalise approval for the foundry investment;
- to increase the project investment from £37.9 million to £38.5 million²⁹, this included £0.45 million for the Special Purpose Vehicle Programme Budget;
- to set up a Special Purpose Vehicle, called 'CSC Foundry Ltd' and authorised the Accountable Body to release funding to the Special Purpose Vehicle; and
- that Monmouthshire County Council would continue to be the Lead Authority for the foundry investment.

1.49 Papers were sent in advance of the meeting, some of which were public, but others were restricted and kept private because of commercial considerations. A restricted paper showed that the outstanding matters had not all been addressed fully. However, the Regional Cabinet felt that enough progress had been made to confirm release of the first tranche, a payment of £6.5 million was made on 4 August 2017.

1.50 As a local government joint committee, the Regional Cabinet is a public body and is required to publish its agendas and papers unless they are restricted. However, the publicly available records of Regional Cabinet meetings on the City Deal website are incomplete and do not include any information relating to the 14 July 2017 meeting.

²⁹ Figures taken from minutes of 14 July 2017. However, the Accountable Body has informed us that the figures should have been from £38.4 million to £38.5 million.

Most of the City Deal partners felt that high level risks were managed appropriately to enable them to make an informed decision, however they had very limited time to consider large amounts of complex information

1.51 As part of our review, we interviewed key individuals within the City Deal partnership who were involved in foundry project investment decision:

- Chief Executives of Monmouthshire, Rhondda Cynon Taf and Cardiff
- Leaders of Rhondda Cynon Taf and Monmouthshire
- Officers from the Lead Authority (Monmouthshire)
- Officers from the Accountable Body (Cardiff)
- Programme Office Director

1.52 We also contacted all Council Chief Executives and current Leaders within the partnership to see if they had any comments. All Leaders who expressed a view felt sufficiently informed before coming to the decision to invest in the foundry. They also emphasised the extent to which they had considered the consequences of not exploring the opportunity when it arose, and of a decision not to invest.

1.53 From January 2017, Chief Executives and Leaders were meeting regularly, formally and informally to discuss the City Deal; frequently including the potential benefits of Compound Semiconductor investment. Each month, Chief Executives met formally as the Programme Board and Leaders also met initially as the shadow joint cabinet, subsequently as the Regional Cabinet. Councils were also able to consult their own statutory officers for advice. The Programme Office Director, representatives from the Accountable Body and Lead Authority officers attended the meetings and produced reports on the foundry project, this included a risk register. Risks included:

- the commercial risks associated with the investment decision;
- the legal powers and regulatory requirements for the decision; and
- the deliverability of a decision within the timescale required.

- 1.54 The City Deal needed to gather and consider an extensive range of complex information necessary for the Regional Cabinet to satisfy itself that the risks were managed appropriately. This involved commissioning professional opinions from external experts as the project evolved, including:
- legal advice about company law, constitutional law, contract and property law, and State Aid;
 - financial advice about accounting treatments, investment decisions and taxation; and
 - property advice about valuation and lease arrangements.
- 1.55 The City Deal put in place a range of other mitigating actions to manage the risks set out in the risk register, including:
- mobilising resources within the partner authorities to focus on the project, including dedicating senior officers to the project; and
 - providing regular briefings between leaders and chief executives of the City Deal partners.
- 1.56 Frequently expert opinion would identify new risks and issues which needed to be addressed. The large volume of complex information involved stretched the capacity of the Programme Office, Accountable Body and Lead Authority. The Programme Office was not fully staffed at this point. In turn, this placed a significant burden upon the Programme Board and Regional Cabinet. Often very little time was available to read and understand lengthy and complex information; in two instances this was limited to 30 minutes³⁰. Therefore, the Regional Cabinet needed to place a high degree of trust in the Programme Board, key officers and external advisors. The Programme Office checked the non-public papers on 26 April 2017 and sent them out to the Regional Cabinet members on 27 April 2017. The Regional Cabinet's 'in-principal decision' to invest in the proposal was made on 2 May 2017, just seven working days after Programme Board's initial consideration on 21 April 2017.
- 1.57 The City Deal's Annual Governance Statement for 2017-18 acknowledges that the City Deal's risk management arrangements provided a limited level of assurance³¹, and that this is an area for improvement.

³⁰ Programme Board held on 24 April 2017 and Regional Cabinet papers for 2 May 2017

³¹ Some significant matters require management attention, with moderate to high risk exposure until resolved.

- 1.58 Under the Well-being of Future Generations (Wales) Act 2015, each of the 10 City Deal authorities is required to carry out sustainable development, which is defined as: ‘...the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals’³². The Well-being of Future Generations Act defines the sustainable development principle as acting in a manner: ‘...which seeks to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs’³³. To act in this manner, public bodies must take account of the ‘five ways of working: collaboration, integration, involvement, prevention and long-term’³⁴.
- 1.59 The intended long-term benefits of the investment, particularly in terms of the economy and job creation, are set out in the semi-conductor proposal report considered by the Joint Cabinet on 2 May 2017. These are also supported by due diligence reports commissioned from a series of external advisers. However, the Lead Chief Executive of the City Deal requested a review of how the Equality Act 2010 and the Well-being of Future Generations Act was addressed in relevant reports relating to the semi-conductor proposal. The report acknowledges that advice given by external experts provided a high-level consideration of the two acts but did not address all the issues relevant to the acts. The review highlighted that ‘it would have been appropriate for a proposal/ investment of this nature and scale to undertake an equalities and wellbeing impact assessment to ensure all issues, both high level and detailed, were fully explored. However, with the external time constraints applied, which meant that detailed reports were being received even on the day of publication of the Regional Cabinet report, there was no opportunity to undertake such an assessment.’ The review recommended that a Well-being and equality assessment form be developed and completed where appropriate. The Future Generations Commissioner advised the Joint Cabinet that in her view the City Deal’s Well-being of Future Generations assessment relating to the investment was not reflective of the duties under the Act and wrote to the Chair to that effect.

32 Part 2 2 Well-being of Future Generations (Wales) Act 2015.

33 Part 2 5(1) Well-being of Future Generations (Wales) Act 2015.

34 Welsh Government, Shared Purpose: Shared Future Statutory Guidance on the Well-being of Future Generations (Wales) Act 2015, 2016.

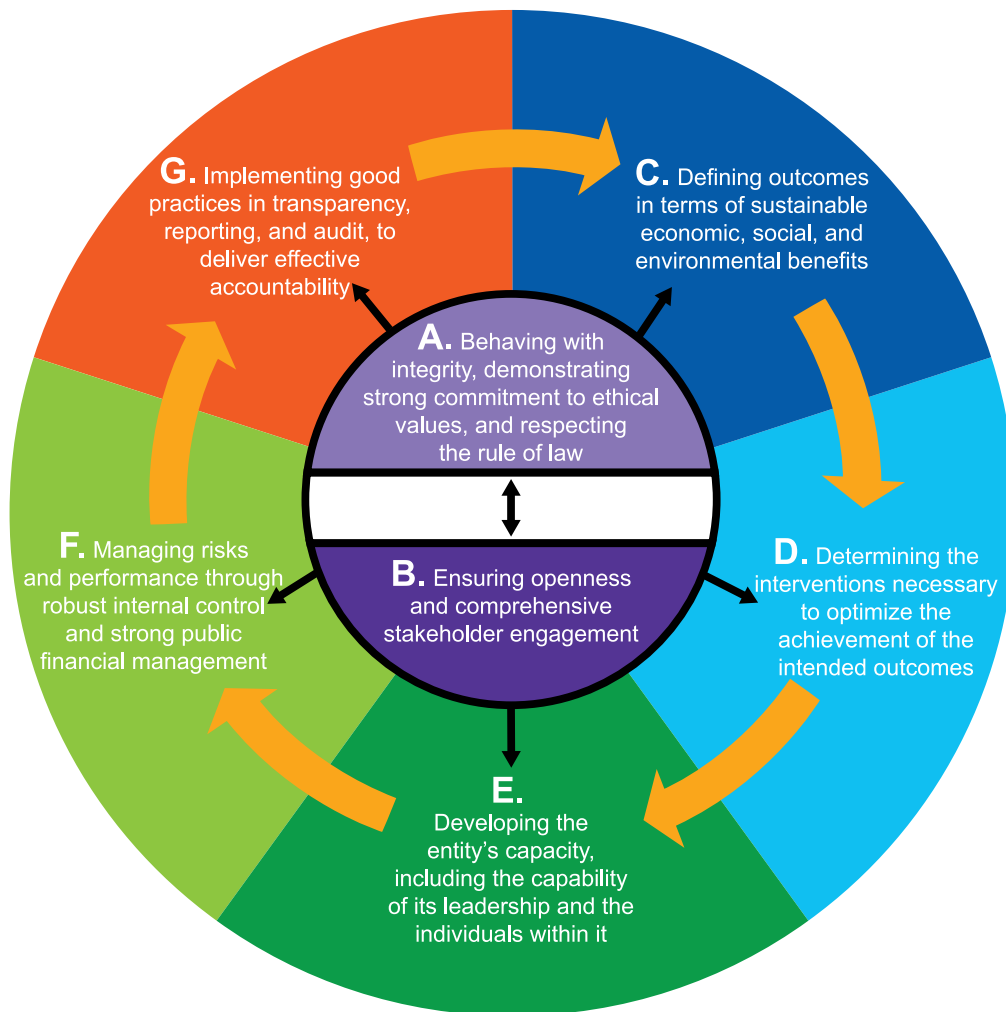
- 1.60 However, we recognise the ambition of the City Deal partners to take advantage of the compound semi-conductor foundry investment opportunity, especially at a time when the partnership was still in its infancy, to work with the private sector to secure a project which has the potential to deliver significant benefits to the region. [Exhibit 1](#) sets out the benefits identified by the City Deal partners of having gone through the experience of its first investment decision.
- 1.61 At the same time, given the scale of public monies involved, it is important that City Deals adhere to the principles of good governance and learn from the lessons of the process of making this first investment decision. We set out these lessons in [Exhibit 2](#) and these are relevant for other City Deals and Growth Partnerships, as well as future projects undertaken by the Cardiff Capital Region City Deal.

Appendix 1: Good Governance in the Public Sector: An International Framework

The International Framework: Good Governance in the public sector³⁵ developed by the International Federation of Accountants and the Chartered Institute of Public Finance and Accountancy sets out how the principles of good governance relate to each other as set out below:

Exhibit 9: achieving the intended outcomes while acting in the public interest at all times

Achieving the Intended Outcomes While Acting in the Public Interest at all Times



35 International Framework: [Good Governance in the public sector](#)

Appendix 2: Our audit approach and methods

Scope

Since the UK Government's announcement in March 2015 that work was underway to establish City Deals within Wales, the Auditor General has envisaged undertaking value for money reviews at Welsh City Deal partnerships, focusing upon governance arrangements to support their initial project decisions. The scope of this review was to determine whether the governance arrangements expected by HM Treasury to support decision-making were in place when the Cardiff Capital Region City Deal took the foundry project investment decision.

Methods

We conducted our review under section 17 (2) (d) of PAWA 2004. In undertaking the review, we:

- reviewed documentary evidence provided by the Welsh Government and the Programme Office;
- interviewed the following key players in the foundry investment decision, based on the main questions, see [Exhibit 10](#);
- opened the invite to all the Leaders and Chief Executives' from the ten Local Authorities; and
- prior to issuing the final report to the City Deal partners, we agreed the factual accuracy of our report with the Cardiff Capital Region City Deal partners and other named parties.

Exhibit 10: main review questions

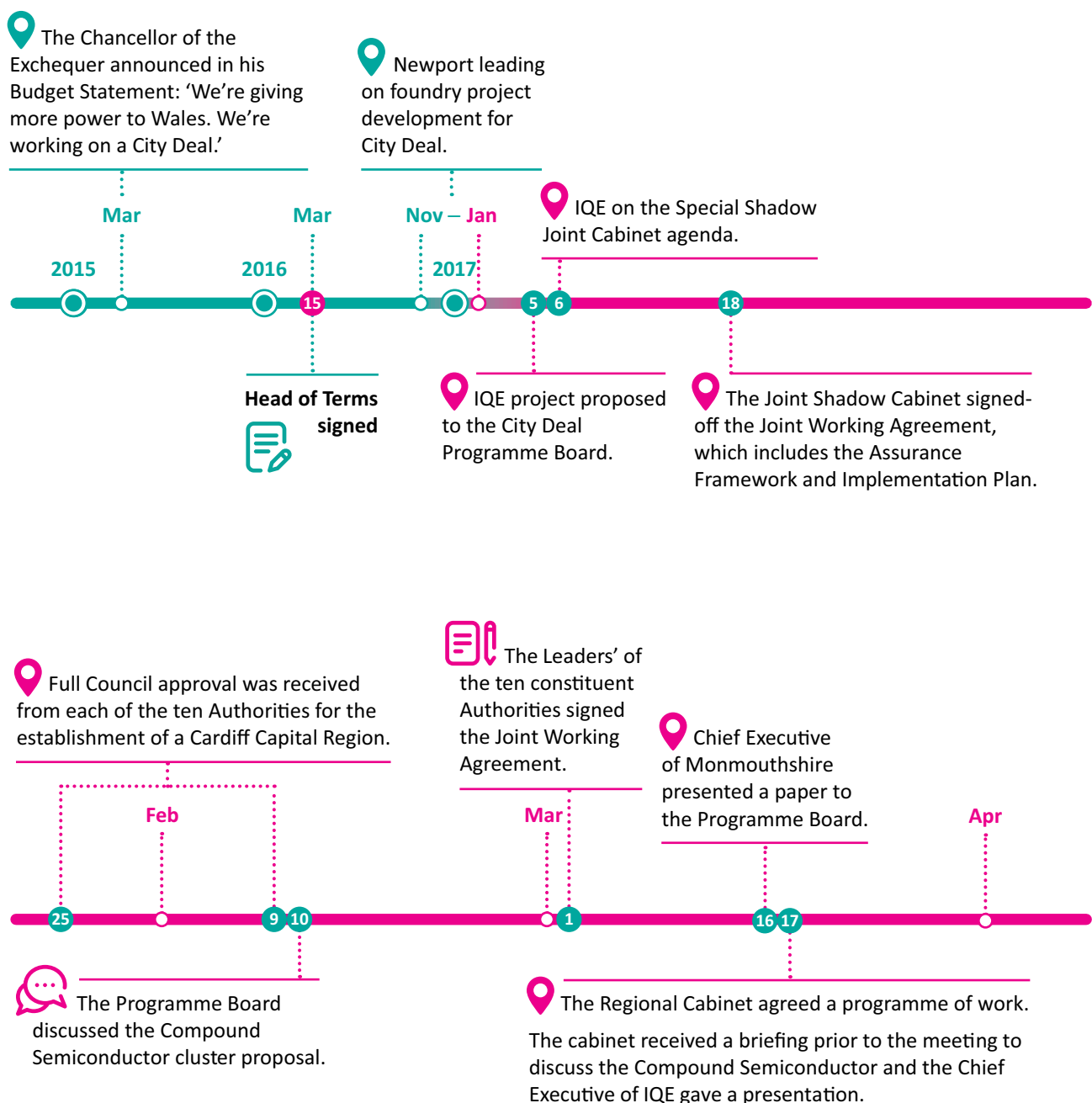
Overarching question
Were appropriate governance arrangements in place to support the Cardiff City Deal decision to fund the foundry project?
Sub-questions
Does HM Treasury have clear expectations of City Deal governance arrangements, which should be in place before funding decisions are taken?
Were HMT expectations relating to governance arrangements communicated to the Cardiff City Deal partnership?
Were the expected arrangements in place when the foundry project investment funding decision was taken?
Was the foundry project investment funding decision taken in accordance with the expected arrangements?
<ul style="list-style-type: none">• Did the foundry project funding decision process include an appropriate consideration of the risks involved?
<ul style="list-style-type: none">• Did HMT seek assurance about the Cardiff City Deal's governance arrangements before releasing the funds?

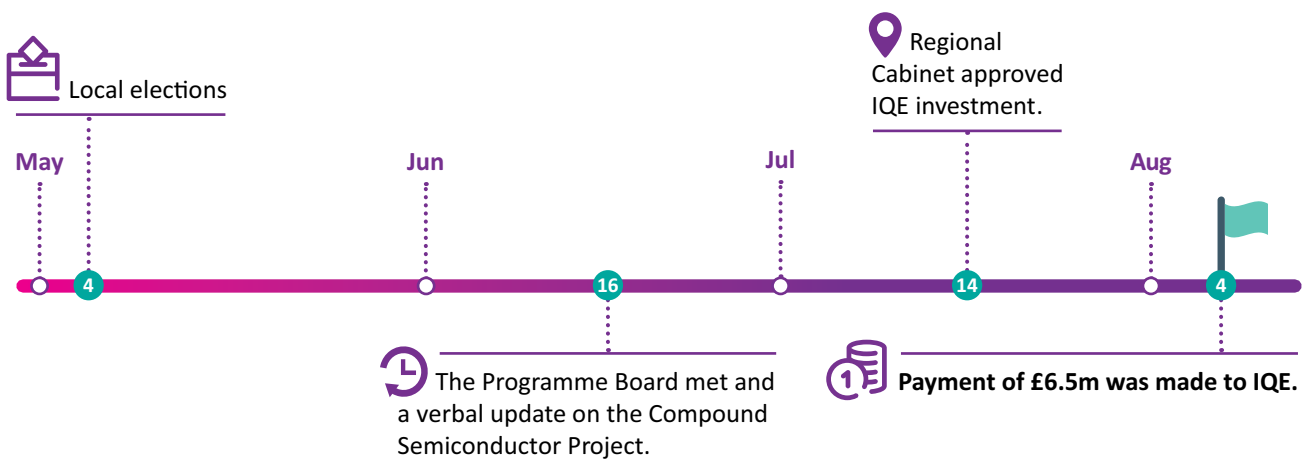
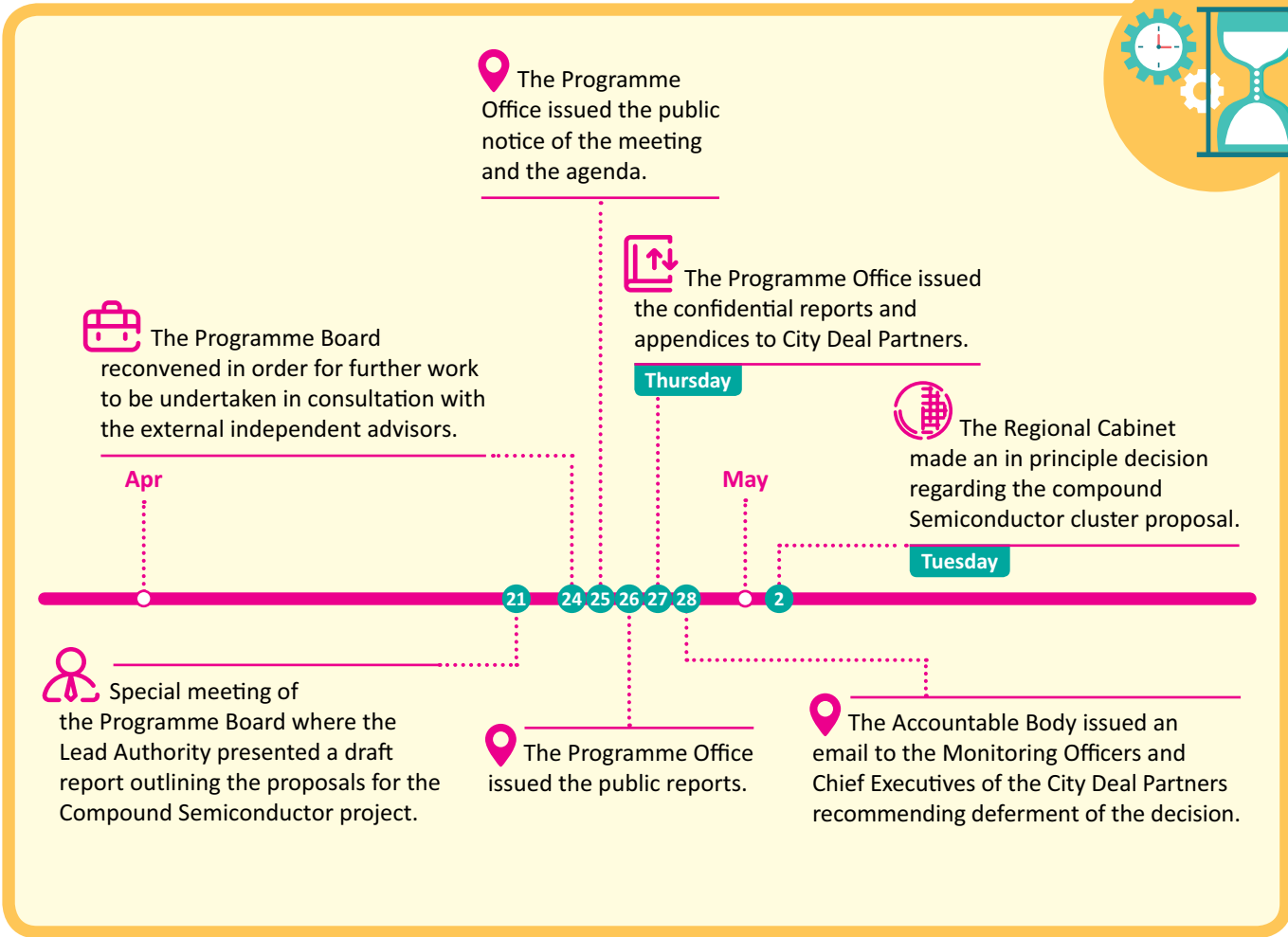
Appendix 3: Timeline of events

Exhibit 11: timeline of events



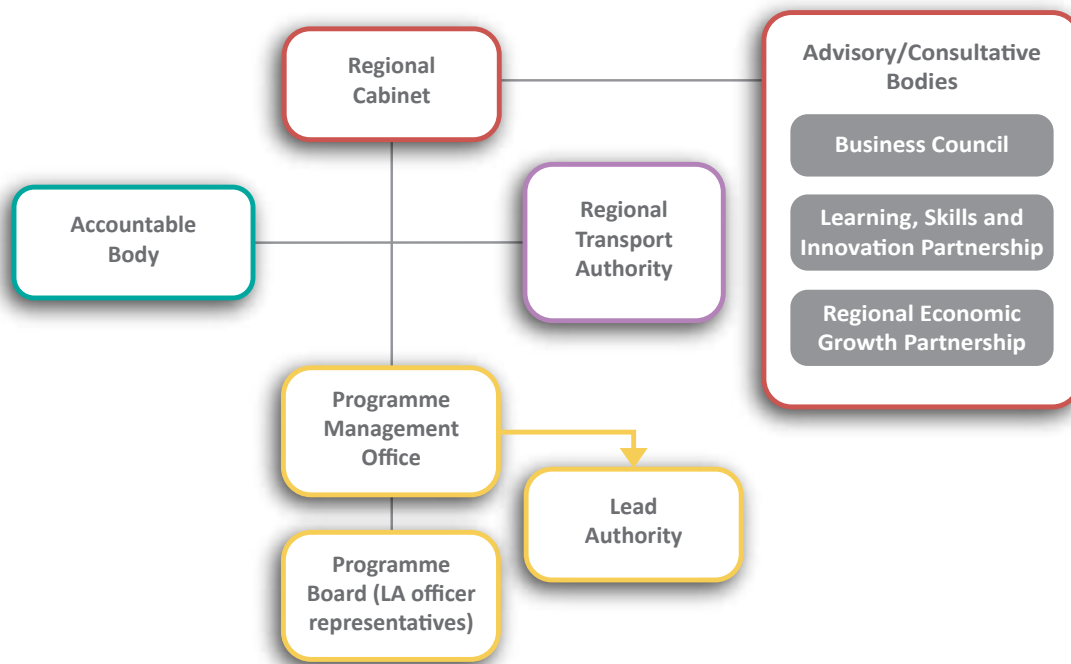
Timeline of events





Appendix 4: the governance structure of the City Deal, including the advisory bodies

Exhibit 12: the governance structure of the City Deal, including the advisory bodies



Programme Management Office: Responsible for providing the Regional Cabinet, UK Government and Welsh Government with quarterly performance reports, performance management and support to the Regional Cabinet.

Programme Board: provides support and challenge to the Portfolios and Themes and to provide recommendations to the Regional Cabinet. Membership of the Programme Board is: City Deal Programme Director (Chair), City Deal Programme Manager, Strategic Directors or equivalent from each constituent authority, Specialist Officers and Legal and Financial representatives from the Accountable Body (also, the Chief Executives/Managing Directors, or nominated substitutes, of each of the constituent authorities will be standing invitees). The Programme Board appoints Theme Leads from its membership.

Lead Authority: responsible for delivering projects approved by the Regional Cabinet.

Accountable Body: Responsible for discharging the ten Councils' obligations in relation to the Cardiff Capital Region City Deal and ensuring that decisions made by the Regional Cabinet are lawful, appropriate and within budget. The Accountable Body manages the financial, legal and governance arrangements of the Regional Cabinet.

Regional Transport Authority: co-ordinates transport planning and investment in partnership with the Welsh Government. Slightly different from the other advisory/consultation bodies as although it advises the Regional Cabinet it also reports directly to them and is chaired by a member of the Regional Cabinet. Met in Shadow form for the first time in October 2016 and was chaired by Cllr Huw David.

Business Council: consists of business stakeholder groups across the city region. It provides a business voice to influence and shape business support programmes.

Learning, Skills and Innovation Partnership: responsible for producing an annual regional plan for employment and skills and influencing and monitoring the delivery and impact of employment and skills programmes across the region. The Board will represent a wide range of stakeholders, including: business organisations; higher and further education; local authorities and the Welsh Government.

Regional Economic Growth Partnership: established to bring together business, higher education and local government. It is responsible for setting the overarching city-region economic development strategy, as well as monitoring and making recommendations to the Cabinet about City Deal implementation. The partnership will have a specific role to provide advice on investment decisions.

Source: Cardiff Capital Region City Deal documentation

Appendix 5: What Are Compound Semiconductors?

Exhibit 13: what are compound semiconductors?

Our business

Epitaxy 101

The elements

Everything in the universe is made of 118 known elements. The periodic table, first published in 1869 by Dmitri Mendeleev, shows the elements arranged in groups or columns according to their properties.

In terms of electrical properties, the elements up to and including those in group III are in general, known as metals and tend to be good conductors of electricity, whilst those from group V and above are generally non-metals and tend to be poor conductors of electricity.

Between the metals and non-metals, (and generally in group IV), are elements whose electrical properties are somewhere between conducting and non-conducting (insulating). These elements, which include silicon and germanium, are known as semiconductors.

The behaviour of semiconducting elements was discovered during the 19th century and it later became known through experimentation that their electrical properties could be altered by adding very small amounts of different impurities and that by placing together two pieces of material with different impurities, an electrical current could be controlled by allowing it to flow in one direction but not the other.

The semiconductor age is born

It was in 1947 that William Shockley, John Bardeen and Walter Brattain, working at Bell Labs, built the World's first transistor using the element germanium.

During the two decades that followed, the ability to control electrical currents using semiconductors allowed engineers to develop a range of new electronic technologies.

The evolution of silicon

Whilst germanium is a very efficient semiconductor material, the ready availability of silicon (basically sand) made for a compelling low-cost alternative and hence a new industry was born that has, for the last five-decades, transformed our lives in so many ways.

Silicon has been the backbone of the electronics revolution from the 1960s, largely by virtue of continuous

miniaturisation which has led to an exponential increase in technological performance – a concept notably observed by one of the founders of Intel, Gordon Moore, and known as "Moore's Law".

Bring on the compound semiconductors

Impressive as the impact of silicon has been on our lives, being a single element, it has a very basic and limited set of properties that restricts its application in many new and emerging technology areas that demand ultra-high performance levels along with sensing and other capabilities.

By atomically engineering crystal structures that combine elements either side of those in group IV of the periodic table (eg groups III and V), a set of new semiconductor materials has emerged whose enhanced properties offer significant capability and performance improvements over those of silicon alone.

These compound semiconductors enable high speed processing in excess of 100 times that of silicon, as well as an array of other properties including the ability to emit and sense light, all the way from the infrared, through the visible and into the ultra-violet part of the spectrum.

Compound semiconductors have already complimented silicon in areas such as wireless communications, where chips made from material combinations such as gallium and arsenic (gallium arsenide, or GaAs) are found in virtually every smartphone where they enable high speed, high efficiency wireless communications in cellular and WiFi networks.

Other properties offered by compound semiconductor materials include the ability to emit and sense light in the form of general lighting (LEDs) and communications (lasers and receivers for fibre-optics).

The photonic and power efficiency properties offered by compound semiconductors that could not be achieved with silicon alone, will enable technologies essential in areas such as safety and security systems, healthcare technologies, aerospace and automotive applications including electrically powered and autonomous vehicles. It is our ability to harness the advanced properties of the full range of semiconducting materials that will drive

the digital revolution for generations to come. Welcome to the world of advanced, compound semiconductors. Compound semiconductors are the DNA of next generation technologies.

Epitaxy

IQE's core business is the manufacture of compound semiconductor wafers or "epiwafers" using a process called epitaxy.

The epitaxial growth process is a nanotechnology whereby complex atomic structures are produced under strictly controlled conditions. The end product is a pure, crystalline, semiconductor wafer upon which complex structures comprising many individual atomic layers are grown.

These epitaxial layers uniquely define the wireless, photonic and electronic performance of our epiwafers which are then processed by our customers to produce the "chips" that are found in virtually all of today's technology devices and gadgets.

Epitaxy is the first key stage in the process of manufacturing the critical components in a wide range of devices from mobile handsets to solar cells, lasers and LEDs, and it requires high specification cleanrooms, sophisticated production tools and high levels of process knowhow and intellectual property.

IQE produces atomically engineered layers of crystalline materials containing a variety of semiconductor materials such as gallium, arsenic, aluminium, indium and phosphorous. The layers are grown onto a crystal substrate or wafer and the finished product containing the wafer and its atomically modified surface is known as an epiwafer. It is the number of layers, their atomic composition and the order in which they are grown that determines the precise physical, electronic and optical properties of the material. An epiwafer can include hundreds of individual layers, each of which may be as thin as two or three atoms.

IQE's IP and process know-how is the science and technology behind the materials and the way in which the atomic structures can be manufactured to yield the wide range of wireless, photonic and electronic properties that are essential in today's electronically enabled age.

The stage is set

Change is a constant in our world. The inexorable drive for electronic devices to continue to achieve higher levels of functionality, speed, performance and efficiency will unquestionably necessitate the increasing use of more sophisticated semiconductor materials. These advanced semiconductors are enabling a range of new mass market applications such as gesture recognition and short range optical communication and at the same time disrupting some existing large markets such as solar energy and power switching. We expect that this rate of change will continue to accelerate.

We have established a global manufacturing platform and a breadth of IP and know how relating to the design and manufacture of advanced materials that is second to none. We have been unwavering in our vision and have developed a robust strategy which gives us confidence over the growth prospects of the business and our ability to create shareholder value.

Enabling new and emerging technologies

Semiconductors in the form of both silicon and compound semiconductors, form the heart of many of today's technologies. Without semiconductors, many devices and applications that we rely on simply would not exist, yet these atomically engineered materials go largely unnoticed amongst the end user brands with which we are so familiar.

Semiconductors are a key enabling technology that feed into multiple supply chains feeding a wide range of market sectors including: aerospace, healthcare technologies, safety & security, big data and the Internet of Things (IoT), energy efficiency (generation and consumption), robotics and automotive products.

Source: IQE's Annual Report 2017

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