Innovation Procurement for Brazil:
Lessons learnt from the UK and the EU

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Lessons learnt from the UK and the EU

This report was commissioned with funds from the UK Government’s Science and Innovation Network and the Opportunities Fund.

The Science and Innovation Network allows collaboration on research and innovation ecosystems, the development of innovative businesses and dealing with challenges facing our society, being the UK one of the most innovative countries in the world. At the same time, the UK is working in partnership with key countries to increase productivity and economic growth, reduce poverty and expand opportunities for international business partnerships. In our shared work on transformative capacity building, reform and pilots in areas such as green finance, trade, energy, future cities, digital access, health and education, there are lessons we can learn and apply from innovative procurement - indicating how important the present report is.

The topic was identified as a cross sector challenge faced by different players in the Brazilian innovation system. The report will give an overview of UK Pre Commercial Procurement (PCP) theory and schemes, and future and developments. The aim of the report is also to introduce case studies and examples on how the UK and some European countries have implemented PCP and any issues encountered by them and how they have addressed. This will enable best practice insights into the Brazilian case, supporting the idea that public procurement can act as a tool for both delivering better services for society and boosting our economies by creating a more competitive environment for innovative companies.
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Table of Contents

Executive Summary ................................................................................................. 6

1 Introduction ........................................................................................................... 9
  1.1 Definitions ........................................................................................................ 9
  1.2 Precommercial Procurement and Procurement of Innovative Solutions .... 10

2 PCP Theory - Short History .................................................................................. 14
  2.1 A European Story ............................................................................................ 14
  2.2 EAFIP .............................................................................................................. 15

3 PCP Key General Issues ....................................................................................... 18
  3.1 PCP - EU Approach ...................................................................................... 18
  3.2 PCP – Key Features ....................................................................................... 18

4 PCP in the UK ........................................................................................................ 20
  4.1 Outline of the Small Business Research Initiative [SBRI] ....................... 20
    4.1.1 US Inspiration for UK Scheme ................................................................. 20
    4.1.2 The UK Programme in More Detail ......................................................... 22
    4.1.3 A Challenge-based Approach ................................................................. 23
    4.1.4 Evaluation of Proposals ........................................................................... 25
  4.2 SBRI History ..................................................................................................... 26
  4.3 Departmental Programming - The Health SBRI ........................................... 27
  4.4 Management of the SBRI – Some Observations ........................................... 27
    4.4.1 Key Dimensions ....................................................................................... 28
  4.5 Key Factors in SBRI Operation - Integration and Evaluation ................. 35
    4.5.1 Integration ................................................................................................ 36
    4.5.2 Evaluation ................................................................................................. 36

5 PCP Insights for Brazil .......................................................................................... 38
  5.1 Procurement Innovation – Some Remarks on Context ......................... 38
  5.2 Innovation Opportunities for PCP in Brazil ................................................. 41

6 Examples of Cross Border Procurement ............................................................ 44
  6.1 Waterschapsbedrijf Limburg (WBL) Pre-Commercial Procurement (PCP) in Artificial Intelligence (AI) models for the sewage water system in the province Limburg, The Netherlands .......... 44
  6.2 Muntstroom Pre-Commercial Procurement (PCP) regarding R&D of end-to-end solutions for monitoring multi-faceted people flow - Brussels Capital Region ................................................................. 46
  6.3 Alu Circles initiative: Pan-European procedure to upcycle or recycle aluminium based sludges from drinking water treatments ........ 48

7 Conclusions ............................................................................................................ 50
  7.1 How to Support PCP – What to Do ............................................................... 50
  7.2 How to Support PCP – What to Avoid .......................................................... 50
  7.3 Questions asked during the Webinar ............................................................. 50

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Executive Summary

The Report

1. This report results from a short study for the Brazilian Government intended to provide advice in the form of a presentation/webinar and short report on pre-commercial procurement. The report has been financially supported by the UK Foreign, Commonwealth and Development Office (FCDO).

2. This report aims to build on the outcomes of an online session that took place on March 10th, 2021, lasting an hour and a half which was provided for Brazilian Government employees, but which has been made available more widely by YouTube. The report generally follows the agenda of the meeting which as is noted here (a-f):

   a. to introduce public procurement of innovation and its legal framework;

   b. to distinguish between Pre-commercial Procurement (PCP) and Public Procurement of Innovative Solutions (PPI);

   c. to present some cases of PCP PPI examples, with an emphasis upon PCP;

   d. to identify lessons from the UK’s SBRI Programme for general policy and programme implementation and management;

   e. to provide some simple but important lessons on the conduct of PCP – in terms of Do’s and Don’ts;

   f. identify matters arising in a Q&A session that could be addressed in the report.
3. The report therefore explains in more detail relevant aspects that due to time constraints could not be tackled in the session, and in particular a thorough introduction of PCP, its key features, its history, several cross-border examples, a brief introduction to the US SBIR (on which the UK SBRI is based) and some conclusions including questions asked during the session.

The Topic

4. The topic of the report is Innovation Procurement, in particular one of its modalities: Pre-commercial Procurement and how the UK and the European experience could be translated to Brazil to improve procurement in several areas of the public sector.

5. Public procurement of innovation and pre-commercial procurement are important tools for governments that can help meet societal and departmental / operational requirements and at the same time generate opportunities for firms to develop new products and services.

Using the Report

6. This is a comprehensive document, so reading it as a whole is highly recommended. Nevertheless, subsections 1.1 Definitions, 1.2 Precommercial Procurement and Procurement of Innovative Solutions, 3.1 PCP - EU Approach, 4.2 SBRI History, 4.3 Departmental Programming - The Health SBRI, 4.4 Management of the SBRI – Some Observations, 4.5 Key Factors in SBRI Operation - Integration and Evaluation as well as section 2 PCP Theory - Short History are more theoretical, so they are more orientated towards policy makers and academia.
7. Subsections 3.2 PCP – Key Features, 4.1 Outline of the Small Business Research Initiative [SBRI], 4.1.3 A Challenge-based Approach and 4.1.4 Evaluation of Proposals, as well as sections 5 PCP Insights for Brazil, 6 Examples of Cross border Procurement and 7 Conclusions, are more practical and subsequently useful for civil servants, staff of public bodies and practitioners.
1 Introduction

1.1 Definitions

Public procurement is the process by which public authorities (such as government departments or local authorities) purchase works, goods or services from companies which they have selected for this purpose. It is regulated to:

- Ensure that public funds are spent efficiently.
- Respond to a specific challenge or topic using an assessment procedure with certain predetermined rules to ensure consistency.
- Reduce the risk of favouritism (i.e., to ensure public funds are spent honestly).

Not all forms of disbursement of public funds are qualified as public procurement, but only when in return for the public funds the public authority obtains the benefits of the works, supplies or services. In European contexts, it does not necessarily require a transfer of ownership to the contracting authority, i.e., there needs to be a contract for pecuniary interest between one or more economic operators and one or more contracting authorities and having as their object the execution of works, the supply of products or the provision of services ("Case C-367/19 Tax-Fin-Lex d.o.o. v Ministrstvo za notranje zadeve, EU:C:2020:685," 2020).¹

The mere financing, through subsidies, of an activity, does not usually fall within the scope of the public procurement rules. An authorization scheme, or a license giving to all operators who fulfil certain conditions should not be seen as public procurement (e.g., licenses for medicines or medical services).

¹ According to a recent Court’s case-law, the legal meaning of ‘for pecuniary interest’ refers to a contract under which each of the parties undertakes or provides one form of consideration in exchange for another. Judgment of 10 September 2020 in Case C-367/19 Tax-Fin-Lex d.o.o. v Ministrstvo za notranje zadeve, EU:C:2020:685
Reciprocity of the contractual relationship is necessary for the requirement of a tendering procedure to apply. Reciprocity takes the form of the material exchange of consideration. (Any kind of remuneration that has monetary value). As is clear from the usual and ordinary meaning of the phrase 'pecuniary interest', a contract cannot fall outside the concept of public contract merely because the remuneration remains limited to reimbursement of the expenditure incurred to provide the agreed service (Case C-159/11 Azienda Sanitaria Locale di Lecce ECLI:EU:C:2012:817).

Exhibit 1 Pre-commercial Procurement (PCP) and Public Procurement of Innovative Solutions (PPI)

Source: European Commission

1.2 Precommercial Procurement and Procurement of Innovative Solutions

Innovation Procurement happens when public buyers acquire the development or deployment of pioneering innovative solutions to address specific mid-to-long-term public-sector needs. In other words, it is the purchase of innovative solutions by the public sector, promoting thus the development of cutting-edge technology and innovation from the demand side.

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2 Opinion of Advocate General Jacobs in Case C–19/00, SIAC Construction Ltd v County Council of the County of Mayo
There are two modalities:

- **Pre-commercial Procurement (PCP):** The Public Buyer purchases R&D services in a competitive phased procedure in which several economic operators participate. It is exempted of the Public Procurement Directives, but at European level it is defined in the Communication from the Commission of 2007: Pre-commercial Procurement: Driving innovation to ensure sustainable high quality public services in Europe (European Commission);

- **Public Procurement of Innovative Solutions (PPI):** PPI takes place when the need to address can be met via innovative solutions that are nearly or already in small quantity in the market and just need minor R&D. The role of the public procurer is as first buyer or early adopter of an innovative solution. As it includes the market deployment, PPI falls under the scope of the European Public procurement Directives.

Usually, the provider will own the IPR and the public procurer will simply be procuring a non-exclusive license (also referred to as ‘user rights’). This may be granted in exchange for a licensing fee bundled into the price for the procurement, or on an on-going royalty-bearing basis.

In order to select between these two approaches, assessing the Technology Readiness Level (TRL) of the solution to be developed and deployed is essential.

TRLs describe the state of a technology’s development. They indicate the maturity level of particular technologies and were first introduced by the USA National Aeronautics and Space Administration (NASA). In 1999, the

---

3 In addition, or alternatively to the non-exclusive license, the public procurer may request the right to grant ‘sub-licenses’. If this right is included in the PPI contract it will result in having to pay a higher price to the PPI solution provider as such clauses reduce the exclusivity of the IPR owner.
US Department of Defense (DoD) wand adopted the TRL scale, in which there are nine technology readiness levels: TRL 1 being the lowest and TRL 9 the highest (Dacus, 2012).

Exhibit 2. TRL Definitions and Pre-commercial Procurement

In the early 2000, the TRL scale was adopted by the European Space Agency (Héder, 2017). However, until 2009 there was no policy tool on its use (Communication from the Commission to the European Parliament, 2009).

In the European Context, The Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: “Preparing for our future: Developing a common strategy for key enabling technologies in the EU” describes what Key Enabling Technologies (KETs) are and identifies five relevant KETs fields. Nevertheless, it doesn’t mention TRLs. It is the High-Level Expert Group on Key Enabling Technologies which explains ‘Death Valley’ in terms of TRLs, which translated to the EU level means that while the EU succeeds on low TRL levels, the results do not translate to TRL 9 technologies and make it quickly to the market. Consequently they

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4 The ‘Death Valley’ refers to the period in the life of a start-up in which it has begun operations but has not yet generated revenue. It can also refer to the period were a
recommend adoption of the TRL scale across Europe. Since, TRLs have been used in Europe to decrease the gap between innovative solutions and the market. For example, Horizon 2020 funding was provided according to the TRL (Deliyanakis, 2015).

Indeed, funding instruments of this program can be grouped in three levels:

<table>
<thead>
<tr>
<th>LABEL</th>
<th>DESCRIPTION</th>
<th>TRL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept development</td>
<td>Basic research, technology formulation, applied research</td>
<td>1-3</td>
</tr>
<tr>
<td>Proof of principle</td>
<td>Small /large scale prototype development unit prototype system</td>
<td>4-6</td>
</tr>
<tr>
<td>Proof of performance</td>
<td>Innovation system, first of the kind commercial system</td>
<td>7-8</td>
</tr>
</tbody>
</table>

*Exhibit 3 TRL in the Horizon 2020*


To identify the TRL level of the solution to be developed and deployed, a State-Of-the-Art (SOTA) analysis should be implemented. This SOTA analysis aims to identify existing/on-going research efforts and their results. This can be done by identifying relevant patents, standards and literature in a certain technological field.

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product or service has been developed but is not generating income. See https://www.investopedia.com/terms/d/death-valley-curve.asp

5 The use of TRLs in the Horizon 2020 Work Programmes and calls for proposals is indicated for each topic in the topic description.

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2 PCP Theory - Short History

2.1 A European Story

In the few last decades, the European Union and its Member States have leaned towards fostering innovation not via subsidies or grants but using procurement as a tool. Moreover, the EU has endeavoured to steer the funding that is spent through public procurement towards purchasing smart innovative solutions leading to a more efficient use of public expenditure.\(^6\)

However, from 2000 onwards, the European Commission started to realise that the European Union wasn’t making use of the potential of public procurement expenditure to foster strategic goals, such as innovation (Apostol, 2012).

To address this issue, the legal framework has been made more flexible. In 2007 the European Commission drafted the Communication ‘Pre-commercial Procurement: Driving innovation to ensure sustainable high-quality public services in Europe’, developing a procurement procedure specially for R&D services with shared risks and benefits. However, the new approach didn’t take off as expected and subsequent initiatives have followed in order to foster the use of the PCP instrument.\(^7\)

One of these initiatives was the 7th Framework Programme (FP7). FP7 was the European Union’s Research and Innovation funding programme for 2007-2013. Part of its budget was awarded on thematic areas such as

\(^6\) A good example is the United States, where the Small Business Innovation Research (SBIR) program helps commercialising R&D solutions developed in homeland.

\(^7\) For example, the Europe 2020 strategy highlights the importance of research and innovation as the main driver of future growth and public authorities should use public procurement wisely, in order to foster it: ‘Buying innovative products, works and services plays a key role in improving the efficiency and quality of public services while addressing major societal challenges. It contributes to achieving best value for public money as well as wider economic, environmental and societal benefits in terms of generating new ideas, translating them into innovative products and services and thus promoting sustainable economic growth’. See recital 47 of Directive 2014/24/EU.

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preservation of oceans and water, better use of raw materials, efficient energy, efficiency in the processing of biological resources, developing smart cities and public sector reform. SMEs were recognised as vital for innovation and given special incentives (European Commission, 2019).

Another example, the Europe 2020 strategy highlights the importance of research and innovation as the main driver of future growth and public authorities should use public procurement wisely, in order to foster it (Eurostat, 2020).

2.2 EAFIP

The Eafip Initiative, implemented by the European Commission, supports public procurers across Europe in developing and implementing innovation procurement and helps public procurers to start new PCP and PPI procurements.⁸

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³⁸ See https://eafip.eu/

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Exhibit 4 The EAFIP Methodology

The Public Procurement Directives of 2014 also encourage innovation:

'Buying innovative products, works and services plays a key role in improving the efficiency and quality of public services while addressing
major societal challenges. It contributes to achieving best value for public money as well as wider economic, environmental and societal benefits in terms of generating new ideas, translating them into innovative products and services and thus promoting sustainable economic growth’ (European Parliament and The Council, 2014c, p. Recital 47).

A good example is the fact that all the three Directives exclude the procurement of research and development services, as long as the benefits don’t accrue exclusively to the contracting authority and the service provided is not remunerated in full by the contracting authority (European Parliament and The Council, 2014a See articles 25 of Directive 2014/23/EU, 14 of Directive 2014/24/EU and 32 of Directive 2014/25/EU; 2014c, 2014d).

Another example is article 31 of Directive 24/2014/EU, which describes the Innovation Partnership for the first time (European Parliament and The Council, 2014b). This novel procedure is intended for innovative products, services or works that cannot be met by purchasing products, services or works already available on the market and the idea is to develop them in different phases and purchase the subsequent results.

The EU Commission has also clarified that R&D service procurements won’t constitute state aid under the TFEU and the EU state aid rules if they are implemented through an open, transparent, competitive procedure with risk- and benefit-sharing at market price (European Commission, 2014). The goal is that the price paid for the relevant services fully reflects the market value of the benefits received by the public purchaser and the risks taken by the participating providers.

As mentioned above, PCP is one of the possibilities offered in order to engage in Innovation Procurement. It is exempted from the Word Trade Organization General Procurement Agreement (WTO GPA hereinafter), and subsequently from the European Public Procurement Directives. The second category embedded in Innovation Procurement is Public Procurement of Innovative solutions (PPI), which is under the scope of the Directives.
3 PCP Key General Issues

3.1 PCP - EU Approach

Through a PCP, public procurers challenge innovative players on the market, via an open, transparent and competitive process divided in phases, to develop new solutions for a technologically demanding mid to long-term challenge that requires new R&D services because there are no near-to-the-market solutions yet. The solution may be addressed to fulfil a need of a particular (direct procurement) or a group of public buyers (joint procurement).

Exhibit 5 Phases of Pre-commercial Procurement

3.2 PCP – Key Features

At EU level, PCP is described in the Communication ‘Pre-commercial Procurement: Driving innovation to ensure sustainable high quality public services in Europe’.
PCP is a public procurement of Research and Development (R&D) services characterized by:

- **competitive** development in **phases**
- **risk-benefit sharing** under market conditions Public procurer does not pay the full cost of the R&D performed under the contract
- a clear **separation** between the procurement of the R&D from the deployment of **commercial volumes of end-products**

*Exhibit 6: Key Features of Pre-commercial Procurement*

Some countries have introduced a legal definition of PCP, but the main trend is to define it in non-legally binding national official documents. On the other hand, some Member States do not provide a definition, but have the legal basis in place to implement a PCP, i.e., the national regulations exclude the provision of R&D services from its scope, as long as the benefits don’t accrue exclusively to the contracting authority and the service provided is not remunerated in full by the contracting authority.

Taking into account that for a PCP to be outside the scope of the Public Procurement Directives (and the WTO GPA), risks and benefits must be shared between the contractors and the Contracting Authority (CA) under market conditions, each contractor will own the IPRs attached to the results of the PCP, so they can widely exploit the newly developed solutions commercially. This will lead to a reduction of the tendered price, i.e., a financial compensation for keeping the IPR ownership compared to the case where the IPRs would be transferred to the procurers.

On the other hand, the procurers must receive rights to use the R&D results for internal use and licensing rights subject to certain conditions. These conditions must be extensively addressed in the framework agreement and in the subsequent contract phases. Moreover, provisions need to be included for the background and sideground IPR.
4 PCP in the UK

4.1 Outline of the Small Business Research Initiative [SBRI]

The SBRI programme connects government organisations with innovative businesses to solve big challenges facing society.\(^9\)

\[\text{Exhibit 7 UK SBRI Basics}\]

4.1.1 US Inspiration for UK Scheme

The Small Business Research Initiative (SBRI) was launched in 2004 by the UK’s innovation agency, the Technology Strategy Board (now Innovate UK), making the UK one of the EU leaders in promoting PCPs. The UK’s introduction of SBRI was ‘modelled’ on the United States’ Small Business Innovation Research programme [SBIR] which was introduced in 1982 Bound and Puttick (2010, p. 10). The SBIR is a very large programme compared with other initiatives. Use of the US programme is intended to be

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\(^9\) SBRI: The Small Business Research Initiative:

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by small companies. The limit on the size of firms supported under the programme is 500 employees.

It is organized in a centralized manner, under a coordinating agency (Small Business Agency (SBA)), and mandatory requirements for the contracting authorities (Federal Agencies) that participate in the program. This allows SBA to coordinate the deployment of the SBIR program and to monitor and assess its performance, including the commercialization support measures deployed by the Federal agencies and the commercialization record of the participating companies.

The statutory purpose of the SBIR program is to ‘strengthen the role of innovative SBCs (small-business concerns) in the Federally-funded research or research and development (R/R&D). Among the more specific program purposes is also the goal to increase private sector commercialization of those innovations developed as part of the SBIR program.

In this regard, it is important to take into account that SBA operates on the basis of a mandatory Policy Directive\(^\text{10}\): The SBIR and Small Business Technology Transfer (STTR) Program Policy Directive that regulates the complementary roles and responsibilities of SBA, on the one side, and the implementing federal agencies, on the other side. The rules in the Policy Directive are far-reaching, covering reporting obligations, centralization and coordination of the SBIR calls (that aim to ensure the spreading of similar calls throughout the year and the avoidance of double federal funding for the same topics), etc. coordinates the implementation of electronic databases at the SBIR agencies, including the technical ability of the agencies to share the data. The Policy Directive expressly includes rules related to commercialization of the developed innovative solution.

A useful resource on the history, design, management and administration of the programme is provided by the US Small Business Administration (United States Small Business Administration, 2021).

4.1.2 The UK Programme in More Detail

The UK's SBRI is currently supported by the UK's innovation agency, Innovate UK and connects government organisations with innovative businesses to solve big challenges facing society by providing advice across government departments and offering some challenge funding (Innovate UK, 2020).

Their interventions have been primarily in the health, the defence and the energy sectors.

This UK programme is particularly focused on small business, as SBRI offers innovators the chance to win a government contract of different values depending on the phase to help demonstrate and develop their new technologies. Nevertheless, depending on the call, different UK entities can apply. Large firms are eligible to apply, and a number do.

In the following table shows the proportion of contracts awarded to entities of different sizes.

<table>
<thead>
<tr>
<th>Firm size</th>
<th>Proportion of contracts awarded (%)</th>
<th>Proportion of total contract value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>23%</td>
<td>25%</td>
</tr>
<tr>
<td>Medium</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td>Small</td>
<td>23%</td>
<td>22%</td>
</tr>
<tr>
<td>Micro</td>
<td>28%</td>
<td>27%</td>
</tr>
<tr>
<td>Academic</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>Public Sector</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Not for Profit</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Figure 1 Available Data Showing Award of contacts by Firm Size UK SBRI
Source: (Connell, 2017, p. 44)

More than 2,900 SBRI contracts valued at over £430 million have been awarded since April 2009.
4.1.3 A Challenge-based Approach

UK SBRI works as follows: all competitions are based on a need/challenge identified by a lead government organisation.

Exhibit 9 UK Challenges and Phases

Once the call is opened, UK companies can submit a proposal. The most promising ones will receive funding for phase 1, in which the project feasibility is tested. This phase lasts 6 months and the available funding ranges from £50,000 to £100,000.

At the end of phase 1 the projects are evaluated, and the most promising ones receive funding for phase 2, which is the prototype development that lasts 2 years and whose funding ranges from £250,000 to £1 million.

See below an image explaining the UK SBRI in 10 steps.
Exhibit 10 SBRI Steps

Linked to the UK SBRI program, the UK Government has created GovTech Catalyst, which uses a £20 million fund to help solve public sector problems (or challenges) using innovative digital technology.\(^\text{11}\)

UK SBRI gives funding to the supply side whereas GovTech Catalyst provides resources to the demand side.\(^\text{12}\)

To be selected for funding, the public buyer/entity must describe a current public need/problem which cannot be solved by an already existing solution and consequently requires an innovative digital solution, which in the end will improve public services or reduce costs. If possible, other organisations should also benefit from the solution.\(^\text{13}\) The public buyer/entity must also be willing to buy the digital solution at the end of the process.\(^\text{14}\)

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\(^\text{11}\) For more information see https://www.gov.uk/government/collections/govtech-catalyst-information#what-is-govtech-catalyst

\(^\text{12}\) UK central government organisations, devolved administrations and local public sector organisations are the public sector organisations that can submit a challenge to GovTech Catalyst.

\(^\text{13}\) In a way, GovTech Catalyst is fostering the use of joint procurement, but not really mandating it.

\(^\text{14}\) This is a sort of PCP with forward commitment.
4.1.4 Evaluation of Proposals

The proposed challenge has to be adjusted to feasibility budget of £50,000, with prospective solutions ready to buy with an additional £500,000 investment. The challenges are scored as follows:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Maximum possible points</th>
</tr>
</thead>
<tbody>
<tr>
<td>The problem describes an important public sector problem which could result in a new digital solution from business with a significant improvement in efficiency, policy or cost reduction for the public body.</td>
<td>Yes/no</td>
</tr>
<tr>
<td>Demonstration of evidenced, clear user needs within the scope of public policy.</td>
<td>40</td>
</tr>
<tr>
<td>Understanding of the market, including approaches that have been tried in the past, in order to demonstrate the opportunity for innovation.</td>
<td>30</td>
</tr>
<tr>
<td>Demonstration of an empowered public sector team with sufficient time, money and people available to invest in the solution and plans to procure the final product.</td>
<td>30</td>
</tr>
</tbody>
</table>

Exhibit 11 UK SBRI Evaluation of Challenges – Criteria Approach

Once a challenge has been selected, it is published and disseminated. Using the SBRI competition process, suppliers are invited to pitch innovative solutions. Up to 5 suppliers will be selected to work on phase 1, which lasts for 3 months.\(^{15}\)

At the end of phase 1. The public buyer/entity together with the GovTech Catalyst team take a decision to start phase 2 or to stop altogether the procedure.

If there the results are positive, up to 2 suppliers will be selected for phase 2, which lasts for one year.\(^{16}\)

As mentioned above, the public buyer/entity must intend to procure any successful phase 2 solutions, but it doesn’t have to take place immediately.

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\(^{15}\) The total funding for the 5 suppliers of phase 1 is a maximum of £250,000.

\(^{16}\) The total funding for the 2 suppliers of phase 2 is a maximum of £1,000,000. av

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To purchase the solution, they will have to start a “traditional” procurement procedure and for that a proper business case should be developed.\textsuperscript{17}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
\textbf{Phase} & \textbf{Funding per challenge} & \textbf{Funding per winner} & \textbf{Phase duration} \\
\hline
Phase 1 & Total funding available for each problem: £250,000 & £50,000 for each winning solution (3 solutions for each challenge) & 12 weeks \\
\hline
Phase 2 & Total funding available for each problem: £1,000,000 & £500,000 for each winning solution (2 solutions for each challenge) & 12 months (including testing by the public sector body) \\
\hline
\end{tabular}
\end{table}

\textit{Exhibit 12 UK SBRI Funding Amounts and Duration}

The GovTech Catalyst fund is worth £20 million in total. So far, 15 challenges have received funding and 5 problems were selected over 3 funding rounds.\textsuperscript{18}

4.2 SBRI History

The current UK SBRI is the third version of the programme to operate in the UK. The initial launch was in 2001, a second launch came in 2004, and in 2008, the current programme was established. The current programme has a number of features that clearly distinguish it from supply side activities the government provides to support firms. These are seen to be as follows:

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{Key Features of the SBRI Model} & \\
\hline
Competitive process to fund development of innovative science and technology-based products and solutions to meet public sector needs as a customer or to address policy challenges & \\
Operates under the EU Pre-Commercial Procurement legal framework & \\
\hline
\end{tabular}
\end{table}

\textsuperscript{17} Bear in mind that the solution does exist in the market now.

\textsuperscript{18} For more information see https://www.gov.uk/guidance/current-govtech-catalyst-projects
Any organisation can apply providing there is a route to commercialisation, but particularly appropriate for SMEs
Phased to reduce risk and focus on best projects:
Phase 1 Feasibility Study: typically, £50-100k over 6 months
Phase 2 Development and Testing of Demonstrator or Prototype:
typically, £250k-£1m over 18-24 months
100% funded contract, not a grant
Awardee retains any IP, subject to limited public sector rights

[Source: (Connell, 2017)]

Exhibit 13 Features of the SBRI

4.3 Departmental Programming - The Health SBRI

In health, while the departmentally supported SBRI Healthcare Programme has the potential to bring new products and services into use, there is in principle coherence of demand within the UK’s health system having some strong top-down features, procurement is still, for many items, undertaken by multiple users in different places and bodies. Recognition of the way this distributed purchasing system might have limited the uptake of new ideas, the UK Government commissioned the Accelerated Access Review (Independent Report of a team led by Sir Hugh Taylor, 2016) to which it responded with proposals to improve commissioning of new products and services (Department of Health and Department for Business Innovation and Skills, 2017).

4.4 Management of the SBRI – Some Observations

19 Although the R&D services are fully remunerated, the risks and benefits are shared based on the fact that the IPR ownership remains in the contractor.
4.4.1 Key Dimensions

While the UK SBRI programme is implemented across government and is available for use by public sector organisations outside central government as well, there are some variations in how the programme is managed. In his report of 2016, Connell proposed that departmental schemes adopt a more systematic approach to the use of the SBRI as he saw lack of coherence and some lack of capability development. The House of Commons Science and Technology committee agreed with some of the recommendations made by Connell, and proposed that the Government fully adopt the recommendations of the Connell Review, including the establishment of a central SBRI fund with a National Board to oversee its delivery as part of the 2019 Spending Review. (Paragraph 78)(UK Parliament - House of Commons Science and Technology Committee, 2019). This has not yet occurred.

In this section we look at the key decisions that have to be taken on programme design and operation, drawing on reports by (Connell, 2014, 2017) and by a team from the University of Manchester, the Enterprise Research Centre and OMB Consulting (John Rigby et al., 2017).

The following figure, Exhibit 14 PCP Considerations – the UK Context, gives an overview of the UK SBRI programme. It shows where the key programme design and management decisions need to be made.
4.4.1.1 Programmes – Top Down, Bottom Up, Federated

Firstly, government needs to decide whether to operationalize PCP through a dedicated programme, such as the SBRI, or even when such a dedicated programme is not used. When PCP is operationalized without a dedicated programme, contracting authorities are independent of each other in their implementation of individual procurements.

The larger contracting authority, with greater procurement capabilities and specialization, will be able to undertake PCP more easily than smaller groups. Also, with a programme implementation of PCP, there can be greater specialization in the use of the programme, and deeper knowledge of how to operate it can accumulate.

The UK has both approaches, but the emphasis is heavily upon the first element, as the UK has a formal programme, overseen by Innovate UK on behalf of the government (under the government department Business,
Energy and Industrial Strategy (BEIS). To the degree that there are individual SBIR programmes operating within individual departments of government, the UK could be said to have a federated system. The federated system parallels some of the country’s other innovation supporting activities, for example in the area of health.

Within the UK NHS’s national framework, there is in principle a federated hospital / region centred innovation model using the Academic Health Science Centre. This form of implementation began in 2011 with the introduction of Science Networks later termed the Academic Health Science Networks (AHSNs) (Department of Health, 2012) which resulted from Lord Darzi’s report of 2007 (NHS London, 2007).

When there is a programme organisation as there is in the UK – in the form of the Innovation Agency Innovate UK, which oversees what is in effect a form of federated programme - that organisation may be in a position to support (i.e., to co-fund) procurements that departments (user departments) which to undertake but don’t have the resource to. In the UK, around a fifth to a quarter of all money spent through the SBRI is co-funding from the innovation agency.

Also, in the UK’s Challenge-based approach, it has been noted that Innovate UK has a right to determine whether the programme is used or not as it decides whether a requirement for innovation can be turned into a challenge.

One further observation could be made here which is that Connell has noted the very different levels of organization and institutionalization that have been achieved in the US for its PCP programme (the SBIR) compared with the UK’s approach. In the use US, there is a significant management structure, developed over decades, with the important features of organisational memory, culture and deep capability.
4.4.1.2 Operational or Policy Competitions

A second decision which has to be made when considering the implementation is whether contracting authorities – as government departments should focus upon meeting their own needs – by running what are termed operational competitions, or meeting broader needs where the government is not directly the customer but where the benefits that flow are public goods – these forms of competition are policy competitions.

<table>
<thead>
<tr>
<th>Department</th>
<th>Number of operational competitions</th>
<th>Number of policy competitions</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOD</td>
<td>78</td>
<td>0</td>
<td>78</td>
</tr>
<tr>
<td>NHS</td>
<td>23</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Innovate UK</td>
<td>0</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>NC3Rs</td>
<td>0</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>HO</td>
<td>11</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>DEFRA</td>
<td>0</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>DAs</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>DH</td>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>DECC</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>BIS</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>DfT</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>130</td>
<td>65</td>
<td>195</td>
</tr>
</tbody>
</table>

Exhibit 15 UK Government Department SBRI Competitions by Type [Operational / Policy / Total – Innovate UK Data – Post 2008 Programme]

Source: (John Rigby et al., 2017, p. 44)

4.4.1.3 Mandating

The US scheme [SBIR] is well-known for having mandatory targets and the UK has had targets in the past. However, at present targets are not mandatory in the UK SBRI. Mandatory targets indicate the willingness of a department to commit to the policy. But without sufficient capability, the meeting of targets is very difficult. This represents a ‘chicken and egg’ dilemma. Without targets, departments will fail to acquire and develop the
competence to run PCP; without the competence to run PCP, departments will fail to meet targets.

4.4.1.4 Need Identification – Narrow and Nested Problems
Pre-commercial procurements are generally funded by relatively small amounts of money with the UK scheme funding to between £50,000 and £100,000 for a Phase One competition and between £250K and £1 million, with comparable amounts in the US scheme. When contracting authorities / government departments are thinking about innovation, there are a number of approaches to conceiving a problem with, in effect a spectrum at one end of which is a narrow problem and at the other end, what we might call a nested problem. Innovation can be seen within either of these contexts.

The approach of a contracting authority to pre-commercial procurement can focus on narrow problems, or be more focused upon broader, nested problems. Where nested and related problems are encountered, a more systematic approach to innovation is required. If the nature of problems or challenges that a department faces is more random and the problems are more disconnected, a more ad hoc and bottom up approach may be more suitable.

4.4.1.5 Contract Size and Implications
Public procurers have to decide upon the level of financial resources they wish to commit when they design a competition. They also need to decide how long the competition should take. The amount of money allocated and the firms chosen to compete are important variables in influencing the success of a procurement. As Connell (2017) has noted, while the programme (the UK programme) has limits, government departments have not always spent as much money as expected. Indeed, in comparisons with the US, the UK may be falling short in terms of the allocation of contract money.
4.4.1.6 Competitions – Stages, Success Rates

PCP is a competitive R&D procurement in stages (which also have to meet other criteria). In the UK, the SBRI programme has two main phases. Government departments have the freedom to use these independently, although the value of doing so is debatable. The Ministry of Defence has tended to operate a large number of Phase One competitions which have not proceeded to Phase Two. It is debatable whether this has been effective. Competitions ending at Phase One may well be good use of the SBRI in terms on solving a research problem and de-risking further investment, but on the other hand they clearly do not immediately result in the commercialization of innovation. It should also be noted that Phase Three competitions do take place in the US although not with programme money, and can also do in the UK but that is unusual and also is done with funds from outside the programme.

In his report on the SBRI Healthcare Programme, Connell (SBRI Healthcare, 2018) argued for some use of Phase 3 contracts:

‘SBRI programme bids should include an element for Phase 3 funding where appropriate. However, contracts should be awarded very selectively, and only when the viability of the technology has already been well demonstrated and there is strong interest in an operational scale evaluation by prospective customers.’

(SBRI Healthcare, 2018, p. 23)

Another aspect to the design of competitions is the issue of success rate. Commonly a feature of competitive grant or contract allocation activities, success rates reflect the relationship between the amount of resource allocated to a challenge and the level of difficulty. When resource allocation is high, more competitors can be allowed to take part in a competition (incentivized) and can be more generously funded, this could increase the
success rate – particular the second point; but if the challenge is one of great technical difficulty, success rates will fall. Deciding how many firms should compete, at each stage, their level of funding, and the nature of the project task (‘the Challenge’ in the UK context) and the arrangements for risk sharing in terms of IP allocation is a complex question and will need to be answered carefully for each procurement.

4.4.1.7 Follow-on Procurement - Risk

At the end of a PCP activity, there may be the opportunity to move towards procurement of larger quantities of a product or service which has been developed in the earlier stage. The success of SBRI competitions in producing commercial products or services has been difficult to assess. It is not always possible to see exactly what outcomes have resulted since firms may develop further products and services outside the scope of the original procurement, and indeed, further firms may form specifically to exploit the intellectual property generated by the original contract. The award of patents is also a lengthy process – with a gap of several years between application and award, and not a few months.

Information provided by the SBRI Healthcare (2018) review of impacts gives some indication of the extent to which competitions result – eventually – in products and services that can be used to solve the original challenge identified in the competition. The report indicates that from 164 contracts, 60 products have resulted. In moving forward to a separate procurement of goods and services, public procurers have to decide whether the de-risking of the technology has been sufficient. Other evidence on this form of impact is available from (Department for Business Energy and Industrial Strategy, 2017) and from (John Rigby et al., 2017) ['the Manchester, ERC and OMB Study'].

One of the earliest evaluations indicated that very few firms reported sales arising from SBRI participation. By 2011 and 2012, substantially more firms [56% of sample] reported sales (SBRI Healthcare, 2018). The same report
stated that in the longer period from 2013 to 2018, from the 164 contracts let to firms, 60 products resulted. It is difficult to assess the extent to which this may count as 'successful'. Comparisons could be made with R&D subsidy programmes. These generally show the value and superiority of demand-based programmes that use PCP.

The PA Study of 2017 noted a similar picture: from 176 projects, 37 were leading to sales or trials. Earlier evaluations reported significant sales with implications for very substantial operational cost savings (SBRI Healthcare, 2015). Until systematic data collection and annual monitoring exercises are conducted across all sectors, it will remain difficult to assess impacts definitively and across all uses of the programme. It remains to be noted that as government has significant operational costs, programmes that can aim to improve efficiencies may even in the short run provide very large savings.

4.5 Key Factors in SBRI Operation - Integration and Evaluation

Two further factors are vital for making a programme like SBRI work well. And what holds true for SBRI holds true for many government programmes. The two factors are integration and evaluation. To make a programme work well, it is essential that a programme integrates its actors so that they can share the information they possess, and generate information together. It is also essential that its processes and outcomes are evaluated. Integration and evaluation support information generation and dissemination and form the backbone of the Plan Do Study Act approach, an approach we consider important when large programmes are operating, and even more so when they are being established.
4.5.1 Integration

By integration we mean connecting up decisions which should be made with other decisions and not separately. There are a lot of decisions in PCP that are connected.

The size of the scheme is an important decision. Larger schemes provide more opportunity for networking, for enabling and capability building. But when they are very top down, and there is a lot of control from a central body, departmental capabilities might not be engaged. The UK has a PCP environment with, as you will be now aware, a large programme, but also freedom for individual contracting authorities to go it alone, if they have the resources. That is a top-down approach, but there is some flexibility in the UK system, and a good description of the way things are done might be a federated approach. When there is a federated approach, there can be a more systematic approach to procurement decisions. For example, contracting authorities could more easily consider procurements in a broader context, looking at problems (or challenges) as a group of interdependent problems rather than as a single issue. So, in a top down or federated system, there can be more consideration of nested problems.

4.5.2 Evaluation

The outcomes of PCP are very important to evaluate. Outcomes are those things that you expect to have from your programme which are the reasons why you do the programme in the first place. That perhaps is obvious. But it is worth doing. PCP should find solutions for government or for the broader public. And firms that participate should benefit, developing products and services for wider sale. With R&D, it is often hard to forecast the outcomes, and so it may be hard to steer PCPs towards specific outcomes, but one should be aware of the outcomes to better understand what the policy does. PCP is of course one policy in a ‘policy mix’. It should be compared with other policies. Recently, it has been claimed that PCP is more effective than supply
side policy in helping firms develop technology for wider sale. That is an important claim.

But there are other aspects of the decisions that are taken about an implementation that are important to evaluate. For example, which types of firms are being supported and whether firms of the right size are being supported.
5 **PCP Insights for Brazil**

5.1 **Procurement Innovation – Some Remarks on Context**

Public procurement in Brazil can take place at federal, state and local levels. Federal public procurement can also be divided into direct (e.g., ministries and departments) and indirect administration (e.g., state-owned companies and mixed-capital companies) (Rauen & Souza de Paiva, 2019).

<table>
<thead>
<tr>
<th>Law No. 8,666/1993</th>
<th>Law No. 12,349/2010</th>
<th>Law No. 9,283/2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazilian Innovation Act 2004</td>
<td>Brazilian public administration can grant to some selected sectors a preference margin up to 25% against foreign suppliers if the products/services (R&amp;D) process were developed in the country.</td>
<td>Technological contracts may include cost of activities that precede the introduction of the innovative solution in the market.</td>
</tr>
<tr>
<td>The government can commission a single supplier (or group of suppliers) to purchase R&amp;D services for particular technology solution or an individual product or service.</td>
<td>Not provide for contracts to reimburse costs such as prototype development.</td>
<td>Same supplier contracted for particular technology development can become the large-scale supplier for the results of this development.</td>
</tr>
<tr>
<td>Same supplier contracted for particular technology development can become the large-scale supplier for the results of this development.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazilian Innovation Act (Law No. 10,973/2004)</td>
<td></td>
<td></td>
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<tr>
<td>Law No. 10,973/2004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law No. 12,349/2010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law No. 9,283/2018</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Exhibit 17 Brazil – Key Innovation Legislation*

Law No. 8,666/1993 is the main regulation on public procurement in Brazil. When it comes to innovation, the Brazilian Innovation Act (Law No. 10,973/2004), Law No. 12,349/2010 and Law No. 9,283/2018 are extremely relevant (Li, Ribeiro, Rauen, & Júnior, 2020).

The Brazilian Innovation Act (Law No. 10,973/2004) allows, as an exception, the government to purchase R&D services to a single supplier (or group of suppliers) for a particular technology solution or an individual product or service. A similar approach to the sort of negotiated procedure without prior publication (for prototype testing) described in the European Public Procurement Directives, named direct hiring.

Furthermore, this supplier who was directly selected to develop a particular technology can become the commercial deployer of the results of this development. We could compare this to the Innovation Partnership procedure of the European Public Procurement Directives, if there is no new procurement procedure for the deployment phase; or to the PCP followed...
by a PPI approach if that is the case. However, costs preceding the introduction of the innovation to the market, such as prototype development are not covered.20

<table>
<thead>
<tr>
<th>Policy Lever</th>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framework Conditions</td>
<td>i) Introduction of innovation-friendly regulations</td>
<td>ii) Simplification &amp; easier access for tender procedures</td>
</tr>
<tr>
<td></td>
<td>Article 20 of the Brazilian Innovation Act, Law No. 12,349/2010 and Law No. 9,283/2018</td>
<td></td>
</tr>
<tr>
<td>Organization and capabilities</td>
<td>i) High level strategies with which to embed innovation procurement</td>
<td>ii) Training schemes, guidelines, good practice networks</td>
</tr>
<tr>
<td></td>
<td>Petrobras' procurement policy and Brazilian Armed Forces refit created innovation support environment</td>
<td>iii) Subsidy for additional costs of innovation procurement</td>
</tr>
<tr>
<td>Identification, specification, and signalling of needs</td>
<td>i) Pre-commercial procurement of R&amp;D to develop &amp; demonstrate solutions</td>
<td>ii) Innovation platforms to bring suppliers &amp; users together; foresight and market study processes; use of standards and certification of innovations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>National Defence Strategy</td>
</tr>
<tr>
<td>Incentivizing innovative solutions</td>
<td>i) Calls for tender requiring innovation; guaranteed purchase or certification of innovation; guaranteed price/tari® or price premium for innovation</td>
<td>ii) Insurance guarantees</td>
</tr>
<tr>
<td></td>
<td>Preferential price margin as high as 25% for innovative solutions</td>
<td></td>
</tr>
</tbody>
</table>

Exhibit 18 Brazil – Innovation Challenges (Li et al., 2020)

Law No. 12,349/2010 allows the Brazilian public administration to grant, to some selected sectors, a preference margin up to 25% against foreign suppliers if the products/services were developed -including the R&D phase

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20 This can be problematic, as prototype testing is an excellent way to decrease the risk of innovation. And indeed, it has been included in the recent Law No. 9,283/2018.

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-- in Brazil.\textsuperscript{21} This is possible due to the fact that Brazil, even though a WTO member since 1 January 1995, hasn’t signed the GPA.

Currently, Law No. 9,283/2018 does include costs of activities that precede the introduction of the innovative solution, product, service, or process onto the market, amending thus Law No. 10,973/2004.

Brazil has now an innovation friendly legal framework, but faces several challenges (Harbour & Johnston, 2020):

\begin{center}
\begin{tabular}{|l|l|}
\hline
Brazil’s legal framework is innovation-friendly & However, technological orders are still underused by the Brazilian public sector due to some obstacles to implement PCP and PPI in Brazil \\
\hline
1. Reduced investment in R&D by the Brazilian industry. & Difficult to find national technologically skilled companies to participate in PCP and PPI. \\
2. Brazil’s macroeconomic objectives/policies are positioned ahead of other objectives, such as the country’s industrial and technological development. & This has been intensified since the 2014 economic crisis which has compromised the country’s budget availability. \\
3. PCP and PPI are not connected with a given national strategy. & The importance of Innovation Procurement and the continuation of programs depends on the political forces. \\
4. Neglect of capacity building. & The lack of expertise and the lack of capacity building programs are a serious deterrent to implement Innovation Procurement. This adds to the difficulty in creating an innovative culture and tackling risk aversion against more radical solutions. \\
5. Many public companies trade with the federal government in Brazil → obstacle to use public demand as a private innovation tool in the country. & Since several of them are totally dependent on federal financial support, there is no stimulus for innovation. \\
\hline
\end{tabular}
\end{center}

\textit{Exhibit 19}

The Brazilian public sector has the important challenge of creating and fostering a culture inclined towards innovation and of tackling the risk aversion against it. For that, clarifying the proper use of the already existing procedures and tools, educating and professionalizing the staff in charge of public procurement in the organisation and clarifying responsibilities is of essence. A general and unified policy connecting all the scarce and disconnected initiatives is also important (OECD, 2019).

\textsuperscript{21} Several decrees defined the different economic sectors that could benefit from these policies at the federal level.

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5.2 Innovation Opportunities for PCP in Brazil

Below, we make a number of observations about the areas (sectors) on which Brazil could focus. Brazil has already experience in eGovernment and digital government initiatives. The Digital Citizenship Platform – focussed on the improvement of the Services Portal, the development of a unique digital authentication system among others - is one of the most recent developments, and has supported the digital transformation of federal government services. The first service came online in January 2018 and in September 2018, 110 services were undergoing digital transformation in 25 different departments.

Exhibit 20 Digital Sector

This digital transformation does not only enhance cost savings, but also provides richer data and intelligence for both the Ministry of Economy and the agency responsible for the relevant service. For its success, available resources (i.e., the agencies are not bearing the full cost of the digital

22 “Brazil’s Digital Governance Strategy (2016-19) is the main strategy on digital government policy providing a framework for programmes and actions. Approved in 2016, the strategy is aligned with the desired goal to shift from e-government to digital government. Updated in 2018, the strategy defines priorities such as promoting the availability of open government data, boosting the use of digital technologies for transparency purposes, improving the delivery and use of public digital services, securing the take-up of digital identity, developing evaluation and services’ satisfaction mechanisms, integrating digital services through interoperable public information technology (IT) systems and data, and increasing citizen participation through digital platforms.”

For more information see https://www.oecd-ilibrary.org/sites/9789264307636-3-en/index.html?itemId=/content/component/9789264307636-3-en

23 See https://www.zdnet.com/article/brazil-makes-progress-on-citizen-portal/
transformation), available support in the digitalization process and clear benefits have been key.

**Health** → Productive Development Partnerships (PDP) for healthcare products
- Reduce the trade deficit and the country’s international dependence
- A private firm signs a contract with the government for the supply of a drug for a certain time.
- The company must transfer all the technology to a local public laboratory, which will become the government supplier.

*Exhibit 21 Health Sector*

Productive Development Partnerships (PDP) for healthcare products have been implemented in the health sector (Andre Tortato & Bianca Souza de, 2019). The program was launched in 2012, and the objective was to reduce the trade deficit and the country’s international dependence, by fostering technology transfer between multinational companies and local producers. In a PDP, a foreign multinational company is awarded a public contract for the supply of a certain drug. During this contract, the company must transfer all the technology to a local public laboratory, which will then become the government supplier.

At the end of 2016, there were 81 partnerships, of which 23 were in the production phase, and two were complete. However, even if the international technology dependence is reduced, innovation is not fostered, since the technology is transferred to a public laboratory, which doesn’t have competition to face.

**Oil sector?** → weight of Petrobras under the government procurement policy of the country.
- 2000s → Petrobras started a purchasing policy with local content requirements

*Exhibit 22 Oil Sector*

The oil sector is extremely relevant to the Brazilian economy and this is proven by the weight of the majority-state-owned Petrobras. Since the beginning of the 2000s, Petrobras adopted a purchasing policy with local requirements, fostering thus job creation, foreign investments and the strengthening of the local supply chain of equipment and services for the oil industry (Ribeiro, Jr, Rauen, & Li, 2018).
6 Examples of Cross Border Procurement

WBL: water management automation, security and big data (full blown procurement program including PCP)
   ☑️ TRL 9 to TRL 3 - 7

Muntstroom: people flow (PCP + PPI)
   ☑️ TRL 5 to TRL 7 + TRL 9

Alu Circles: upcycling Alum sludge (R&D + Deployment)
   ☑️ TRL 7 to TRL 9

Exhibit 23 Cross Border Examples Discussed

6.1 Waterschapsbedrijf Limburg (WBL) Pre-Commercial Procurement (PCP) in Artificial Intelligence (AI) models for the sewage water system in the province Limburg, The Netherlands

Waterschapsbedrijf Limburg (WBL) has 17 sewage treatment plants and approximately 150 pumping stations in ownership and management. In the past, each purification system had its own process automation (PA). It often consisted of different equipment that was not geared to one another and was partly outdated. It was inefficient, ineffective and unnecessarily expensive. Together with Waterleiding Maatschappij Limburg N.V. (WML), WBL has developed the WAUTER concept (water automation) in the recent past. With this central process automation project, the management of the installations of WBL is standardized and automated. A highlight in the automation process was the official commissioning of the Central Control Room. This has been phased in and fully operational since mid-2016.

In recent years, a growing number of municipalities in Limburg are transferring their waste water transportation services to WBL. Within a few years, thousands of pumping stations will be managed by WBL. The pumping stations of these municipalities are currently not linked to WAUTER, since this would overload the central control room (CCR) with systems for monitoring and alarming. Monitoring of the pumping stations is currently being done manually. Given the increasing size and complexity of
the systems, it is not a realistic option to continue doing these analyses manually. In order to achieve efficiency in the maintenance of these pumping stations, WBL has recently launched a procurement for an improvement of WAUTER (Procurement Process Automation, Security and Artificial Intelligence), together with a PCP to improve the management of the pipelines for the transportation of waste water, as currently there is little insight into the correct functioning of these systems and WBL can only react to fault notifications, rather than anticipating and taking proactive action.

Exhibit 24 Tendering Route Process

As a preliminary market consultation showed that there is still no technology available that combines IoT, Data Analytics, Artificial Intelligence and deep knowledge about the transportation of waste water and waste water treatment plants that meets the needs of WBL, PCP was the selected procurement approach. Subsequently, this procurement is for R&D services to develop innovative solutions/algorithms to continuously analyse measured values and to convert these into intelligent signals that tell whether and what has changed in the system. Because of the many
different types of sensors in the field, WBL has a large amount of data to process in real time. The quality of the data must be monitored, and the structure of the data must be able to be changed easily and quickly, thus increasing the value of (Big) data for WBL.

Exhibit 25 WBL – Full Blown Programme

The total budget available to fund the WBL PCP project is 625,000 euro (VAT excluded) and the expected duration is until June 2021.

6.2 Muntstroom Pre-Commercial Procurement (PCP) regarding R&D of end-to-end solutions for monitoring multi-faceted people flow - Brussels Capital Region

The Muntstroom PCP aims at developing and testing an integrated end-to-end solution for monitoring people flow. To shape the pedestrian monitoring system, the general idea is to design and test a system that is designed to 1) capture, 2) communicate, 3) store, 4) process 5) analyse and 6) provide smart access to people flow data.

The expected output of the desired system consists of visualisations of the People Flow-data, People Flow-data sets (Open Data and on-demand data sets) and support for routing.
Exhibit 26 Munstroom Technologies

Four public partners are procuring jointly:

1. Public transport operator STIB-MIVB
2. Brussels Regional Informatics Centre CIRB-CIBG
3. Regional authority Brussels Mobility
4. Regional agency Parking Brussels

The foreseen budget for co-financing the R&D is maximum € 500,000, not including the possible future public procurement of the to be developed solutions (PPI), as a result of the PCP.

Exhibit 27 PCP and PPI
6.3 Alu Circles initiative: Pan-European procedure to upcycle or recycle aluminium based sludges from drinking water treatments

The Alu Circles initiative intends to purchase the R&D services and the deployment of solutions for the upcycling or recycling of aluminium based sludges from drinking water treatment. The solutions/methods/processes to be developed and deployed are qualified as so-called ‘specialised products’, as these solutions/methods/processes can be especially used in the water sector, justifying the use of the Innovation Partnership procedure.

Exhibit 28 Innovation Partnership and TRL Stages – A Mapping

The Public Buyers Group includes:


3. Scottish Water (SCT): Leven KY9 1JU, United Kingdom

The Framework Agreement concerns a period of 4 years, with the possibility for the members of the Public Buyers Group to extend the Framework
Agreement 1 time for 2 more years. Accordingly, the potential total Framework Agreement term is 6 years.

The Framework Agreement has an estimated value of 5,000,000 euro per year (VAT excluded). This estimated value entails – indicatively – the maximum estimated value (net of VAT) of the research and development activities to take place during all stages of the envisaged partnership as well as of the supplies, services or works to be developed and procured at the end of the envisaged partnership, (i.e., the purchase of the R&D services and the deployment of solutions for the upcycling or recycling of aluminium based sludges from drinking water treatment). Depending on the outcome of the R&D phase, it is possible that there is a positive business case for some of the Contracting Entities, but not for all. Consequently, the Contracting Entities have the right, but not the obligation to conclude a phase contract for the deployment. The maximum budget for the whole R&D phase is limited to €200,000 in total.

Exhibit 29 Alu Circles – An Innovation Partnership

- Analysis of market capabilities through a Market Dialogue
- Innovation partnership → selection of technology and partner(s)
- Innovation partnership → piloting
- Innovation partnership → deployment
7 Conclusions

7.1 How to Support PCP – What to Do

**DO’s**

1. Follow a step-by-step methodology
2. Have a proper needs, SOTA and market analysis
3. Validate your Business and Value case
4. Mitigate the risk in phases– share benefit & risk
5. Leave the IPR to the contractor for commercial exploitation
6. Establish clear IPR regime and FRAND
7. Use contract exit clauses and clauses to add value
8. Establish governance and monitoring system
9. Foster R&D of EU SMEs

7.2 How to Support PCP – What to Avoid

**DON’T’s**

1. Fail to comply with the principles of transparency, equal treatment and non discrimination.
2. Lack a proper needs, SOTA and market analysis.
3. Fall in vendor lock-in.
4. Fall in prohibitions of state aid.
5. Lack innovation and monitoring clauses

7.3 Questions asked during the Webinar

The questions at the end of the workshop showed a clear interest in Innovation Procurement, in particular in the practical side.
One of the first questions regarded the potential link between the PCP phase and the PPI phase (a possibility that Brazil’s legal framework already regulates under “direct hiring”).

In Europe, the possibility of bundling the R&D phase and the deployment phase exists under the Innovation Partnership procedure.

Exhibit 30 PCP, PPI, IP

However, it is slightly different to the Brazilian “direct hiring”, as it is mandatory to start a competitive procedure to select the suppliers. Moreover, it can only be used under certain very restrictive conditions, in order to ensure that the market remains open to competition:
An extremely relevant question was about how to define the demand if there is no existing solution yet, and how to ensure that the outcome of the procedure benefits several public buyers.

In public procurement, the preparatory steps before actually starting the award procedure are essential. The importance of these preparatory steps exponentially increases when it comes to Innovation Procurement.

**Exhibit 31 Requirements**

- Contracting authorities shall apply criteria concerning the candidates’ capacity in the R&D field and developing and implementing innovative solutions. This requirement is especially interesting, because in practice Innovation Partnership can favour big companies who have both R&D and deployment capabilities.

- The Contracting authority shall identify the need for an innovative product, service or works that cannot be met by purchasing products, services or works already available on the market, as well as the define the minimum requirements and the IPR arrangements. Moreover, the business case will have to define value of both R&D and deployment phase (of a not yet existing solution, which makes it virtually impossible to do a benchmark).

- Any economic operator may submit a request to participate by providing the information for qualitative selection.

- Contracts awarded on the sole basis of the best price-quality ratio with one or several partners.

- The Contracting authority shall ensure the equal treatment of all tenderers during negotiations.

- The structure of the partnership (duration and value of the phases) has to reflect the degree of innovation of the proposed solution and the sequence of the research and innovation activities.
In this regard, the public buyer has to conduct a needs identification and assessment, engaging from the very beginning all potential stakeholders. Ideally this step would be a recurrent and continuous procedure to identify upcoming needs with enough time. Once a need has been identified, the public buyer can reach out to analyse if other organisations share the same need in order to start a joint procurement.

If so, the public buyers with the same needs can implement together a State-Of-The-Art (SOTA analysis), market consultations and a business case, sharing the costs and ensuring that the procurement definition is common. In particular, in case of a joint PCP, the challenge should be shared by all procurers. When it comes to joint PPI, the core functionality of the procured solutions should be the same for each procurer (to create a market for solutions/providers with economy of scale benefits that reduce the cost of solutions for procurers), but there may be additional specific features.

A last practical question referred to pricing schemes and how to establish a price for not yet existing solutions. The answer to this question starts by referring to the previous point: the preparatory steps are key when it comes to innovation procurement.

If a public buyer has correctly implemented a SOTA analysis and conducted a thorough market analysis, they will have information regarding the market prices and what can they expect. Based on that information and on the available budget, the public buyer will establish the maximum budget for all the three phases of the PCP and the maximum budget available for the tenderers in each of the phases.

Once this is done, there are two possibilities:

1. The price is fixed, and the tenderers compete only in the quality award criteria.
2. The price is not fixed and the tenderers received more points if they offer lower prices (with shared IPRs), according to transparent and explained formula, i.e., the more money the Contractor is willing to co-fund, the more points he will receive for his financial offer.
Annexes

Annex 1  Literature on PCP – A Short Overview

Search
A search of the citation index from Web of Science Core Collection [ts= ("pre-commercial procurement") or ts = ("precommercial^*")] reveals 424 results from all years. But many important documents do not appear in citation indexes as there are reports of evaluations and legal cases that are important but may not be included. A number of book chapters are also relevant but may not appear, for example (J. Rigby, 2013). There are some books on the subject, for example (Apostol, 2017) is a useful review of the EU approaches, with helpful comparisons with programmes in other countries (The UK, Netherlands, the USA). Google Search and Google Scholar can be more helpful in identifying material. Also, because this is an emerging topic that is constantly changing, there is much material on the web in the form of presentations, webinars etc.

Scope of the Web of Science Material
Much of the material located in these searches uses different meaning of precommercial and is not relevant to innovation policy. Papers reported in management, business, economics and policies categories, of which there are eleven in number are relevant studies. Other papers that appear in the search items are papers that report the results of pre-commercial procurement activities, in fields such as health, often conducted as a result of funding by the US SBIR. These studies can sometimes be useful in that they give insight into the benefits and also the challenges of pre-commercial procurements.
The USA

The USA has a substantial evaluation culture and systematic data on its SBIR Programme. This is a useful resource. However, the operation of its programme is different in many respects, as we have noted above, from UK and EU approaches, and what might be relevant in Brazil.
Annex 2  The Study Team

Corvers

Mr. Stephan CORVERS is a senior procurement expert with over 25 years of experience in European public procurement law and he is the founder and owner of Corvers Commercial and Legal Affairs. He has been working in the field of Innovation procurement since 2004. Furthermore, Stephan Corvers has founded the Corvers Chair on Innovation procurement vested at the University of Zaragoza (Spain) since January 2020.

He was cofounder of the Dutch Scientific association of Procurement Law in 1994 and is now member of the Advisory Board.

Stephan Corvers regularly publishes in the field of procurement law and regularly gives various lectures at national and European level. Furthermore, he is author of numerous publications on European Procurement and a frequent speaker at congresses. Stephan Corvers is an external expert of the European Commission in the field of innovation and tenders. Because of his expertise in the field of ICT tendering, Stephan Corvers was involved as external expert in a parliamentary research into ICT projects within the Dutch government that was commissioned by the House of Representatives in 2014. Since 2015, Stephan Corvers is the (Legal) Project Manager for the Eafip initiative. Amongst others, since 2020, Stephan Corvers is of legal counsel on Innovation Procurement for the Dutch Air Traffic Control Organisation (LVNL).

Dr. Ana Isabel (Anabel) PEIRÓ BAQUEDANO is a legal procurement consultant at Corvers with extensive research experience at various universities in Europe (including Milan, Trento, Munich and Münster). Previously she was a researcher and PhD candidate in administrative law at the University of Zaragoza.

She was involved as a researcher in the European Water PiPP project, a project under the European FP7 program on Innovation Oriented Public Procurement (IOPP) in the water sector. She was a member of the Technical Assistance on Public Procurement of Innovation research team funded by the Aragón’s Health Institute and is a collaborator of the Spanish Public Procurement Observatory. She has several publications in the field of Public Procurement.

Since August 2019 Anabel has been involved in several innovation procurement projects that Corvers supports.
**John Rigby** is a director of Bibliometrika Ltd, a consultancy operating in the area of policy and programme design and evaluation. He is formerly senior research fellow at The University of Manchester Institute of Innovation Research, and Associate Head for Postgraduate Research in the Innovation, Management and Policy Division of the Alliance Manchester Business School, where he now holds an honorary fellow position. John is a Fellow of the Royal Statistical Society, a Fellow of the Royal Society of Arts, a Life Member of the International Society for Scientometrics and Informetrics, of counsel to Corvers, the leading legal consultancy and services company based in 's-Hertogenbosch in The Netherlands, a member of the Procurement Law Academic Network, a former President of Manchester Statistical Society, and formerly a Popplewell Scholar. John's academic and consultancy work extends around the whole policy cycle from policy and programme design and development, through implementation to evaluation, and impact assessment. John has undertaken important pieces of work in the area of public procurement of innovation for a range of key client organisations. Between 2010 and 2012 he led the DG Enterprise study on the feasibility of EU support to the procurement of innovation, and more recently has led the UK Government’s review of the UK SBRI, working with Professor Stephen Roper of the ERC and Warwick University. Since 2020, John has been a member of the Advisory Board of CHERRIES – Responsible Healthcare Ecosystems - a three-year project funded under Horizon 2020. His role in CHERRIES is complemented by a study on health innovation in the context of the UK’s National Health Service and its implementation of the integrated care approach which will be published in mid-2021.
Elvira Uyarra is Reader in Innovation Policy and Strategy at Alliance Manchester Business School (University of Manchester) where she is also director of the Manchester Institute of Innovation Research and programme director of the MSc in Innovation Management and Entrepreneurship. Elvira is also adjunct professor at the Mohn Center of Innovation and Regional Development at the University of Western Norway and visiting fellow at the Centre for Innovation Management Research (CIMR) of Birkbeck, University of London. She teaches and conducts research on science and innovation policy and management and on regional innovation. She is fellow of the Regional Studies Association (RSA) and Chair of the North West if England branch of the RSA.
Annex 3    References


Improving patient access to breakthrough technologies and treatments in a cost-effective model.


