1. This evidence is written in a personal capacity and draws on my own research. In this evidence I focus on the question regarding *the use of technology*, but my submission is also relevant to questions on *public engagement* and *parliamentary scrutiny processes*.

2. In my view, there is much scope for the use of technology to clarify and illuminate the legislative process, with benefits to legislators, officials, and the public.

3. With a colleague, I developed an innovative method for visualising and quantifying legislative amendments.\(^1\) The method produces a graphic display of the changes to a bill as it passes through its parliamentary stages. An example is shown in Figure 1, which shows the progress of a bill that was greatly altered in the Lords report stage, and to a lesser extent in two other stages.\(^2\)

![Figure 1 Changes to the Childcare Act 2016 at each parliamentary stage.](image)

4. This method also allows the amount of change to be measured and analysed. Our quantitative study of government bills in three parliamentary sessions revealed that on average about 30 per cent of the lines of legislative text are altered during the whole parliamentary passage of a bill. Figure 2 shows that the degree of alteration varies widely, with some bills being greatly altered and some not at all. On average, the bills in this sample grew in length by some 40 per cent during the parliamentary process.

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\(^2\) This and other examples are discussed in more detail in our post on the PSA Parliaments Group blog: [https://parliamentsandlegislatures.wordpress.com/2017/07/12/visualise-legislative-amendments/](https://parliamentsandlegislatures.wordpress.com/2017/07/12/visualise-legislative-amendments/)
Implications of this analysis

5. This is the first time that computerised methods have been used to quantify the level of amendment to UK legislation, despite similar types of ‘version-analysis’ being well developed in other scientific fields. Currently this methodology simply displays the amount of alteration to each bill but it could potentially display more information, such as indications of the legislative effects of amendments, or the legislators who proposed them. To this end, during the course of my Parliamentary Academic Fellowship (hosted by the House of Lords Library) I will work with parliamentary officials to investigate how this type of visualisation might be made more informative and accessible. This work aims to benefit the public understanding of the legislative process, and aid the work of legislators and officials.

This type of analysis would be greatly aided by the availability of XML files of each bill version. Since about 2015, XML files are available for some bill versions on the parliamentary website, but the set is incomplete and difficult to search.

6. Cabinet Office guidelines\(^3\) indicate that government amendments should be kept to a minimum:

\begin{quote}
“Some government amendments to bills are necessary. However, amendments can also create the impression that a bill has not been properly prepared, they may hinder the progress of a bill, unnecessarily take up parliamentary time and cause ill-feeling in Parliament.

Even if amendments by themselves are small and uncontroversial and unlikely to take up much time, their cumulative impact can be serious. Government amendments to bills after introduction must therefore be kept to a minimum and will usually only be cleared
\end{quote}

by PBL Committee if they are considered essential to ensure that the bill works, to avoid a government defeat or otherwise significantly ease handling in Parliament. Amendments that are purely desirable are very unlikely to be cleared but may sometimes be made."

7. The alterations shown in Figure 2 almost all result from government amendments. Further analysis of the reasons for – in some cases – such high levels of amendment could allow better prediction of the likelihood of amendments and help departmental bill teams optimise the preparation of legislation.