This paper will seek to 1) explore links between conceptual change literature and complexity theory and 2) report on three projects which have used these links to foster teacher/researcher collaboration.

The literature on conceptual change continues to grow (Duit, 2009) and has moved on from the early consideration of ‘misconceptions’ (Driver et al., 1994). Firstly, some conceptual change researchers now recognise that pupil concepts are at times fragmented and inconsistent, but at other times form coherent theories (Vosniadou, 2012, p15). We will show that this picture of conceptual change is consistent with models of complex dynamic systems in which concepts move between ‘attractor states’ in an abrupt and often unpredictable way (Brown, 2013; Bereiter & Scardamalia, 2008). This furthermore fits with neurological evidence from dynamic EEG scanning (Kelso et al. 2013; Freeman, 2000).

Secondly, conceptual change literature is increasingly being brought to bear on classroom practice (e.g. Riordan, 2013). After outlining the synergies and oppositions of conceptual change and complexity theory, this paper will report on three projects which bring together these perspectives to suggest practical applications. The first project, funded by the Institute of Physics, revolves around using conceptual change literature to offer guidance on teaching a specific topic: light (Hardman & Riordan, 2013). We will explore the value but also the challenges of ‘translating’ the literature for teacher use. The second project scales up the use of conceptual change literature through six schools working to develop a research informed KS3 scheme of work, which will be subjected to a randomised control trial across London in 2014-15. The third project investigates how conceptual change occurs in the classroom by coding video from a single lesson and attempting to quantify the dynamic interactions of pupils to analyse their influence on learning.

As well as linking conceptual change and complexity theory, this paper contributes to research through methodological developments in interpreting teacher action and coding dynamic interactions in the classroom. We will also discuss the value to teachers in a perspective which overcomes simplistic notions of learning as the ‘linear’ accumulation of knowledge and speaks to their experience of learning as unpredictable and sensitive to context. Collaborations between teachers and educational researchers, through these projects, are leading to the evolution of theory and practice in parallel.