$$\mathbf{P}_t = \begin{array}{c} \\ \text{H} \\ \text{S1} \\ \text{S2} \\ \text{DOC} \\ \text{DS} \end{array} \begin{array}{c} \begin{array}{ccccc} \text{H} & \text{S1} & \text{S2} & \text{DOC} & \text{DS} \end{array} \\ \begin{pmatrix} \texttt{p\_HH}_t & \texttt{p\_HS1}_t & \texttt{p\_HS2}_t & \texttt{p\_HDOC}_t & \texttt{p\_HDS}_t \\ \texttt{p\_S1H}_t & \texttt{p\_S1S1}_t & \texttt{p\_S1S2}_t & \texttt{p\_S1DOC}_t & \texttt{p\_S1DS}_t \\ 0 & 0 & \texttt{p\_S2S2}_t & \texttt{p\_S2DOC}_t & \texttt{p\_S2DS}_t \\ 0 & 0 & 0 & 1.0 & 0 \\ 0 & 0 & 0 & 0 & 1.0 \end{pmatrix} \end{array}$$

$$\mathbf{P}_t = \begin{array}{c} \\ \text{H} \\ \text{S1} \\ \text{S2} \\ \text{D} \\ \text{trDS} \end{array} \begin{array}{c} \begin{array}{ccccc} \text{H} & \text{S1} & \text{S2} & \text{D} & \text{trDS} \end{array} \\ \begin{pmatrix} \texttt{p\_HH}_t & \texttt{p\_HS1}_t & \texttt{p\_HS2}_t & \texttt{p\_HD}_t & \texttt{p\_HDS}_t \\ \texttt{p\_S1H}_t & \texttt{p\_S1S1}_t & \texttt{p\_S1S2}_t & \texttt{p\_S1D}_t & \texttt{p\_S1DS}_t \\ 0 & 0 & \texttt{p\_S2S2}_t & \texttt{p\_S2D}_t & \texttt{p\_S2DS}_t \\ 0 & 0 & 0 & 1.0 & 0 \\ 0 & 0 & 0 & 0 & 0.0 \end{pmatrix} \end{array}$$

$$S = \begin{bmatrix} s_{01} & s_{02} & \dots & s_{0k} \\ s_{11} & s_{12} & \dots & s_{1k} \\ \vdots & \vdots & \ddots & \vdots \\ s_{\omega 1} & s_{\omega 2} & \dots & s_{\omega k} \end{bmatrix}$$

$$s_t = s_0 \cdot P^t$$