$$
\begin{tikzcd}
\{\boldsymbol{v}_j\}_{j=1}^{n} = \mathfrak{V} \subseteq \mathcal{V} \arrow[r, "T(\cdot)"] & \mathcal{W} \supseteq \mathfrak{W} = \{\boldsymbol{w}_j\}_{j=1}^{m} \\
\rotatebox[origin=c]{90}{$\in$} & \rotatebox[origin=c]{90}{$\in$} \\
V\left[\boldsymbol{v}\right]_V = \quad v^j\boldsymbol{v}_j = \quad \boldsymbol{v} \arrow[r, shift right, "T(\cdot)"'] \arrow[d, shift right, "V^{-1}"'] \arrow[dr, phantom, "VT^{-1}W^{-1}\boldsymbol{w} ="] & \boldsymbol{w} = w^j\boldsymbol{w}_j = W\left[\boldsymbol{w}\right]_W = T(\boldsymbol{v}) = T\left(V\right)\left[\boldsymbol{v}\right]_V \arrow[l, shift right, "T^{-1}(\cdot)"'] \arrow[d, shift right, "W^{-1}"'] \\
V^{-1}\boldsymbol{v} = \left[\boldsymbol{v}\right]_V \arrow[u, shift right, "V"'] \arrow[ur, bend left] \arrow[r, shift right, "T"'] & \left[\boldsymbol{w}\right]_W = W^{-1}\boldsymbol{w} = \left[T(\boldsymbol{v})\right]_W = T\left[\boldsymbol{v}\right]_V \arrow[u, shift right, "W"'] \arrow[l, shift right, "T^{-1}"'] \\
\rotatebox[origin=c]{-90}{$\in$} & \rotatebox[origin=c]{-90}{$\in$} \\
\boldsymbol{t}_j = \left[T\left(\boldsymbol{v}_j\right)\right]_W \qquad \mathbb{F}^n \arrow[r, "T"] & \mathbb{F}^m \qquad T = \left[T\left(V\right)\right]_W \\
\rotatebox[origin=c]{-90}{$\in$} & \rotatebox[origin=c]{-90}{$\in$} \\
\left\{\mathbb{R}^n, \mathbb{C}^m, \cdots\right\} & \left\{\mathbb{R}^m, \mathbb{C}^m, \cdots\right\}
\end{tikzcd}
$$

$$= WTV^{-1}\boldsymbol{v}$$