The comodule analogue of homotopy pullbacks is completed by the following:

1) Cartan constructions are the analogue of fibrations

2) Cartan constructions replace comodules by assembling proper injective resolutions

3) Make a chain model which is balanced and homologically invariant

4) Prove that the Eilenberg-Moore construction gives a chain model for a homotopy pullback.

<u>Cartan</u> <u>constructions</u> :

C = simply connected differential coalgebra which is free over R = <u>base</u>

F = chain complex over R = <u>fibre</u>

E = construction over C = <u>total space</u> :

a) $E = F \otimes C$ as a comodule, i.e.

$\Delta : E = F \otimes C \xrightarrow{1 \otimes \Delta} F \otimes C \otimes C = E \otimes C$
is coaction

b) E is a differential comodule over C

and $F \equiv F \otimes R \leq E$ is a subcomplex.

Proposition: b) is equivalent to:

$\exists$ linear maps of degree -1,

$\tau : F \otimes \bar{C} \longrightarrow F$ such that