Ehresmann's theorem on proper submersions

It is very difficult to find a complete but reasonably simple account of this result in the literature (Ehresmann simply published an announcement of the result in the late 1940s). One of the best sources is Section 9.5 (pp. 136 – 140) of the following set of lecture notes on differential topology by B. Dundas:

`http://www.math.ntnu.no/~dundas/SIF5034/revII/dtIIUS.pdf`

Ehresmann's result for infinite-dimensional manifolds

Very large portions of the theory of smooth manifolds can be extended to an infinite-dimensional setting, and such infinite-dimensional objects have proven to be useful in topology and also in analysis. Some of the most basic facts in the theory of smooth infinite-dimensional manifolds are discussed in the survey article by Eells and the textbooks by Lang, Abraham – Mardsen – Ratiu, and van Mill cited below. The list of references also includes several items which treat infinite-dimensional analogs of finite-dimensional topological manifolds.

In view of the preceding remarks, it is natural to ask whether there are at least partial generalizations of Ehresmann's Theorem to infinite-dimensional manifolds, and in fact there are results of this type. A fairly recent paper by O. Gutú and J. Jaramillo (cited below) describes many of the results in this area.

J. Eells. *A setting for global analysis.* Bull. Amer. Math. Soc. **72** (1966), 751–807.

S. Lang. Differential Manifolds. *Addison-Wesley Longman, Reading MA etc.*, 1972. ISBN-10: 0–201–04166–9.

R. Abraham, J. Marsden, and T. Ratiu. Manifolds, Tensor Analysis, and Applications. Second edition. [Springer] Applied Mathematical Sciences [Series] Vol. 75. *Springer-Verlag, Berlin-etc.*, 1988. ISBN: 0–387–96790–7.

O. Gutú and J. Jaramillo. *Fibrations on Banach manifolds.* Pacific J. Math. **215** (2004), 313–329.

Topological theory of infinite-dimensional manifolds

This is definitely not an exhaustive listing. Further sources can be found by checking the references listed in each of the items listed here.

T. A. Chapman. Lectures on Hilbert cube manifolds (Expository lectures, CBMS Regional Conference, Guilford College, 1975). CBMS Regional Conference Series in Mathematics, No. 28. *American Mathematical Society, Providence RI*, 1976.

H. Toruńczyk and J. West. *Fibrations and bundles with Hilbert cube manifold fibers.* Memoirs Amer. Math. Soc. **80** (1989), no. 406.

J. van Mill. Infinite-dimensional topology. Prerequisites and introduction. North-Holland Mathematical Library, Vol. 43. *North-Holland Publishing , Amsterdam NL*, 1989. ISBN: 0–444–87133–0.

J. van Mill. The infinite-dimensional topology of function spaces. North-Holland Mathematical Library, Vol. 64. *North-Holland Publishing , Amsterdam NL*, 2001. ISBN: 0-444-50557-1.

J. J. Dijkstra and J. van Mill. *Infinite-dimensional topology*. Recent progress in general topology II (M. Hušek and J. van Mill, *ed.*), 115–130, *North-Holland Publishing, Amsterdam NL*, 2002.