How dangerous is a situation on board in case of a hydraulic system failure?

The hydraulic systems of the aircraft are very important for safe flights as they provide power for (are used to operate) primary and secondary flight control surfaces (elevator, rudder, stabilizer, ailerons), landing gears, flaps, braking and steering systems. And, of course, any hydraulic loss can negatively affect aircraft performance and general operation. So the crew will experience difficulties flying the aircraft. But, fortunately, today's commercial aircraft have two or more independent hydraulic systems, so in case of one system failure the crew may switch on the back ups. But if all the systems fail, the crew can have a real trouble: the crew can lose the control of the plane resulting in crash and fatality.

- ***What are the most common causes of a hydraulic system failure?***

The main reasons for hydraulic system failure may be poor quality of hydraulic fluid, fluid contamination, hydraulic leak, low or high hydraulic pressure, pumping system failure or a damage of hydraulic lines and filters, system overheat or fatigue. (Also, I think, some hazardous weather phenomena like turbulence, icing or lightning strike may negatively affect hydraulic operation ???)

- ***What kind of hydraulic system-related problems may take place on board an aircraft?***

The crew may experience braking and steering problems, difficulties with extending and retracting landing gear, have only partial control of different control systems and ,finally, the crew can lose autopilot or total control of the aircraft in flight.

- ***What are the possible consequences of hydraulic problems on board?***

In case of hydraulic problems the crew may experience difficulties with speed and direction control , the pilot will need to perform a long and high speed approach and landing, so the aircraft can run out , skid of the RW or block it. Due to rough landing the aircraft can receive severe damage or even catch fire and passengers may be injured.

- ***At what stages of flight may a hydraulic problem arise?***

It may happen at any stage of flight: during approach and landing, takeoff, climb and cruising.

- ***How can a pilot know about a hydraulic malfunction on board?***

A pilot can know about it from the message on his electronic monitor (ECAM), also from pressure indicator. Besides he can have a warning light and receive a voice/sound alert.

- ***What are expected actions of the crew in case of hydraulic system failure?***

In such a case the crew may perform a low pass, go around and missed approach procedures, proceed to the holding area to check. After assessing the situation the crew could decide to make an immediate landing at the nearest suitable aerodrome, request vectors. If the situation is critical the crew may declare PanPan or MayDay for forced landing or ditching.

- ***How a controller assist a flight with a hydraulic system failure?***

I think, the best way is to act in accordance with the Euro-control principles to ASSIST.

- ***What are the best principles of ATC assistance in case of a hydraulic system failure?***

These principles mean/The best principles are :

- **A** 'Acknowledge' - **S** 'Separate' - **S** 'Silence' - **I** 'Inform' - **S** 'Support - **T** 'Time'

A S S I S T principle

A - **acknowledge** the hydraulics problem, ask for the crews' intentions, and if the crew is able to control the aircraft

S - **separate** the aircraft from other traffic, increase vertical and lateral separation, provide priority landing

S – impose radio **silence** if necessary

I - **inform** the supervisor and the airport emergency services and all concerned units

S - **support** the crew with any information (e.g. type of approach, runway length and aerodrome details, updated weather information, etc.); if there is fire or smoke from brakes. Also ask the crew for POB and dangerous goods on board

T - provide **time** for the crew to **assess** the situation.

- ***What arrangements are needed on the ground for successful landing?***

For successful landing of an emergency aircraft the controller should (keep) clear the RW from departing, arriving aircraft and also from any vehicles, stop all the operations in the maneuvering area. The supervisor alerts appropriate emergency services and the ground staff. As for the ground staff they should prepare/ arrange necessary towing devices/equipment and an isolated parking stand/position.

- ***What kind of special vehicles may be required upon arrival?***

After landing the pilot may need towing trucks, tractors or a tow bar for his type of aircraft, a follow-me-car, fire vehicles, an ambulance and additional/special passenger steps.

- ***Have you ever had/heard of a situation connected with a hydraulic system problem?***

I can remember one situation when a pilot reported a minor a steering problem during taxing to the holding point. He decided to return to the stand and check the system. Later he informed me of low hydraulic pressure and his decision to delay the departure. I coordinated it with the necessary services and units, we gave the pilot time to resolve his problem. Of course, the situation was a little bit inconvenient for passengers, but in general it didn't affect greatly ATC and aerodrome activities/operations.