Appendix A. List of Concepts in a Multilevel Perspective

The notion of **level** is central in a multilevel perspective (Rousseau 1985). Miller (1978) defines levels as qualitatively distinguishable entities of a system, such as cells, organs, individuals, and societies. Levels can be conceptualized differentially for particular study purposes and they are often embedded in certain larger, higher-order systems, such as individual levels, group levels, and organizational levels embedded within a societal system (Kozlowski and Klein 2000).

Organizational researchers differentiate three "types" (as opposed to instances) of levels for methodological consideration, including "the **level of construct**", "the **level of measurement**", and "the **level of statistical analysis**" (e.g., Kozlowski and Klein 2000). Kozlowski and Klein (2000, p. 27) referred to "the level of construct" as "the level at which it [the construct] is hypothesized to be manifest in a given theoretical model." Rousseau (1985, p. 4) defined the level of construct as "the focal unit to which generalizations are made." Instead of "level of construct", some also prefer to use "**level of theory**" to refer to the level at which the proposed theory is manifested (e.g., Klein et al. 1994). Given that theory can include multiple constructs, the level of theory for a particular multilevel theory may point to more than one level (Kozlowski and Klein 2000). Level of measurement and level of statistical analysis are related to theory testing; they are not addressed in this paper.

As conventionally used in the IS and the management literature (e.g., Lapointe and Rivard 2005; Drazin et al. 1999), **level of analysis** often refers to "level of construct" as used by multilevel theorists such as Kozlowski and Klein (2000) and Rousseau (1985). Another term that deserves clarification is "**unit of analysis**". Some equate unit of analysis with level of analysis (e.g., Petter et al. 2008), whereas others use "unit of analysis" in a slightly different sense, referring to the subject of a study (e.g., Yin 1994).

Some researchers differentiate theory and models, arguing that models are simplistic representations of theory, whereas theory typically includes more substance and detailed explanations than models (e.g., Kozlowski and Klein 2000). **Multilevel theory** thus refers to theory that "entail(s) more than one level of

conceptualization [of constructs] and [statistical] analysis" (Kozlowski and Klein 2000, p. 79). A necessary condition for theory to be multilevel is that it includes theoretical constructs that manifest at multiple levels. A **multilevel model** refers to specification of the relationships among the constructs in a given multilevel theory (Kozlowski and Klein 2000). This definition is broader than Rousseau's (1985) notion of "multilevel model", which refers more specifically to a type of model with functionally equivalent relationships among constructs at multiple levels of analysis (Burton-Jones and Gallivan 2007; Kozlowski and Klein 2000). A cluster of terms is used to differentiate **types of multilevel models** (e.g., Kozlowski and Klein 2000; Rousseau 1985; Chan 1998; House et al. 1995; Klein et al. 1994). These types of models differ in terms of criteria such as "whether there is a causal relationship across levels".

Development of multilevel theory differs from **multilevel analysis**. Multilevel analysis refers more narrowly to statistical analysis of hierarchical data for theory testing (Kozlowski and Klein 2000). Multilevel analysis employs statistical techniques such as Hierarchical Linear Modeling (Hofmann and Gavin 1998).

References

Burton-Jones, A., and Gallivan, M. J. 2007. Toward a Deeper Understanding of System Usage in Organizations: a Multilevel Perspective. ***MIS Quarterly*** **31**(4) 657–679.

Chan, D. 1998. Functional Relations Among Constructs in the Same Content Domain at Different Levels of Analysis: a Typology of Composition Models. ***Journal of Applied Psychology*** **83**(2) 234–246.

Drazin, R., Glynn, M. A., and Kazanjian, R. K. 1999. Multilevel Theorizing About Creativity in Organizations: a Sensemaking Perspective. ***Academy of Management Review*** **24**(2) 286–307.

Hofmann, D. A., and Gavin, M. B. 1998. Centering Decisions in Hierarchical Linear Models: Implications for Research in Organizations. ***Journal of Management*** **24**(5) 623–641.

House, R., Rousseau, D. M., and Thomas-Hunt, M. 1995. The Meso Paradigm - a Framework for the Integration of Micro and Macro Organizational-Behavior. ***Research in Organizational Behavior*** **17** 71–114.

Klein, K. J., Dansereau, F., and Hall, R. J. 1994. Levels Issues in Theory Development, Data-Collection,

and Analysis. ***Academy of Management Review*** **19**(2) 195–229.

Kozlowski, S. W. J., and Klein, K. J. 2000. A Multilevel Approach to Theory and Research in Organizations: Contextual, Temporal, and Emergent Processes. ***Multilevel Theory, Research, and Methods in Organizations***, K. J. Klein and S. W. J. Kozlowski (eds.), 3–90.

Lapointe, L., and Rivard, S. 2005. A Multilevel Model of Resistance to Information Technology Implementation. ***MIS Quarterly*** **29**(3) 461–491.

Miller, J. G. 1978. ***Living Systems***, McGraw-Hill, New York.

Petter, S., DeLone, W., and McLean, E. 2008. Measuring Information Systems Success: Models, Dimensions, Measures, and Interrelationships. ***European Journal of Information Systems*** **17**(3) 236–263.

Rousseau, D. M. 1985. Issues of Levels in Organizational Research: Multi-Level and Cross-Level Perspectives. ***Research in Organizational Behavior*** **7** 1–37.

Yin, R. K. 1994. ***Case Study Research: Design and Methods***, Thousand Oaks, CA.