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GRASS4LEED: Building geospatial support for Leadership in Environmental and Energy Design

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Rising energy prices and increasing pressures on natural resources make sustainable development a necessity rather than a matter of choice.
Major advacement in adaptation of sustainable development principles has been achieved by introduction of the LEED rating (US Green Building Council Leadership in Environmental
and Energy Design) that provides tools to quantify success in sustainability.
The role of landscape in sustainable development has been recently recognized by introduction of a new
national standard for neighborhood design LEED-ND that incorporates important categories
with geospatial components, such as location efficiency, land conservation, protection of habitats, runoff and erosion control, transportation, and others.
Ready access to geospatial information and interactive, easy-to-use modeling environment
can substantially improve exploration of various alternatives and optimize the proposed design for the best environmental and energy performance.
The draft LEED-ND rating currently includes over 70 prerequisites and credits with important spatial components in all of its four categories: 1. Location efficiency, 2. Environmental preservation, 3. Compact and connected neighborhoods, 4. Resource efficiency.
We outline a concept for the development of GRASS4LEED methodology that will take advatage of the
wide range of geospatial analysis and modeling tools that are already available in GRASS
and can be used to build the following subsystems: 1. Geospatial Sustainability Analyst
for analysis of pre-construction landscape and the initial site plan;
2. Geospatial Designer for modification of the site plan, such as incorporation of best management practices (BMP) and green site development

principles,
and evaluation of the effectiveness of modifications; and 3. Geospatial Sustainability Evaluator
for self rating the final design and evaluation of its effectiveness using predictive modeling
and environmental-economic trade-off analysis.
To facilitate face-to-face collaboration during the design process, we explore the possibilities to use Tangible GIS that integrates landscape representation and control within
a physical tangible model coupled with its virtual digital representation.
We provide examples of tools and applications developed for GRASS that can be used as components
for the proposed system, such as terrain analysis, 3D visualization, surface water flow
and erosion simulation, solar radiation and photovoltaic evaluation, BMP design,
and linking GRASS with Tangible GIS.

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